Parking Enforcement Patterns in Allentown, Bethlehem, and Easton

January 9, 2024

Introduction

Dear Ms. Weber,

This report is a follow-up to the initial analysis we conducted on your behalf investigating parking ticketing trends in Allentown. With the addition of Bethlehem and Easton data, this study compares, contrasts, and quantifies the ticketing landscapes of the Valley's three major cities.

This report is formatted to highlight results. Result headlines are presented in red with discussions below them. The methodology of each section is included in each result section.

As you know, the ticket datasets from Allentown, Bethlehem, and Easton itemize or summarize all parking tickets issued by their respective parking authorities between January 1, 2022, and February 28, 2023. However, the quality of the data provided by the authorities varied. Allentown's dataset contained block locations and violation descriptions for each ticket, allowing a detailed and precise examination of the impacts and outcomes on individual neighborhoods and how they relate to demographics. Easton's dataset contained street locations as opposed to block locations for the tickets, preventing examination of neighborhood impact. Bethlehem's dataset did not contain individual ticket information but instead presented data in two ways: (a) ticket types aggregated by month and (b) the total number of tickets aggregated by block location. Not knowing where different types of tickets were issued limited the information obtainable from Bethlehem. Throughout this report, we note when these structural limitations prevented further analysis. Despite these limitations, the analysis presented herein still contains relevant and pertinent comparisons of the cities.

We found that ticketing rates in some cities fluctuated greatly, indicating frequent changes in enforcement practices. We found that enforcement practices impact certain neighborhoods more than others, and sometimes based on the diversity of that neighborhood. It is important to emphasize that these results do not imply causation. We know that policies, rules, and regulations do not occur in social vacuums; no matter the intention, these practices can disproportionately affect certain groups or communities. Furthermore, the differences seen in each city accentuate the need for small-scale investigations like the current study to develop effective and appropriate regulations and policies. Consistent evaluation of policies and practices is necessary to ensure that a government agency is supporting the community it serves.

We are grateful for the opportunity to work with you and The Morning Call, and for the ability to contribute to this important conversation. If you have any questions on the material presented in this document, please don't hesitate to contact me at the information below.

With warm regards,

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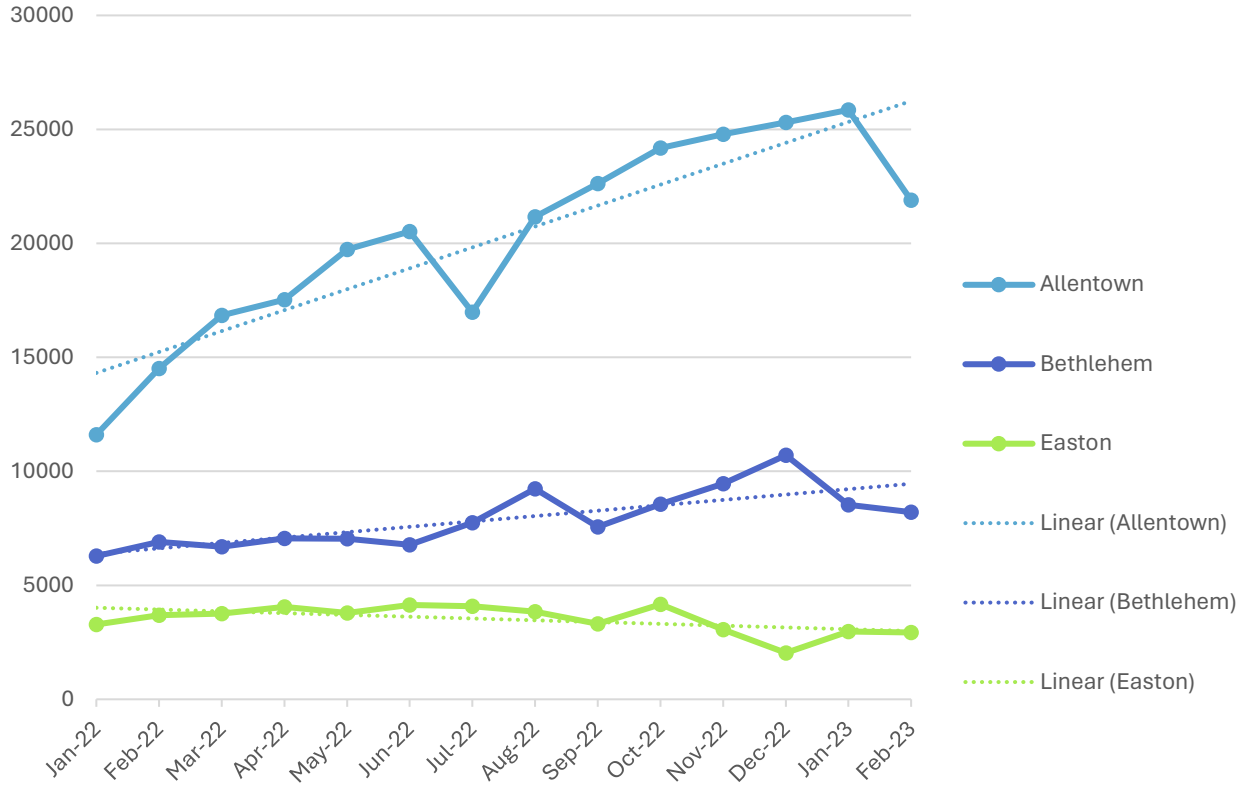
Results

City-Wide Trends: Allentown and Bethlehem increasing; Easton saw little change

To get a broad picture of enforcement in each city, we examined how the total number of tickets issued changed per month and how that related to the cities' populations. The graph and its corresponding table are shown in Figure 1 and Table 1.

Figure 1: *Ticket counts in each city*



Allentown had the steepest growth rate, issuing an average of 919 more tickets each month. In January 2022, the APA issued 11,607 tickets, which was 9% of Allentown's entire population of 125,094 residents. One year later in January 2023, the APA issued 25,854 tickets, which was 21% of Allentown's population. As you calculated in *Parking Problems*, this is approximately a 120% increase. In fact, from January 1, 2022, to August 31, 2022, the APA issued more tickets than the city's entire population. By January 31, 2023, the APA had issued more tickets than twice the city's population.

Bethlehem also had an increasing ticket trend, but it was not as steep as Allentown's. Each month, the BPA issued 175 more tickets on average. The BPA issued more tickets than the city's population by November 2022. On average, the BPA issued 7,716 tickets per month, which was 10% of the city's population.

Of the three cities, Easton's ticketing experienced the least change. Easton issued an average of 78 fewer parking tickets each month, in contrast to Allentown's and Bethlehem's increasing trend. On average, the EPA issued 3,507 tickets per month, which was 12% of the city's population.

Table 1: Ticket counts, cumulative sums, and per capita rate of ticketing

	ALLENTOWN			BETHLEHEM			EASTON		
	Tickets	Cumulative Sum	Per Capita	Tickets	Cumula-tive Sum	Per Capita	Tickets	Cumulative Sum	Per Capita
JAN-22	11,607	11,607	0.093	6,283	6,283	0.081	3,277	3,277	0.108
FEB-22	14,508	26,115	0.116	6,899	13,182	0.089	3,692	6,969	0.122
MAR-22	16,846	42,961	0.135	6,697	19,879	0.086	3,759	10,728	0.124
APR-22	17,535	60,496	0.140	7,064	26,943	0.091	4,049	14,777	0.133
MAY-22	19,736	80,232	0.158	7,038	33,981	0.091	3,787	18,564	0.125
JUN-22	20,519	100,751	0.164	6,781	40,762	0.087	4,137	22,701	0.136
JUL-22	16,978	117,729	0.136	7,747	48,509	0.100	4,077	26,778	0.134
AUG-22	21,159	138,888	0.169	9,236	57,745	0.119	3,850	30,628	0.127
SEP-22	22,627	161,515	0.181	7,568	65,313	0.098	3,304	33,932	0.109
OCT-22	24,179	185,694	0.193	8,559	73,872	0.110	4,165	38,097	0.137
NOV-22	24,784	210,478	0.198	9,461	82,630	0.113	3,061	41,158	0.101
DEC-22	25,308	235,786	0.202	10,706	92,648	0.129	2,037	43,195	0.067
JAN-23	25,854	261,640	0.207	8,539	100,494	0.101	2,974	46,169	0.098
FEB-23	21,899	283,539	0.175	8,215	108,023	0.097	2,933	49,102	0.097
	Pop	**Avg. Tickets**	**Avg. Change**	**Pop**	**Avg. Tickets**	**Avg. Change**	**Pop**	**Avg. Tickets**	**Avg. Change**
	125,094	20,253	919	77,617	7,716	175	30,341	3,507	-78

These trends suggest that Allentown and Bethlehem may be experiencing changes in enforcement or offending. As you mention in *Parking Problems*, the APA has recently increased patrol to 24/7 and quadrupled the number of its enforcement officers. This is the likely explanation for Allentown's sharp increase in tickets. Bethlehem may be experiencing enforcement increases as well. To know more about how parking enforcement functions in Lehigh Valley neighborhoods, we examined trends in violations. What violations are responsible for these sharp increases?

