

Preliminary Homicides Data in Mexico (2019-2020)

Exploratory analysis

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The challenges of obtaining recent homicide data

Publishing official homicide data entails a rigorous and extense process. Before being accounted as a homicide by INEGI, every single case has to be confirmed by the local authorities as an actual crime. Due to this reason, official homicide data takes long to be open to the public. Normally, official data for a specific year is published one year after it ended. That is the reason why, so far, INEGI has only published homicide data for 1990 to 2018.

What to do, then, if one wants to study the phenomenon of homice in Mexico in the recent 18 months? Luckily, the Secretariat of Security and Citizen Protection (SSPC as its acronym in spanish) makes pre-miliminary homicide data available on its website. It uses two main sources of information: a daily report produced by an interdisciplinary team (constituted by the own SSPC, the military, the navy and the General Attorney's office); and open sources, constituted by homicide reports in local newspapers. The SSPC publishes daily reports for the numbers obtained from these two sources.

The problem with the reports that the SSPC uploads on its website is that they come in a pdf format, which means that a deep cleaning process is needed. In the first place, the documents have to be webscrapped from the web, then, they have to be transformed into an excel format and checked by a human. The cleaning process also requires ortographic correction and minor but numerous changes. After homicide data is cleaned, population data is added at both the state and municipal level for the estimation of the homicide rate.

Source 1: Interinstitutional group

The daily reports produced by the interinstitutional group consist in a single table that shows the number of killings in each of the 32 Mexican states, as well as the national toll. This is the descriptive analysis produced after data cleaning.

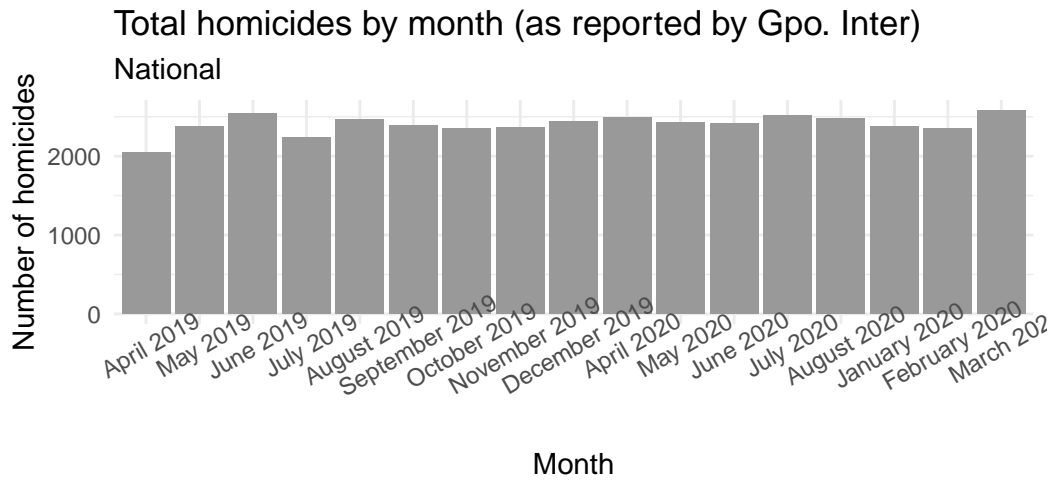
National level homicides

Homicides in Mexico have increased significantly since 2008, when the militarization of the country took effect. In the following table, it can be appreciated that the homicide rate has been above 18.9 homicides per 100,000 inhabitants.

Year	Month	Homicides	Monthly homicide rate
2019	April	2045	1.62
2019	May	2380	1.89
2019	June	2543	2.02
2019	July	2241	1.78
2019	August	2469	1.96
2019	September	2386	1.89
2019	October	2356	1.87
2019	November	2370	1.88
2019	December	2444	1.94
2020	January	2377	1.87
2020	February	2352	1.85
2020	March	2585	2.03
2020	April	2492	1.96
2020	May	2423	1.90
2020	June	2413	1.90
2020	July	2519	1.98
2020	August	2481	1.95

