

CITY OF LOS ANGELES' - Homeless Data Analyses

*DSO 545: Statistical Computing and Data
Visualization*



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EXECUTIVE SUMMARY

Aim:

The aim of this project is to discover and identify patterns in data across time, geography and homeless population segment, that can help formulate useful hypotheses, recommend actions from identified trends and propose an data driven optimization framework based on available resources.

The city of Los Angeles will generate \$1.2 billion in tax revenue through Measure H and Measure HHH. Our project consists of an in-depth analysis that observes relationships, correlations and trends to analyze how best the tax revenue can be allocated.

The homeless count is currently 260,000, rising 23% in the last year*

- Identified the density hot spots for where homelessness is most common
- Calculated the areas (by census tract and zip code) where homelessness rose and declined within the last year
- Analyzed crimes by type and location against the homeless population and identified high density locations of homeless people through location of 311 calls

*Source: <http://beta.latimes.com/local/lanow/la-me-ln-homeless-count-20170530-story.html>

Identifying hotspots and vulnerable areas

- Analyzed homeless density, number of shelters, population trends, location of crimes, along with the average property values for each district in the city of LA
- Located the area most vulnerable for females due to frequent crime against women
- Defined property value hot spots where officials can investigate further opportunities to buy land for future shelters and institutes
- Identified locations of mental health institutes and potential for expansion of these institutes based on homeless density and count of agencies

Created an interactive geo-spatial R Shiny dashboard

- An interactive dashboard that allows government officials to identify hot spots, shelters, homeless density, property value, mental health institutes, crime locations, and non profit agencies
- Government officials can add 2018 data to dashboard for performance tracking, e.g., rise and decline of homeless density, number of shelters, amount of crime against the homeless

DATA AND METHODOLOGY USED

Source of Data

Contextual research

- City of Los Angeles Homelessness strategy
- LAHSA homelessness count methodology, research, and more

Publically available

- LAHSA PIT count tabular data
 - [2017](#)
 - [2016](#)
 - [2015](#)
- [LAHSA PIT count geospatial data](#)
- [311 call data \(multiple formats\)](#)
- [Mental Health Counseling Data](#)
- [Shelters and services \(shapefile\)](#)
- [LA County Land Pricing data](#)
- Los Angeles crime details with victim detail
(Note: Homeless victims ID'd with an MO code of 1218)
 - [Homeless victims Aug 2016 - Aug 2017](#)
- [USPS ZIP Code Crosswalk files \(3rd Quarter 2017\)](#)

Dataset Description

1. LAHSA PIT count tabular and geospatial data:

This data set from LAHSA gives the total counts of sheltered, unsheltered and total homeless population counts in 2016 and 2017. The counts are based on census tracts.

Components of the Homeless Count:

Street Count (all census tracts): Captures a point in time estimate of the unsheltered population.

Shelter Count (from Homeless Management Integration System):

Captures the homeless population in emergency shelters, transitional housing, safe havens and vouchered motels/hotels.

Youth Count (sample census tracts):

Collaborative process with youth stakeholders to better understand and identify homeless youth.

Variables in the Data Set -

Tract - 2010 US Census Tract Code

Year - Year Tract was Counted

City - City Name

LACity - Whether tract in Los Angeles city (1=City,2=County)

Community_Name - Community Name

Detailed_Name - City, Community, or Los Angeles Neighborhood Council

SPA - Service Planning Area

SD - LA County Supervisorial District

CD - City Council District

Ca_ssd - State Senate District

Ca_sad - State Assembly District

Us_cd - US Congressional District

DemogSurvCt - Number of Valid Adult Demographic Surveys

YouthSurvCt - Number of Valid Youth Demographic Surveys

SheltHmisCt - Number of Valid HMIS Individual Records

ShelterCountAny - Whether any shelters reported in tract

StreetCountAny - Whether PIT count reported in tract

totStreetSingAdult - Single adults over 24 years old counted during the Street Count

totStreetFamHH - Family households counted during the Street Count

totStreetFamMem - Total family members counted during the Street Count

FamCarPeople - Family Members calculated living in cars

FamVanPeople - Family Members calculated living in vans

FamCamperPeople - Family Members calculated living in campers

FamTentPeople - Family Members calculated living in Tents

FamEncampPeople - Family Members calculated living in encampments (makeshift shelters)

IndCarPeople - Individuals calculated living in cars

IndVanPeople - Individuals calculated living in vans

IndCamperPeople - Individuals calculated living in campers

IndTentPeople - Individuals calculated living in Tents

IndEncampPeople - Individuals calculated living in encampments (makeshift shelters)

totSHYouthUnaccYouth - Total unaccompanied minors, under 18 years in safe havens

totUnsheltPeople - Total population of unsheltered homeless persons

totESPeople - Total population in emergency shelter

totTHPeople - Total population in transitional housing

totSHPeople - Total population in safe havens

totSheltPeople - Total population of sheltered homeless persons

totPeople - Total population of sheltered and unsheltered homeless persons

2. **311_Calls_with_CTs_Data_2017:**

Service request data from MyLA311 for 2016. This includes requests submitted via 311, call centers, email, mobile apps, website, and other sources.