Ticket Types by City: Large variances in violations among the cities

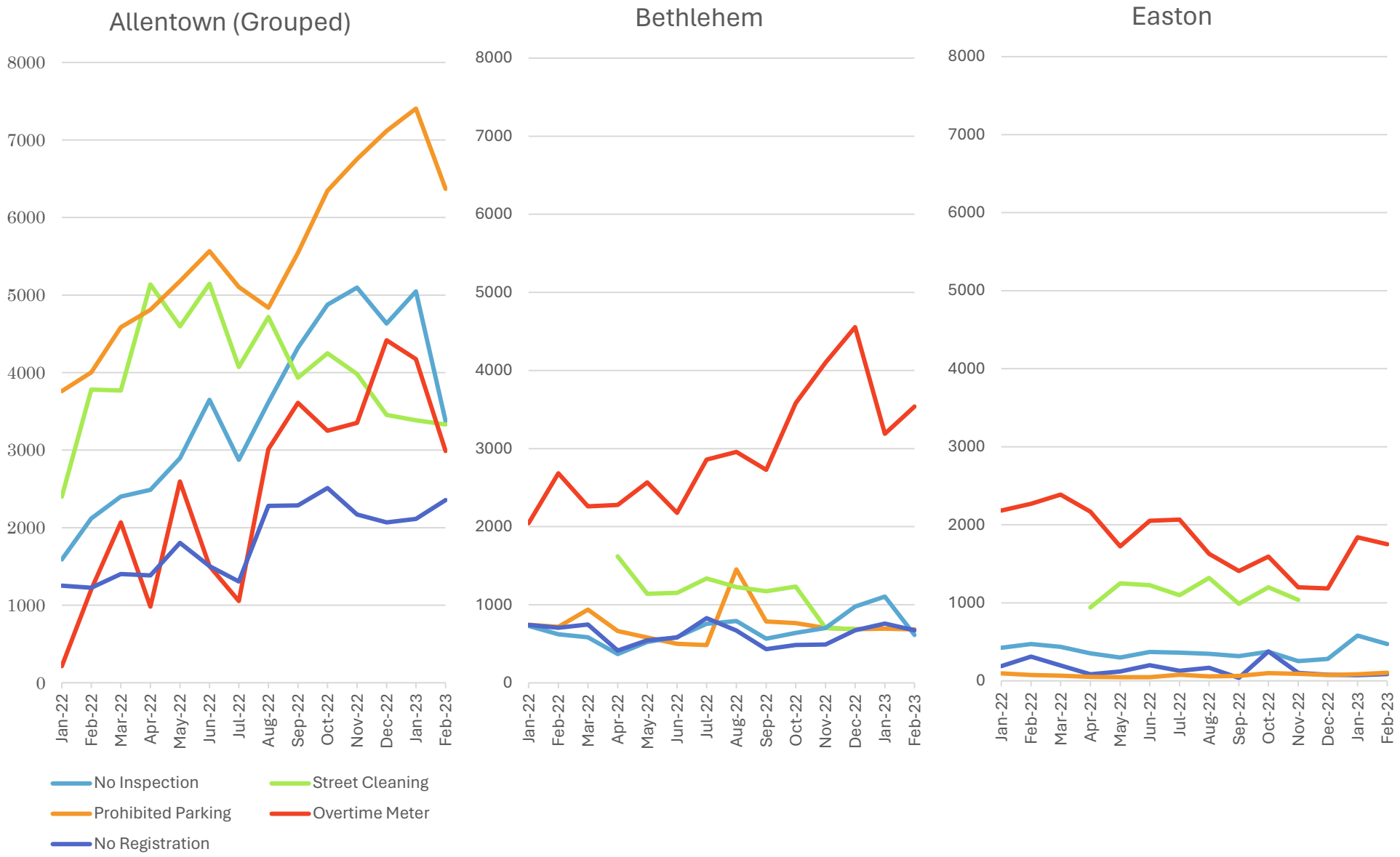
Table 2 contains an abbreviated breakdown of violations in each city. Important equivalent violations are highlighted in the same color for ease of comparison. Any duplicated violations by typo were combined.

A glance through the table reveals some interesting statistics. Overtime parking at a meter appears to be more of a problem in Easton and Bethlehem due to the large shares of meter tickets there. Over half of all parking tickets in Easton regarded overtime parking at a meter, and this was nearly 40% in Bethlehem. Further, Allentown had a larger share of expired inspection violations than Easton and Bethlehem. Double parking only accounted for 1.5% or less in each city. Bethlehem had the lowest share of street cleaning violations. To examine these results in greater detail, we delved into the chronology of ticket issuances, the local ordinances of the cities, and the geography of the cities.

Table 2: *Abbreviated table of violations by city*

Allentown			Bethlehem			Easton		
Ticket	**Count**	**Percent**	**Ticket**	**Count**	**Percent**	**Ticket**	**Count**	**Percent**
Grand Total	*283,539*	*100.0%*	*Grand Total*	*108,023*	*100.0%*	*Grand Total*	*49,102*	*100%*
3JB-NO CURRENT INSPECTION	48,981	17.3%	EXCEEDING PARKING METER	41,519	38.4%	OVERTIME PARKING	25,449	51.8%
6B-NP STREET CLEANING	46,521	16.4%	OVERTIME PARKING IN 2 HOUR ZONE	18,598	17.2%	STREET CLEANING. NO PARKING THIS SIDE	9,059	18.4%
2E-NP ANYTIME	35,860	12.6%	OFFICIAL SIGN: NO PARKING	10,401	9.6%	NO CURRENT INSPECTION/EMISSION	5,340	10.9%
7A-OT PARKING AT A METER	34,421	12.1%	OFFICIAL SIGN: NO PARKING/ STREET CLEANING	10,272	9.5%	INOPERABLE OR UNREGISTERED VEHICLE	2,151	4.4%
3JA-NO CURRENT REG/INOPERABLE	25,662	9.1%	EXPIRED INSPECTION	9,568	8.9%	NOT PARKED WITHIN A METERED SPACE	1,192	2.4%
4D-NP ON PRIVATE PROPERTY	13,701	4.8%	EXPIRED REGISTRATION	8,748	8.1%	COLLEGE HILL RPP ZONE	1,182	2.4%
2G-TOO CLOSE TO CORNER/INTERSECTION	12,160	4.3%	NO PARKING PRIVATE PROPERTY	2,354	2.2%	NO PARKING OFFICIAL SIGN	1,038	2.1%
8B-ST CLEANING REPEAT OFFENDER	9,430	3.3%	WITHIN 15' OF A FIRE HYDRANT	1,085	1.0%	NO PARKING	1,009	2.1%
2V-NO PARKING ON A SIDEWALK	7,937	2.8%	WITHIN 20' OF A CROSSWALK AT AN INTERSECTION	649	0.6%	TOO CLOSE TO CORNER	758	1.5%
2C-NP THIS STREET	6,855	2.4%	WITHIN 30' OF STOP SIGN OR SIGNAL	592	0.5%	STORAGE OF VEHICLES	441	0.9%
2W-PARKED OPPOSING THE FLOW OF TRAFFIC/TOO FAR FROM CURB	6,797	2.4%	ON A SIDEWALK	494	0.5%	FIRE HYDRANT	368	0.7%
No Violation	5,822	2.1%	RESERVED FOR HANDICAPPED	405	0.4%	OTHER VIOLATION	320	0.7%
9A-DOUBLE PARKING	4,285	1.5%	NOT PARKED IN A METERED SPACE	383	0.4%	RPP ZONE HR LIMIT	307	0.6%
4I-BLOCKING STREET/LANE	3,955	1.4%	AGAINST TRAFFIC 2-WAY STREET	344	0.3%	HANDICAP PARKING ONLY	204	0.4%
5C-NO PARKING W/IN 15FT OF A FIRE HYDRANT	3,932	1.4%	OVERTIME PARKING IN 20 MINUTE ZONE	298	0.3%	UNAUTHORIZED PARKING ON PRIVATE PROPERTY	161	0.3%
4C-NP OVER 72 HRS ON STREET	2,948	1.0%	OVERTIME PARKING IN 4 HOUR ZONE	293	0.3%	BLOCKING GARAGE OR DRIVEWAY	76	0.2%
2H-OT PARKING IN RPP ZONE	2,255	0.8%	RESERVED FOR HANDICAP-RESIDENTIAL	249	0.2%	DOUBLE PARKING	19	0.0%
2A-NP IN FRONT OF DRIVEWAY	1,517	0.5%	DOUBLE PARKED	222	0.2%	(blank)	13	0.0%

Figure 2: *Violation trends by city*



The three graphs in Figure 2 compare trends in ticket counts for the five most important ticket types in each city. Because Allentown had several tickets that were similar in nature (i.e., “NP Street Cleaning” and “St Cleaning Repeat Offender”), we combined the similar charges in Allentown in groups that reflect the most important ticket types. In Allentown, street cleaning appears to have no overall trend except for cyclic variability. The other four violations have strong positive trends. On average, there were 297 more inspection tickets issued each month, 279 more prohibited parking tickets issued, and 304 more meter tickets issued, culminating in an over 200% increase in the number of these tickets from January 2022 to January 2023. This, coupled with similar trends in prohibited parking, inspection, and meter tickets, suggests a possible shift in enforcement. It is unlikely that over three times more individuals began neglecting meters, inspections, and parking limits over the year. It is more likely that an enforcement alteration for meters or limits led to closer examination of vehicle inspection and registration. Therefore, these violations may act as a gateway to receiving inspection or registration tickets. This theory aligns with the lack of an overall trend in street cleaning violations; more patrol does not alter the number of street cleaning tickets issued because they are issued systematically. Finally, the sharp increase in prohibited parking violations is attributed to dramatic increases in “too close to corner/intersection” (106 more tickets each month on average) and “NP anytime” (57 more tickets each month on average).