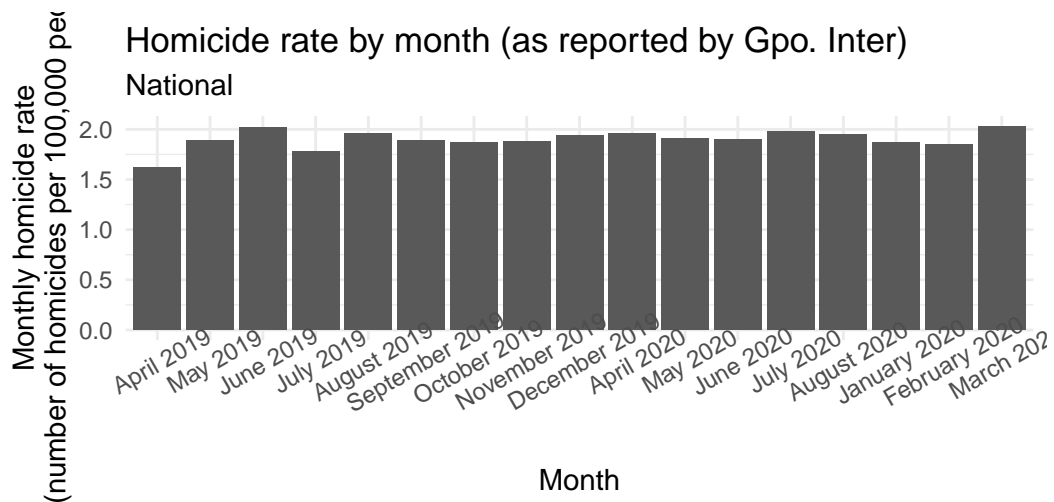
Figure 1: Number of cases and homicide rate per month at the national level

Both the trends on the total number of homicides and the homicide rate show a stable number of homicides at the nation level. Besides a slight increase at the beginning of the time series, the levels are constant over time as shown in the next two figures.



Source: Daily reports of the SSPC, retrieved from: <http://www.informeseguridad.cns.gob.mx/>

Figure 2: Total homicides by month at the national level



Source: Daily reports of the SSPC, retrieved from: <http://www.informeseguridad.cns.gob.mx/>

Figure 3: Homicide rate by month at the national level

We see that the descriptive statistics show an overall increase in the number of cases between 2019 and 2020. There is also less variance in 2020. But we need to take into account that there may be population changes between one year and another, as well as the fact that we don't have the same months for each year and we may be overlooking stationary effects.

Year	Month with lowest homicides	Lowest number of homicides in a single month	Month with highest homicides	Highest number of homicides in a single month	Average number of homicides	Standard Deviation
2019	April	2045	June	2543	2359.3	144.5
2020	February	2352	March	2585	2455.2	77.9

Figure 4: Descriptive statistics for the number of homicides at the national level

When looking at the descriptive statistics for the mortality rate, we find, once more, that there was an increase in homicides from 2019 to 2020. But now there are not population effects. Still, there may be stationary effects that have not been accounted for.

Year	Month with lowest mortality rate	Lowest homicide rate in a single month	Month with highest mortality rate	Highest homicide rate in a single month	Average mortality rate	Standard Deviation
2019	April	1.62	June	2.02	1.9	0.1
2020	February	1.85	March	2.03	1.9	0.1

Figure 5: Descriptive statistics for the homicide rate at the national level

In the next section, we will see the information deaggregated by state, in order to find more subtle differences in data.

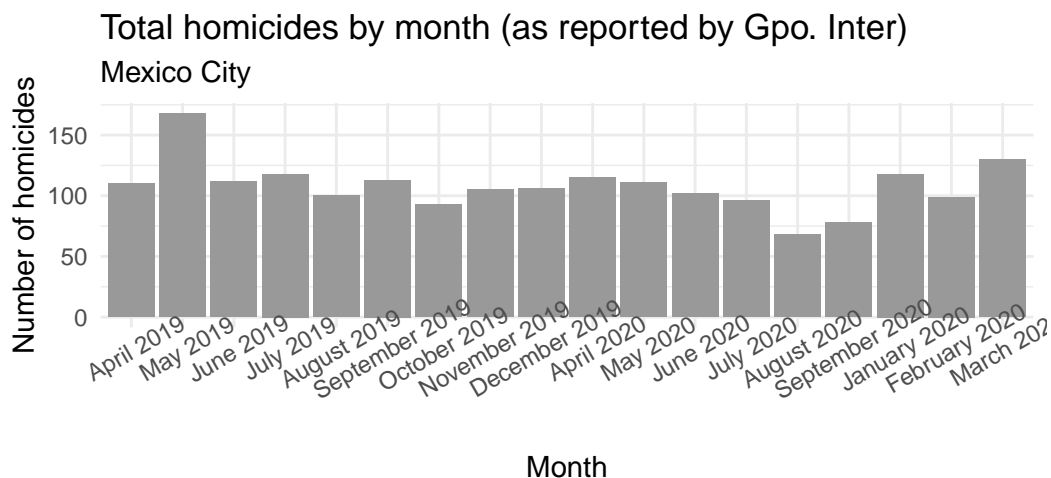
State level homicides

In the next table, we show the total amount of homicides as well as the homicide rate for each state in 2019 and 2020. It is worth remembering that none of the years were complete in the original sources. For 2019, we only have information from April to December; while 2020 comprehends from January to July.

