

Project 1

Chicago Crime Insights

Team 3

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Agenda

- Proposal Summary
- Data Sources & Cleaning Summary
- Insights per question
- Conclusion

Proposal Summary

Research Area: Study Crime in Chicago for years 2018-2022

Outline:

- 1) Identify most (and least) common types of crime that occurred in Chicago during the observed time period
- 2) Analyze trends by district and year
- 3) Include visual representation of trends of crime by type and crime by district

Research Questions to Answer:

- 1) What is the most and least prevalent type of crime in Chicago?
- 2) Are certain areas most prone to crime than others?
- 3) How has crime changed over time?
- 4) How common is extremely violent crime (for example: homicide)?

Github link: https://github.com/ralfwelters/project1_chicago_crime

Data Sources & Cleaning Summary

Data Sources:

Crime in Chicago for years 2018-2022:

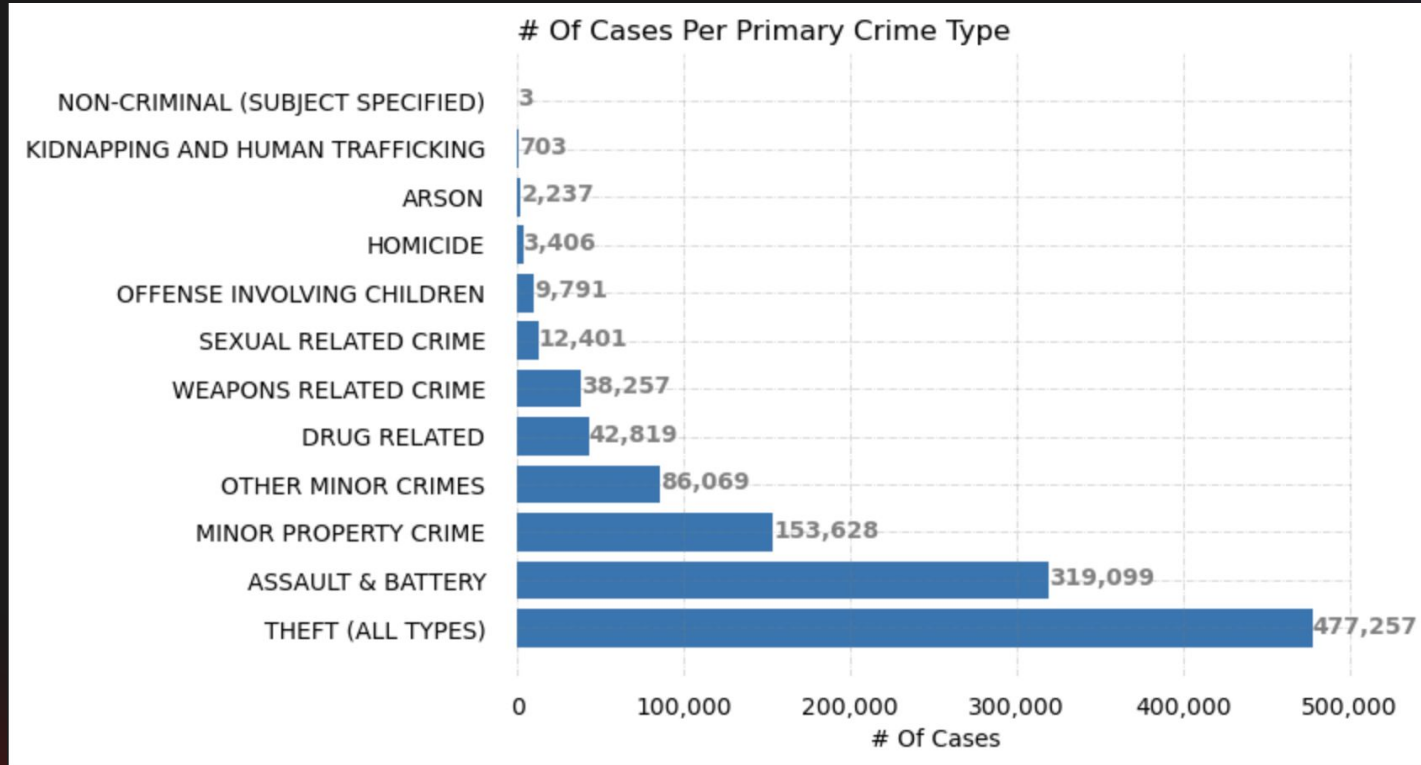
<https://data.cityofchicago.org/Public-Safety/Crimes-2001-to-Present/ijzp-q8t2>

