2013 National Gunfire Index

SST™

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Background

SST, Inc. is the global leader in gunshot detection and location technology providing the most trusted, scalable and reliable gunfire alert and analysis solutions available today. Our company pioneered the concept of deploying an array of collaborative acoustic sensors which detect impulsive noises (e.g. gunfire, explosions) over wide coverage areas and provide actionable intelligence to law enforcement in real time. In our datacenter, ShotSpotter servers apply sophisticated mathematical techniques to accurately locate the source of specific gunfire incidents based on the acoustic telemetry provided by the sensors.

ShotSpotter systems then forward the data to the SST Real-Time Incident Review Center (IRC) where expert reviewers confirm the gunfire, provide the final classification, and add additional situational context (e.g. number of weapons fired, existence of fully automatic/machine gun weapons, etc.) before pushing the alert to authorities—all in less than a minute, 24x7x365.

The result of this complex collection and review process is accurate ground truth related to gunfire incidents that

- improves officer safety by providing data on the number and precise location of the shooters;
- fuels a more effective law enforcement response to gun crime by empowering first responders to be on the scene faster, with more/better intelligence, knowing precisely where to go and generally being much better prepared; and
- provides data that aides in prosecution. Law enforcement is more likely to recover shell casings, link those shells both to gun type and specific weapon used, identify the shooter, and obtain a detailed forensic report and court-admissible data.

In fact, ShotSpotter data has been admitted as evidence in more than 50 court cases in some 17 states as well as in Federal court, and has played a critical role in thousands of investigations. SST, Inc. is the sole provider of this game-changing intelligence generated by unique technology protected by over 32 issued patents and proven through successful deployments in over 80 cities worldwide.

As the globally recognized experts on gunfire acoustics for over 15 years, our real-time intelligence has been sought by law enforcement agencies around the world to combat violent gun crime more effectively.

In this capacity, we have gained two powerful insights into urban gun violence:

Gun violence today is undermining the vitality of our urban centers and the Americans who call these cities home. As a result of these two key factors, the true scope of gun violence, is both under reported and misreported. The tragic consequence is an uninformed and inadequate tactical response complicated by well-meaning solutions proposed at the national level that do not address the problem.

Our goal in making this 2013 inaugural report available is to begin a more informed discussion about gun violence. SST holds, by far, the most comprehensive and detailed data on gun incidents that is currently available. We aggregate and analyze the data, and publish our analysis—currently the only form of "Big Data" that provides communities, and those who govern them,

- **Traditional measures of gun violence—homicides, shootings involving injury, and victimization surveys—grossly underestimate the true scope of daily gun violence.**
- **Communities most impacted by gun violence are least likely to call police. In fact, fewer than 1 in 5 unlawful shootings are reported to 9-1-1.**

with visibility into the real impact of gunshot violence. SST makes this Index available for the benefit of federal, state and local law enforcement agencies and organizations to shed light on the shocking but true nature and volume of gun illegal gun activity in America.

SST believes that this detailed gunshot data could, over time, provide important insight into the affects of gunshot violence on our emotional health and well-being. The section of this Index that correlates gunfire incidents and unemployment rates is just a beginning. With that, SST has taken the first meaningful step toward analysing gunshot violence as it relates to the health of our communities.

Let's work together to better inform policy makers with this type of data and analysis. We encourage you to comment on this report via on Twitter using the #GunfireIndex hashtag.

Top 5 Findings

A note on our sample size: Our Index collected data from communities in 48 different US cities covering 165 square miles, with an average coverage area of 3.8 mi² per community. According to 2010 US Census data 1,138,000 people live in the areas sampled.

Here's what we found:

1 **Total gunfire data:** In 2013, our Incident Review Center reviewed and confirmed over 51,000 separate incidents of illegal gunfire in these areas, of which ~7,000 (15%) were concentrated over two holiday periods; New Year's Eve/Day and July 4th. This was an average of 1 incident every 10 minutes nationwide on Friday and Saturday nights between 10pm & 2am–every week.

2 **Highest rate of illegal gunfire:** Detailed comparative analysis revealed the city with the highest rate of gunfire experienced 1,065 illegal gunfire incidents per square mile consisting of 3,023 rounds (bullets) fired, which is 3.9 times the national average of 273 illegal gunfire incidents and 791 rounds per square mile. This city with the highest rates averaged 8.2 bullets every single day within that single square mile.

3 **Gunfire incidents per homicide:** The sampled areas accounted for an estimated 375 homicides during 2013, approximately 2.6% of all US homicides in the year prior. By this estimate, there are 129 gunfire incidents and 396 bullets fired for every one homicide—further evidence that gunfire is vastly under-reported.

4 **Gunfire is vastly under-reported.** In fact, fewer than one in five unlawful shootings are reported to 9-1-1.

5 **Seasonality:** There is strong seasonal, day of week, and time of day variance in gunfire rates. 42% of all gunfire incidents take place in the summer months of June through August.

Communities and Area Sampled

ShotSpotter gunfire detection and alert systems have been deployed in over 80 communities worldwide. For the 2013 annual index, SST sampled ShotSpotter data from 48 communities in the United States.

As more and more cities nationwide adopt ShotSpotter technology, their data become available to be sampled as part of this Index. During 2013, the number of cities sampled increased from 34 to 48, an increase of 14 cities or 41%. (see Figure 1)

ShotSpotter area coverage per community ranges from 1–19 square miles.

During 2013, the aggregate area sampled increased by 60 square miles (mi²), from 105 mi² at the end of Q1 to 165 mi² at year's end. Within the sample the smallest coverage area remained 1 mi² and the largest grew from 9–13.3 mi². (see Figure 2)

Figure 1
Communities included in Sample, 2013

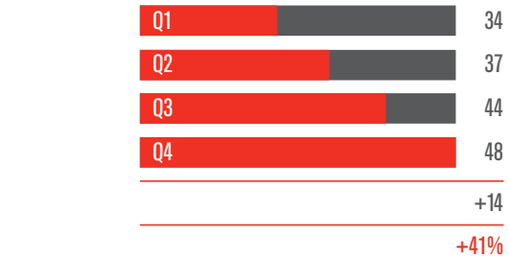
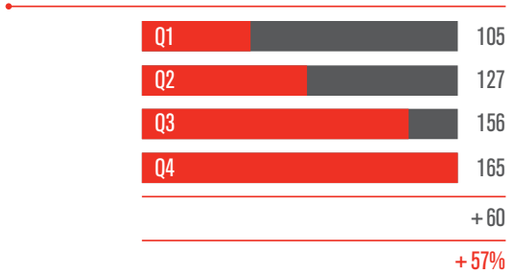


Figure 2
Square Miles included in Sample, 2013



In 2013, ShotSpotter systems detected 51,357 gunshot incidents nationwide.

Figure 3
Gunfire Incidents, 2013

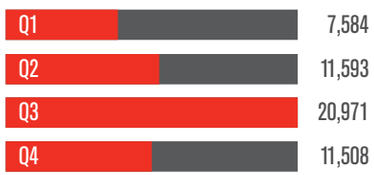
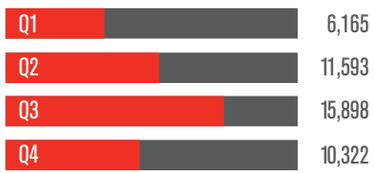


Figure 4
Gunfire Incidents, 2013 excluding July 4th and New Years Eve



Detailed Findings

1. Total Gunshot Data

In 2013, ShotSpotter systems detected 51,357 incidents nationwide, 43,875 (85.4%) of which took place outside of holiday periods.

In Q4 2013, ShotSpotter systems detected 11,508 separate incidents of gunfire. Of these, 1,186 incidents (10.3% of the entire quarterly total) took place during the last 6 hours of the year ("celebratory" gunfire around the New Year). There were 10,322 gunfire incidents not including this holiday period.

Quarterly Gunfire Rates

On a quarterly basis, gunfire not related to holidays peaked at 15,898 incidents in Q3, historically the busiest quarter for gunfire. (see Figure 3 and 4)

Monthly Gunfire Rates

Gunfire incidents increased each month throughout the first half of the year, notwithstanding the high rate of gunfire early on the morning of New Year's Day itself (which accounts for 41.1% of all gunfire in the month of January), and then remained elevated (at or above the levels of January through May) throughout the remainder of Q3. The July 4th Independence Day holiday accounted for a nearly identical percentage of gunfire during the month of July (41.7%) as did New Year's Day during January (41.1%), although the actual number of incidents (5,073) was far greater.

In Q4, gunfire rates dropped dramatically, a seasonal pattern consistent with prior years. Some indications are that gunfire rates may have dropped somewhat more precipitously in 2013 due to the extreme cold weather which gripped much of the country. The six hours leading up to New Year's 2013/2014 once again accounted for a substantial amount of the month's gunfire, totaling 1,186 (26%) of the month's gunfire. (see Figure 5 and 6)

Figure 5
Monthly Gunfire Incidents; all Cities as of January, 2013

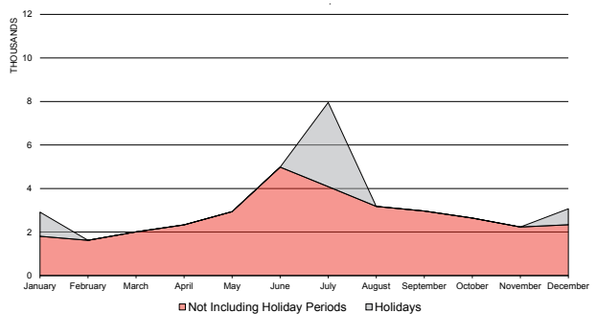
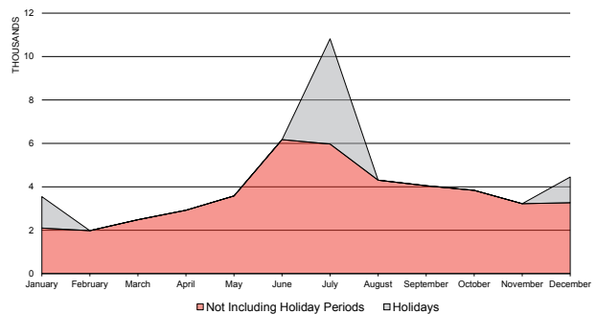


Figure 6
Monthly Gunfire Incidents; including Cities added during 2013



Gunfire rates exhibit strong seasonal trends.
June and July dramatically outstrip all other months.