Variables in the Data Set -

SRNumber - Service Request Number

CreatedDate - Request creation date and time

UpdatedDate - Request updated date and time

ActionTaken - Action taken by Department on the service request

Owner - The department which created the request on the system

RequestType - Service requested by user

Status - Status of the request (Cancelled/Closed/Forward/Open/Pending)

RequestSource - Medium of the request recorded (Mobile App/Call/Email..)

MobileOS - Operating System if Request Source is Mobile App

Anonymous - Is the user anonymous? (Y/N)

AssignTo - The group the service request is assigned to

ServiceDate - Date and time of processing the service requested

ClosedDate - Date and time of closing the service requested

AddressVerified - Is the address of the user verified? (Y/N)

ApproximateAddress - Is the address of the user approximate address? (Y/N)

Address - Address of the user

HouseNumber - House number of the user

Direction - Direction of street extracted from Address

StreetName - Street name extracted from Address

Suffix – Street suffix extracted from Address

ZipCode – ZipCode extracted from Address

Latitude – Latitude of the Address

3. **Mental_Health_Counseling Data:**

This data set contains Mental health center locations data.

Variables in the Data Set -

Name – Mental health center location names

Latitude – Latitude of the mental health centers

Longitude – Longitude of the mental health centers

ZipCode – ZipCode extracted from mental health center address

ObjectID – Census Tract ID of mental health center

4. **Shelters and services (shapefile):**

Locations of homeless shelters and services in Los Angeles County.

Variables in the Data Set -

Source - 211 (168), Current Services Locator (9)

Cat1 - Social Services (183)

Cat2 - Homeless Shelters and Services (183)

City - Los Angeles (75), Long Beach (12), Lancaster (10), Pasadena (7), Santa Monica (6), North Hollywood (6)... (36 more)

State - CA (182)

Phones - Service/Intake (661) 945-7524 (3), No Telephone () - (3), Service/Intake and Administration (661) 945-7524 (2)... (161 more)

Post_id - min: 772 max: 71,888 avg: 52,585.04 count: 183

Zip - 90013 (15), 90028 (9), 93534 (8), 90813 (7), 90033 (6), 90731 (5), 91605 (4), 90401 (4), 90027 (4), 90015 (4)... (73 more)

Date_updated - 11/01/2010 to 02/22/2017

POINT_X - min: 4.22 max: 6,646,252.49 avg: 6,453,539.82 count: 183

POINT_Y - min: -2.15 max: 2,078,274.89 avg: 1,838,438.18 count: 183

OBJECTID - Unique ID

Latitude - min: 27.2 max: 34.7 avg: 34.03 count: 183

Longitude - min: -138.15 max: -117.72 avg: -118.35 count: 183

5. LA County Land Pricing data:

Property value of listed properties or open land in the Los Angeles county district.
Variables in the Data Set -

ZipCODE5 – Zipcodes in the county of Los Angeles

Latitude – Latitude of each listed property

Longitude– Longitude of each listed property

TotalLandImpValue – Total value of each listed property

City – City of each location of each listed property

Avg_price – aggregated average price of property by zipcode

6. Los Angeles crime details with victim detail from Aug 2016 - Aug 2017

This data set contains homeless related crimes information.
Variables in the Data Set -

Victim Sex – Gender of homeless victims

Premise Description - Location where the crimes happened

Latitude - Latitude of the crime location

Longitude - Longitude of the crime location

GeoID - Census tract ID of the crime location

7. USPS ZIP Code Crosswalk files (3rd Quarter 2017)

This data set contains Zipcode and the corresponding census tract identification number,
It is used to map the Zipcode to the census tract
Variables in the Data Set –