Crime data cleaning:

- Deleted data where the latitude and longitude was missing.
- Using the uszipcode python library added the zip code per case.
- Using the census api to obtain population data for 2022.
- Grouped crime types from 30 categories into 11 categories.
- Dropped unnecessary columns.
- Dropped records assigned to district 31. District 31 is not a valid district.

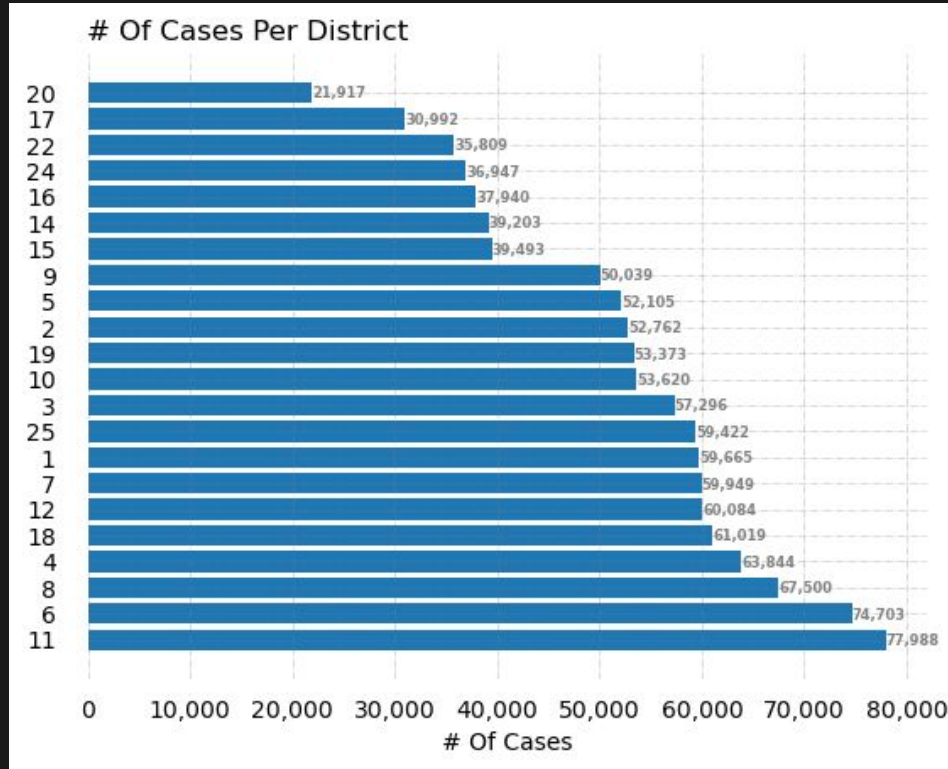
1) What is the most and least prevalent type of crime in Chicago?

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Theft dominates all crimes with 41.7% of the mix.

1) What is the most and least prevalent type of crime in Chicago?



District 11 has the highest number of crimes across the city. (Just west of the loop)

1) What is the most and least prevalent type of crime in Chicago?