	2019		2020	
	Homicides	Homicide rate	Homicides	Homicide rate
<i>Aguascalientes</i>	49	3.49	49	3.44
<i>Baja California</i>	1660	46.76	1105	30.64
<i>Baja California Sur</i>	44	5.64	35	4.39
<i>Campeche</i>	40	4.1	29	2.92
<i>Chiapas</i>	424	7.56	300	5.27
<i>Chihuahua</i>	1148	30.64	1156	30.55
<i>Mexico City</i>	1031	11.41	774	8.58
<i>Coahuila</i>	203	6.44	147	4.6
<i>Colima</i>	433	56.48	278	35.69
<i>Durango</i>	114	6.18	115	6.18
<i>State of Mexico</i>	2042	11.9	1739	10.03
<i>Guanajuato</i>	2158	35.11	2600	41.93
<i>Guerrero</i>	1178	32.39	725	19.86
<i>Hidalgo</i>	296	9.76	237	7.72
<i>Jalisco</i>	1696	20.48	1272	15.2
<i>Michoacan</i>	1254	26.26	1136	23.62
<i>Morelos</i>	509	25.3	450	22.13
<i>National</i>	21301	16.91	17582	13.82
<i>Nayarit</i>	125	9.91	60	4.69
<i>Nuevo Leon</i>	628	11.43	551	9.89
<i>Oaxaca</i>	872	21.22	598	14.47
<i>Puebla</i>	882	13.55	617	9.39
<i>Queretaro</i>	93	4.19	61	2.7
<i>Quintana Roo</i>	584	35.08	412	24.18
<i>San Luis Potosi</i>	235	8.29	242	8.47
<i>Sinaloa</i>	669	21.46	472	15.01
<i>Sonora</i>	417	13.81	370	12.11
<i>Tabasco</i>	454	17.94	328	12.82
<i>Tamaulipas</i>	435	12.06	395	10.86
<i>Tlaxcala</i>	127	9.37	70	5.1
<i>Veracruz</i>	1170	13.83	701	8.23
<i>Yucatán</i>	31	1.4	21	0.93
<i>Zacatecas</i>	387	23.48	539	32.46

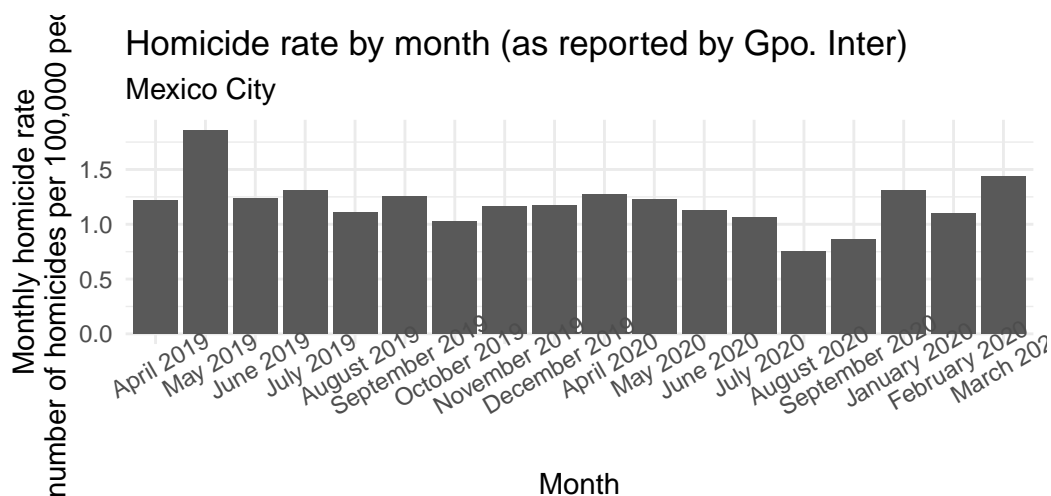
Figure 6: Total number of homicides and mortality rate by year and state

A closer look to specific states' time series reveal that the stagnation seen at the national level is not the reality for all the regions. Instead, it seems to be the result of opposite trends: homicides went down in some states, while spiking at others. For instance, Mexico City is one of the states where homicides decreased after december of 2019. This trend is clear in the total number of cases, as in the homicide rate.