In Bethlehem, the only violation with a strong trend is the meter violation, with a steadily increasing trend of 143 more tickets per month on average. The lack of a strong upward trend in Bethlehem’s inspection and registration tickets supports the theory that Allentown’s new technology contributes to the detection of those issues, rather than those issues becoming more prevalent. The August spike in “No Parking” violations in Bethlehem is easily attributed to MusikFest.

Easton exhibits the opposite trend of Bethlehem and Allentown in that meter violations followed a decreasing trend of about 68 fewer tickets per month on average. All other major violations did not experience any noticeable trends.

The situations in the three cities are diverse. This initial analysis conveys that Allentown’s dramatically increasing ticket rate is explained by increases in prohibited parking, meter, inspection, and registration tickets. These increases are so dramatic that it is unlikely the incidence rate is increasing; rather, the more likely scenario is that the Parking Authority’s acquisition of new technology and their staff increases have resulted in them capturing more of those offenses. Bethlehem and Easton’s change in meter tickets but lack of change in inspection and registration tickets supports this. Bethlehem may have increased patrol for expired meters, but their technology does not allow for the immediate detection of expired credentials. Easton, on the other hand, experienced a decrease in meter tickets that also appears unrelated to inspection and registration.

These preliminary results don’t tell the full story. How parking rules in each city affect their neighborhoods is a big part of Lehigh Valley residents’ current gripes with their parking authorities. Is street cleaning truly less of an issue in Bethlehem, or does Bethlehem have different stipulations that are more favorable to its residents? Who do street cleaning violations primarily affect? Are meter violations truly more of an issue in Easton and Bethlehem, or do they have more meters than Allentown? Does double parking impact certain neighborhoods more than others? How does this relate to these neighborhoods’ poverty levels and diversity? These questions raise concerns that parking enforcement may be related to equitability issues and indirectly result in a disproportionate impact on marginalized communities. To investigate, we dove deeper into the ticket data, using geospatial analysis techniques and U.S. Census data to examine potential sources of disparity.

Parking Meter Tickets: Accounting for the meters in each city, trends still vary

In Bethlehem, 41,519 tickets, 38% of all Bethlehem parking tickets, involved meters. In Allentown, only 12% of tickets involved meters. In fact, despite Allentown issuing more than 2.5 times as many meter tickets as Bethlehem overall, Bethlehem issued about 20% more meter tickets in quantity than Allentown. In Easton, over half (52%) of all tickets involved meters. To assess if meter violations were truly more common in Easton than in Bethlehem, and more common in Bethlehem than in Allentown, we needed to know how many available metered spaces are in each city.

Method

Obtaining estimates for parking meters was different for each city. The APA's website[1] claims that Allentown has 1,500 parking meters throughout the city. To estimate how many meters exist in Bethlehem, we used the BPA's public GIS map of *Public, Metered, and Residential parking under the jurisdiction of BPA*[2] and calculated the length of the designated metered roads in feet using an ArcGIS geoprocessing tool. Then, we measured the distance between several pairs of meters in different locations in the city on Google Maps and concluded that the distance between two parking meters is approximately 21 feet. Dividing the length of each road segment by 21 produced an estimate for the number of meters on each segment. After summing them all, my estimate for the total number of parking meters in Bethlehem is 2,231. For Easton, the only source we could find was a Patch article[3] from 2011 that claims Easton had 986 parking meters and would be installing about 96 meters. For the sake of completeness, we assumed Easton has approximately 1,082 parking meters, but this number is not rigorously validated. Dividing the number of meter tickets each month by the number of meters in the city yielded a monthly rate of violations per meter.

Results

High variability in meter tickets suggests enforcement fluctuations; rise in Allentown and Bethlehem suggests enforcement increases; potential cyclic trend in Easton

Figure 3: *Meter ticket rates in each city over time*

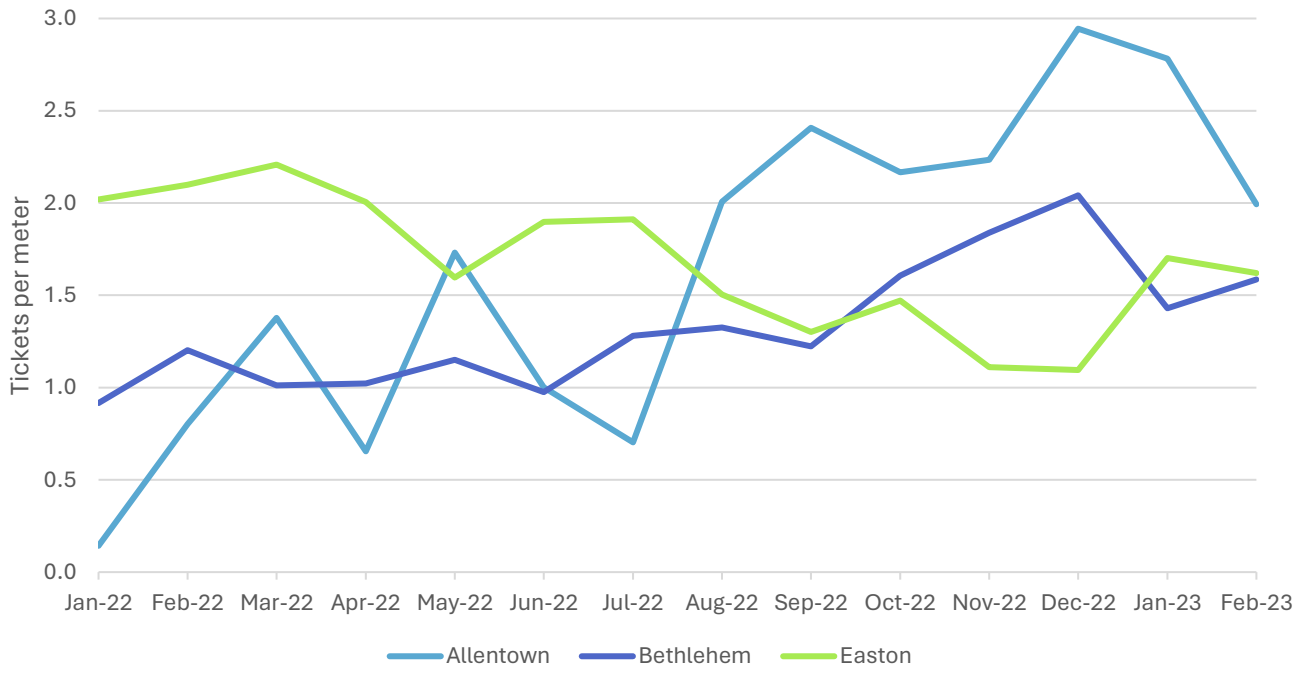
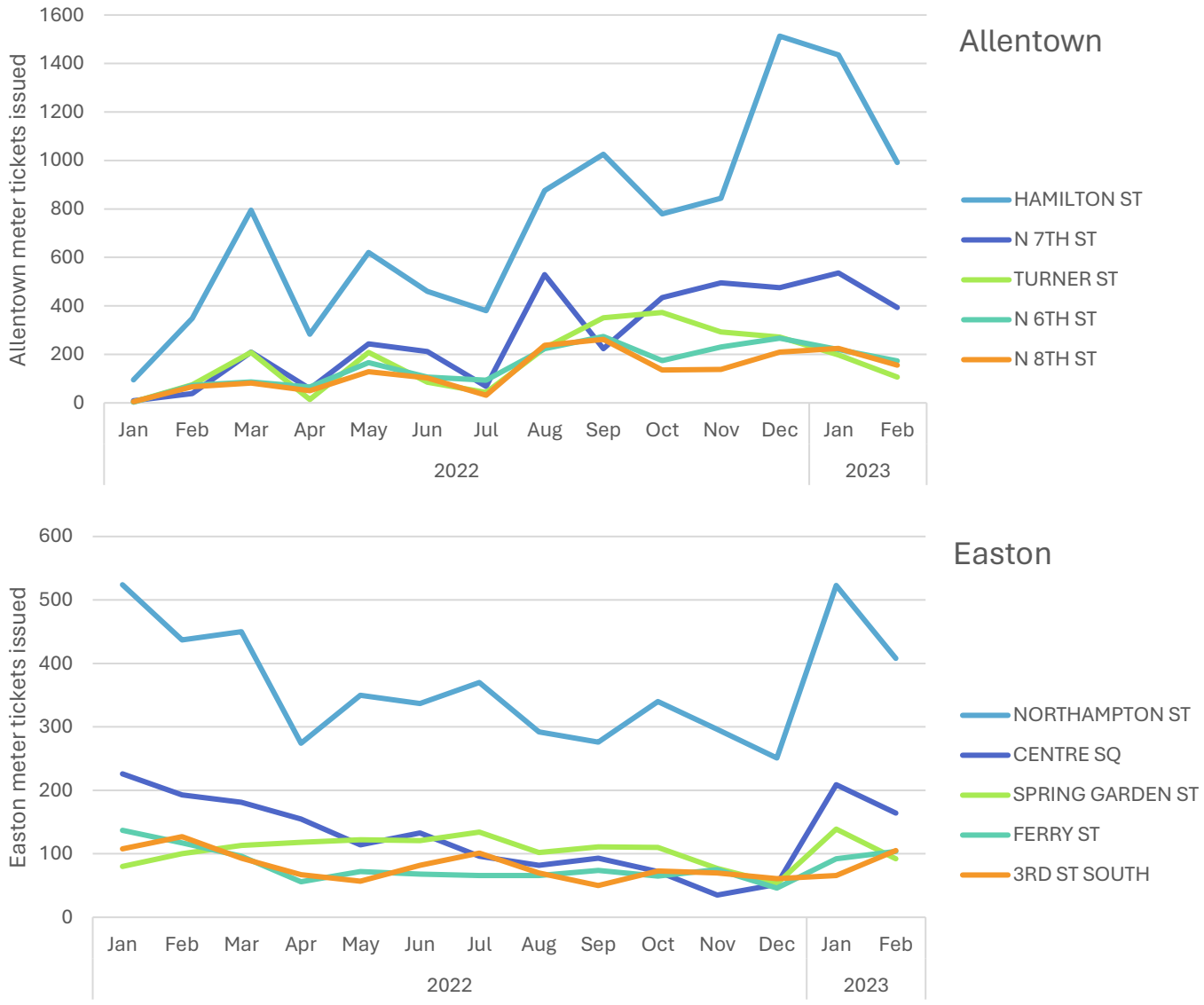