Figure 7
Monthly Gunfire Incidents

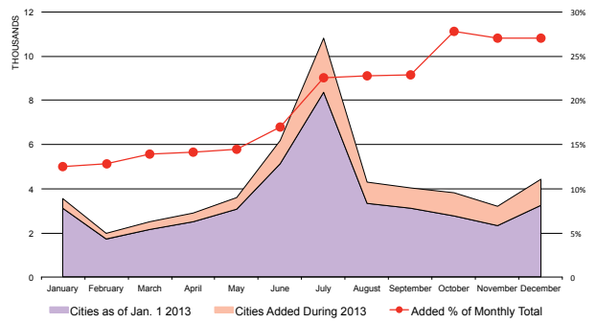


Figure 8
Monthly Gunfire Rates; including Holiday Periods

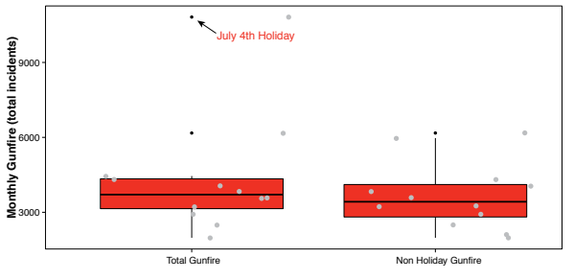
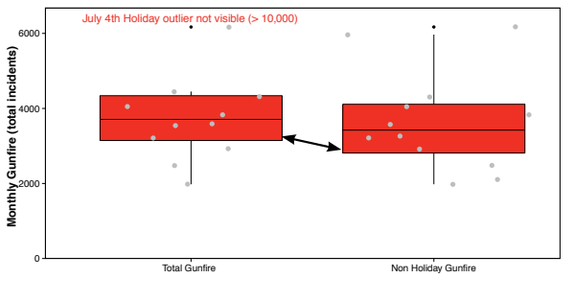


Figure 9
Monthly Gunfire Rates; not including July 4th holiday



Expansion throughout 2013

Fifteen cities deployed new ShotSpotter coverage areas during 2013, and four cities expanded coverage during the year. Therefore overall gunfire rates are biased upwards throughout the year. To correct for this effect, we analyzed the data from those 30 cities which began 2013 with coverage and maintained it throughout the year and compared it to the overall trends. Those data are presented separately below and more accurately reflect the seasonality and month-to-month change in gunfire rate. All told, gunfire detected in cities which added ShotSpotter coverage during 2013 totaled 10,522 incidents, or 20% of the 51,357 gunfire incidents detected nationwide. By the end of the year, cities adding ShotSpotter coverage during 2013 accounted for just over 27% of the overall sample. (see Figure 7)

Taking each month separately, the maximum gunfire rate was 10,819 incidents/month (including holiday periods) and 5,969 incidents/month (excluding holiday periods), across the sample. Additional descriptive statistics are summarized. (see Figure 8)

A closer look at the data not including the July 4th outlier shows the impact of the holidays in general on minimum gunfire rates. (as highlighted with the black arrow in Figure 9)

The number of homicides is a tiny fraction of the total number of gunfire incidents.
In 2013, there were 129 gunfire incidents per homicide.

2. Gunfire and Homicides

Over a 5-year period, an average of 1,125 homicides took place across the cities in the sample for which homicide data were available. We estimate that between 250 and 500 of these homicides took place within the ShotSpotter coverage areas themselves.

Thus cities saw between 97 and 193 gunfire incidents per homicide within the coverage area. We estimate that there were 129 gunfire incidents per homicide. By a similar analysis, the number of rounds (bullets) fired per homicide within the coverage area ranged between 297 and 593, which we estimate to be 396 rounds per homicide. (see Figure 10)

Ratio of: Gunfire to Homicides

Within the cities, the percentage of incidents which occurred within the ShotSpotter coverage area varies widely and is difficult to estimate. However, using homicide-per-capita and population density, it is possible to make an approximation which can be corrected by comparison to the city's overall homicide rate. The number of homicides is vastly lower than the number of gunfire incidents per city. The total number of gunfire incidents detected in 2013 in those cities for which homicide data were available was 48,261. Therefore, the following ratios can be calculated, (see Figure 11).

Figure 10

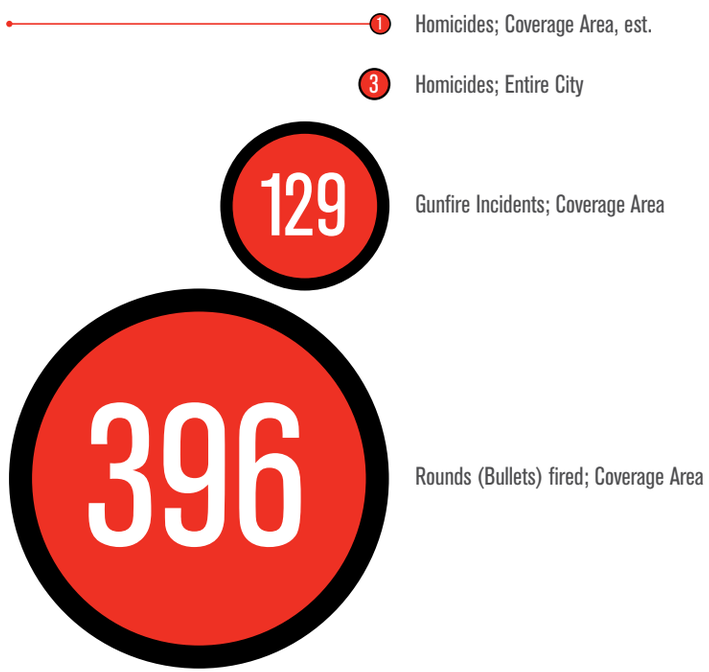
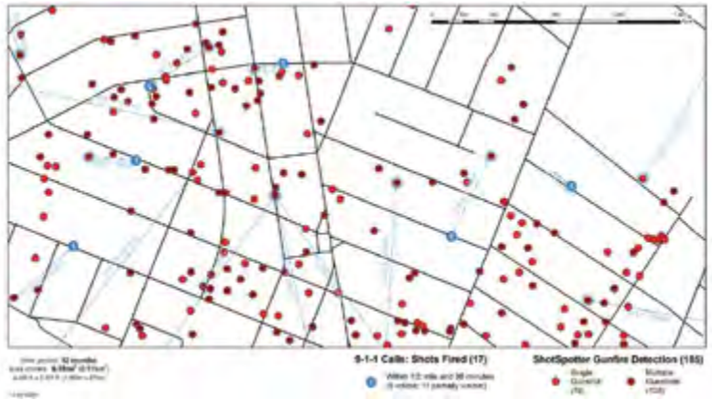


Figure 11
Ratio of: Gunfire to Homicides

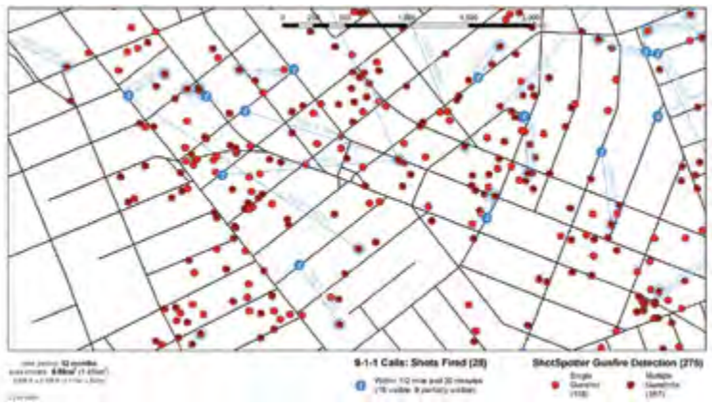
	Entire City	Coverage Ares (est.) Low	Best est.	High
Total Homicides	1,125	250	375	500
Gunfire Incidents	46:1	193:1	129:1	97:1
Rounds per Homicide	142:1	593:1	396:1	297:1

Figure 12
ShotSpotter Detections and 9-1-1 Shots Fired Calls

Sample A) 0.35m², 9.2% Reporting Rate



Sample B) 0.56m², 10.2% Reporting Rate



3. Actual Gunfire Incidents versus Reports to 9-1-1 for Shots Fired

Community members call 9-1-1 at approximately 20% the rate of the actual gunfire, but some of those calls are not related to real gunfire (i.e., they are false alarms). Our analysis comparing real gunfire incidents with related 9-1-1 calls found that only 13% of actual gunfire incidents result in a 9-1-1 call from community members within 30 minutes and one half (½) mile.

A dramatic non-reporting pattern presents itself in the data: those areas which suffer the highest gunfire rates fail to report gunfire, while those which experience lower rates are more likely to report. In particular "micro clusters" of gunfire (20+ incidents at a single intersection) are highly correlated with complete non-reporting.

Because no source of data of actual gunfire was ever available prior to the deployment of ShotSpotter technology, no statistical analysis of gunfire versus 9-1-1 call rates has previously been possible. Thus this Index reports the first accurate comparison of 9-1-1 calls to actual gunfire. Moreover, because the sound of gunfire resonates over a large physical area (it can often be heard at a distance of a mile or further), and because 9-1-1 callers do not typically provide detailed information (such as the number of guns being fired, the number of rounds fired, etc.), it can be very difficult for law enforcement to respond effectively to a 9-1-1 report: how, for example, does a police officer effectively respond to a call for "shots fired" from a citizen a full mile from an incident?

To perform our analysis, SST acquired 9-1-1 call data and compared it to ShotSpotter detections in the same geographic areas. Our analysis was limited to a single city with a large coverage area (greater than 10 square miles) and a high incident rate (several thousand gunfire incidents per year) and spanned a two-year (24-month) period).

There were just under 10,000 calls to 9-1-1 regarding shots fired throughout the entire city. In this city, ShotSpotter technology covered 25% of the land mass and detected 8,769 incidents (i.e., 88% of the city total in 25% of the land mass). Of those 10,000 calls to 9-1-1 regarding shots fired, only 8.8% took place within ¼ mile and 15 minutes, and another 4.2% took place within the further ¼ mile and 15 minutes (i.e. 1,136 or 13% were made within ½ mile and 30 minutes). Visualizing the relationship between 9-1-1 calls and actual gunfire incidents detected by ShotSpotter provides a compelling picture of the challenge presented to law enforcement in attempting to respond to 9-1-1 calls which often occur at great distances. (see Figure 12)

Average Distance and Delay

On average, a 9-1-1 call within ½ mile and 30 minutes of an actual gunfire incident is reported at a distance of 258 meters (~850 feet, approximately 0.2 miles). As the figures show, outlier distances far in excess of this average are common: the 780 foot average distance of 9-1-1 calls from actual gunfire is precisely that: an average. Many calls come from much further away, as the maps show clearly. Police officers responding to such calls must search impractically large areas. (see Figure 13)

Sample C) 0.56m², 10.9% Reporting Rate

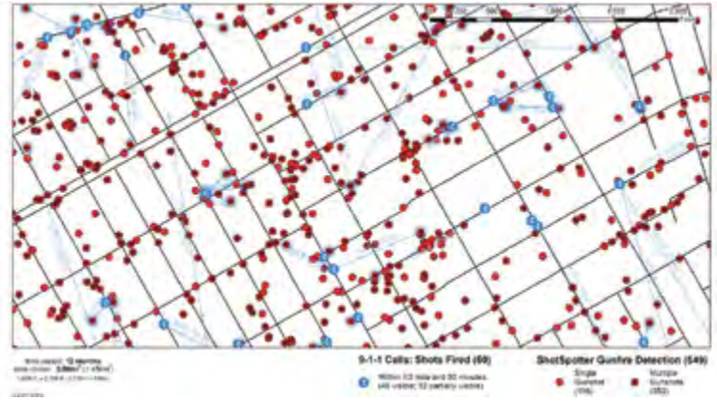


Figure 13
Search Areas

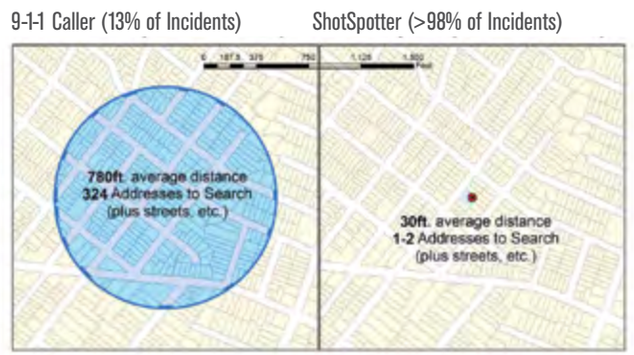


Figure 14
Average Gunfire Incidents per Square Mile, 2013

Figure 15
Average Gunfire Incidents per Square Mile, 2013 excluding holiday periods

Figure 16
Highest Gunfire Incidents per Square Mile, 2013

Figure 17
Highest Gunfire Incidents per Square Mile, 2013 excluding holiday periods

4. Gunfire Incidents per Square Mile

Gunfire incidents per square mile provide an opportunity to compare gunfire rates across cities regardless of coverage area.