District	Highest Crime	Highest Crime Cases	Lowest Crime	Lowest Crime Cases
1	THEFT (ALL TYPES)	37,112	KIDNAPPING AND HUMAN TRAFFICKING	18
2	THEFT (ALL TYPES)	21,939	KIDNAPPING AND HUMAN TRAFFICKING	37
3	THEFT (ALL TYPES)	19,661	KIDNAPPING AND HUMAN TRAFFICKING	46
4	THEFT (ALL TYPES)	21,206	KIDNAPPING AND HUMAN TRAFFICKING	59
5	ASSAULT & BATTERY	16,459	KIDNAPPING AND HUMAN TRAFFICKING	33
6	THEFT (ALL TYPES)	25,779	KIDNAPPING AND HUMAN TRAFFICKING	54
7	ASSAULT & BATTERY	21,393	KIDNAPPING AND HUMAN TRAFFICKING	48
8	THEFT (ALL TYPES)	27,008	NON-CRIMINAL (SUBJECT SPECIFIED)	1
9	THEFT (ALL TYPES)	18,758	KIDNAPPING AND HUMAN TRAFFICKING	33
10	ASSAULT & BATTERY	17,079	KIDNAPPING AND HUMAN TRAFFICKING	31
11	ASSAULT & BATTERY	22,503	NON-CRIMINAL (SUBJECT SPECIFIED)	2
12	THEFT (ALL TYPES)	31,839	KIDNAPPING AND HUMAN TRAFFICKING	16
14	THEFT (ALL TYPES)	21,728	KIDNAPPING AND HUMAN TRAFFICKING	9
15	ASSAULT & BATTERY	13,595	KIDNAPPING AND HUMAN TRAFFICKING	29
16	THEFT (ALL TYPES)	17,992	HOMICIDE	34
17	THEFT (ALL TYPES)	14,908	KIDNAPPING AND HUMAN TRAFFICKING	15
18	THEFT (ALL TYPES)	39,235	KIDNAPPING AND HUMAN TRAFFICKING	19
19	THEFT (ALL TYPES)	32,220	KIDNAPPING AND HUMAN TRAFFICKING	18
20	THEFT (ALL TYPES)	10,934	KIDNAPPING AND HUMAN TRAFFICKING	11
22	THEFT (ALL TYPES)	14,353	KIDNAPPING AND HUMAN TRAFFICKING	41
24	THEFT (ALL TYPES)	17,751	KIDNAPPING AND HUMAN TRAFFICKING	12
25	THEFT (ALL TYPES)	23,531	KIDNAPPING AND HUMAN TRAFFICKING	42

Theft is the most prevalent crime across the districts. Kidnapping and human trafficking the least prevalent.

**2) Are certain areas more
prone to crime than
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Null hypothesis: Each district has the same amount of crime

Degrees of Freedom = 21

P-value of 0.05

Confidence Value of 0.95

Critical Value = 32.67

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Power_divergenceResult(statistic=82280.93870311696, pvalue=0.0)
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Since the chi square value exceeds the critical value of 32.67, we conclude that the results are statistically significant.

2) Are certain areas more prone to crime than others?

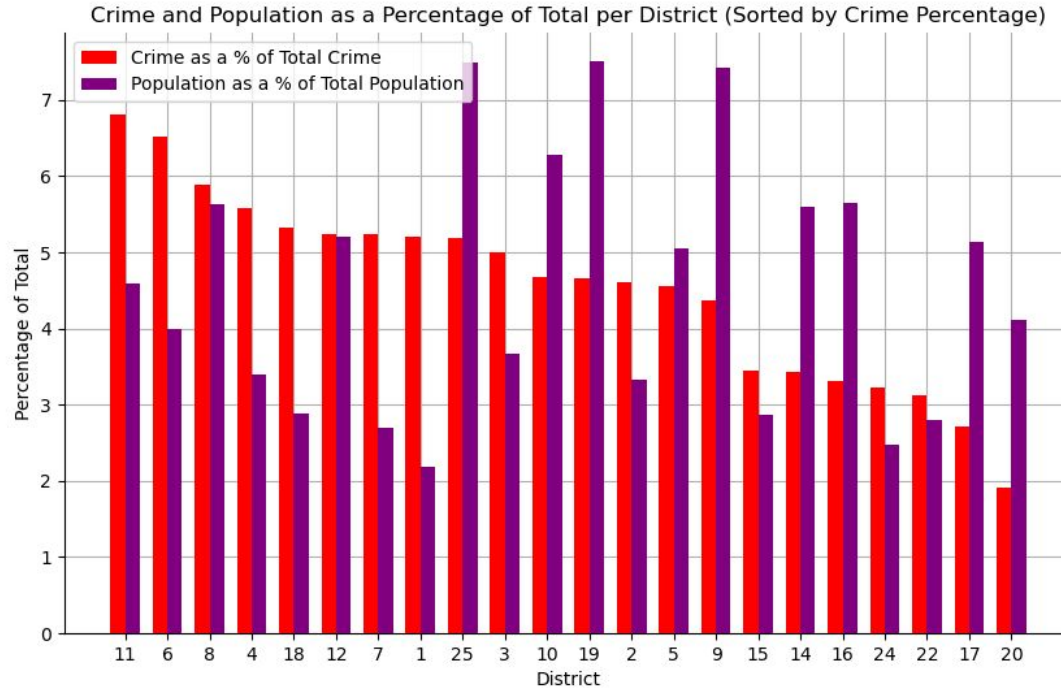
Null hypothesis: Each district has the same amount of crime