Zip – Zipcode

Tract - Census tract ID

Data Cleaning

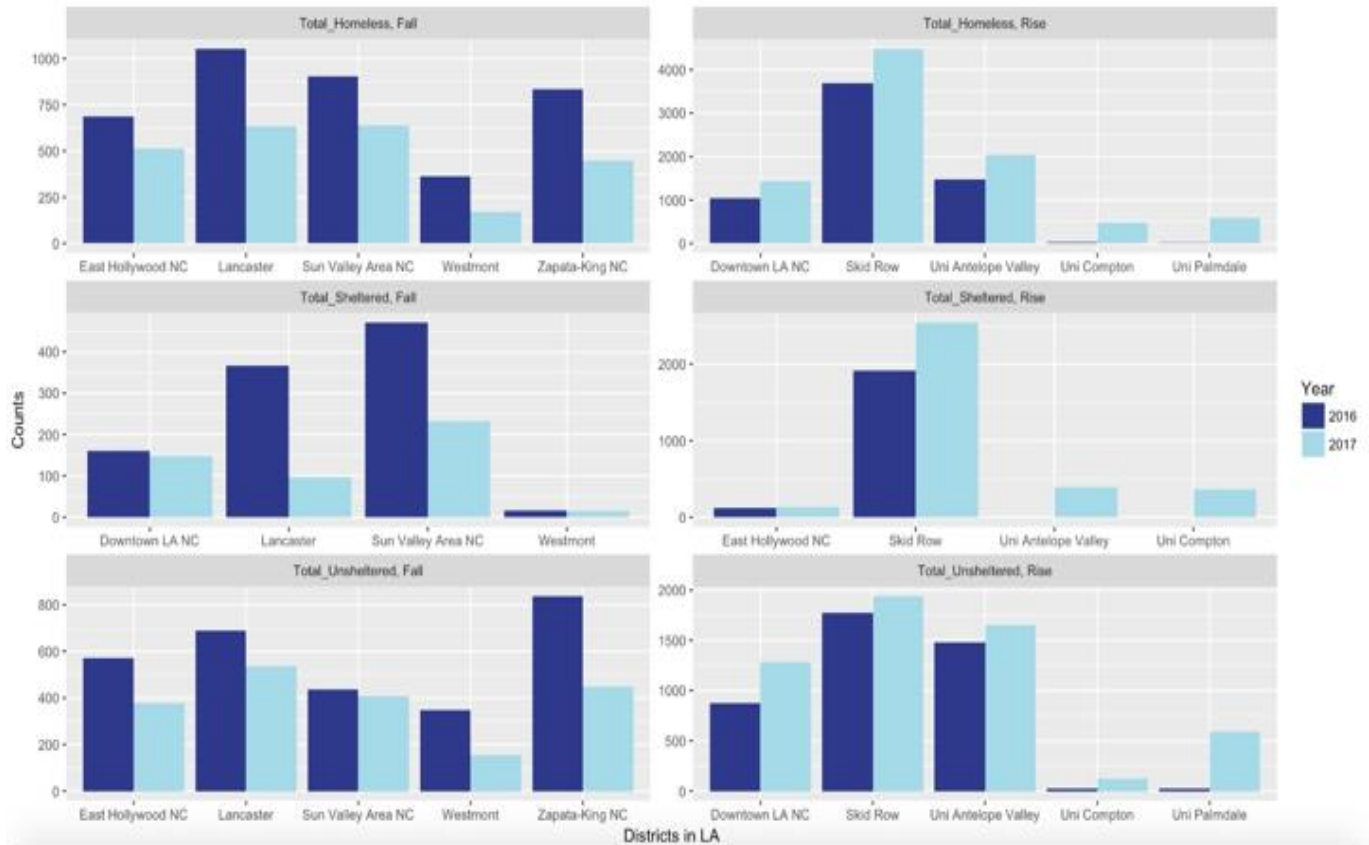
- Converted dates from a factor format to POSIXct format using Lubricate Package in R
- Extracted weekdays, months and hours for all date variables

Tools and Packages Used

- R
- R Studio
- dplyr
- Leaflet
- ggmap
- ggplot2
- Shiny R
- StringR
- Tidycensus
- Shinydashboard