The city with the highest rate of gunfire per square mile during 2013 experienced an average of 1,137 gunfire incidents in a single square mile area (3.1/day). This city's gunfire rate per square mile was 3.6 times higher than the average number of incidents of 319/m². Excluding holiday periods, the city with the highest rate of gunfire experienced 1,065 gunfire incidents per square mile, 3.9 times higher than the national average of 273/m².

As with raw incident counts, the average number of incidents per square mile displayed noticeable seasonality across quarters. Rates in Q4 returned to approximately those of the prior Q1, whereas summer gunfire rates (reflected by Q2 and Q3) are approximately 35% higher. (see Figures 14-17)

Excluding holidays, the median incident rate per square mile was 280/mi² in 2013, somewhat below the average of 319. This indicates that the distribution is positively skewed by several high scores (which are evident in the histogram below). The seven highest rates (between 500 and 1,200/mi²) lie outside the first standard deviation, thus substantially increased the average over the median and skewing the distribution. Because these measures are of gunshot density per square mile, not total across the city, it can safely be concluded that gunfire in these particular cities is not just slightly but rather dramatically worse than the average case.

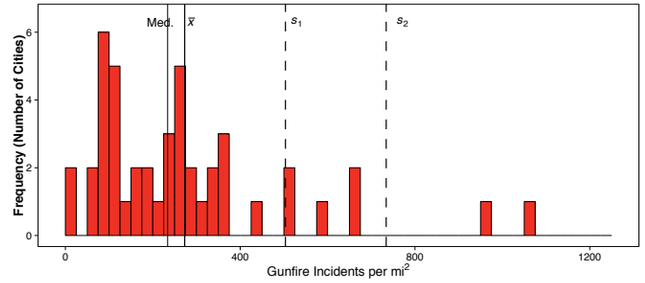
The city with the highest rate of gunfire per square mile experienced an average of 3.1 gunfire incidents (8.2 rounds) per square mile per day.

The highest gunfire rate in a city is notable for exceeding the average by just under 3 standard deviations. (It is, thus, a "three sigma outlier.") Excluding high incident outliers, the data appear somewhat more evenly distributed but nonetheless concentrated around incident rates between 30 and 100 per square mile (i.e., below the average rate).

Of particular note is that while the average city saw its gunfire per square mile rise meaningfully during holiday periods (from 273/mi² to 319/mi², or 17%) and while the worst city saw a larger gross increase (1,065/mi² to 1,137/mi²), the percentage increase, and thus the relative impact, was much lower (only 6.7%) in the worst city. (see Figure 18)

Thus gunfire rates are so high in these outlier cases that even a gross increase in holiday gunfire rates roughly twice the nationwide average periods is barely distinguishable from the "normal" (read: already very high) gunfire rates.

Figure 18
Annual Gunfire Rate in Individual Cities Sampled; per Square Mile



The Midwest saw the highest average illegal gunfire rates (per square mile), as well as the highest overall gunfire rate.

Regional Differences

As the sample size grows, regional variations in gunfire rate are beginning to make themselves evident. The average number of gunfire incidents per square mile per year is higher in the Midwest than any other region, whereas the rest of the country shows remarkably similar average rates. Highest rates are, necessarily, outlier phenomenon and, as expected, differ much more widely. (see Figures 19-22)

Figure 19
Average Incident Rate per m^2; Census Region

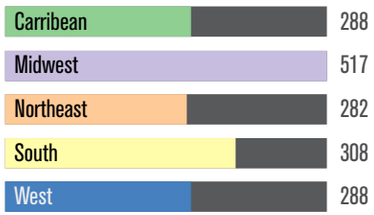


Figure 20
Highest Incident Rate per m^2; Census Region

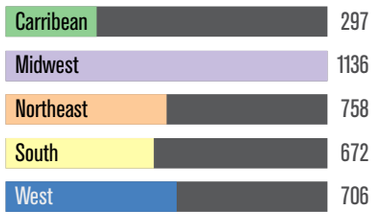


Figure 21
Average Incident Rate per m^2; Census Division

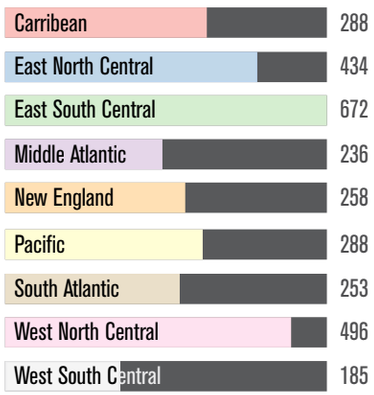
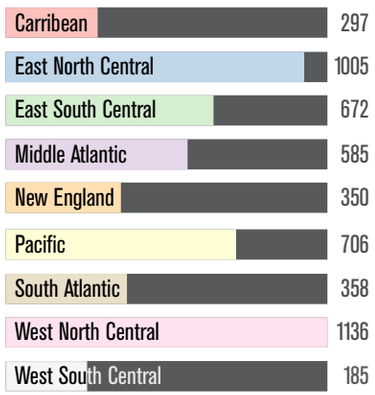


Figure 22
Highest Incident Rate per m^2; Census Division



The highest rate of gunfire experienced in a single month (in a single specific square mile) was 337 incidents.

5. Most Concentrated Gunfire Area

The highest city-wide average rate of gunfire per square mile experienced in a single month was 195 incidents during the month, with 399 rounds fired in June and 449 rounds fired in July, not including the July 4th holiday.

Such gunfire rates can be difficult to visualize. This average incident rate per square mile across the city can vary widely from one area to another within the same city. For example, the following map shows an area in a city with high gunfire rates per square mile. The city averaged some 90 incidents per square mile across its coverage area (well over 5 mi^2), but this particular one square mile (1 mi^2) area saw an even higher total of 337 in a single month. The area of the circle in the image shown is 1 mi^2. The area below is roughly 8 blocks in North to South and 16 blocks West to East. (see Figure 23)

Figure 23
Gunfire in 1 mi^2, July 2013 (not including July 4th Holiday)

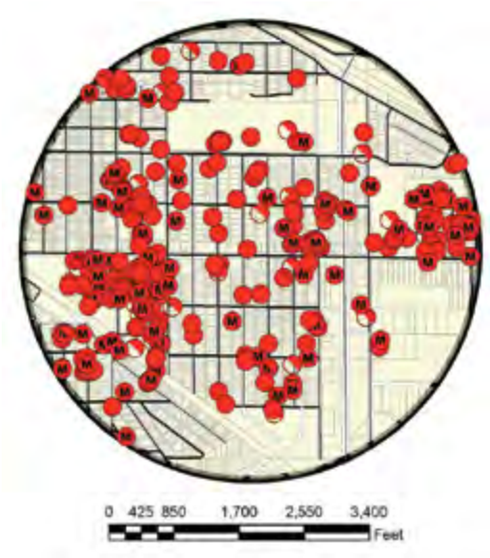
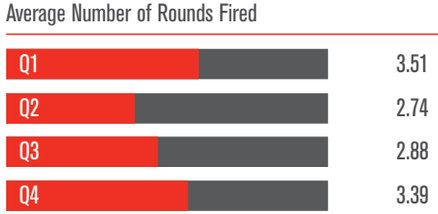


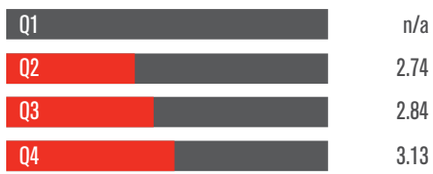
Figure 24
Total Number of Rounds Fired

Total Number of Rounds Fired, exluding Holiday Periods

Figure 25
Average Number of Rounds Fired



Average Number of Rounds Fired, exluding Holiday Periods



Average Number of Rounds Fired, July 4th Holiday

6. Rounds Fired

A total of 159,696 rounds were fired in the 51,357 incidents detected during 2013. Holiday periods accounted for 30,077 (19%) of all rounds fired.

On average, 3.1 rounds were fired per incident in 2013. That average was substantially higher on holidays (4.01 per incident) than non-holidays (2.95). One single incident included 57 rounds fired by a semi-automatic weapon with a high capacity magazine. It occurred at 2:30 am local time early on the morning of August 4, 2013. The 57 rounds were fired in 12.8 seconds.

The city which experienced the largest number of rounds fired saw 16,566 bullets fired in 4,241 gunfire incidents (an average of 3.9 rounds per incident) in 2013. That city experienced shootings at a rate of 45 rounds and 11.6 shootings per day.

On a per square mile, the city with the highest single square mile rate experienced 3,216 bullets fired in just that single square mile, or approximately 9 bullets every single day within that single square mile.
(see Figures 24+25)

July is the month in which the greatest number of rounds are fired, by far, even after adjusting for the July 4th holiday.

Rounds Fired in Most Concentrated Area

July is the month in which the greatest number of rounds are fired, by far, even after adjusting for the July 4th holiday.