Degrees of Freedom = 21
P-value of 0.05
Confidence Value of 0.95
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Year	Chi Square Value
2018	21728
2019	22328
2020	16444
2021	13549
2022	14687

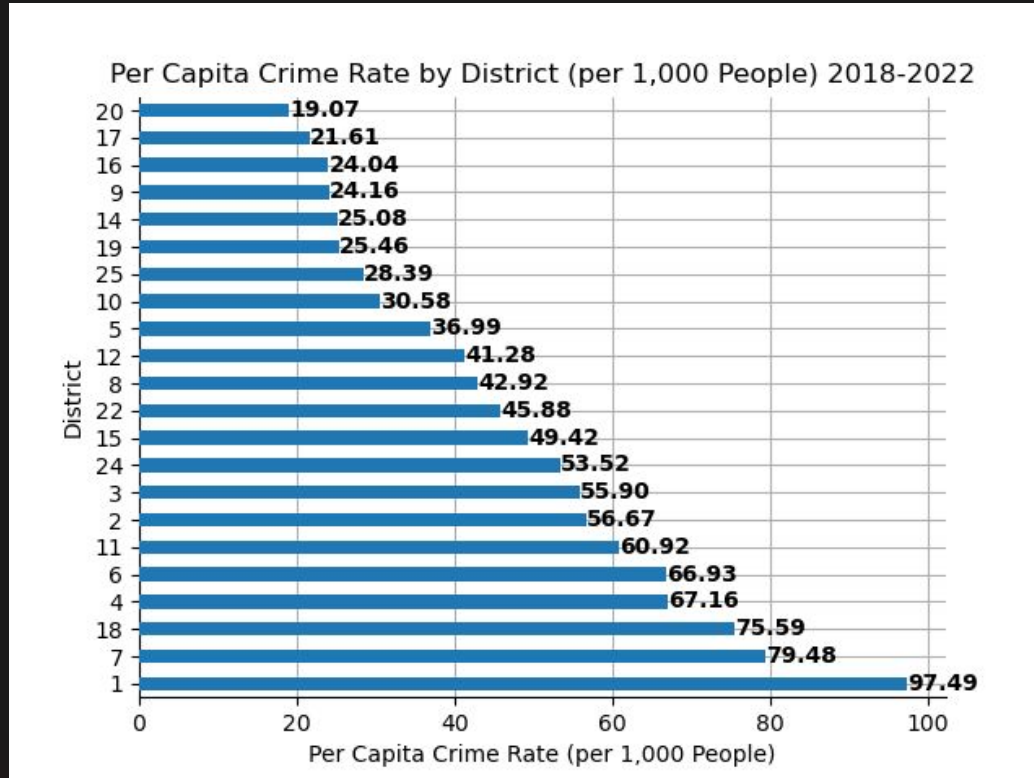
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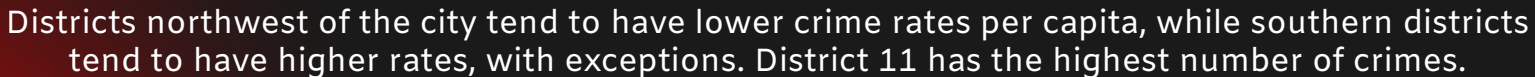


District 11 has the highest crime as a percentage of total crime. District 19 had the highest population as a percentage of total population.

2) Are certain areas more prone to crime than others?



