# Using GIS to Identify the Sheltered and Unsheltered Homeless Populations of Los Angeles County

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California has one of the highest homeless populations in the United States with more than 150,000 of its residents sleeping in shelters, cars, or on the streets, and Los Angeles County is currently seeing the highest concentration. Two comparable states are New York and Hawaii, with a slightly higher per capita rate of homelessness but California is known to have the largest proportion of homeless population living without shelter, making it a visibly obvious problem, along with putting the homeless population at a higher risk for illness, violence, and death. One well-known and visible area is Skid Row where according to 2019 census data has 1,974 sheltered and 2,783 unsheltered inhabitants. Equaling a total of 4,757 people live in half a square mile (Los Angeles Homeless Services Authority).

Homeless is defined by the Department of Housing and Urban Development as People who are living in a place not meant for human habitation, in emergency shelter, in transitional housing, or are exiting an institution where they temporarily resided (Department of Housing and Urban Development). The history of homelessness in LA county began in the 1930s and most recently regained steam in the 1990s during the crack epidemic which paralleled with a decrease in welfare payments and decrease in low-income housing availability due to the city's updated land-use policy. Currently, about two-thirds of those homeless in LA county are experiencing psychological and/or substance abuse disorders but many also have found themselves homeless due to an increase in rent and other temporary mental disorders. While New York City guarantees a "right to shelter" in 2006 Los Angeles agreed to a "right to sidewalk" which gave way to the increased encampment seen on sidewalks county-wide today. Between 2018 and 2019 LA county's homeless population grew 12% where an estimated 55,000 residents "lost a place to live" (California Policy Lab). Due to the increase in the homeless population, The Los Angeles Housing Authority estimates that last year they were able to place 20,000 people into housing last year after having their funding stimulated. The use of funding was also reevaluated after an audit showed that LA spends more than 50 percent of its homeless funding on law enforcement. With GIS insight collecting data on the homeless population in LA county, the question being asked is can GIS be used to approach the increasing homeless population.

**Data Model**

In order to determine where in Los Angeles County are the higher populations of homeless, we retrieved a shapefile layer titled “County of Los Angeles Total Homeless' '. This layer was produced on behalf of the Los Angeles Homeless Authority and contains data collected during 2019. The attribute table within this layer contains the estimated sum of the total homeless population including the Santa Catalina and San Clemente islands, as well as categorization based on whether the individual is sheltered or unsheltered. As defined by HUD, a sheltered homeless person resides in a shelter, transitional housing. or supportive housing. A sheltered person lives in a place not meant for human habitation, such as cars, parks, sidewalks, abandoned buildings, or the streets (Housing and Urban Development).

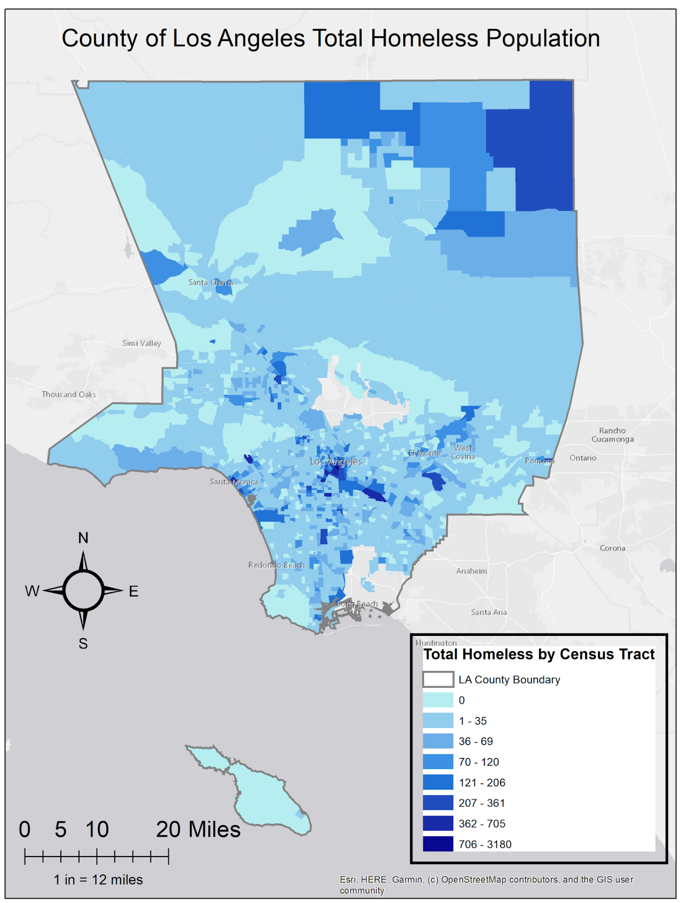
We were not able to locate this shapefile from the official LAHA website, but luckily, we were able to find it published as a host layer on ArcGIS online. Since we focused on countywide homeless populations, the size of our data set was fairly large and census tracts vary by size and become very clustered in the very densely populated areas especially in the city of Los Angeles. We had to modify the layer to not display the census tract boundaries, and just display the quantities within the boundaries so map data is more readable at full extent.