The average number of rounds fired per incident in area identified in Section 4 was 2.6, slightly below the national average of 2.74 (see next section). Viewing the map on a rounds fired basis by increasing the size of each red incident icon based on the number of rounds fired and overlaying a geospatial kernel density map provides a striking picture of those areas with a very high number of rounds fired. (see Figure 26)

Figure 26
Rounds Fired in Most Concentrated Area

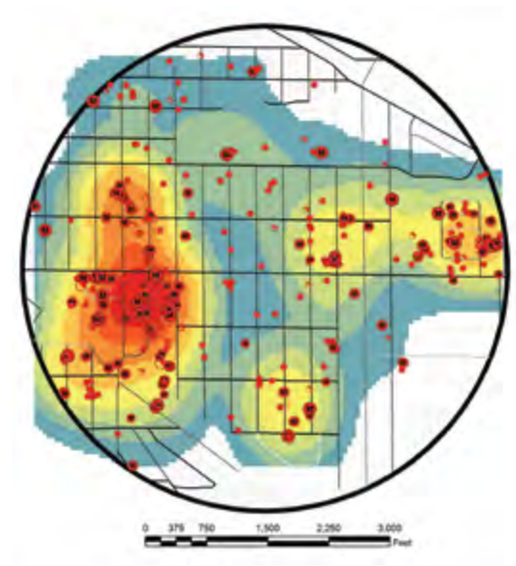


Figure 27
Average Rounds per Incident; by City

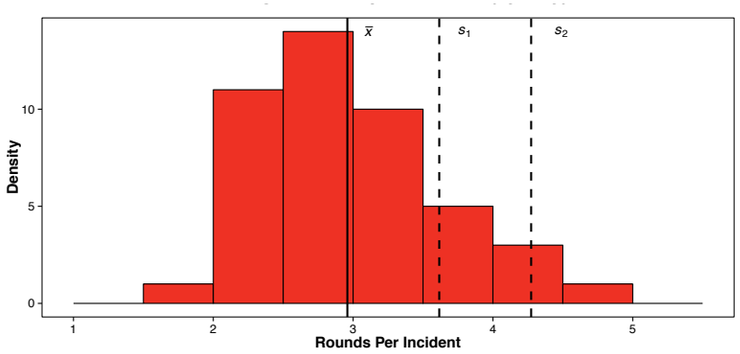
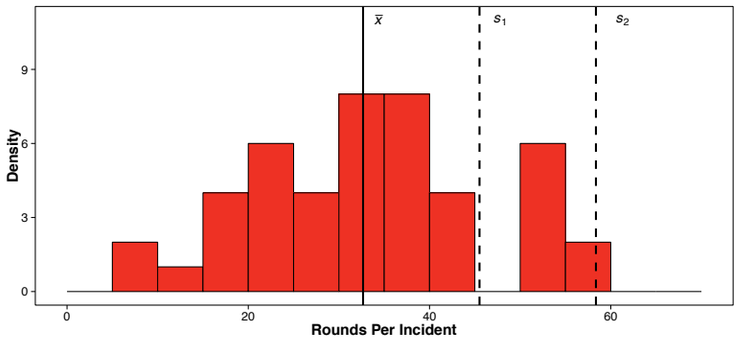
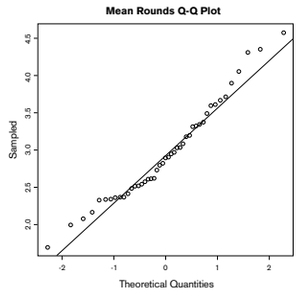


Figure 28
Maximum Rounds per Incident; by City

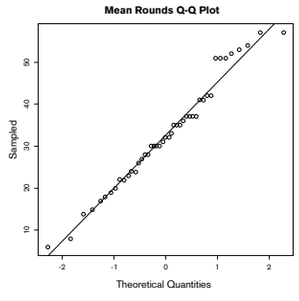


Average and Maximum Number of Rounds Fired

The number of rounds fired on average remained tightly grouped across all cities and appears normally distributed:



By contrast, the maximum number of rounds varied dramatically, from 9 in the lowest case to the 57 identified above:



There appears to be a moderate yet statistically significant ($p < 0.0006$) relationship between the average number of rounds fired in any given city (per incident) and the maximum number of rounds fired, as can be seen in the following scatter plot. (see Figure 29)

Figure 29
Average versus Maximum Gunfire Rounds

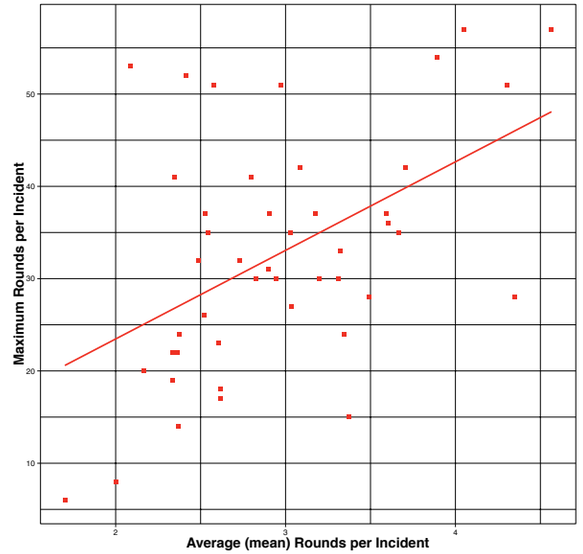


Figure 30
Average Rounds per Incident; by Census Region

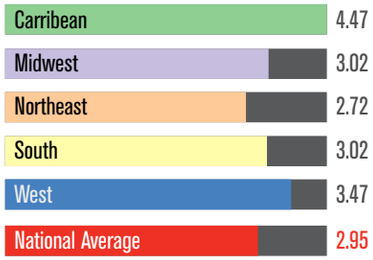
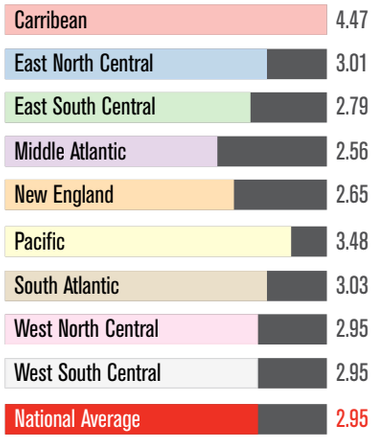


Figure 31
Average Rounds per Incident; by Census Division



Moreover, there was a marked difference in the average number of rounds fired per incident across different regions of the country, with the Caribbean/Atlantic region displaying average rounds per incident well above the national average. (see Figures 30-33)

Figure 32
Average versus Maximum Gunfire Rounds; by Census Region

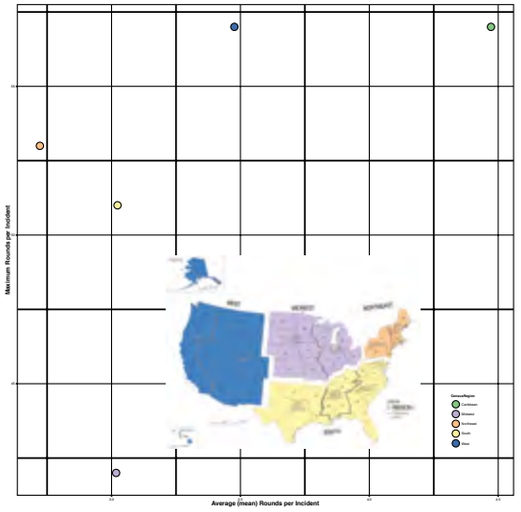


Figure 33
by Census Division

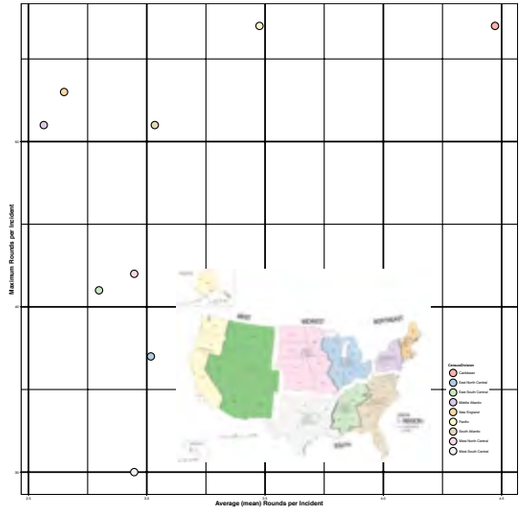
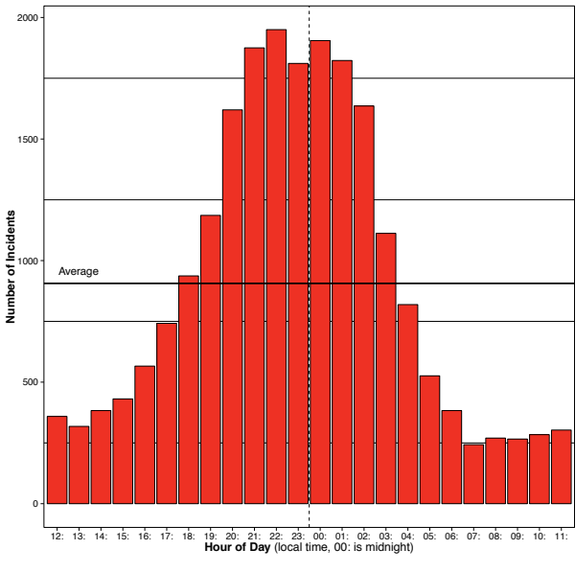


Figure 34

Number of Incidents by Hour of Day; Local Time



7. Time of Day

The busiest hour of the day for gunfire is 10:00 pm to 11:00 pm local time. 49% of gunfire takes place in the eight hours between 4:00 pm and midnight local time. 21% of gunfire takes place between midnight and 3:00 am.

Gunfire rates per hour show busiest hours between 20:00 and 03:00 local time each day. The hour with the lowest rate of gunfire (07:00 local) begins a slow increase towards higher rates beginning at 16:00 (4:00 pm) local time. (see Figure 34)

Some differences were evident between Central and East Coast regions in comparison to the West Coast: gunfire tends to peak before midnight on the West Coast, whereas it tends to continue at or close to its highest levels until 2:00 am or 3:00 am local time on the East Coast and in the Central parts of the country. Gunfire in the Atlantic timezone (Caribbean) region tends to peak far later in the night. (see Figures 35+36)

Gunfire peaks between 10:00 pm and 2:00 am local time.
The West Coast peaks earlier and the Caribbean peaks later than other regions.

Figure 35

Incidents by Hour of Day; Local Time

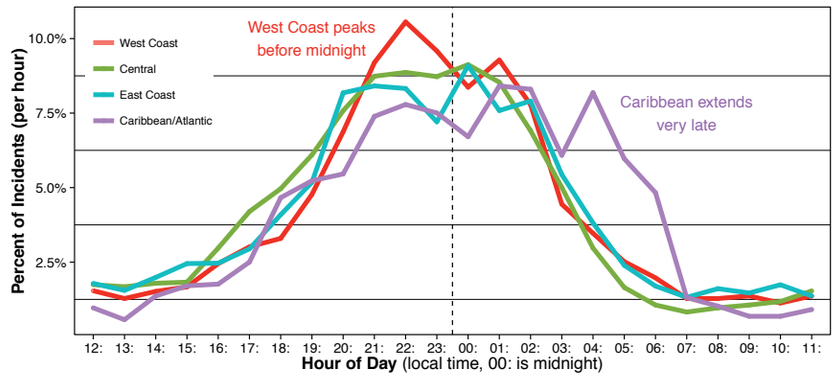
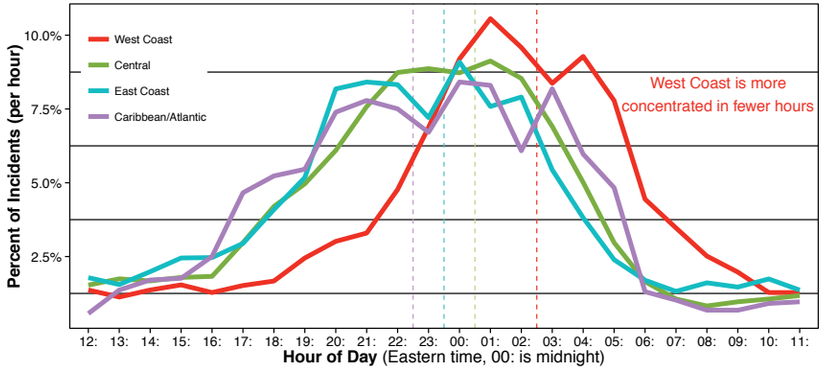


Figure 36

Incidents by Hour of Day; Eastern Time



Gunfire rates are 40% higher on weekend nights than on weekdays.