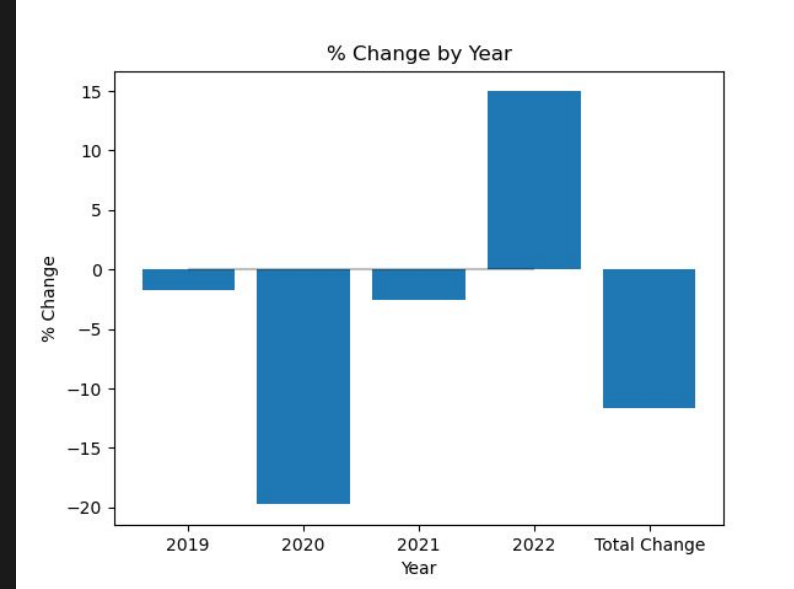
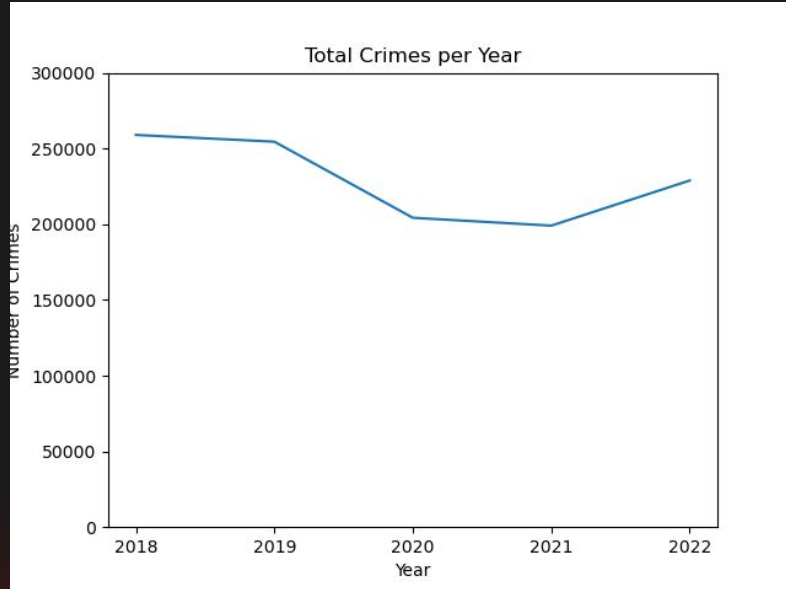
District 1 experiences the highest amount of crime per capita. District 20 experiences the least.



Districts northwest of the city tend to have lower crime rates per capita, while southern districts tend to have higher rates, with exceptions. District 11 has the highest number of crimes.