Figure 3 shows the meter ticket rates per meter for each city. The monthly average of tickets per meter in Allentown was 1.6; meaning that, on average, each meter in Allentown received 1.6 tickets each month. In Bethlehem, it was 1.3, and in Easton, it was 1.7. That is, despite half of Easton's tickets involving meters but only an eighth of Allentown's tickets involving meters, their average ticket quantities do not differ starkly when accounting for the number of meters. While Easton and Allentown have similar averages, their trends and variability are quite different. From month to month, Allentown had higher variability in tickets, indicating that offending or, more likely, enforcement, fluctuated widely in magnitude. The overall rises in enforcement in Allentown and likely in Bethlehem have placed their rates over Easton's halfway through 2022, suggesting that Easton may initially have more meter violations relative to its meters. Without earlier data, it is impossible to know for sure. However, the graphs of the numbers of tickets issued by street in Figure 4 suggest that while the trends in Easton's meter tickets are decreasing, the quantity of tickets in January 2023 appears to return to a similar level as in January 2022. This suggests that Easton's downward trend may be yearly cyclic. That is, Easton's downward trend may repeat each year. More data would strengthen this hypothesis. Not knowing the locations of meter tickets in Bethlehem inhibits its analysis.

Figure 4: *Amount of meter tickets issued for the top five Allentown and Easton streets over time*



A glance at the most ticketed streets' trends in Figure 4 reveals a common increasing trend among Allentown streets, but a sharper trend in Hamilton St later in 2022, suggesting that the APA may have targeted this street. Hamilton St has the most parking meter violations: 10,450 tickets equating to 30% of all meter tickets. N 7th St is next at 3,923 tickets, or 11% of all meter tickets. Easton's Northampton St accumulated the most meter tickets, 5,128, which accounted for 20% of all meter tickets in Easton.

Double-Parking: Two blocks make up the most tickets in Allentown

Table 3 lists the top ten Allentown blocks for double parking tickets. In total, N 7th St predictably had the highest count of all streets, with 1,761 tickets, or 36% of all tickets. The 500 and 600 blocks of N 7th St encompassed one-quarter of double parking tickets. Hamilton St was second at 379.

Table 3: *Top ten Allentown blocks and the number of double parking tickets*

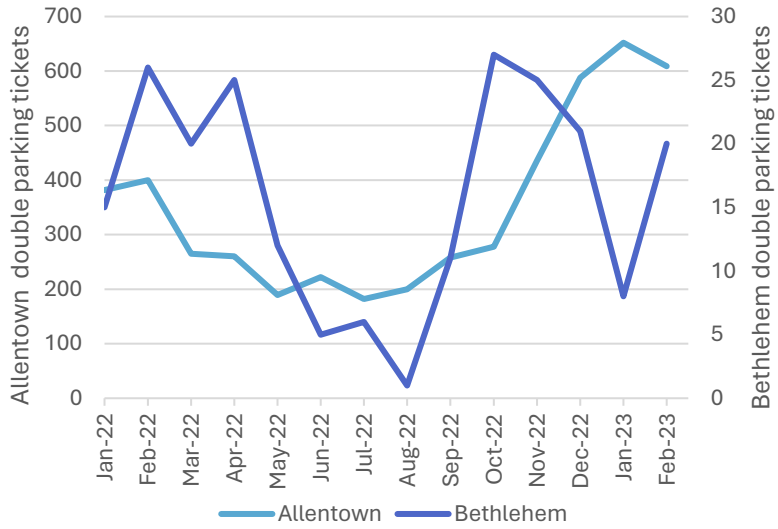
Block	*Number of Double Parking Tickets*
500 BLK N 7th St	695
600 BLK N 7th St	544
300 BLK N 7th St	172
400 BLK N 7th St	167
900 BLK Hamilton St	128
700 BLK Hamilton St	77
600 BLK Hamilton St	68
600 BLK N 9th St	57
0 BLK N 6th St	54
400 BLK N 6th St	51

Of the three cities, double parking had the largest share of tickets in Allentown, but this was still small compared to other violations. The four double parking violations accounted for 4,921, or 1.7%, of all Allentown tickets. On average, 4,921 tickets equate to 11.6 tickets per day, but Figure 5 demonstrates that this fluctuated by month. In fact, July saw 5.9 tickets per day, while February 2023 saw 21.8 tickets per day.

While this may seem like a lot, it is likely that this does not capture the extent of double parking. The violation may be too short-lived to be quickly noticed by the enforcement officers. Regardless, those who live and/or work on N 7th St experience double parking ticketing more than other residents of the city. The 500 and 600 blocks of N 7th St host many businesses in addition to housing on the upper levels of the buildings. Residents on this street segment undergo this inconvenience more frequently, whether because they are double-parking due to lack of spaces or if they are objects of the violation. As a result, N 7th St is a "targeted enforcement area" for the APA, and residents on this street may have a greater likelihood of receiving other tickets as well, though evidence for this would be difficult to obtain.

Allentown's line in Figure 5 shows a noticeable spike in double parking tickets in November continuing through the end of the data collection period. The number of tickets from January 2022 to January 2023 increased by 71%. Because the number of tickets did not return to the same level in January 2023 as it was in January 2022, it is unlikely that the November spike is cyclic.

Figure 5: *Double parking tickets in Allentown and Bethlehem*



Double-parking tickets are the most expensive of all tickets, at $100 for first offenses and up to $300 for subsequent offenses. A $50 fee is attached when the ticket is not paid within 10 days.[4] The additional 270 double parking tickets in January 2023 from January 2022 amount to about $25,000 in revenue, assuming all the tickets were paid and paid on time. Just over 2% of double parking tickets involved repeat offenders.

Bethlehem's lack of locations attached to ticket type prevented a thorough analysis of its double parking tickets, but we could examine their trends. As with Allentown, Bethlehem experienced fewer tickets in the summer months. As there are so few of these tickets per month in Bethlehem, any other inferences are limited. Easton only served 19 double parking tickets, and 6 of them were on Northampton St.

Street Cleaning: Potential Source of Disparity

Street cleaning has the potential to perpetuate disparity in that some neighborhoods may be less equipped to respond to the cleaning requirements. Street cleaning requires cars to be off the street at specific recurring times of day, but this may be difficult or even impossible for some residents due to childcare, work responsibilities, or limited availability of nearby substitute spaces.

Method

Table 4 summarizes the street cleaning information for the three cities. Street cleaning enforcement in Bethlehem and Easton is restricted to April through November or December; Allentown enforces street cleaning year-round in some areas. Consequently, it is interesting that Easton had a similarly sized share of street cleaning violations as Allentown, despite sweeping fewer months out of the year. However, this may reflect how Easton had 21 different types of tickets while Bethlehem and Allentown had 40 and 42 respectively. That is, rather than street cleaning violations being more of a problem in Easton, it may be that Allentown has other violations that dilute its presence. Bethlehem's street cleaning ticket rate may be lower due to Bethlehem's less frequent and shorter sweeping periods, reducing the opportunity for tickets. To investigate these ideas, we needed to examine the occurrences of street cleaning tickets in each city by the total length of designated street segments, the frequency of enforcement on those streets, and the duration of the prohibited periods.