Figure 37
Gunfire Incidents; Total

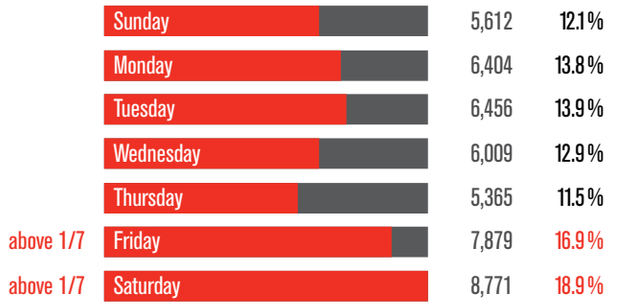


Figure 38
Gunfire Incidents; per Night

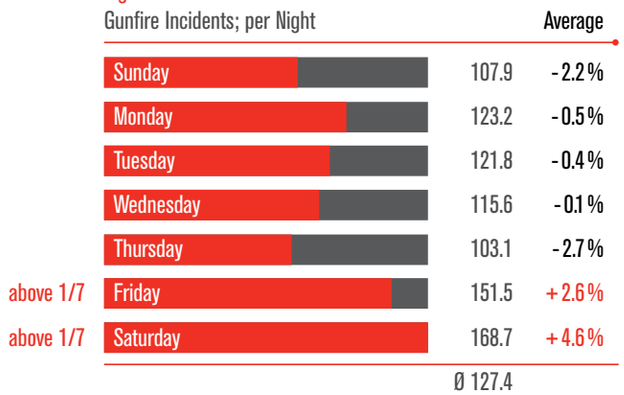


Figure 39
Weeknight versus Weekend Night Incident Rate

8. Day of Week

Gunfire rates were 25% higher than average on Friday and Saturday nights. Friday, Saturday, or Sunday nights together accounted for 51% of all weekly gunfire.

35.8% of gunfire takes place on Friday and Saturday nights alone. (see Figures 37+38)

The rate of gunfire on weekend nights is approximately 40% higher on weekend nights than it is on weekday nights, and 25% higher than average. (see Figure 39)

There was an average of 1 incident every 10 minutes nationwide on Friday and Saturday nights from 10:00 pm until the next morning at 2:00 am–every week.

9. Day and Hour of the Week

Friday and Saturday nights (continuing into Sunday morning) were the busiest periods for gunfire by a substantial margin. Gunfire peaks on Saturday night between 22:00 local and midnight, continuing until Sunday at 02:00 am local time.

The following table identifies the total number of gunfire incidents per hour of the week throughout the weeks of 2013, excluding holiday periods. (see Figures 40+41)

Figure 40
Total of all Incidents per given Hour/Day Combination, 2013

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
Sunday	58	49	75	118	149	159	256	220	230	219	200	189
Monday	76	62	100	126	135	207	229	220	197	238	199	189
Tuesday	62	72	96	122	150	156	198	204	222	262	251	200
Wednesday	43	67	93	135	146	235	186	269	222	225	212	193
Thursday	52	60	81	101	147	188	233	227	260	252	246	234
Friday	66	50	72	75	124	204	205	250	268	396	404	389
Saturday	66	68	90	130	136	201	205	277	285	347	419	425

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
Sunday	372	352	273	112	78	49	57	40	40	34	49	70
Monday	162	115	76	55	24	24	32	36	42	29	77	44
Tuesday	148	111	76	47	36	40	49	30	36	59	40	40
Wednesday	160	130	70	49	54	34	32	21	25	47	33	44
Thursday	145	81	75	45	28	36	30	48	32	33	38	45
Friday	144	129	81	47	38	38	36	45	33	45	34	60
Saturday	361	303	210	130	101	88	51	65	62	79	60	69

Figure 41
Average Incidents per given Hour/Day Combination, 2013

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
Sunday	1.12	0.94	1.44	2.27	2.87	3.06	4.92	4.23	4.42	4.21	3.85	3.63
Monday	1.46	1.19	1.92	2.42	2.60	3.98	4.40	4.23	3.79	4.58	3.83	3.63
Tuesday	1.17	1.36	1.81	2.30	2.83	2.94	3.74	3.85	4.19	4.94	4.74	3.77
Wednesday	0.83	1.29	1.79	2.60	2.81	4.52	3.58	5.17	4.27	4.33	4.08	3.71
Thursday	1.00	1.15	1.56	1.94	2.83	3.62	4.48	4.37	5.00	4.85	4.73	4.50
Friday	1.27	0.96	1.38	1.44	2.38	3.92	3.94	4.81	5.15	7.62	7.77	7.48
Saturday	1.27	1.31	1.73	2.50	2.62	3.87	3.94	5.33	5.48	6.67	8.06	8.17

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
Sunday	7.15	6.77	5.25	2.15	1.50	0.94	1.10	0.77	0.77	0.65	0.94	1.35
Monday	3.12	2.21	1.46	1.06	0.46	0.46	0.62	0.69	0.81	0.56	1.48	0.85
Tuesday	2.79	2.09	1.43	0.89	0.68	0.75	0.92	0.57	0.68	1.11	0.75	0.75
Wednesday	3.08	2.50	1.35	0.94	1.04	0.65	0.62	0.40	0.48	0.90	0.63	0.85
Thursday	2.79	1.56	1.44	0.87	0.54	0.69	0.58	0.92	0.62	0.63	0.73	0.87
Friday	2.77	2.48	1.56	0.90	0.73	0.73	0.69	0.87	0.63	0.87	0.65	1.15
Saturday	6.94	5.83	4.04	2.50	1.94	1.69	0.98	1.25	1.19	1.52	1.15	1.33

Figure 42
Gunfire Busiest Periods

Rank	Day (ranked)	Total Gunfire	Day	Hour (Pacific, ranked)	Total Gunfire
1	21-Jul	222	22-Jul	18:00	60
2	22-Jul	213	21-Jul	23:00	39
3	25-Aug	199	3-Aug	22:00	37
4	1-Dec	199	1-Sep	22:00	32
5	28-Jul	195	4-Aug	23:00	31
6	15-Sep	192	21-Jul	22:00	30
7	21-Oct	191	3-Nov	23:00	29
8	4-Aug	188	25-Aug	23:00	29
9	20-Oct	187	27-Jul	21:00	29
10	27-Jul	184	17-Sep	18:00	28

10. Busiest Periods

Outside of the holiday periods, the busiest hour for gunfire during the period was Saturday night between 11:00 pm and midnight local time, when some 425 incidents were detected nationwide throughout the year. Again excluding holiday periods, July 21, 2013 was the busiest day for gunfire was in 2013, accounting for some 222 incidents across all time zones.

During the single hour between midnight and 1:00 am Eastern time on July 5th (9:00 pm to 10:00 pm on July 4th, Pacific time), 1,276 separate incidents of gunfire were detected.

The busiest hour outside of the holiday period occurred between 9:00 pm and 10:00 pm East Coast Time on July 22, when 60 gunfire incidents occurred across the sample, or more than one per minute.

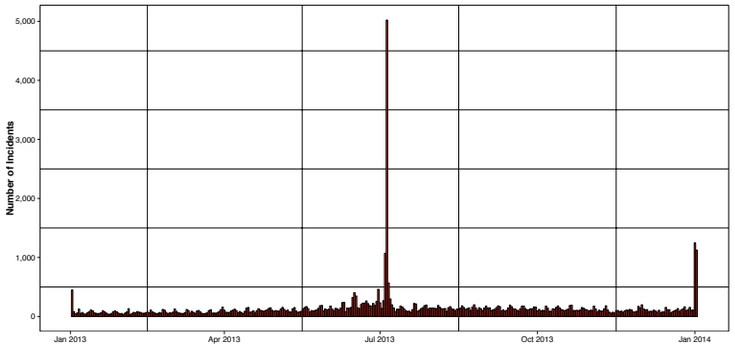
Gunfire typically reaches peak levels in the summer months, as detailed in prior sections, so it is not surprising to see that four of top ten days for gunfire activity were in July. The remainder of heavy gunfire days are distributed throughout the second half of the year, in part due to the expansion of coverage areas and communities covered throughout the year.

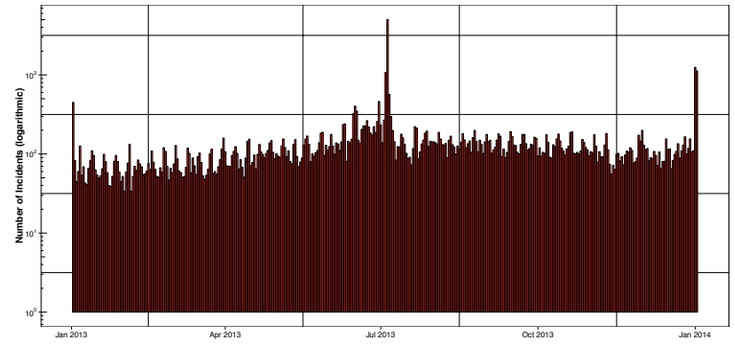
Of the top specific hours (i.e., single hours on single days), six took place on days which themselves fell in the top 10 busiest days of the year. (see Figure 42)

Of the top specific hours (i.e., single hours on single days), six took place on days which themselves fell in the top 10 busiest days of the year.

Gunfire activity rates for the entire year are shown in the figure below. (Note that these counts do not include the 210,000 some-odd incidents of fireworks or other pyrotechnics detected and filtered out by ShotSpotter systems during the first two weeks of July, or similar events which took place throughout the year.) The massive increase in gunfire around the July 4th and New Year's Eve/Day holidays is remarkable, as is the relative scale of each holiday. (see Figure 43)

Figure 43
Gunfire Rate by Day, 2013





Population and Community Demographics

Approximately 1,138,000 people live in the 44 communities and 165 square miles of the US sampled. Unemployment averaged 13.5% in these areas during 2011, approximately 4.6% above the US national average of 8.9% during the same period.

