INNOVATE MEMPHIS

Illegal Dumping Predictive Analysis, 2023

Overview: The City of Memphis asked Innovate Memphis to explore whether/how much different neighborhood/geographic factors correlated with 311 requests related to illegal dumping. We worked with Jessica Buttermore, our partner at Rhodes College's Research2Action Lab to analyze this data. Our analysis below shows that the strongest factor by far was vacancy – total vacant parcels, prolonged vacancies (i.e., those in the Land Bank) and vacancy acreage within a given Census tract. This summary includes the methodology/factors included in the analysis and the Census tracts with the highest concentrations of vacancies and 311 requests.

Methodology: Based on previous interviews with relevant City division directors and peer city leaders, we identified five different types of potential contributors to illegal dumping and nine potential measures that we could correlate with the frequency of 311 requests in each Census tract in the City of Memphis.

Potential Contributors, Illegal Dumping	How to Identify/Measure
Historical Patterns	Frequency of 311 reports related to litter, dumping, bulk pile and pick pile activities in the past year
Construction Contractors & Car Mechanics	1. # of construction and demolition site permits 2. # of current/recent sites related to construction & tire debris → Use specific 311 code requests
Resident Mobility	3. High-density renter areas 4. # of recent evictions (Note: lack of compliance on reporting evictions to Solid Waste for curb pickup – ordinance in place, interested in streamlining) 5. # of parcels owned by landlord/property owners w/ high eviction rates
Vacancies/Unattended Areas	6. # of current utility cutoffs/USPS vacancies 7. Square footage of vacant lots, low-density industrial areas
Barriers to Disposal	8. Long distance to landfills, other disposal sites 9. Limited/no curb disposal pick-up services

We then completed three phases of analysis:

PHASE 1 – Correlations

1. Collect baseline data from 2018 for as many indicators (#1-9) above as possible where we already have available data. We chose 2018-2019 for this analysis to avoid potential outlier trends during the start of the COVID-19 pandemic.
2. Create a correlations matrix between each 2018 indicator and the cumulative # of 311 requests related to dumping, bulk piles, etc. during the 2019 calendar year using Census tract as the unit of analysis.

PHASE 2 – Prioritizing Geographic Areas

3. Limit this phase of analysis only to indicators that had strongest correlations in Step 2. Use cumulative data for the past year (July 2022 – June 2023) where possible. Rank all Census tracts on aggregate stats for each indicator. Flag tracts in the top quartile ("worst" conditions that could lead to more illegal dumping).

4. Identify tracts with the most top quartile conditions and that have relatively high 311 code requests related to dumping/pick piles for the past year.

PHASE 3 – Community Profiles & Maps

5. Create profiles for the top Census tracts that include aggregate stats on the indicators used in Phase 2, which indicators for the tract are in the top quartile, and a visual map showing where 311 hotspots are within the tract and parcels with 1-3+ predictive indicators. *Note: We have created a City-wide map and have compiled statistics for each Census tract but are awaiting City guidance on which tracts to prioritize for more detailed/granular profiles.*