Source: Daily reports of the SSPC, retrieved from: <http://www.informeseuridad.cns.gob.mx/>

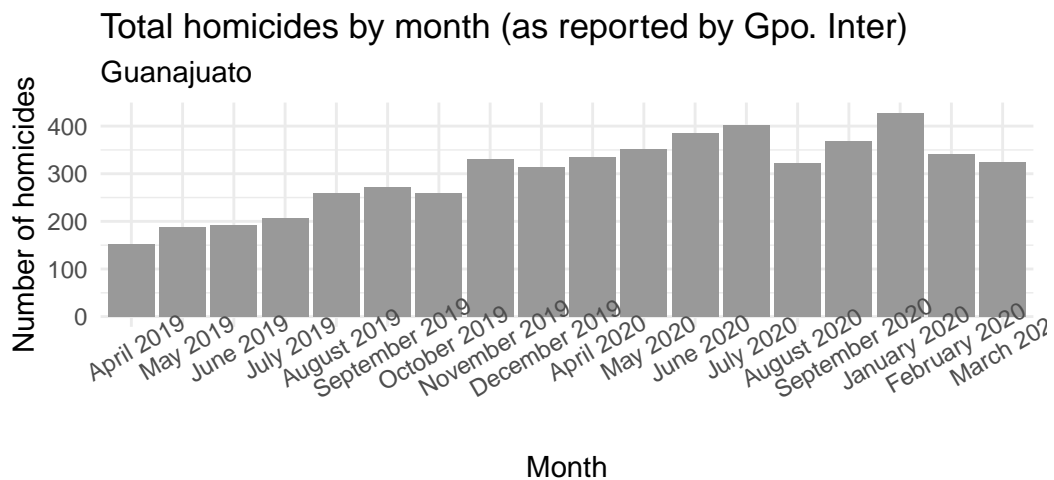
Figure 7: Total homicides by month in Mexico City



Source: Daily reports of the SSPC, retrieved from: <http://www.informeseuridad.cns.gob.mx/>

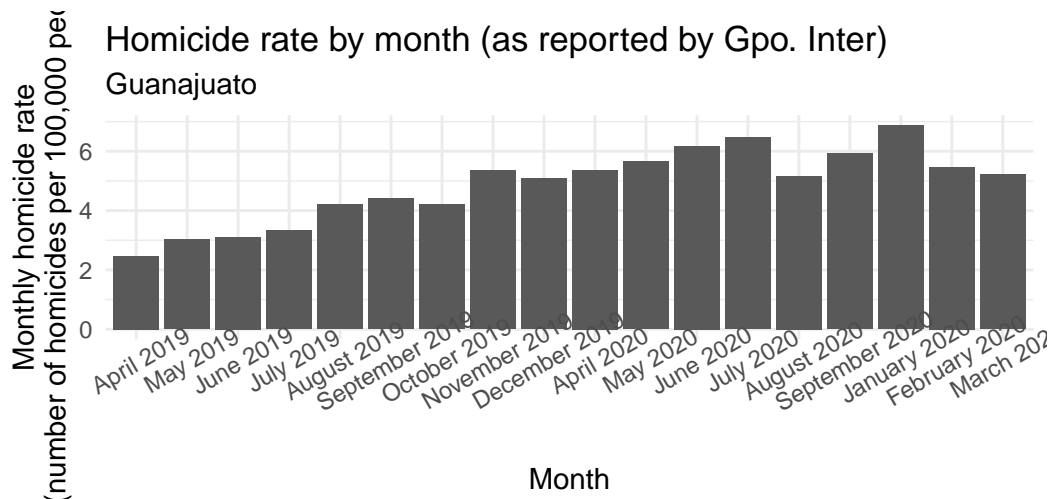
Figure 8: Homicide rate by month in Mexico City

In constrast to the capital, Guanajuato is a prime example of states where homicide violence increased significantly in 2020, as it is shown in the following graphs that report the total number of cases in the state as well as it's homicide rate.



Source: Daily reports of the SSPC, retrieved from: <http://www.informeseuridad.cns.gob.mx/>

Figure 9: Total homicides by month in Guanajuato



Source: Daily reports of the SSPC, retrieved from: <http://www.informeseuridad.cns.gob.mx/>

Figure 10: Homicide rate by month in Guanajuato

The comparison between 2019 and 2020 becomes easier when comparing each month side by side. Unfortunately, the SSPC data is not available for all of 2019's months. Nonetheless, we can see the patterns in the months that are present for both years for the three cases seen in this report: national level, Mexico City and Guanajuato. Since the homicide rate considers the effects of population, we display this measurement, the differences in the patterns are obvious.