INITIAL DATA ANALYSIS AND INSIGHTS

1. YoY Change in Homeless Count

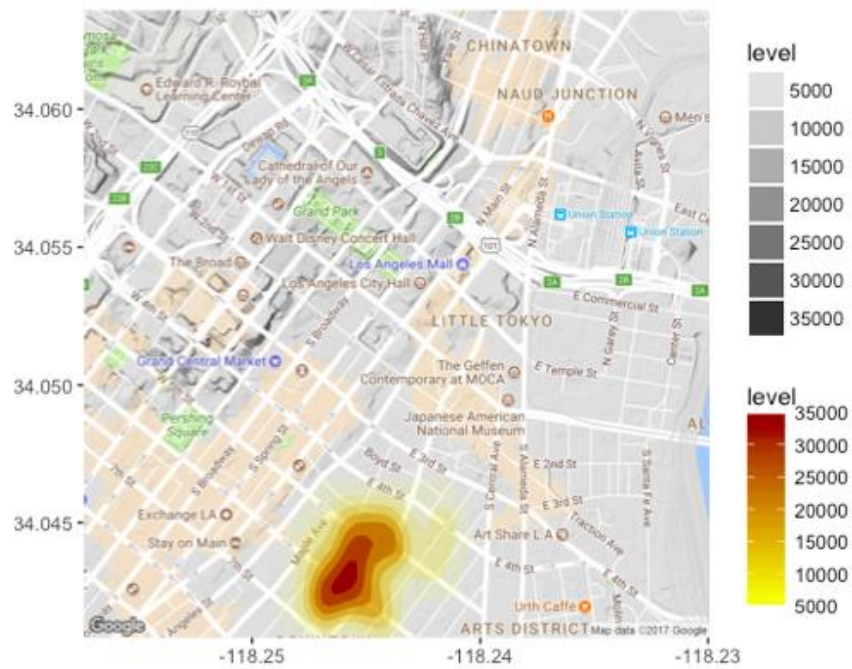


Homeless Count Variation from 2016 to 2017

On analyzing the LAHSA PIT count data for 2016 and 2017, we observed the following:

- There are certain Council districts in LA County which have a high decrease in homeless count from 2016-2017. These include East Hollywood NC, Lancaster, Sun Valley Area NC, Westmont, Zapata-King NC.
- On the other hand, areas like Downtown LA NC, Skid Row, Antelope Valley, Compton and Palmdale have shown a stark increase in homeless count.