Table 4: *Street cleaning enforcement in all three cities*

Allentown	*Bethlehem*	*Easton*
Some districts year-round, some April 1 – November 30	April 1 – October 31	April 1 – December 1
Some streets weekly, some bi-monthly; M – F	Some streets weekly, some bi-monthly; T – F	Weekly; M – F
8:00 am – 3:00 pm	7:00 am – 12:30 pm	7:00 am – 2:00 pm
2-Hour, 2.5-Hour, and 3-Hour windows	1-Hour and 2-Hour windows	1-Hour, 2-Hour, and 3-Hour windows

We devised a measurement called *burden* which captures how much each segment, street, or city is affected by cleaning enforcement. To calculate the burden for a segment, we multiplied that segment's length by the duration of the cleaning period in hours, the number of days per week the period is active, the number of active weeks per month, and the number of active months. This provides a number representing how much a segment is "burdened" by street cleaning. The burden for a street is the sum of all segment burdens on that street. The burden for the city is the sum of all its street burdens. The formulae are below.

$$Segment\ Burden = Length \times \frac{Active\ Hours}{Day} \times \frac{Days\ Active}{Week} \times \frac{Weeks\ Active}{Month} \times \frac{Months\ Active}{one\ 14-month\ period}$$

$$Street\ Burden = Sum\ of\ all\ segment\ burdens\ on\ the\ same\ street$$

$$City\ Burden = Sum\ of\ all\ street\ burdens\ in\ the\ city$$

Dividing the total number of tickets issued on a street by its burden gives a rate that describes if certain streets were "more burdened" by cleaning, accounting for the segment lengths and the duration and frequency of the cleaning periods.

$$Burden\ Ratio = \frac{Number\ of\ Tickets}{Burden}$$

On their websites, Allentown[5] and Easton[6] have PDFs that list the details of street cleaning, including the designated segment and its enforced hours, days, and months. We input these manually into ArcGIS to derive each segment's length in feet. Bethlehem[7] houses a public ArcGIS layer of its enforced segments on its GIS website. Table 5 displays each city's burden, the number of street cleaning tickets issued, and the corresponding burden ratio. The corresponding maps in Figure 6 show street cleaning enforcement.

Results

Bethlehem had the largest burden ratio; Easton and Allentown have similar burden ratios

Allentown has the largest burden by far; its burden is five times greater than Easton's. The number of tickets issued in Allentown was also about five times Easton's, so they have similar burden ratios. This implies that street cleaning had roughly the same impact on Allentown and Easton.

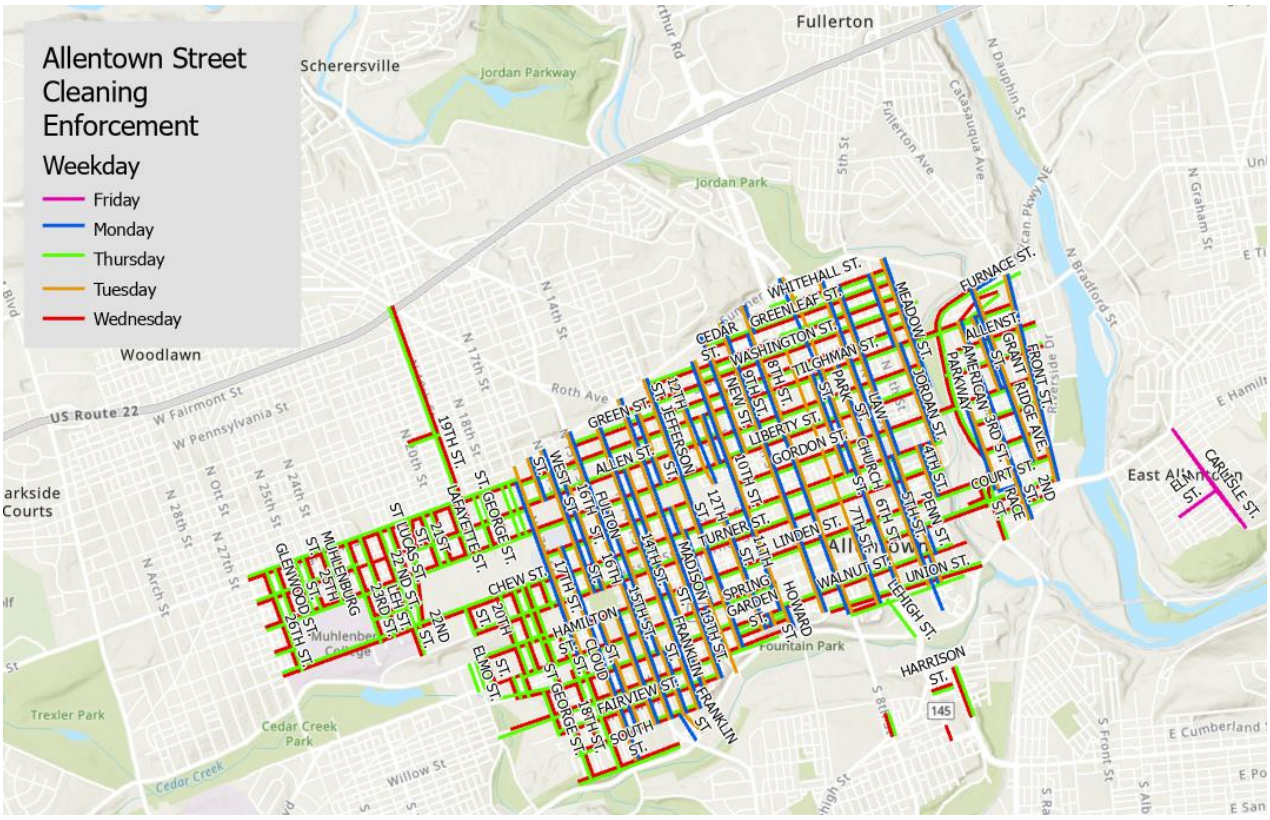
Bethlehem has the smallest burden, three times less than Easton's. However, Bethlehem issued more tickets than Easton, giving it the largest burden ratio. That is, while Bethlehem had overall less street cleaning enforcement, it issued more violations. There are several possibilities. Bethlehem residents may be less able to adhere to street cleaning requirements. Another possibility is that the smaller number of enforced segments means that the city doesn't clean the segments which would increase the burden without adding too many tickets, as may be happening in Allentown and Easton.

Table 5: *Each city's total burden of street cleaning with the total tickets issued and burden ratio*

	Allentown	*Bethlehem*	*Easton*
Street Cleaning Tickets	46,521	10,272	9,059
City Burden	95,096,423	6,134,044	19,177,910
Burden Ratio	0.00049	0.00167	0.00047

Bethlehem's data did not allow for any closer examination. For Allentown and Easton, we investigated the burdens and tickets on individual streets. We went even further with Allentown to investigate the correlation between street cleaning tickets and other demographic descriptors of block groups.