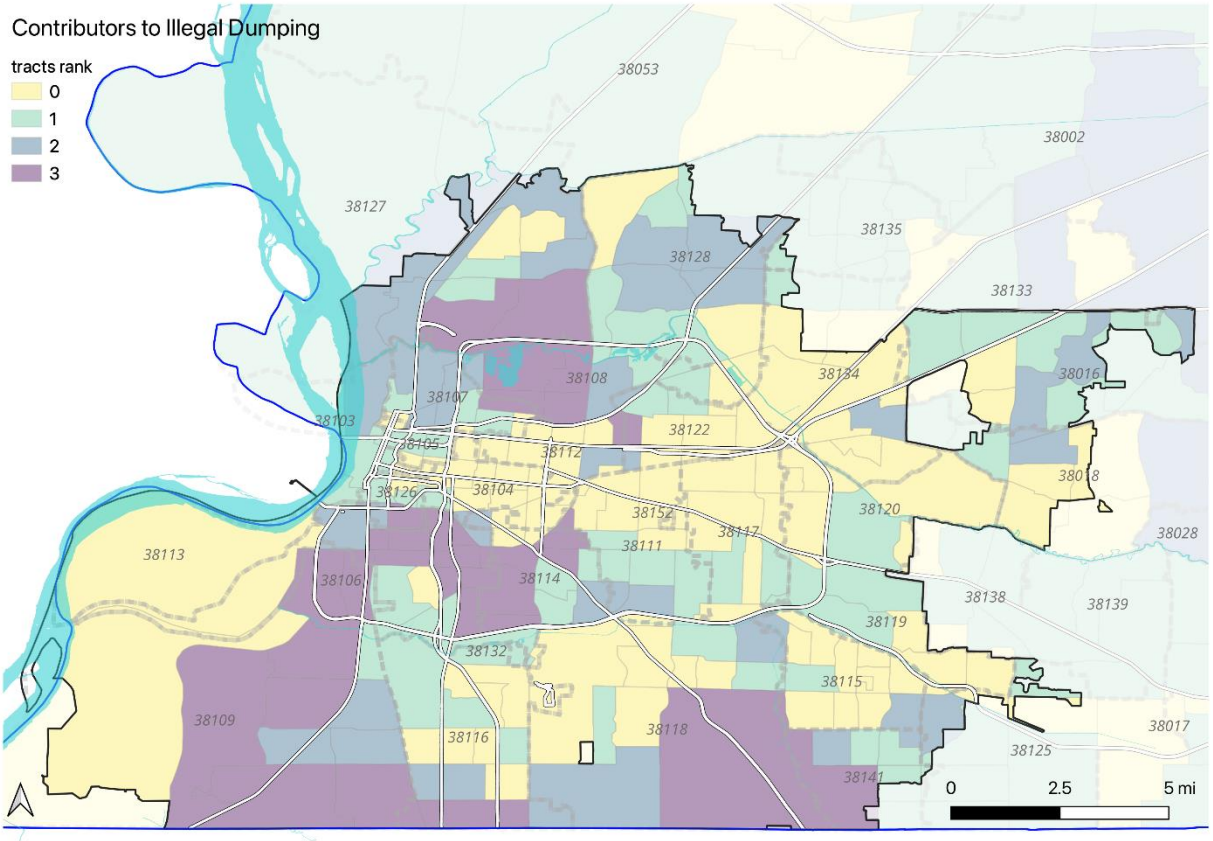
Results

In phase 1, the row and column with bold red font show how each indicator correlates with illegal dumping-related 311 requests when looking at each Census tract in Memphis. The higher the number in a given cell, the stronger the correlation is between 311 requests and another neighborhood factor. For example, Census tracts with a high number of landbank properties have a strong correlation with 311 requests reported (0.63) while tracts with a lot of building/demolition permits and evictions do not have a strong relationship with 311 requests (0.06 and 0.05, respectively). The three factors that had the strongest correlations by Census tract were the aforementioned number of landbank properties, the number of parcels with a recent MLGW utility cutoff and the total number of vacant parcels. All of these indicators have to do with vacancies in terms of being unoccupied for a long period (# landbank properties), a high concentration of vacancies (# vacant properties), and/or churn of occupants (# utility cutoffs).

CENSUS TRACT LEVEL								
	# Building/Demo Permits	# Evictions	**# Related 311 Requests**	# Utility Cutoffs	# Landbank Properties	# TDEC Dumping Sites	# Vacant Properties	# Vacant Acreage
# Evictions	0.08							
# Related 311 Requests	0.06	0.05						
# Utility Cutoffs	0.13	0.44	0.51					
# Landbank Properties	-0.09	-0.09	0.63	0.30				
# TDEC Dumping Sites	-0.01	-0.06	0.12	0.06	0.21			
# Vacant Properties	-0.06	-0.15	0.48	0.31	0.80	0.20		
% Vacant Acreage	-0.13	-0.14	-0.04	0.03	0.24	0.15	0.45	

# Vacant Properties	total number of vacant parcels per tract
% Vacant Acreage	percent vacant of total acres

For phase 2, we then examined 2022-23 data for just the indicators that had strong correlations by Census tract - # of 311 requests, # of landbank properties, # of total vacant properties, and # of properties with recent utility cutoffs. We identified Census tracts in the top quartile for each of these issues and created a City-wide map to show which geographic areas most likely to need support addressing illegal dumping. In the map below, "Tracts Rank" indicates the number of indicators where the Census tract was at greater risk of illegal dumping. The dark purple tracts with a "3" ranking should be considered for more resources and attention to address this issue.



There are over 25 census tracts in the map above with a rank of "3," meaning they have the most severe issues with vacancies and illegal dumping. We recommend working with City and community leaders to narrow down a more intensive intervention project to just 1-2 tracts for initial support/remediation so that we can test improvement strategies before scaling up.

To start work on Phase 3 of our analysis, we have provided a list of the top 10 "Category 3" tracts with the most 311 requests reported between 2022-23. All 10 tracts also have a higher-than-average number of vacant parcels and landbank properties. Over half of these tracts are also clustered in the southwest quadrant of the City, meaning there are opportunities to concentrate more resources and address more in-depth root causes specific to this area.

Census Tract	Descriptive Location	# 311 Requests	# Vacant Parcels	# Landbank Properties	311 Count Rank	Vacant Land Rank	Landbank Rank	# of Problem Indicators
47157005300	In SW I-55/I-240 corridor next to MS River	752	910	30	1	1	1	3
47157022410	Westhaven to TN-MS stateline	686	782	18	1	1	1	3
47157022700	Whitehaven Shelby Dr to TN-MS stateline	682	274	5	1	1	1	3
47157006700	NW section of Orange Mound	623	754	18	1	1	1	3
47157007821	Alcy-Ball Elvis Presley Blvd	575	323	4	1	1	1	3
47157022310	SW corner between Mitchell & Raines Rd	547	277	7	1	1	1	3
47157010220	Range Line corridor east of Frayser	527	319	3	1	1	1	3
47157011500	Bellevue Blvd/I-69 corridor east of Soulsville	516	652	15	1	1	1	3
47157005700	W of I-69 corrdidor btw S. Pkway and Person Rd	514	643	27	1	1	1	3
47157022220	Below SW I-55/I-240 corridor	503	701	16	1	1	1	3
	Average Memphis Census Tract	181	138	1.7				