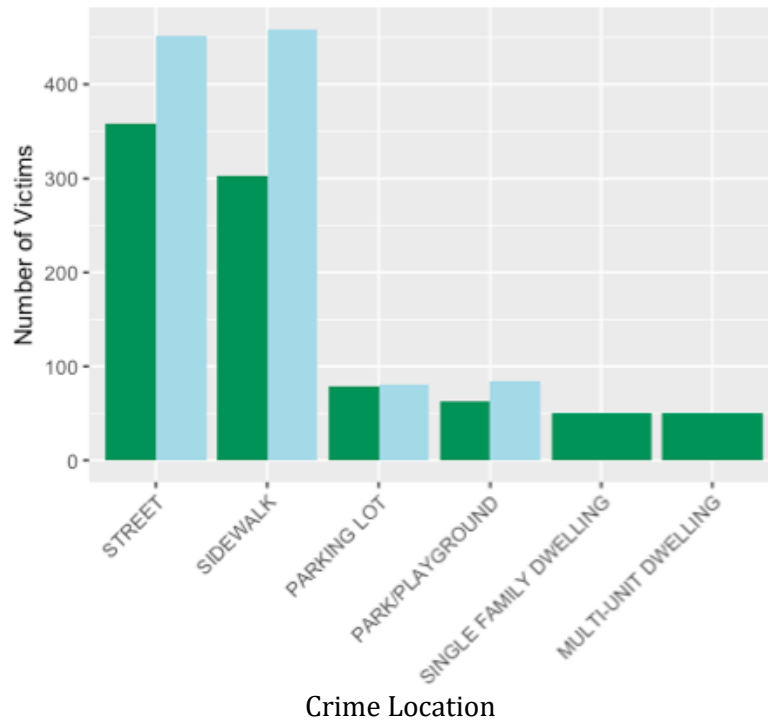
2. Crime Distribution



Crime Density



Crime Distribution by Gender

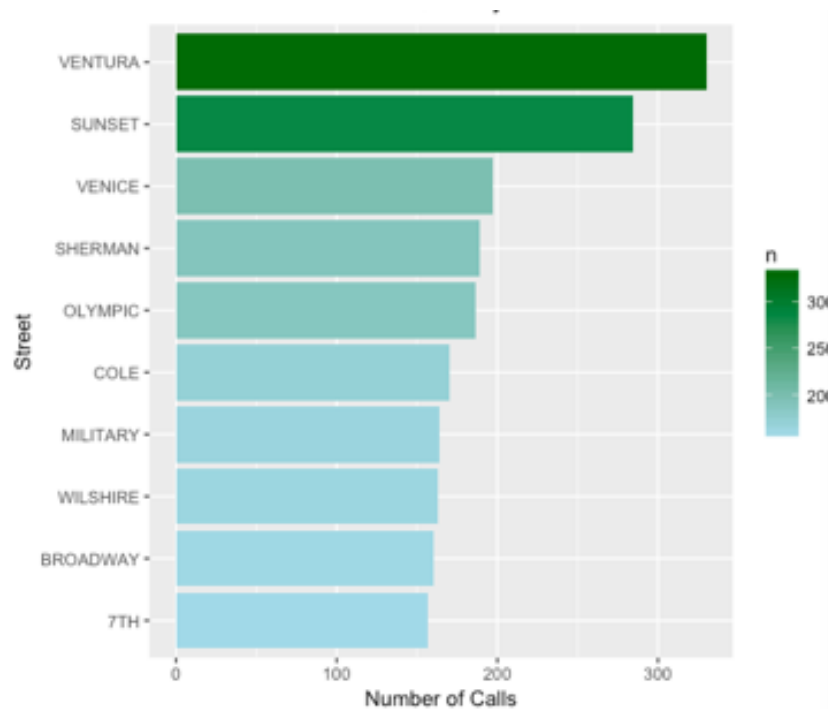


- DTLA observed the highest volume of crimes
- Victims with different genders are not evenly distributed in the map
 - In some streets, such as W4th street, most victims are male;
 - In some streets, such as S Los Angeles street, most victims are female