Figure 6: *Maps of the cities' street cleaning enforcement*



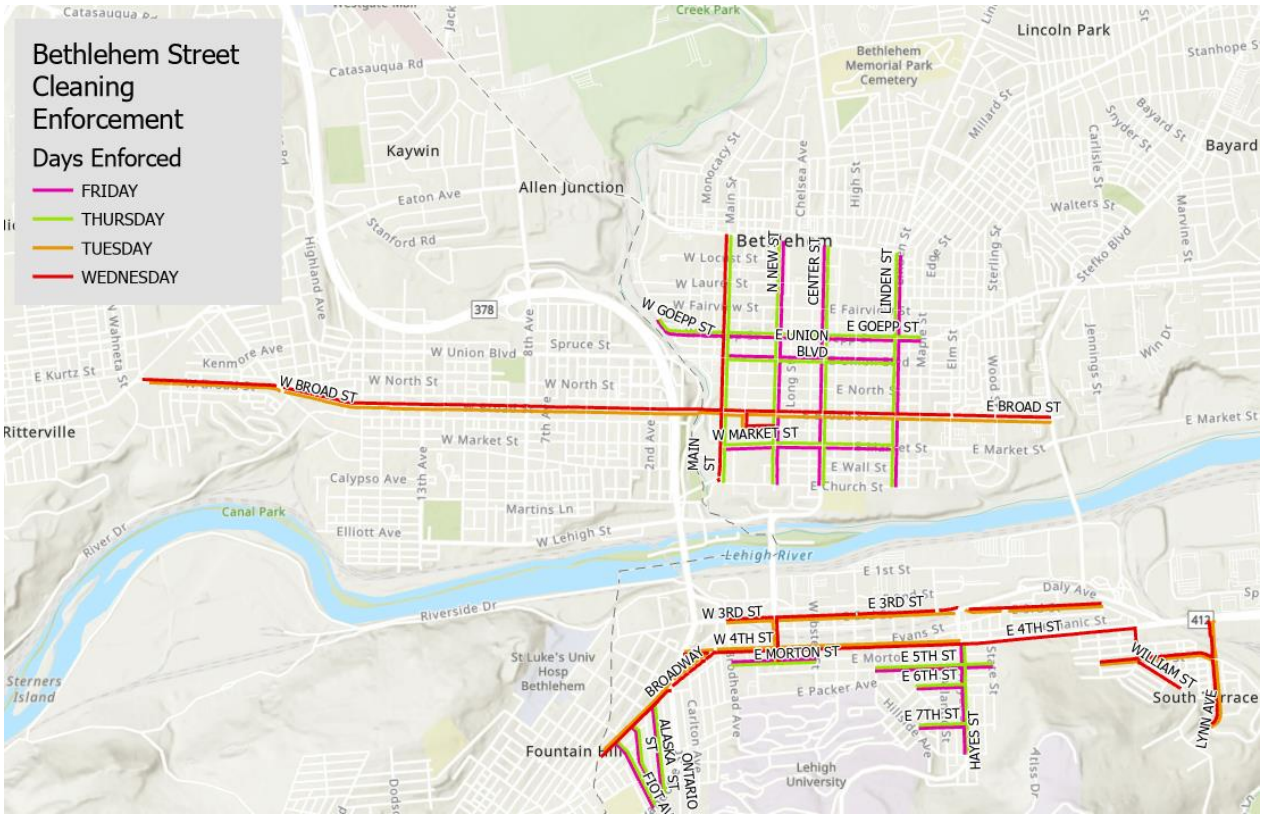
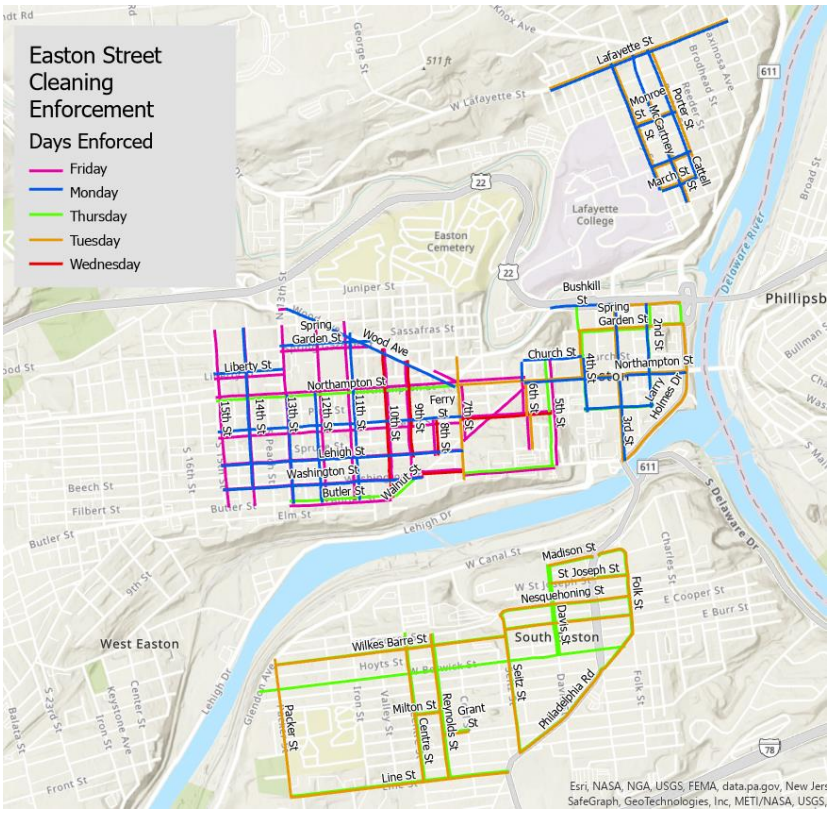


Figure 6 (cont.)



Street cleaning may disproportionately affect certain Easton neighborhoods

With Easton's data reflecting ticketing on full streets rather than by blocks, we analyzed how the streets experienced cleaning enforcement and if any were more prone to ticketing than others. The bubble chart in Figure 7 displays street burden on the horizontal axis, burden ratio on the vertical axis, and number of tickets on each street as the bubble size. Some clear patterns emerge.

The streets with the largest burdens were, unsurprisingly, the longer and busier streets of Easton. Wilkes Barre St, Ferry St, Washington St, and Lehigh St had the highest burdens. Monroe St, High St, March St, and Church St – most of these nearby Lafayette College – had the smallest burdens.

Northampton St and Ferry St received the most tickets, 983 and 834, about 11% and 9% of all cleaning tickets, respectively. However, Ferry St had a higher burden than Northampton St. Therefore, while Ferry St had more "opportunity" for ticketing than Northampton St, Northampton St received more tickets, giving it a moderately high burden ratio. Consequently, Northampton St was more prone to ticketing. This persists for Wilkes Barre St, Washington St, and Lehigh St.

Streets with smaller burdens tended to see higher ratios of tickets. Despite having the second-smallest burden out of the 48 streets, March St had the largest burden ratio, meaning it saw the greatest impact from street cleaning for its size and demand. This pattern of streets with smaller burdens being impacted more by ticketing continues for more Northern Easton streets such as High St, McCartney St, and Cattell St. Putting these results on a map like the one in Figure 8 shows that the neighborhood surrounding Lafayette College appears to have been impacted the most by street cleaning in 2022, while South Side Easton appears to have been impacted the least.