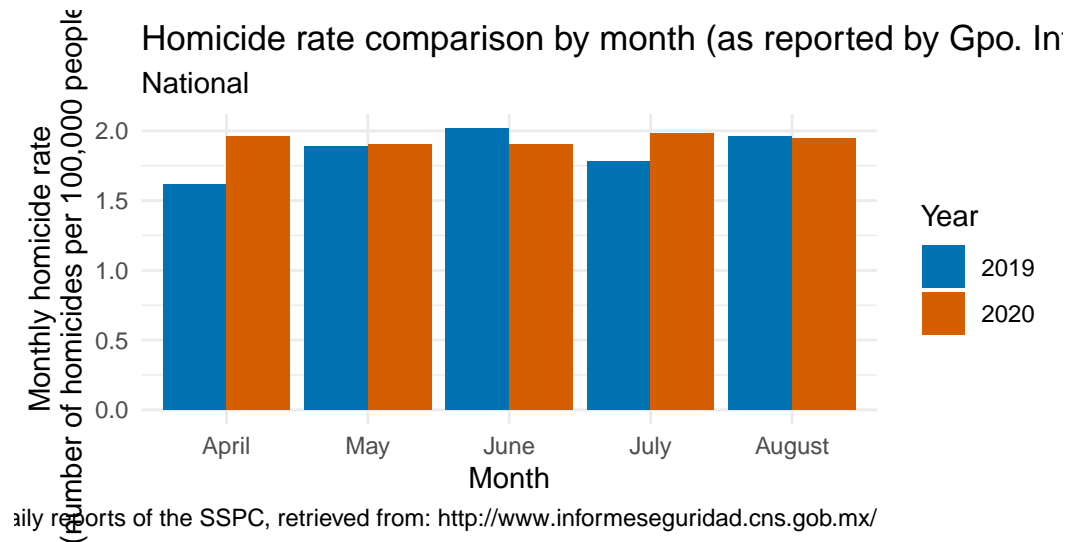


Figure 11: Homicide rate comparison by month at the national level

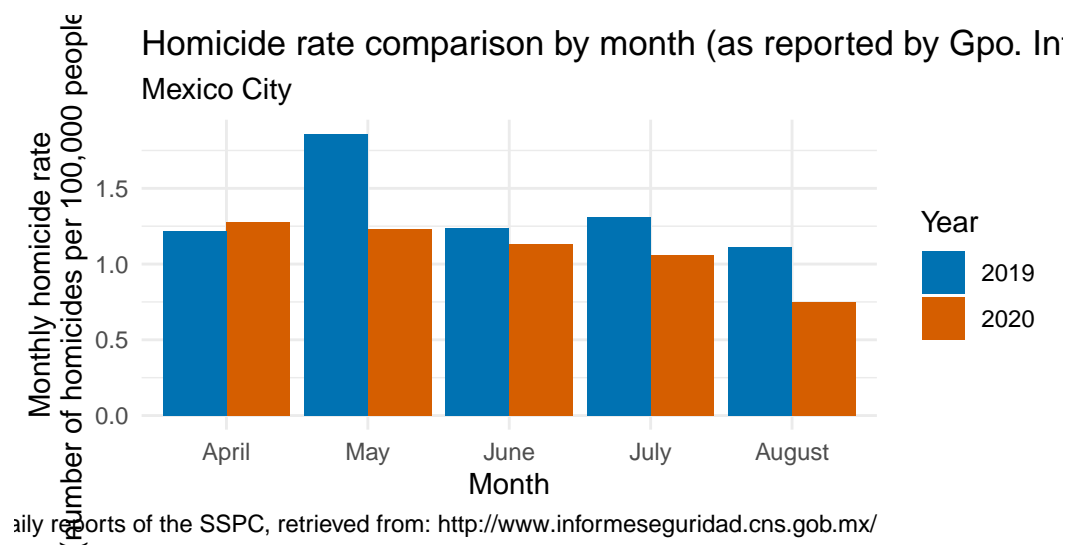


Figure 12: Homicide rate comparison by month in Mexico City

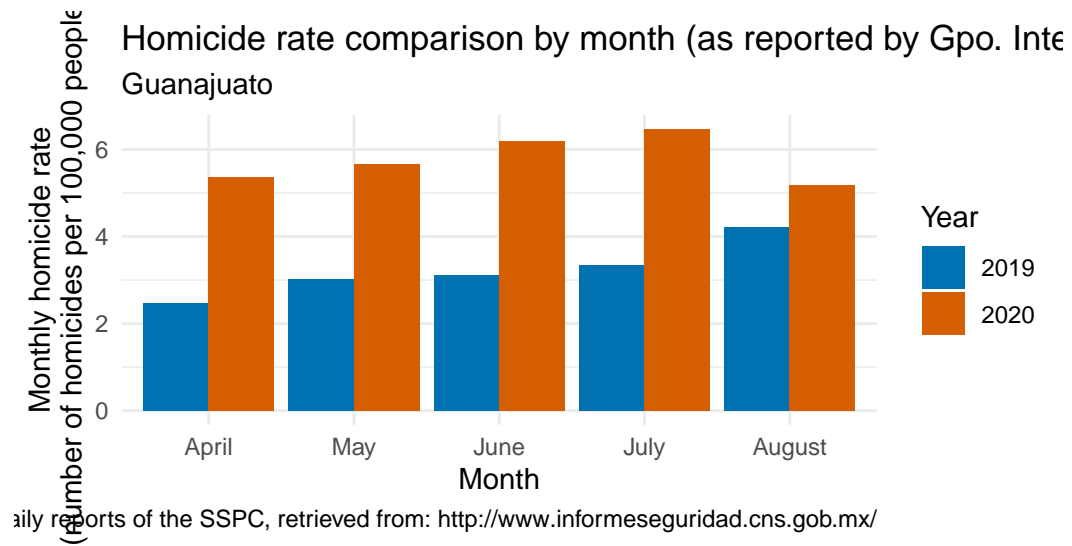


Figure 13: Homicide rate comparison by month in Guanajuato

To appreciate more differences, we display descriptive statistic for each state in the following table.

	2019				2020			
	Lowest homicide rate in a single month	Highest homicide rate in a single month	Average mortality rate	Standard Deviation	Lowest homicide rate in a single month	Highest homicide rate in a single month	Average mortality rate	Standard Deviation
<i>Aguascalientes</i>	0.14	0.64	0.4	0.2	0.14	0.56	0.3	0.1
<i>Baja California</i>	4.11	5.92	5.1	0.7	3.63	5.06	4.4	0.5
<i>Baja California Sur</i>	0.25	1.02	0.6	0.2	0.12	1.12	0.6	0.4
<i>Campeche</i>	0.1	0.91	0.5	0.2	0.1	0.9	0.5	0.3
<i>Chiapas</i>	0.55	1.08	0.8	0.2	0.58	0.91	0.7	0.1
<i>Chihuahua</i>	3.11	4.06	3.4	0.4	3.24	5.58	4.2	0.8
<i>Coahuila</i>	0.38	1.23	0.7	0.3	0.4	0.96	0.6	0.2
<i>Colima</i>	5.31	7.5	6.3	0.8	3.06	5.99	4.8	1.1
<i>Durango</i>	0.32	1.46	0.7	0.4	0.27	1.12	0.7	0.3
<i>Guanajuato</i>	2.46	5.35	3.9	1	5.17	6.87	5.8	0.6