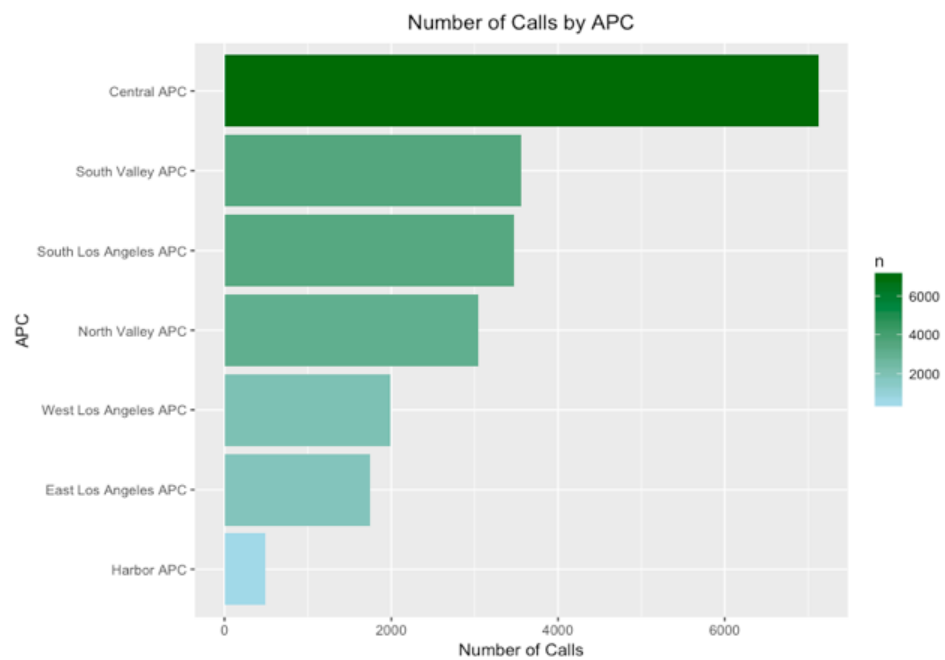
3. 311 Calls



Concentration of 311 Calls



Concentration of 311 Calls by Street

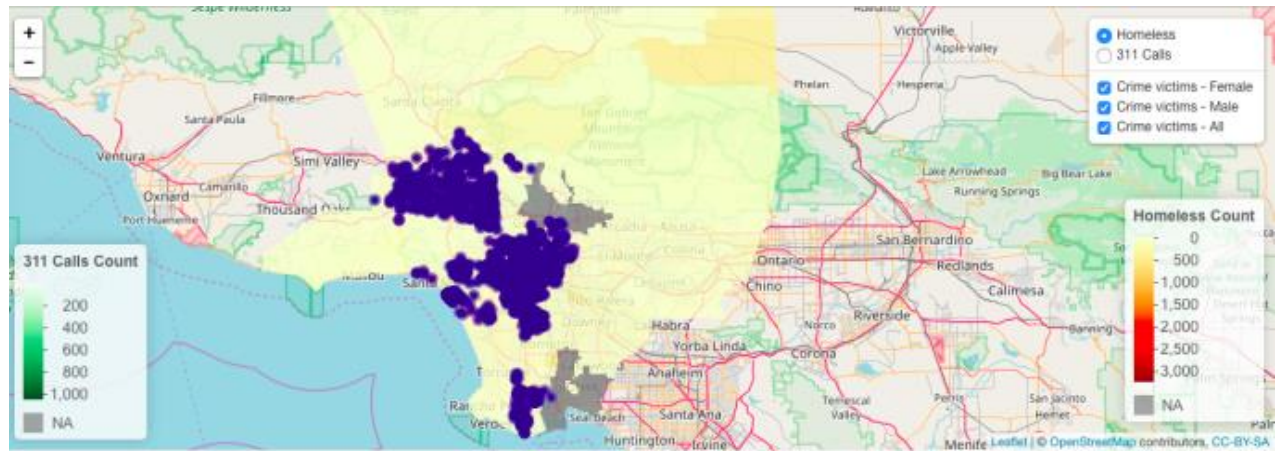


Number of 311 Calls by Center Location

- Downtown LA and Central LA Received the most calls compared with other areas.
- We can take more action and allocate more resources to the top 10 streets that received the most 311 calls.

AREAS OF FOCUS

Crime



Homelessness Density vs. Crimes

Observations:

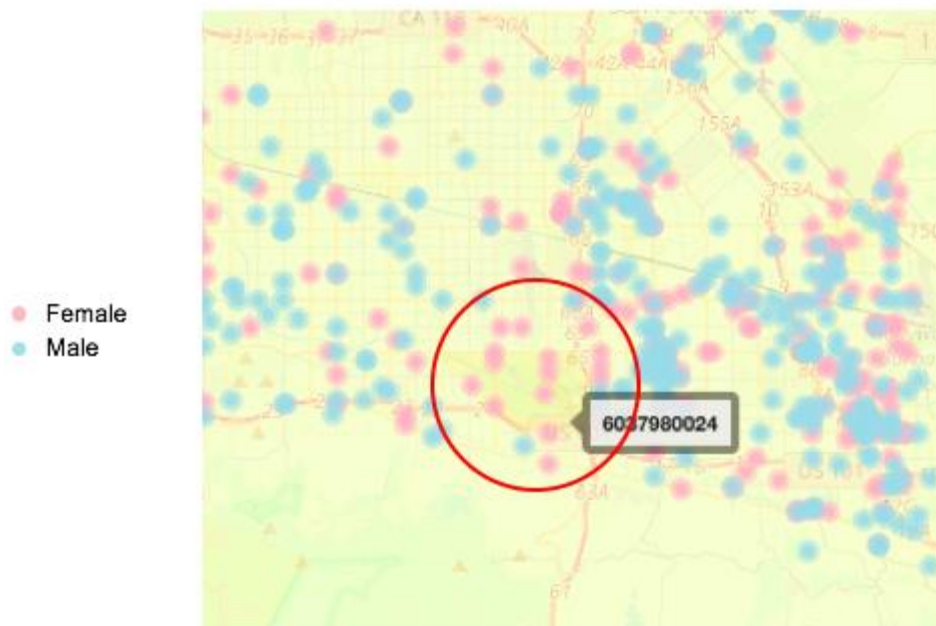
- DTLA saw the highest density of homelessness
- In most of the areas, the higher homelessness density is, the more crimes there are
- There are 4 main clusters of crimes (purple dots): DTLA, North Hollywood, Santa Monica and San Pedro