Figure 44
Communities by Census Region

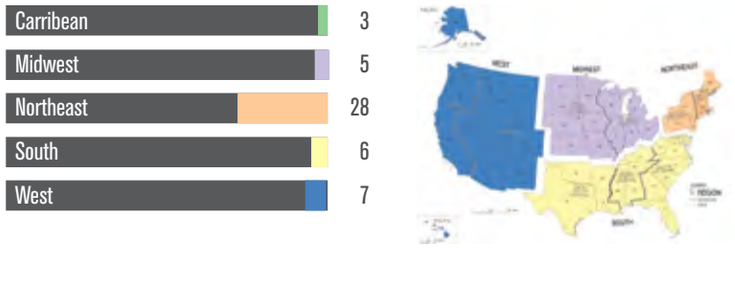
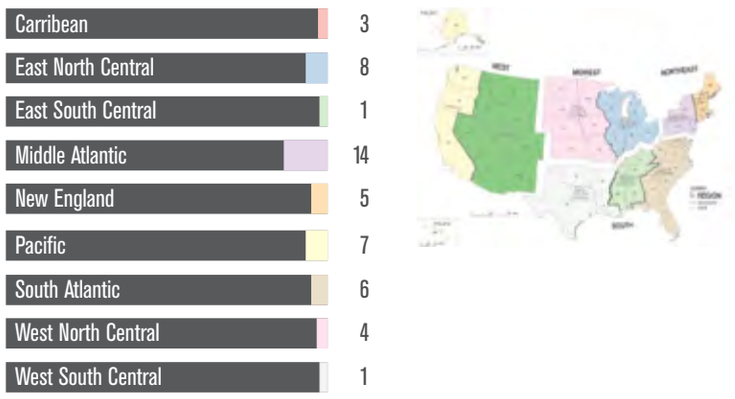


Figure 45
Communities by Census Division



The average population density in the sample was 6,977 individuals per square mile, slightly above the national average density of 6,320 for those living in cities

Population

The approximately 1,138,000 people who live in the sample would, if grouped as a single city, constitute the 10th largest city in the United States (falling between #9 Dallas, TX with 2013 estimated population of 1,241,162 and current #10 San Jose, CA with 2013 estimate 982,765).

ShotSpotter coverage areas are selected jointly by community government, law enforcement officials, and SST. There is therefore an a priori bias towards area perceived to have elevated levels of gunfire activity. These areas typically experience somewhat higher violent crime rates in general.

The sample is taken from cities in which ShotSpotter technology is deployed. The sample intentionally excludes cities outside of the United States, but includes US territories and other possessions. To protect customer confidentiality, the names of cities within the sample are not released.

Regional Distribution

The communities are not evenly distributed across the regions and districts defined by the US Census Bureau. Communities in the Northeast census region and Middle Atlantic census division substantially outnumber communities elsewhere (but the total square mile area covered in those cities do not—see next section).

The entire coverage area for each community in the sample is included. The median coverage area size in Q4 was 3.1 square miles. Most customers (the first standard deviation) fell between 1.5 and 6.0 square miles, which decreased slightly from 1.4 and 6.2 square miles in Q3, respectively. The average (mean) coverage area increased slightly in size from 3.7 square miles in Q3 to 3.8 square miles in Q4, reflecting primarily the addition of three new cities with similar, 3.0 square-mile coverage areas during Q4. (see Figures 46+47)

Figure 46
Square Miles sampled (mi^2)

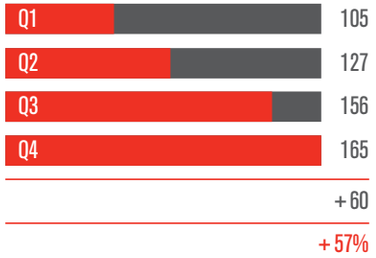


Figure 47
Average Coverage Area Size per Community sampled (mi^2)

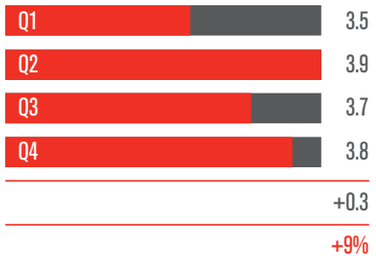


Figure 48
Community Coverage Area Sizes by Census Region

Figure 49
Community Coverage Area Sizes by Census Division

The number of square miles covered per city is shown in the two charts following, one each colored by census region and division. (see Figures 48+49)

The distribution and quantity of coverage areas and their respective sizes changed noticeably between Q1 and Q4, as the following histograms illustrate.
(see Figures 50+51)

Figure 50
Coverage Area Size (Histogram) as of January 1st, 2013

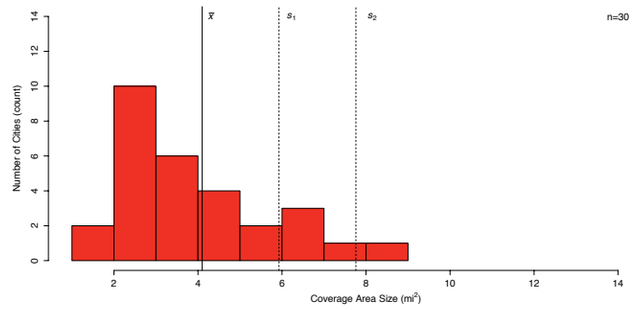


Figure 51
Coverage Area Size (Histogram) as of December 31st, 2013

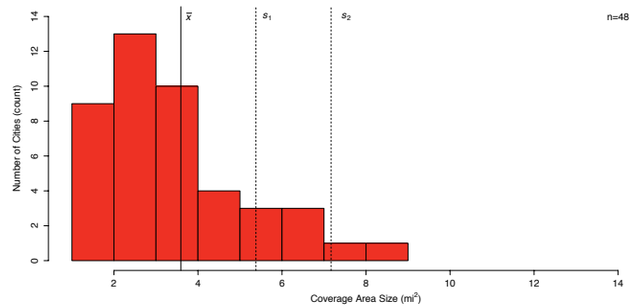


Figure 52
Coverage Area Size by Census Region

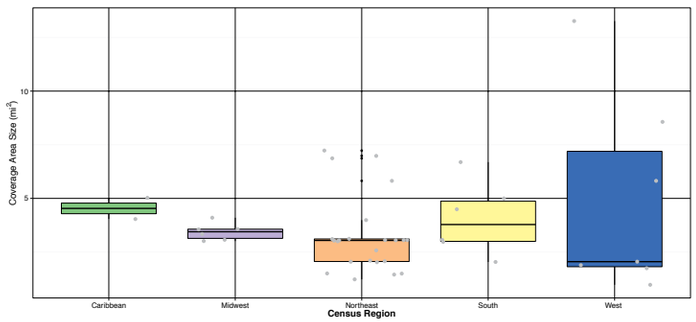
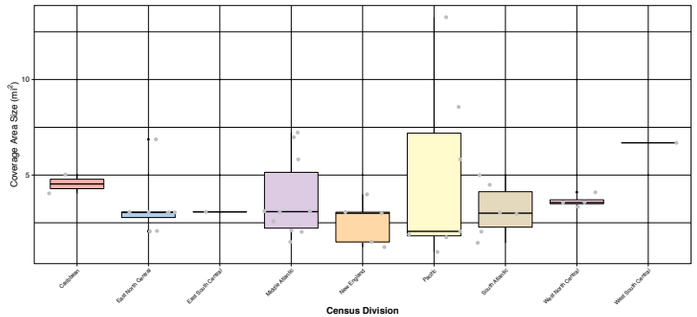


Figure 53
Coverage Area Size by Census Division



Coverage areas are not evenly distributed across the country. To illustrate the variability in coverage area size, we grouped cities within the sample along the 4 US Census "Regions" and the 9 US Census "Divisions," to which we added a single region and division for the Caribbean, for which the Census Bureau does not have a corresponding grouping but which constitute a meaningful subset of ShotSpotter coverage areas. (see Figures 52+53)

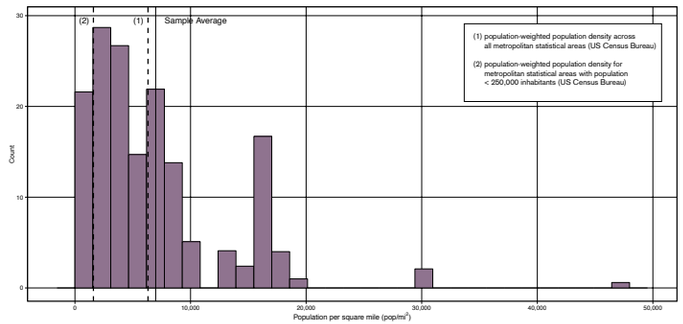
Community Demographics

The areas sampled suffer from other demographic symptoms of violent crime, including high unemployment rates and homicide rates. Of particular note is the substantially higher unemployment rate in these areas, compared to the nation as a whole. (see Figure 54)

Population densities within the sample were on the whole unremarkable when compared to those of the majority (84%) of the United States population which lives within what the US Census Bureau refers to as "Metropolitan Statistical Areas." The nationwide average population density of such areas is 6,320 inhabitants per square mile; the sampled population had a weighted mean population density of 6,985 persons per square mile, approximately 11% higher than the national average, consistent with the tendency for ShotSpotter coverage areas to be selected in urban centers where their utility can be maximized. (see Figure 55)

Figure 54
Unemployment Rate (%)

Figure 55
Population Density within Sample



Gunfire incident rate per square mile is highly correlated to unemployment rate.

Figure 56
Gunfire Incidents and Unemployment Rates

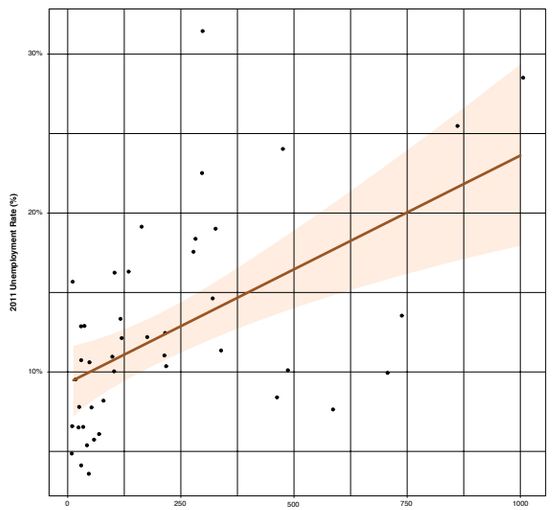
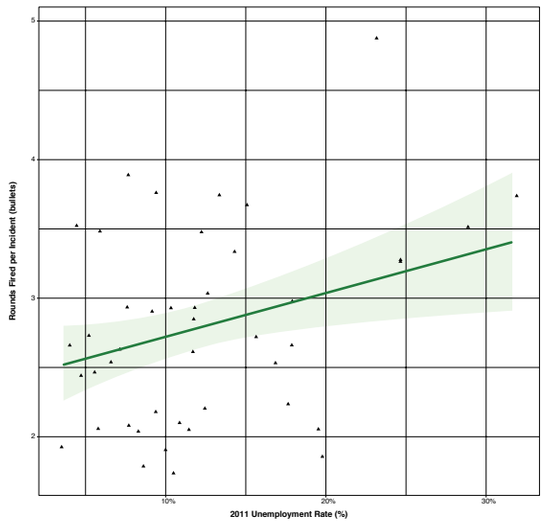


Figure 57
Gunfire Rounds (Bullets) per Incident and Unemployment Rates



Correlation Between Illegal Gunfire and Community Demographics

Because ShotSpotter coverage areas are commonly deployed so as to maximize their likely coverage of high crime areas, community demographics are likely to demonstrate patterns consistent with areas of higher crime and unemployment. Nevertheless, noticeable trends were evident within the sample, some of which proved statistically significant.