<i>Guerrero</i>	2.39	4.58	3.6	0.7	2.13	3.45	2.8	0.5
<i>Hidalgo</i>	0.66	1.51	1.1	0.3	0.45	1.26	1	0.3
<i>Jalisco</i>	1.99	2.64	2.3	0.2	1.83	2.45	2.1	0.2
<i>Mexico City</i>	1.03	1.86	1.3	0.2	0.75	1.44	1.1	0.2
<i>Michoacan</i>	1.84	3.59	2.9	0.6	2.69	3.69	3.4	0.3
<i>Morelos</i>	2.08	3.91	2.8	0.6	2.3	3.77	3	0.5
<i>National</i>	1.62	2.02	1.9	0.1	1.85	2.03	1.9	0.1
<i>Nayarit</i>	0.79	1.26	1	0.2	0.31	1.01	0.7	0.2
<i>Nuevo Leon</i>	0.99	1.48	1.3	0.2	1.14	1.59	1.4	0.1
<i>Oaxaca</i>	1.77	3.06	2.3	0.4	1.28	2.41	1.9	0.4
<i>Puebla</i>	1.22	1.88	1.5	0.2	0.95	1.57	1.3	0.2
<i>Queretaro</i>	0.27	0.8	0.5	0.2	0.18	0.79	0.4	0.2
<i>Quintana Roo</i>	2.14	4.87	3.9	0.9	1.91	4.41	3.3	0.8
<i>San Luis Potosi</i>	0.6	1.48	0.9	0.3	0.8	1.92	1.3	0.4
<i>Sinaloa</i>	2.17	2.56	2.4	0.1	1.68	2.76	2.1	0.3
<i>Sonora</i>	0.99	2.77	1.5	0.6	1.01	2.21	1.8	0.4
<i>State of Mexico</i>	1.21	1.48	1.3	0.1	1.16	1.62	1.4	0.1
<i>Tabasco</i>	1.41	2.63	2	0.4	1.21	2.33	1.9	0.4
<i>Tamaulipas</i>	0.86	2.07	1.4	0.3	0.99	2.03	1.5	0.4
<i>Tlaxcala</i>	0.51	2.13	1.1	0.5	0.43	1.52	0.8	0.3
<i>Veracruz</i>	1.18	2.07	1.6	0.3	0.93	1.39	1.2	0.2
<i>Yucatan</i>	0	0.22	0.1	0.1	0.04	0.22	0.1	0.1
<i>Zacatecas</i>	1.57	3.32	2.6	0.5	1.74	6.66	4.7	1.5