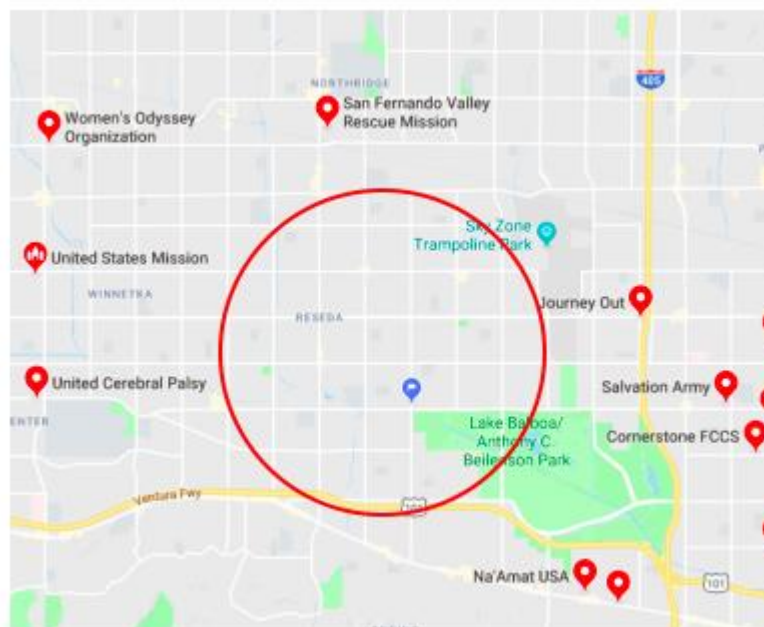
Homelessness Density vs. Crimes

Observations:

- Some places are with high homeless density but low crime rate (e.g. 6037532304, 6037930200, 6037543305)



Homelessness Density vs. Crimes by Gender

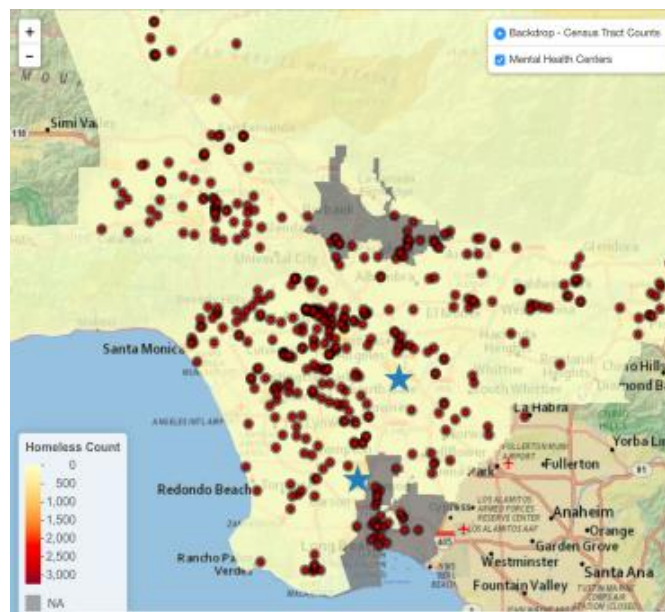
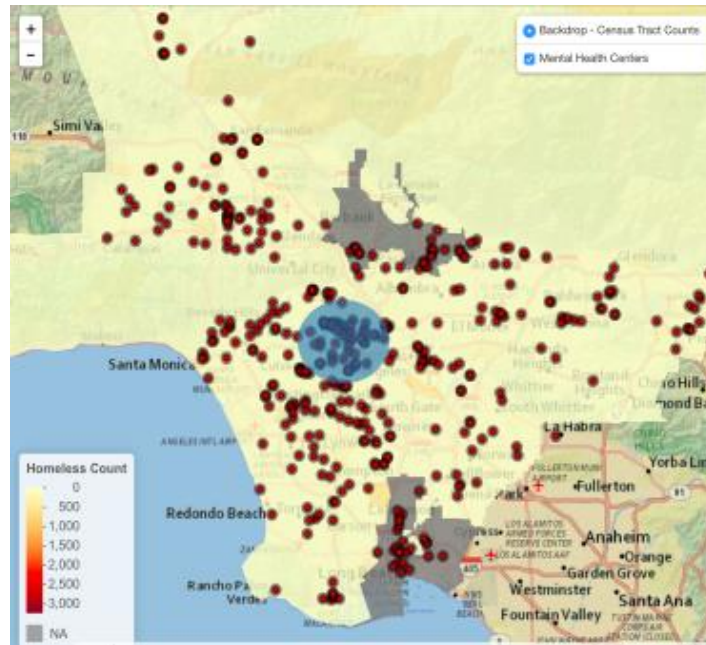


Women Shelter Source: Google Map

Observations:

- Male and female victims are not evenly distributed
- There are extra women shelters surrounding the red circle in Google map but not on LA city shelter list such as NA'AMAT USA