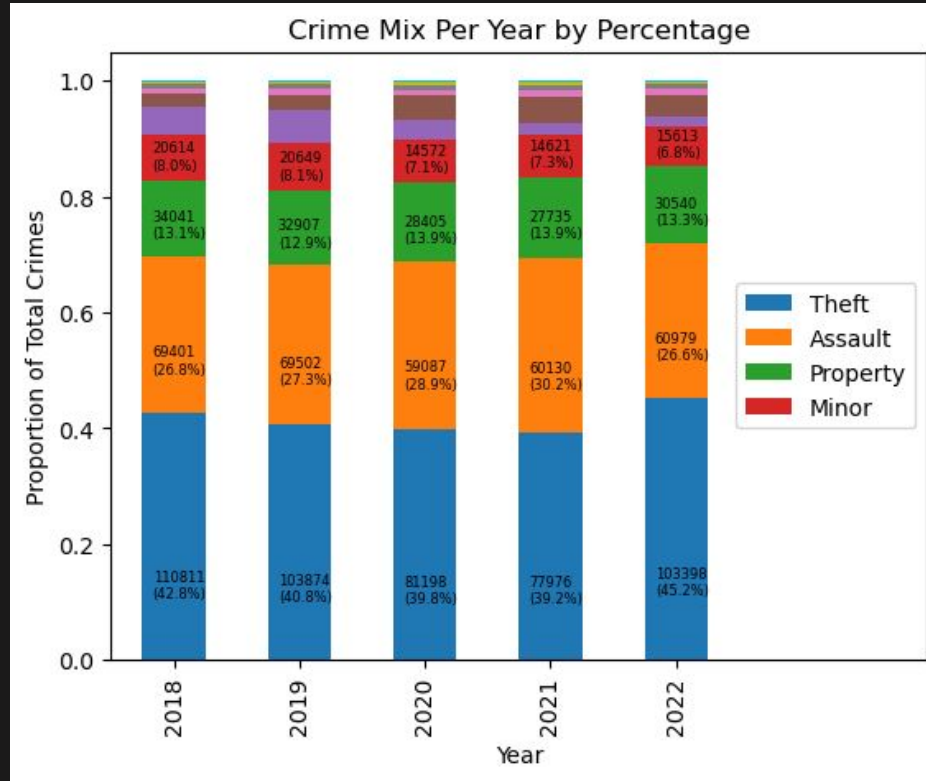
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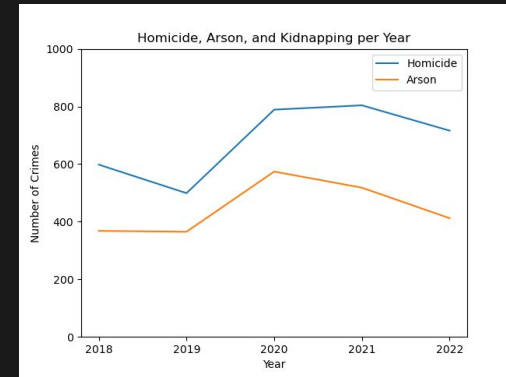
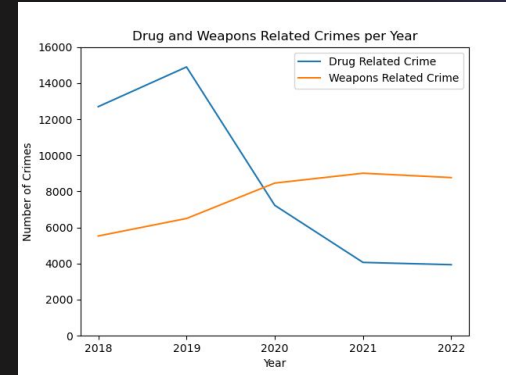
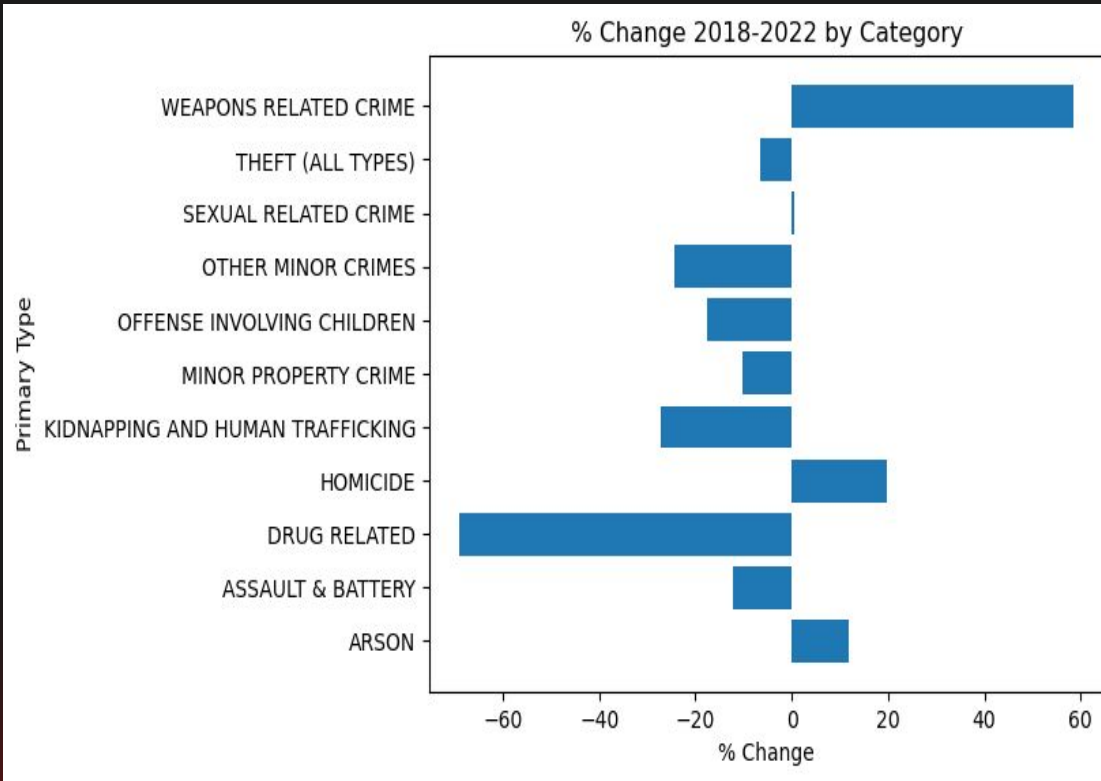
The total number of crimes fell overall from 2018-2021, but rose in 2022.
The largest decline came in 2020.