The Los Angeles County Boundary was downloaded from the Los Angeles County GIS Data Portal. It contains attributes within the table labeled “mainland” and “island” for mainland

California and LA County Jurisdiction on the Santa Catalina and San Clemente islands to the East, along with the dedicated names to each polygon. Lastly, we utilized a layer titled "Los Angeles County Shelter and Services" which contains locations of registered facilities that offer services specialized for homeless populations. Publicly funded, private, and non-profit organizations are all included on this layer.

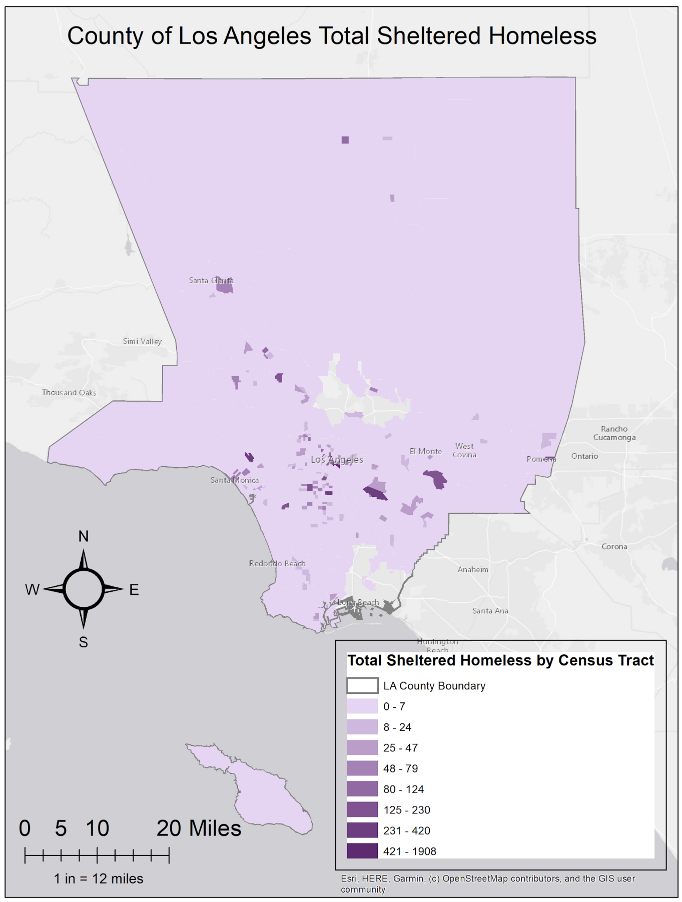
## Analysis & System Documentation

For Map 1. we decided to display the data showing quantities and graduated colors using the value field containing the total of both sheltered and unsheltered homeless populations. This data was classified using eight classes by natural breaks (Jenks).