Figure 7: *Bubble chart of Easton streets' burden, tickets, and burden ratios*

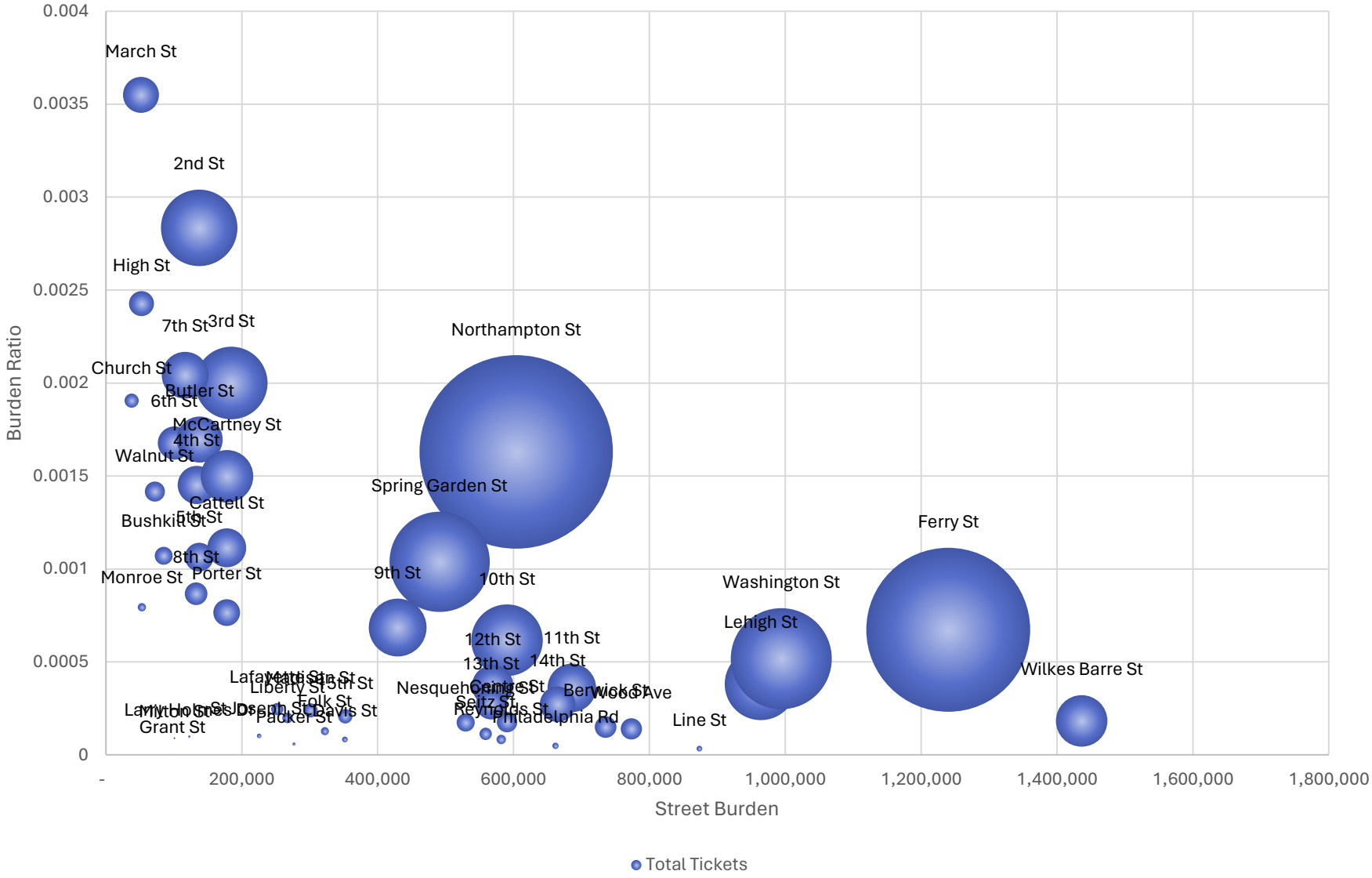
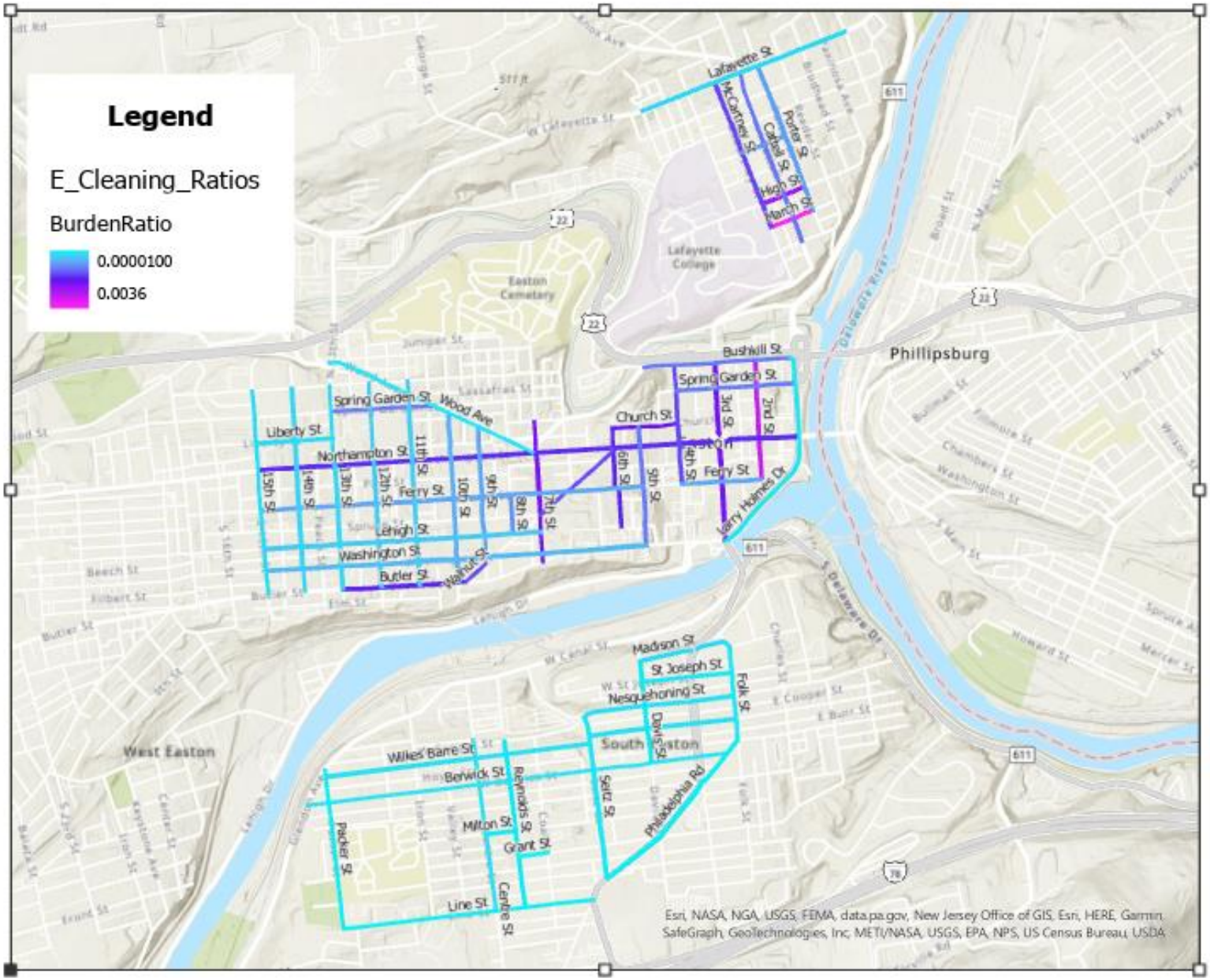


Figure 8: *Map of Easton's street burden ratios*



Two Allentown streets saw the most street cleaning ticketing; large burdens accounted for number of tickets

Table 6 summarizes ticketing on Allentown streets and blocks. The streets that received the most cleaning tickets were Turner and Chew, each receiving about 3200 tickets. The 900 and the 1600 blocks of Chew each received over 300 street cleaning tickets.

Table 6: *Top 10 Allentown streets and blocks with cleaning tickets*

Street	*Total Number of Tickets*	*Block*	*Total Number of Tickets*
TURNER ST	3209	900 BLK CHEW ST	312
CHEW ST	3205	1600 BLK CHEW ST	308
ALLEN ST	2122	300 BLK N 17TH ST	296
LINDEN ST	1931	300 BLK N 10TH ST	295
N 8TH ST	1693	400 BLK N 7TH ST	293
N 9TH ST	1509	1600 BLK TURNER ST	286
WALNUT ST	1502	100 BLK N 8TH ST	280
N 10TH ST	1427	100 BLK ALLEN ST	279
N 6TH ST	1337	400 BLK TURNER ST	276
GREEN ST	1313	100 BLK LIBERTY ST	263

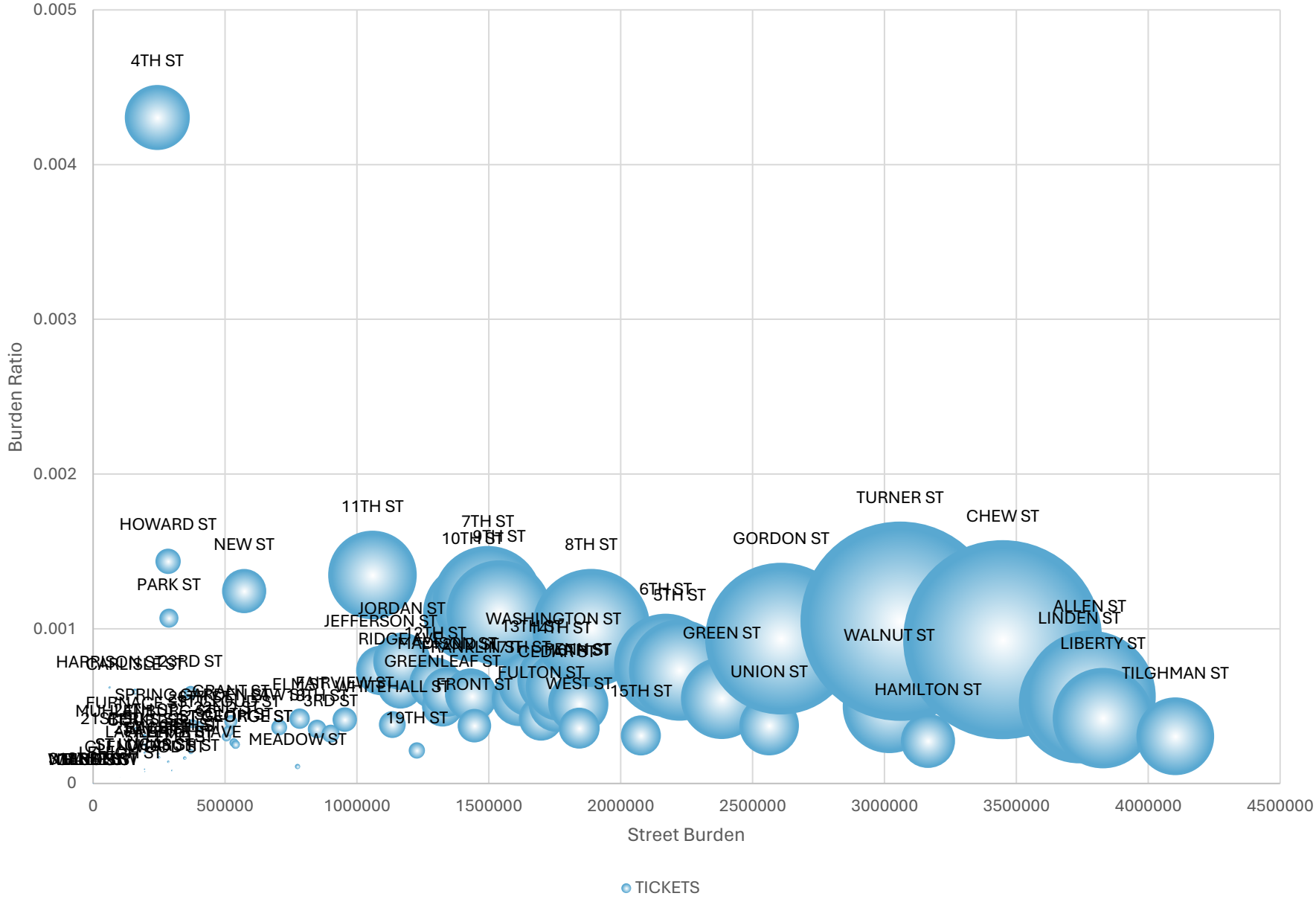
The streets with the largest burdens were Tilghman, Liberty, Allen, and Linden. Burden ratios had low variability apart from 4th St. 4th St had the largest burden ratio of 0.0043, which is three times greater than the next-highest burden ratio, Howard St. While Turner and Chew had the highest total number of tickets, their large street burdens accounted for this spike in ticketing – they do not have notably different burden ratios to other streets with fewer tickets.