3) How has crime changed over time?



As total crime decreased, the proportion of thefts also decreased, but the proportion of assaults rose. Overall, the proportions of each type of crime remained fairly steady throughout the five year period.

3) How has crime changed over time?



Most types of crime followed the overall trendline, but homicide, arson, and weapons related crimes increased overall, and drug related crimes saw a significant decline.

**4) How common is
extremely violent crime?**

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Occurrences of crime grouped by Primary Type (by year)

	Arson	Assault	Drug Crime	Homicide	Kidnapping	Non-criminal Children	Other	Sex Crime	Theft	Weapons	All Crimes	
2018	368	69,401	12,696	598	177	3	2,152	20,614	2,577	110,811	5,528	258,966
2019	365	69,502	14,894	499	182	nan	2,302	20,649	2,846	103,874	6,498	254,518
2020	574	59,087	7,227	789	122	nan	1,835	14,572	2,002	81,198	8,460	204,271
2021	518	60,130	4,064	804	93	nan	1,727	14,621	2,386	77,976	9,006	199,060
2022	412	60,979	3,938	716	129	nan	1,775	15,613	2,590	103,398	8,765	228,855
Totals	2,237	319,099	42,819	3,406	703	3	9,791	86,069	12,401	477,257	38,257	1,145,670

- Chicago gets a lot of media coverage for supposedly having very high rates of crime (specifically homicide and other violent crime). Just how accurate is this? Does the data back it up. For our study, we defined extremely violent crime (heinous crime) as any crimes committed that fell into three categories: arson, homicide (murder), and kidnapping/human trafficking.

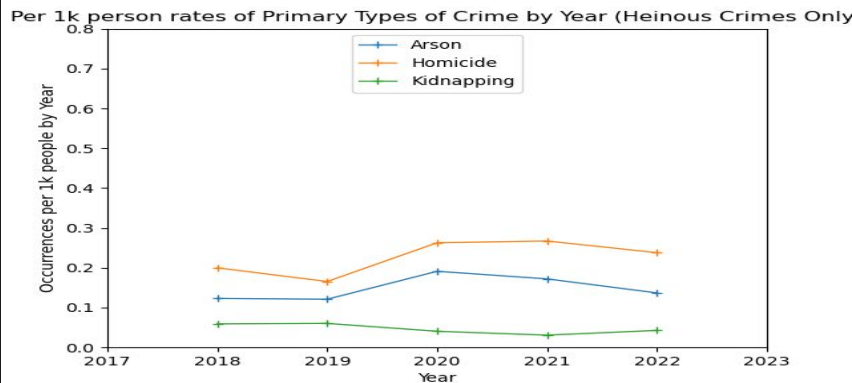
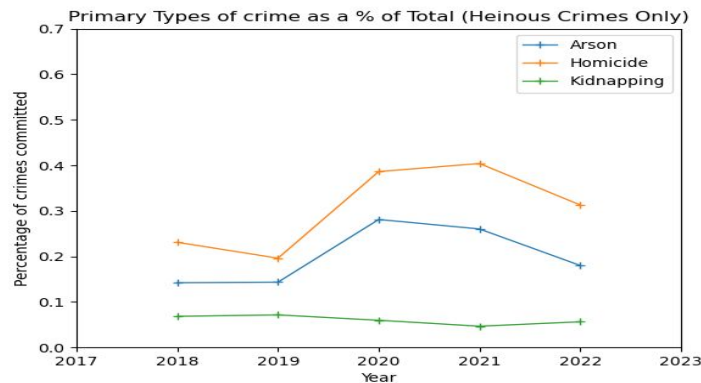
4) How common is extremely violent crime?