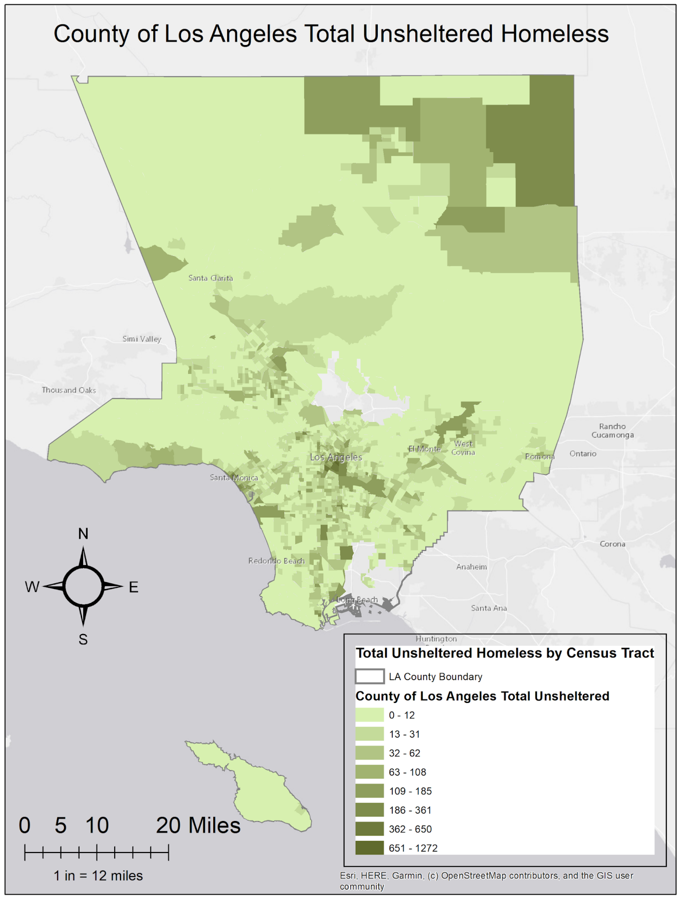



**Map 1.** County of Los Angeles Total Homeless Population by Census Tract

The same classification and showing were utilized for Map 2 and 3, except instead of utilizing the total homeless population, Map 2 shows sheltered homeless, and Figure 3 shows the unsheltered homeless populations throughout the county within each census tract. When displaying data for all three maps we formatted labels to display numeric value categories with no decimal place rounding.

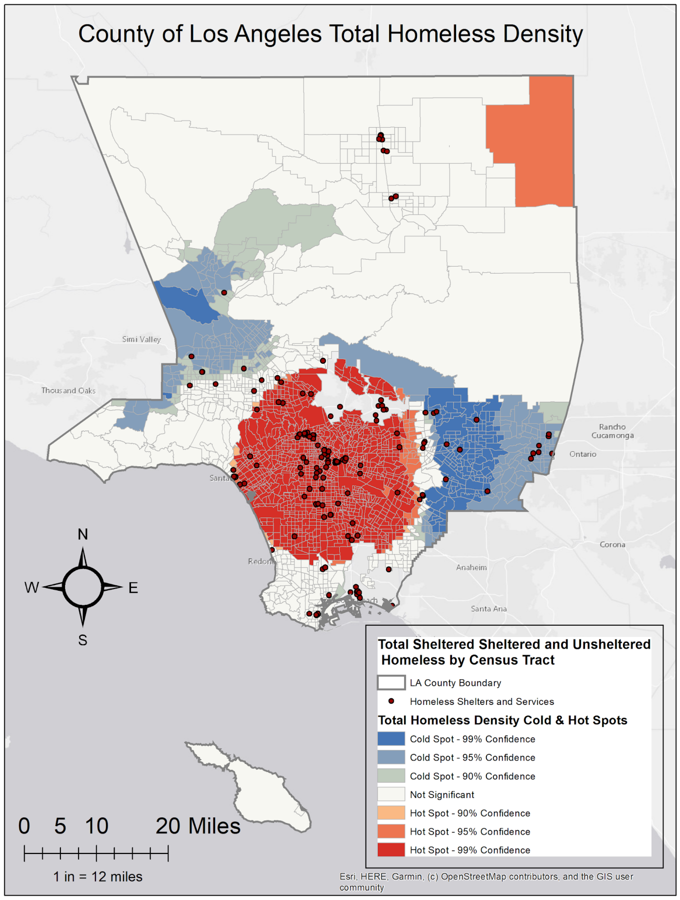



**Map 2.** County of Los Angeles Total Sheltered Homeless by Census Tract




**Map 3.** County of Los Angeles Total Unsheltered Homeless by Census Tract

Map 4. displays where the highest densities in relation to available services, we utilized the County of Los Angeles Total Sheltered Table and utilized the Hot Spot Analysis (Getis-Ord Gi*) tool within the Mapping Clusters and Spatial Statistics Toolbox, which highlights the areas on a map that have the highest concentration of input data based on quantity and proximity. From here, we were able to determine what areas have the highest homeless density, as well as where services are available.