Figure 14: Descriptive statistics for the homicide rate at the state level

Source 2: Open sources (newspapers)

Besides the interinstitutional group, the SSCP uses a second source for estimating the amount of homicides: local newspapers. On the website, there are daily reports with the amount of homicides registered at the county level. One of the main advantages of this source is that information is disaggregated by gender. Hence, we get more detailed information. Nonetheless, it can be flawed and that is why it is considered, simply, as preliminary numbers.

National level homicides

As we just mentioned, the open source data from the SSCP offers the possibility of disaggregating information by gender. Please note that this feature was not implemented until February of 2019, for January data was only made available for the total number of homicides, this explains the inconsistency in the total number of homicides reported for 2019 and numbers broken down by gender.

The fact that the amount of people killed for whom their gender could not be identified is greater than the number of women killed it is certainly worth of attention. One possible explanation is that the level of violence is so staggering that a considerable amount of people die in atrocious ways that leave their bodies unrecognisable.

Year	Total homicides	Male	Female	Non identified
2019	28001	19507	2737	3498
2020	22490	17548	2426	2516

Figure 15: Number of homicides disaggregated by gender and year at the national level

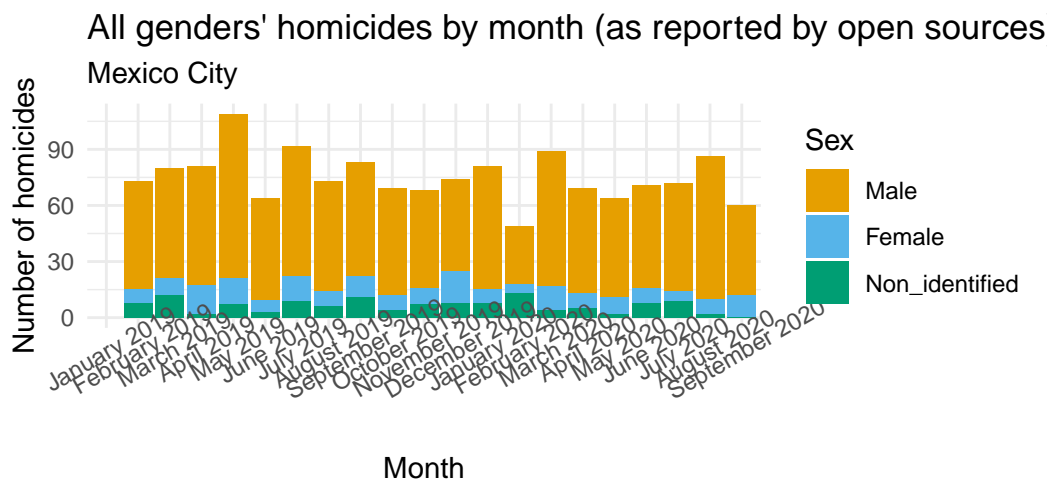
State level homicides

The numbers of total homicides, homicides of men, women and people with their gender not identified are displayed in the next table.

	2019				2020			
	Total homicides	Male	Female	No identificado	Total homicides	Male	Female	No identificado
<i>Aguascalientes</i>	111	76	13	10	76	65	4	7
<i>Baja California</i>	2096	1448	194	283	1924	1481	204	239
<i>Baja California Sur</i>	54	32	10	4	32	26	1	5
<i>Campeche</i>	44	32	5	4	41	33	3	5
<i>Chiapas</i>	384	271	50	19	197	150	32	15
<i>Chihuahua</i>	1912	1401	184	184	1548	1185	199	164
<i>Coahuila</i>	258	181	40	15	196	150	28	18
<i>Colima</i>	687	428	52	169	444	264	54	126
<i>Durango</i>	154	125	17	10	129	106	14	9
<i>Guanajuato</i>	3565	2534	324	469	3616	2876	372	368
<i>Guerrero</i>	1813	1324	144	178	1181	932	108	141
<i>Hidalgo</i>	336	203	40	57	217	158	28	31
<i>Jalisco</i>	1804	1061	148	434	1457	1030	147	280
<i>Mexico City</i>	974	672	117	77	641	515	75	51
<i>Michoacan</i>	1949	1466	162	197	1531	1247	173	111
<i>Morelos</i>	929	664	87	87	624	532	48	44
<i>Nayarit</i>	128	56	6	64	55	33	10	12
<i>Nuevo Leon</i>	724	513	75	66	528	427	54	47
<i>Oaxaca</i>	986	718	110	89	689	509	93	87
<i>Puebla</i>	1081	764	118	117	725	547	104	74
<i>Queretaro</i>	155	113	15	18	144	109	14	21
<i>Quintana Roo</i>	778	493	70	133	510	410	50	50
<i>San Luis Potosi</i>	378	276	40	34	512	427	47	38
<i>Sinaloa</i>	891	594	32	201	687	579	28	80
<i>Sonora</i>	872	582	78	163	787	628	44	115
<i>State of Mexico</i>	1360	967	195	80	1069	830	165	74
<i>Tabasco</i>	638	492	69	36	414	339	49	26
<i>Tamaulipas</i>	567	346	54	76	484	381	46	57
<i>Tlaxcala</i>	176	119	24	20	118	89	14	15
<i>Veracruz</i>	1644	1146	206	151	1198	956	140	102
<i>Yucatan</i>	35	28	3	0	28	16	11	1
<i>Zacatecas</i>	518	382	55	53	688	518	67	103