Heinous crimes as a % of total crimes by year

	Arson	Homicide	Kidnapping
2018	0.1421%	0.2309%	0.0683%
2019	0.1434%	0.1961%	0.0715%
2020	0.2810%	0.3863%	0.0597%
2021	0.2602%	0.4039%	0.0467%
2022	0.1800%	0.3129%	0.0564%
Totals	0.1953%	0.2973%	0.0614%

Heinous crimes committed per 1000 people

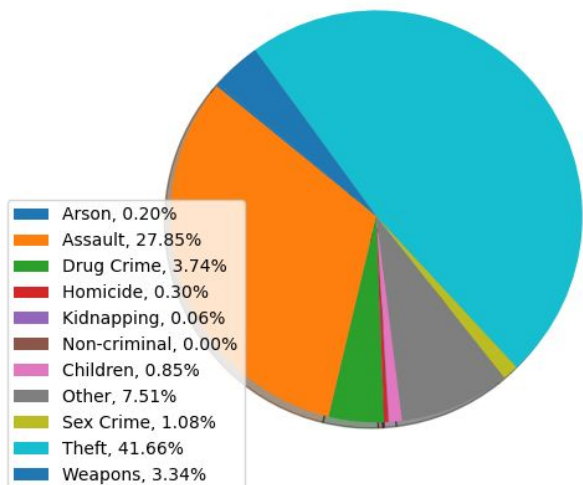
	Arson	Homicide	Kidnapping	All Crimes
2018	0.123007	0.199886	0.059164	86.561429
2019	0.121068	0.165515	0.060368	84.422063
2020	0.191133	0.262725	0.040624	68.019027
2021	0.172114	0.267142	0.030901	66.140823
2022	0.136893	0.237902	0.042862	76.040681
Average	0.148846	0.226629	0.046776	76.230859



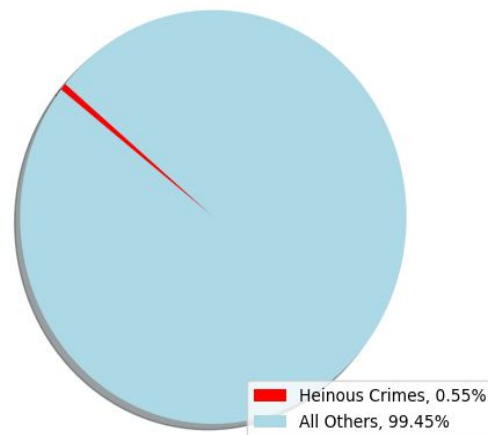
4) How common is extremely violent crime?

- As the below pie charts show, heinous crimes represent a very percentage of the crimes committed in Chicago during the observation period when compared to most other types of crime. Each of the 3 categories of 'heinous crime' had lower percentage of crimes committed rates than all but one category (other non-criminal).

Percentage of overall crimes committed by Type



Heinous Crimes as a % of Overall Crimes Committed



Conclusion

- Theft is the predominant crime with 41.7% of the mix.
- District 11 has the highest number of total crimes.
- District 1 has the highest crime per capita.
- The total number of crimes fell from 2018 to 2021, but rose in 2022.
- Arson and homicide saw a notable uptick from 2019 to 2020 (both in absolute terms and on a relative basis). Homicides continued to rise into 2021. Both leveled off and started to fall again after 2021. Despite large percentage increases during the pandemic period, both categories remain very small as a percentage of overall crimes committed.
- Kidnappings saw a significant fall during the observation period. This began before the onset of the pandemic.

THANK YOU