Gunfire incident rate per square mile is highly correlated to unemployment rate, as this figure demonstrates. (see Figure 56)

A somewhat counterintutive but nonetheless statistically significant (p-value = 0.012) analysis also indicates that the average number of rounds (i.e. bullets) fired during an incident is also correlated with unemployment rate.

In this case, the correlation coefficient calculated was somewhat strong: p=0.34 at p-value of 0.012, indicating a moderate correlation with statistical significance between the unemployment rate and the number of rounds fired in any given incident. (see Figure 57)

Methodology and Notes

Communities were counted as included in the sample if SST Incident Review Center monitoring of those systems began on or before the last day of the respective quarter (i.e., March 31 for Q1/2013, June 30 for Q2/2013). In all cases, incidents were counted only after formal qualification and operational use of ShotSpotter data by the client agency began, even if gunfire or other incidents were detected previously. Incidents were counted as gunfire if they were classified as Single Gunfire, Multiple Gunfire, or Possible Gunfire by SST-certified review personnel. All other incident types (fireworks, firecrackers, explosions unrelated to gunfire, transformer explosions, thunder, lightning, helicopters, etc.) were excluded from all statistics presented in this report.

ShotSpotter installations nationwide, of which the sampled communities constitute a subset, include those in Amityville, NY; Atlantic City, NJ; Baton Rouge, LA; Bayamón, PR; Bell Gardens, CA; Belle Glade, FL; Bellport, NY; Birmingham, AL; Boston, MA; Brentwood, NY; Brockton, MA; Camden, NJ; Canton, OH; Charlotte, NC; Chicago, IL; East Chicago, IN [sic]; East Orange, NJ; East Palo Alto, CA; Fall River, NJ; Freeport, NY; Gary, IN; Glendale, AZ; Gretna, LA; Hartford, CT; Hempstead, NY; Huntington Station, NY; Jackson, MS; Jefferson Parish, LA; Kansas City, MO; Los Angeles, CA; Miami Gardens, FL; Miami-Dade, FL; Milwaukee, WI; Minneapolis, MN; Montgomery, AL; Mt. Vernon, NY; Nassau County, NY; New Bedford, MA; New Haven, CT; Newark, NJ; Oakland, CA; Omaha, NE; Paterson, NJ; Peoria, IL; Plainfield, NJ; Prince George's County, MD; Quincy, WA; Redwood City, CA; Richmond, CA; Riviera Beach, FL; Rochester, NY; Rocky Mount, NC; Roosevelt, NY; Saginaw, MI; St. Croix, USVI; St. Thomas, USVI; San Francisco, CA; San Juan, PR; San Pablo, CA; South Bend, IN; Springfield, MA; St. Louis, MO; St. Louis, MO; Stockton, CA; Suffolk County, NY; Trujillo Alto, PR; Uniondale, NY; Washington, DC; Wilmington, DE; Wilmington, NC; Worcester, MA; Wyandanch, NY; Yonkers, NY; Youngstown, OH.

ShotSpotter data does not remain static, as information and adjustments are often made several days or weeks after initial detection (as forensic evidence is analyzed, cases are investigated, etc.). After publication of the Q2 report in early July, 2013, additional information on a small number of incidents became available. Throughout this report, figures for each of the quarters previously reported in quarterly index reports have been corrected to reflect these updated data, and comparisons from one quarter to another therefore take into account the most accurate and recently-available information.

1. Square mileage is measured on the basis of contractual coverage area. For each such area, the geographic area is defined as the convex hull surrounding each coverage area. In some cases, small areas within these coverage areas are intentionally excluded when gunfire is regularly expected in those specific locations (e.g. a legal outdoor shooting range or police practice range). In those cases, gunfire which takes place in those locations outside of authorized areas is still included in the tallies, but gunfire which takes place during permitted (expected) periods is not included.

   Descriptive statistics for each quarter's samples follow:

	M	s	$-1\tilde{x}$ $(\tilde{x}-s)$	$+1\tilde{x}$ $(\tilde{x}+s)$
Q1	3.476	3	2.001	1.475	5.478
Q2	3.872	3	2.544	1.329	6.417
Q3	3.803	3.1	2.363	1.440	6.166
Q4	3.592	3.05	1.788	1.804	5.380

   The sample included two cities whose coverage area increased (expanded) from Q1 to Q2 2013, three cities whose coverage area increased (expanded) from Q2 to Q3, and one city whose coverage area expanded from Q3 to Q4 2013. During Q3, an audit was performed comparing the actual coverage area against contractual records. In approximately 25% of the cases, the actual coverage area was found to be slightly larger than contractually required (for example, 3.1mi² actual, 3.0 mi² contractual). In one case, the audit identified a single coverage area which measured 3.0mi² contractually but, in fact, covers 3.5mi². By coincidence, this coverage area had the highest rate of gunfire per square mile in 2, both when measured as a 3.0mi² area and as a 3.5mi² area after the calculations were adjusted. The rate per square mile in 2 was reported as 417 incidents per square mile during the period, based on a 3.0mi² coverage area; the figure has been corrected in this report to 352 incidents per square mile, based on an actual 3.5mi² coverage area. The change in denominator did not change the ranking: this city retained its rank as the highest gunfire rate per square mile.

2. Gunfire incidents were counted if the local time in the time zone of their occurrence was for Q1 between 00:00:00 standard time (i.e., midnight) on January 1, 2013 and 23:59:59 daylight saving's time on March 31, 2013 (i.e., 1 second before midnight on April 1, 2013). Gunfire was assigned to "New Year's Morning" if it occurred in the first 6 hours of this period, i.e., between 00:00 on January 1 and 06:00 on January 1. For Q2, gunfire incidents were counted if they occurred between 00:00:00 local daylight saving's time on April 1 and 23:59:59 local time on June 30, 2013. For the purposes of clarity by example, due to this time zone adjustment an incident occurring, for example, at 02:10 local time in New York on the morning of July 1 would be counted as a Q1 event, even though this incident was reviewed by the SST IRC at 23:10 Pacific Daylight Time (PDT) on the prior day (June 30). For Q3, gunfire incidents were counted if they occurred between 00:00:00 local daylight saving's time on July 1 and 23:59:59 local daylight saving's time on September 30, 2013. For this and other sections except §8-11, the July 4 holiday period was considered to begin at 12:00 noon local time on July 4 and continue until 06:00 on July 5.

   Descriptive monthly statistics for all gunfire within the sample are as follows:

	M	s	$-1\tilde{x}$ $(\tilde{x}-s)$	$+1\tilde{x}$ $(\tilde{x}+s)$
Total Gunfire (Monthly)	4,280	3,708	2,319	1,961	6,598
Non-Holiday Gunfire (Monthly)	3,656	3,422	1,341	2,315	4,998

   Note, as expected, the much higher variance when including the unusually high activity periods around July 4th and New Year's Eve/Day.

3. The Federal Bureau of Investigation (FBI) collects annual violent crime (and other data) nationwide in the Uniform Crime Report (see http://www.fbi.gov/about-us/cjis/ucr/ucr) and includes both homicides and the types of weapons used to commit crimes in their data set. These data are not geocoded, and it is therefore not possible to identify which homicides occurred geographically within ShotSpotter coverage areas. Moreover, because the definition of "homicide location" is somewhat ambiguous (is it the location of the death? the mortal wound which caused death at a hospital? the hospital? the home of the victim?), homicide incidents cannot be directly counted within the ShotSpotter coverage areas. These data were not available for all communities in the sample, because FBI does not report UCR data for Caribbean locations in the same manner that it does those in the 50 states. Accordingly, a matching subset of gunfire totals was used to make an "apples-to-apples" comparison between incident rates and homicides.

FBI does report per capita homicide rates, however, and these can be used to estimate the number of homicides which occurred within ShotSpotter coverage areas (see note to §CD on population density). However, a simple per capita extrapolation of homicides would likely underestimate the number of homicides which occur in ShotSpotter coverage areas, as the city's overall homicide rate is likely concentrated in certain areas. To perform our estimate, we calculated the number of homicides which occurred throughout all of each city in which a sampled coverage area exists (1,125 total, according to UCR data) and then combined per capita population and coverage area size to estimate that the number of homicides which occurred within the covered areas was between 250 and 500. Our best estimate is 375 homicides, in light in particular of the relatively small coverage areas currently deployed in some cities which contributed heavily to the overall homicide count.

4. 9-1-1 call data vary in quality from city to city. For this analysis, we requested two years of computer-aided dispatch (CAD) data for a large city with a large ShotSpotter deployment and performed a several-stage analysis. The first stage involved geocoding the CAD data, which was commonly reported either as approximate street address or as the nearest street intersection. We found the Google geocoder to be the most reliable and used it consistently. There were over 9,000 CAD events to review over two years (2012 and 2013) specifically identified as calls for "shots fired." Once latitude and longitude coordinates were available, the data were displayed and "scrubbed." Fewer than 50 of the CAD incidents had addresses which would not geocode properly and were discarded.

   The CAD incidents were then compared geospatially to ShotSpotter incidents on a pairwise basis. The Euclidean distance between the points was calculated, in meters, using the CAD and ShotSpotter incidents represented in geographic coordinates (WGS84 datum), and time calculations were performed using the ShotSpotter event time for ShotSpotter incidents and the CAD system "record time" for CAD incidents. It was required that a "matched" ShotSpotter and CAD incident meet both the time and distance criteria (i.e. Boolean "AND"). Expanding the maximum distance beyond ½ mile did not materially increase the percentage of incidents reported, nor did expanding the time window. Of particular note is that the 780 foot average distance of 9-1-1 calls from actual gunfire is precisely that: an average. Many calls come from much further away, as the maps show clearly.

   In order to assure the confidentiality of the community studied, the maps presented do not identify street names, and they have been intentionally rotated from true North by a random angle which differs between the figures. The streets themselves, their scale, and the relative location of shots has not been changed. Calculations performed were for both 2012 and 2013, but the maps show data for one single year (12 months).

5. Because coverage areas are arbitrary shapes and are not drawn in square mile blocks, incident rates per square mile must be analyzed on a city-by-city average basis.

   Descriptive statistics follow:

		M	s	$-1z$ $(\tilde{x}-s)$	$+1z$ $(\tilde{x}+s)$	skew (y_1)
Total Gunfire per mi² (Monthly)	319	280	254	65	573	1.306
Non-Holiday Gunfire per mi² (Monthly)	273	234	230	42	504	1.620
Total Rounds per mi² (Monthly)	978	841	800	747	1208	1.130
Non-Holiday Rounds per mi² (Monthly)	791	668	699	92	1490	1.542

   The sample distribution shows noticeable skew in most cases, consistent with the several positive outliers in the distribution.