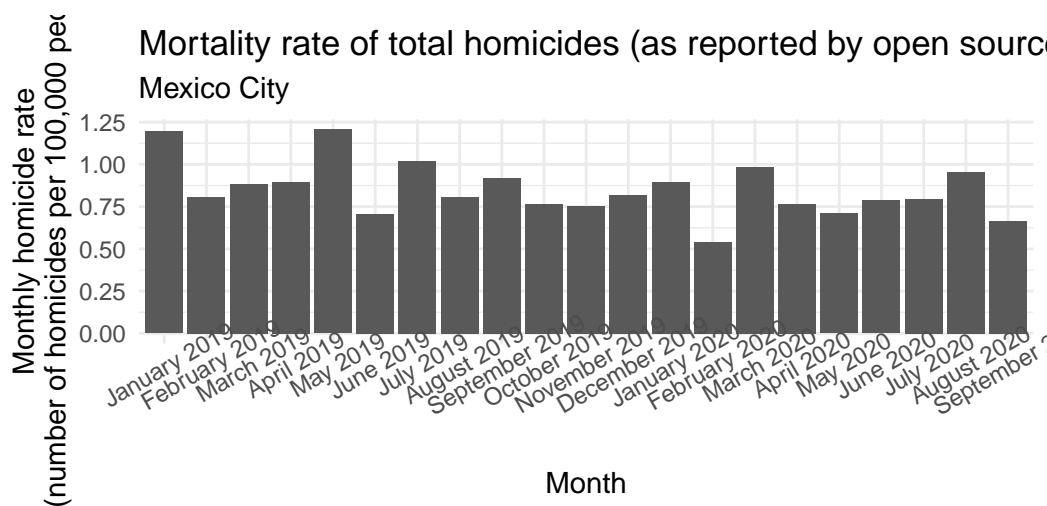
Figure 16: Number of homicides disaggregated by gender and year at the state level

To gain further insight into the trends in the states, we present the time series for total homicides and homicide rate for Mexico City.



s of the SSPC, retrieved from: <http://www.informeseuridad.cns.gob.mx/>

Figure 17: Montly homicides by gender, 2019-2020



Source: Daily reports of the SSPC, retrieved from: <http://www.informeseuridad.cns.gob.mx/>

Figure 18: Homicide rate by month in Mexico City

Finally, we present a table with descriptive statistics for the sates data base. The table includes the states that had the lowest level of homicides in a single month, we can see that each year there are four cases where some state had just one homicide (Baja California, Campeche and Yucatan, twice, in 2019; and again Baja California and Yucatan, thrice, in 2020). In contrast, Guanajuato had the most violent month of each year.

Year	State with lowest homicides in a month	Month with lowest homicides	Lowest number of homicides in a single month	State with highest homicides in a month	Month with highest homicides	Highest number of homicides in a single month	Average number of homicides	Standard Deviation
2019	Campeche	May	1	Guanajuato	December	349	73.1	67.9
2019	Yucatan	July	1	Guanajuato	December	349	73.1	67.9
2019	Baja California Sur	April	1	Guanajuato	December	349	73.1	67.9
2019	Yucatan	March	1	Guanajuato	December	349	73.1	67.9
2020	Yucatan	June	1	Guanajuato	August	654	78.9	88.7
2020	Yucatan	August	1	Guanajuato	August	654	78.9	88.7
2020	Baja California Sur	June	1	Guanajuato	August	654	78.9	88.7
2020	Yucatan	May	1	Guanajuato	August	654	78.9	88.7

Figure 19: Descriptive statistics for the number of homicides at the national level