**Map 4.** County of Los Angeles Total Homeless Density

## Approaching the Problem with GIS

The case of an increasing homeless population can be addressed with geographic information systems, a framework for gathering, managing, and analyzing data (Esri). When well done, GIS has the capability to reveal patterns and geographic relationships. The maps above have been modeled to reflect total homeless population (map 1), total sheltered homeless (map 2), total unsheltered homeless (map 3), and total homeless density (map 4) in Los Angeles county. Using these maps, some recommendations can be made to help remediate the homeless problem in the city.

Map 1 gives us insight into the homeless population count per census tract. Using this map city planners can aim to station government assistance programs and facilities in the high-density areas.

Map 2 details the sheltered count of homeless people. The map can be used the same as Map 1 but can additionally be used to implement public transportation stops to assist in affordable modes of transportation to help the population get to other areas for services, jobs, groceries, etc.

Map 3 is a layer that presents the total number of unsheltered homeless persons. This map can be generous in helping to transition this population into shelters. The map can be a blueprint for areas where shelters could be positioned.

Map 4 is the total homeless density featuring cold and hot spots in the county. This map can be used to understand larger areas, such as how many services or shelters need to be placed in Downtown LA and Palmdale (hot spots) versus Van Nuys (cold spot).

An example of a way to use GIS in homeless resolution could be in collaboration with the Second Dwelling Unit (Accessory Dwelling) Pilot Program. Through this program homeowners are paid to host homeless people in their backyard “granny flats” which is an additional house that can be built and rented on a single-family property (Los Angeles County Planning Department). As noted by LA county, there are tens of thousands of potential sites in unincorporated areas. This knowledge possibly came from the use of GIS mapping to understand single-family cites, their land size, their land use, and access to public transportation. GIS can overlay all the aforementioned map layers to find overlapping cite options, then approach the homeowners with the option and program information. This would help alleviate the homeless problem with diversion and re-housing and emergency rental assistance.

**Strengths and Weaknesses**

Nobody experiences homelessness the same as it is a complex issue with many layers and contributing factors. The intention of this research project was not to simply identify these populations, but also to understand its growth throughout the years. Originally, we planned on reporting on the city of San Francisco but were unable to find homeless data through the city's GIS portal. Due to this, we decided to modify our research location to that of Los Angeles County where we were able to find a dataset on behalf of the Los Angeles Homeless Authority. Unfortunately, at the time of our project, the official Los Angeles County GIS Data Portal was under maintenance so datasets for previous years were not available for download so again, we had to modify our research question based on the only reliable data we located. Also, due to sensitivity and confidentiality precautions, many organizations that also track and report homeless populations do not make their raw data readily available and are reluctant to share their data with the public. In the future, it would be necessary to plan for ample time to build a rapport with organizations that can provide valuable resources. It would also benefit a study of this nature to include participatory methods such as interviews with people that are impacted by homelessness to gain a real, deeper understanding of the difficulties of living homeless as well as give an opportunity to share people's stories.

This was a very enjoyable project and eye opening into a topic that my teammate and I feel passionate about.   making the project fun with discussion, working with ArcGIS to find datasets and information to put the project together, and the time given to complete the project was more than enough time. The future requests I would have for a project revision would be a little more guidance into the research topic. When first beginning it felt overwhelming to have so much great information in our hands but near unapproachable in not knowing where to begin. Our initial topic we had difficulty finding the dataset and layers that we would need so we ended up revising the location but sticking with the topic of homelessness. Areas that GIS cannot cover in our project with the homeless population are personal stories, understanding trends to why a person(s) became homeless. Because this population tends to not live in a permanent area it’s hard to collect concrete spatial data.

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