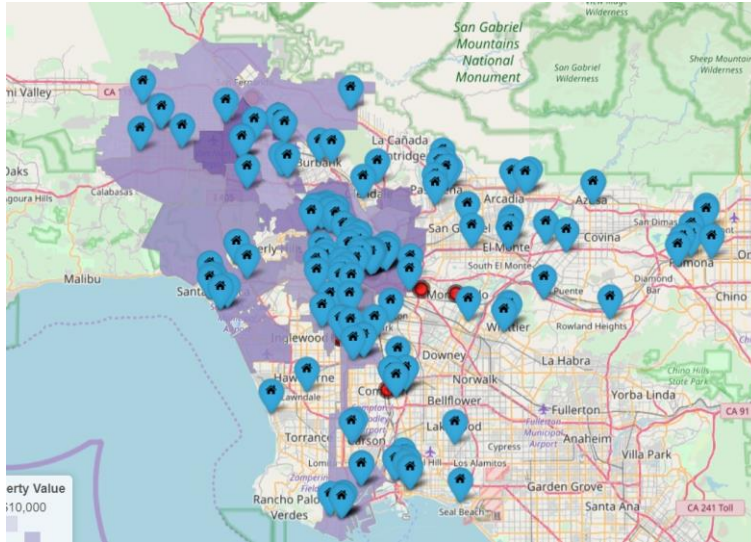
Mental Health Centers



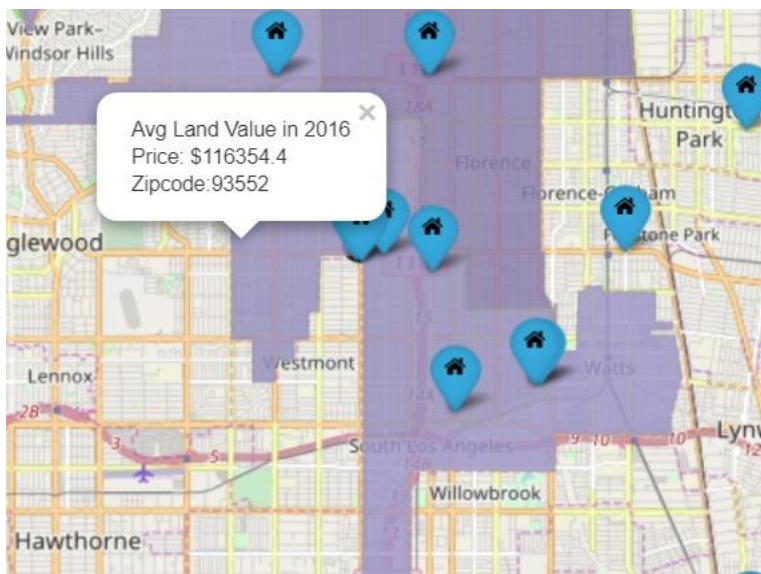
Observations:

- Some areas have high homeless density with sufficient mental health centers nearby. For instance, the location with the census tract 6037206300.
- Some areas have low homeless density without sufficient mental health centers nearby (e.g., 6037532304, 6037541001).

Property Value Analysis



Choropleth map of property values in the city of LA



Identified Hot Spot for land investment

Observations:

- Identified hot spots that are defined by low to medium property value, low shelter count in the area and a rise of homelessness in that area
- Two zipcodes were identified as vulnerable hot spots that are suggested locations that the city officials should investigate further for investment opportunities
 - These zipcodes include 93552, 93591

RECOMMENDATIONS

Shelter Optimization

- Available Shelters vs Areas of Increased Homeless Counts:
 - Optimize the available shelters both in terms of location and capacity.
 - Areas identified with high increase in Homeless Count and low number of shelters around them.
- Areas of Interest:
 - Lancaster, Pacoima NC, East Los Angeles, Montebello, Skid Row, Empowerment Congress Southeast NC

Crime

- Build shelters in safe areas (e.g. 6037532304, 6037930200, 6037543305) to lower crime rate
- Partner with NGOs that are not on LA city's list to support women homeless people, especially in high crime rate areas such as 6037980024

Cost Benefit Analysis on Hotspots

- Further investigate land investment opportunities in the two identified hot spots in order to increase count of shelters and/or subsidies housing for the homeless population (Zip Codes: 93552, 93591)
- Branch out to non-profit organization in these hot spot areas to increase government aid and homelessness prevention

Mental Health Center

- Partner with nearby local mental health centers to provide mental counseling service.
- Provide mental health service within the existing shelters in areas without sufficient mental health centers

Empowering the Homeless – A Long Term Solution

Empowering the Homeless People through Non-Profit Organizations. One such identified Non-Profit is "Chrysalis".

- It takes in homeless and low wage-earning population and employs them in Street maintenance and staffing services.
- It also provides vocational training to such populations.

This could empower the homeless people to re-enter the work force and earn a livelihood for themselves, thereby contributing to a permanent long-term solution of eradicating the problem of Homelessness in Los Angeles.