6. A circular area of 1 mi² has a radius calculated as follows:
   $1=\pi r\text{^}2 \rightarrow r=1/\sqrt{\pi} \rightarrow r=2{,}978\text{ft.} = 908\text{m}$

   The outer circle shown on the map is of this size. For this map, individual incidents were plotted and may sometimes overlap. The area shown has an extremely high and local concentration of gunfire which is dramatically higher than the overall city average per square mile. Such concentrations are typical and can be found in many locations.

7. Averages reported are across all cities; individual city averages are calculated on a city-by-city average basis. Gunfire counts above 50 were manually reviewed (and removed in a small handful of cases where data input error was evident); none of these manually removed incidents was found to be gunfire. To investigate normality of these sampled means, a Shapiro-Wilkes test was applied, resulting in W=0.942 with p-value of 0.037. Such a p-value lies on the margin for what is generally accepted ($p=0.05$ or less), thus indicating that additional samples will be required to further elucidate the nature of the distribution.) Given our suspicion that at least the average number of rounds fired is normally distributed, we performed the correlation analysis between average and maximum number of rounds fired using the familiar Pearson's product-moment correlation coefficient, r. The correlation was found to be mild ($r^2=0.25$) but statistically significant ($p < 0.0006$).

8. Individual hours of the week and days of the week were calculated on a local time basis. For the purposes of these calculations, and those in the following two sections, the first two weeks of July, including the two weekends surrounding the July 4th holiday (from July 1 through July 14) were excluded because they deviated so dramatically from normal patterns. Times shown reflect either standard or daylight savings time, depending on when they ocurred.

   Counts per hour are calculated on a local time basis from: 00:00 minutes: seconds after the hour to: 59:59 minutes: seconds after the hour. There were five (5) cities in the Pacific Time zone and 22 on the East Coast, but coverage areas in the Pacific Time zone are substantially larger, thus reducing the disparity in counts. Note that time graphs begin on the left at 12:00 noon local time and progress to midnight (in the middle), then continue to 11:00am local (at the right).

   The following describe the distribution within hours of the day (i.e., the totals by hour throughout the year):

		M	s	$-1\tilde{x}$ $(\tilde{x}-s)$	$+1\tilde{x}$ $(\tilde{x}+s)$
Total Gunfire per Hour	2,004	885	2,606	0	4,610
Non-Holiday Gunfire per Hour	906	654	645	261	1,551
Total Rounds per Hour	6,071	2,584	8,571	0	14,642
Non-Holiday Rounds per Hour	2,760	1,986	2,096	664	4,856

9. "Night of the Week" is defined as a day starting at 06:00:00 local time and extending to 05:59:59 the next morning. For example, early 02:05 Sunday morning is counted as Saturday night. All days of the week statistics were calculated using the actual number of each day of the week in 2013 (e.g. 52 Sundays but 53 Tuesdays that year).

   The following describe the distribution within days of the week (i.e., the totals by day of the week throughout the year):

		M	s	$-1\tilde{x}$ $(\tilde{x}-s)$	$+1\tilde{x}$ $(\tilde{x}+s)$
Total Gunfire per Day of Week	7,335	6,456	1,684	5,651	9,019
Non-Holiday Gunfire per Day of Week	6,642	6,404	1,241	5,401	7,884
Total Rounds per Day of Week	2,248	22,603	4,733	17,754	27,219
Non-Holiday Rounds per Day of Week	2,038	21,946	4,018	16,363	24,399

10. The totals shown are for the relevant periods for the entire year.

11. In order to identify the single busiest hour of the period, times were converted to Eastern Daylight Time.

CD Community Demographics data were calculated by associating a single United States Postal Service ZIP® code with each individual coverage area within a community. Because ZIP codes do not have well-defined geographic boundaries (rather, they define the streets driven by mail carriers) the US Census Bureau has developed so-called Zip Code Tabulation Areas (ZCTAs). For each ShotSpotter coverage area, a single ZCTA was identified by finding the ZCTA which contained the geographic centroid of the convex hull of the coverage area. In some cases, multiple ZCTAs were thus simplified into a single ZCTA and used to represent the entire coverage area. In all cases of multiple coverage areas within a single city or community, a specific (unique) ZCTA was associated with each coverage area.

   The bar charts showing coverage area size by census region and census division are intended to visually present the relative sizes and frequency of communities within the regions. These bar charts represent the total coverage area of a given community, not the sizes of the constituent coverage areas.

   Both population density and unemployment rate data were obtained via the US Census Bureau. Unemployment rates for 2012 were the latest readily available through the US Census Bureau API and were therefore used in this analysis. For unemployment rate v. gunfire rate per square mile, the correlation coefficient calculated was ρ=0.55 at p-value of $6\text{x}10^{-6}$, indicating a strong correlation at high statistical significance between the two variables. The distributions are not normally distributed, so a nonparametric statistic (Spearman's rank-correlation, ρ) was used.[1]

[1] Spearman's ρ should not be confused with Pearson's r, which is suitable for normally distributed samples but not samples of this nature.

Coverage Areas

The table on the following page presents an inventory of coverage areas; coverage areas within the same community (city) can be identified by matching identifier columns.

Identifier		Coverage	Census		Population Density	Unemployment	5-Year UCR Average	
Community	Area	mi²	Region	Division	/mi²	2012	Violent Crime	Murders
/cQ	/cQ	3.04	Northeast	East North Central	17200	0.139	30	146
+1n	SJe	1.01	Northeast	Middle Atlantic	5700	0.062	n/a	n/a
+1n	+1n	2.00	Northeast	Middle Atlantic	2800	0.066	n/a	n/a
0BH	0BH	4.10	Midwest	West North Central	4500	0.175	2413	38
1Jm	1Jm	3.11	Northeast	Middle Atlantic	13200	0.118	435	9
1kR	1kR	1.00	Northeast	Middle Atlantic	2100	0.044	n/a	n/a
4/g	4/g	3.03	Northeast	South Atlantic	900	0.122	719	7
5bN	5bN	3.99	Northeast	New England	7600	0.112	1131	4
8gG	8gG	13.27	West	Pacific	16000	0.097	7116	108
Avh	Hnn	1.00	Northeast	East North Central	400	0.237	519	5
Avh	Rde	1.05	Northeast	East North Central	3800	0.156	519	5
bcR	bcR	3.05	Northeast	East North Central	2100	0.136	246	9
Bfl	Bfl	6.87	Northeast	East North Central	3000	0.245	729	41
BHR	BHR	3.09	Northeast	New England	3000	0.052	622	10
biC	biC	3.11	Northeast	Middle Atlantic	3700	0.167	740	13
bP+	bP+	0.99	Northeast	Middle Atlantic	3200	0.076	n/a	n/a
bP+	bP+	1.00	Northeast	Middle Atlantic	3200	0.076	n/a	n/a
com	com	2.05	West	Pacific	n/a	0.101	27	0
Cyx	RzE	2.81	Northeast	Middle Atlantic	7000	0.190	1189	19
Cyx	6Mm	4.42	Northeast	Middle Atlantic	2900	0.099	1189	19
dvW	tto	1.00	South	South Atlantic	3700	0.108	5522	62
dvW	dvW	1.96	South	South Atlantic	6200	0.057	5522	62
dvW	jAT	2.04	South	South Atlantic	4200	0.102	5522	62
Fyv	Fyv	3.55	Midwest	West North Central	5100	0.096	2958	53
gds	gds	3.01	Midwest	East North Central	2000	0.203	363	4
GJe	GJe	5.82	Northeast	Mid ntic	4400	0.123	1199	9
hGE	hGE	3.07	Midwest	East North Central	10500	0.283	2629	31
iPp	iPp	4.49	South	South Atlantic	5800	0.146	1031	23
IWc	IWc	3.06	Northeast	Middle Atlantic	8900	0.106	184	2
J0G	J0G	2.04	South	South Atlantic	200	0.190	375	5
K1X	kHz	1.32	Midwest	West North Central	6700	0.232	4135	32
K1X	w0/	2.02	Midwest	West North Central	9400	0.101	4135	32
kJN	kJN	1.89	West	Pacific	5700	0.082	326	6
kLn	kLn	2.02	Northeast	Middle Atlantic	400	0.168	4168	47
KR2	KR2	2.07	Northeast	East North Central	3400	0.316	717	23
KvS	KvS	2.97	South	South Atlantic	300	0.186	684	9
l7W	l7W	2.10	Northeast	Middle Atlantic	7000	0.171	1928	47
lrp	lrp	3.05	Caribbean	Caribbean	600	n/a	n/a	n/a
mlb	mlb	3.05	Northeast	New England	9100	0.166	1060	3
Mxy	Mxy	1.74	West	Pacific	7200	0.114	276	5
nB1	RrP	1.07	Midwest	West North Central	8000	0.139	3264	68
nB1	inF	2.51	Midwest	West North Central	4900	0.256	3264	68
o1A	o1A	3.05	Northeast	East North Central	3900	0.224	299	6
O7T	O7T	0.97	West	Pacific	17100	0.090	192	4
Ouz	l+l	0.46	South	West South Central	800	0.158	2622	68
Ouz	3m9	0.49	South	West South Central	2600	0.127	2622	68
Ouz	EU4	0.91	South	West South Central	2600	0.127	2622	68
Ouz	B7G	0.92	South	West South Central	1400	0.041	2622	68
Ouz	WRt	1.00	South	West South Central	2600	0.104	2622	68
Ouz	OBK	2.92	South	West South Central	2700	0.036	2622	68
Q9S	Q9S	5.82	West	Pacific	7200	0.114	1112	27
rND	rND	3.07	South	East South Central	1400	0.150	1634	51
SJe	UtS	1.98	Northeast	Middle Atlantic	3700	0.090	n/a	n/a
su8	hTD	0.59	West	Pacific	46500	0.078	3034	31
su8	6y9	0.80	West	Pacific	17000	0.085	3034	31
su8	Xle	0.94	West	Pacific	14800	0.060	3034	31
su8	qb7	0.95	West	Pacific	29800	0.056	3034	31
su8	xER	0.96	West	Pacific	20000	0.064	3034	31
su8	y7l	1.00	West	Pacific	12900	0.056	3034	31
su8	3LY	1.12	West	Pacific	29800	0.056	3034	31
su8	TxB	2.20	West	Pacific	6900	0.129	3034	31
thL	thL	1.50	Northeast	New England	9000	0.111	1948	21
vGr	nlu	0.50	Northeast	South Atlantic	4400	0.154	n/a	n/a
vGr	3il	0.95	Northeast	South Atlantic	3600	0.091	n/a	n/a
Vkd	Vkd	5.03	Caribbean	Caribbean	8300	0.224	n/a	n/a
Wka	Wka	1.23	Northeast	New England	4900	0.153	1132	8
Ygd	Ygd	0.99	Caribbean	Caribbean	600	n/a	n/a	n/a
ZDc	ZDc	2.58	Northeast	Middle Atlantic	16900	0.074	1476	17

Additional Information

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