Comparing the bubble charts in Figure 8 and Figure 9 demonstrates the differences between Allentown and Easton. Easton had a cluster of low-burdened streets, mostly near Lafayette College, that had relatively high burden ratios. This suggests that some Easton neighborhoods were disproportionately affected by street cleaning requirements than others. In Allentown, there does not appear to be such a phenomenon, apart from 4th St.

Of course, looking at street burden aggregates the experiences of a whole street into one number. While the low variability in burden ratios may indicate that Allentown neighborhoods experienced street cleaning similarly, this neglects to investigate if some blocks or neighborhoods are disproportionately affected. After all, the neighborhoods along integral roads such as Tilghman St are diverse in residents, housing, and commercialism.

While a good portion of street cleaning tickets probably results from simple forgetfulness, the structure of the neighborhood may play a role in the ability of residents to move their vehicles. Residents in denser block groups may have a harder time finding open spaces due to a higher prevalence of vehicles. We hypothesized that more street cleaning tickets would be issued in denser areas where parking may be less available.

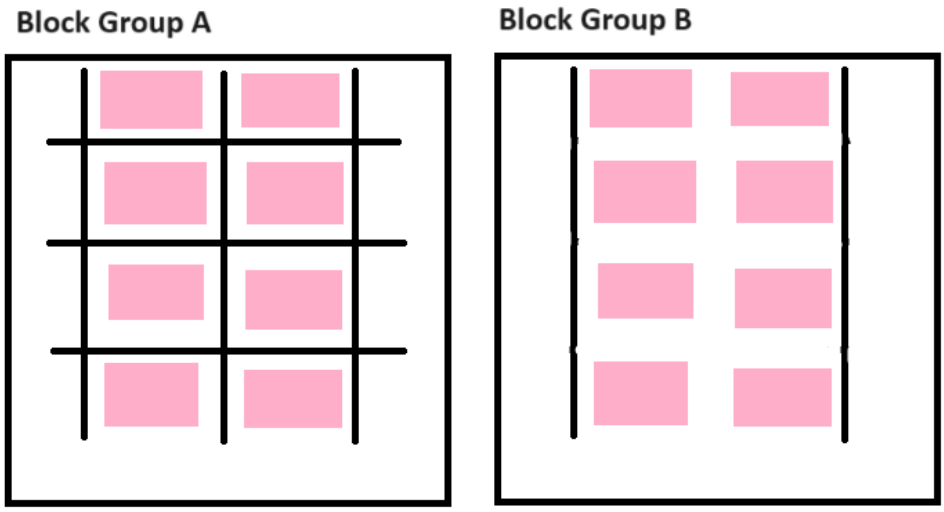
Figure 9: *Bubble chart of Allentown streets' burden, tickets, and burden ratios*



Method

A block group's density can be defined by the number of residents per square meter, but other kinds of density may be influential in this problem. The number of buildings per square meter may also influence parking availability. Families in one household may share a vehicle, so the more units that exist in a block group, the more vehicles potentially need to park there. Another density measurement is the length of all roads in the block group. As illustrated by the example in Figure 10, it is possible that two identical block groups in terms of area, residents, and number of buildings can have different amounts of available nearby spaces based on the total length of nearby roads, thus affecting the ability of residents to move their vehicles.

Figure 10: *Example illustration of how the length of roads in the block group might affect the ability of residents to move their vehicles for street cleaning. Both block groups have the same number of buildings (pink rectangles) and the same area, but different street configurations (black lines).*



Consequently, we measured the density of block groups in three ways: (1) number of residents / square meter, (2) number of buildings / square meter, and (3) total length of all roads in the block group in meters / square meter. Then, we found the correlation between those density measures and the number of street cleaning tickets issued. We obtained the number of residents in each block group from the 2021 ACS[8] from the U.S. Census Bureau. We deduced the number of buildings in each block group from a GIS layer maintained by the city of Allentown.[9] We calculated the length of all roads in the block group with a 2022 shapefile from the U.S. Census Bureau.[10] Finally, we perform a linear regression analysis on the number of street cleaning tickets in each block group to isolate the effect of demographic factors on street cleaning tickets, accounting for burden, population, and area.

Results

Street cleaning ticketing in Allentown was moderately correlated to population density

Table 7 contains the correlations for each measure of density with the number of street cleaning tickets issued. The building density correlation and population density correlation were nearly identical at 0.48 and 0.49 respectively. This suggests a moderate positive relationship between the density of residents in a block group and the residents' ability to accommodate street cleaning. While we don't know whether this correlation arises from increased difficulty of finding spaces or that there are simply more cars to issue

tickets to, this suggests that the denser areas of Allentown are moderately more likely to receive street cleaning tickets. Thus, these residents face this additional inconvenience.

Table 7: *Correlations between density measures and number of street cleaning tickets in each block group*

Population Density and Tickets	*Building Density and Tickets*	*Road Density and Tickets*
0.484	0.490	0.368

More diverse Allentown block groups saw more street cleaning tickets accounting for contextual factors

To isolate the effects of demographic descriptors on street cleaning tickets, we performed a linear regression analysis. We controlled for the street burden of the entire block group, the percentage of residential buildings, the population, the percentage of Nonwhite residents, the percentage of households below the poverty rate, the area in square feet, and the median household income. The results are in Table 8. Unsurprisingly, block groups with a higher burden and a larger population had significantly more tickets. Interestingly, block groups with a smaller area received significantly more cleaning tickets. Most notably, the block group's percentage of Nonwhite residents was significant in predicting the number of tickets. Accounting for the other predictors, one percentage point increase in a block group's Nonwhite percentage corresponded to an increase of 9.5 tickets. For example, a block group that is 90% NonWhite would see 95 more tickets over the 14 months than an otherwise identical block group that is 80% NonWhite.

Table 8: Results from linear regression model on street cleaning tickets

Variable	*Estimate*	*SE*
Intercept	569.475	658.859
Block Group Burden	0.004***	0.001
Percent Of Residential Buildings	-6.113	6.495
Population	0.348*	0.141
Percentage Of NonWhite Residents	9.578*	3.807
Percentage Of Households Below Poverty Rate	-2.904	5.024
Area (Square Feet)	-0.014***	0.004

Note: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Summary and Conclusion

Below is a summary of the important findings from this study.

- Overall ticketing in Allentown dramatically increased over the 14 months, with an additional 919 tickets each month. Bethlehem's ticketing was moderately increasing, with an additional 175 tickets each month. Easton's ticketing saw a decrease of 78 fewer tickets each month, the lowest change of the three.
- The APA issued more tickets than 20% of its population in one month in early 2023, a rate that was twice as much as the other two cities.
- Allentown's dramatic ticketing increases in meter tickets are likely attributed to its implementation of new technology and increases in its meter ticketing, as you discuss in *Parking Problems*. Surges in inspection and registration violations likely arise from this as well.
- Easton's meter ticketing rates may be yearly cyclic, meaning the moderately decreasing trend may not be due to any systematic changes. However, in early 2022, prior to Allentown's sharp increase in meter ticketing, Easton had a meter ticket rate that was one to two times that of Allentown.
- Half of all double parking tickets in Allentown were confined to N 7th St, Hamilton St, and N 6th St. While N 7th St is a targeted enforcement area, double parking may be more frequent here because individuals who live or work here may experience a lack of available parking or vehicle mobility. As N 7th St is one of Allentown's busier streets, double parking is an inconvenience at best and a serious driving hazard at worst. Finding ways to provide additional and accessible parking might help reduce the problem and, consequently, avoid the additional ticketing these residents may face.
- Street cleaning may be disproportionately impacting the North Easton neighborhood around Lafayette College, as evidenced by the high ratios between ticket counts and street burden. While we did not find any evidence that Allentown streets are disproportionately affected by street cleaning, taking advantage of the tickets' more precise block locations allowed us to examine how ticketing compared to block group demographics. Accounting for contextual factors like area, street cleaning regulations, population, and poverty rate, we found that more diverse neighborhoods saw more street cleaning tickets. Specifically, a 10 percentage-point increase in a block group's percentage of NonWhite residents corresponded to 95 additional tickets over the 14 months, all else equal.

It is important to emphasize that the results from this study do not imply that the parking authorities targeted certain individuals or neighborhoods, and they do not conclude the reasons behind ticketing. These results quantify the situation and do not imply causation. However, this research does provide insights into the outcomes of parking enforcement in the Valley. Regardless of the intention, these disproportionate outcomes are impacting real Lehigh Valley residents. Discussing how policies or practices may be disproportionately affecting certain communities, particularly marginalized communities, should be part of the routine evaluation that all relevant organizations should exercise.

Thank you again for your dedication to uplifting and amplifying the voices of Lehigh Valley residents. We hope that this analysis assists you in your goals. Please do not hesitate to contact us if you have any questions or would like any additional data or statistics.

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