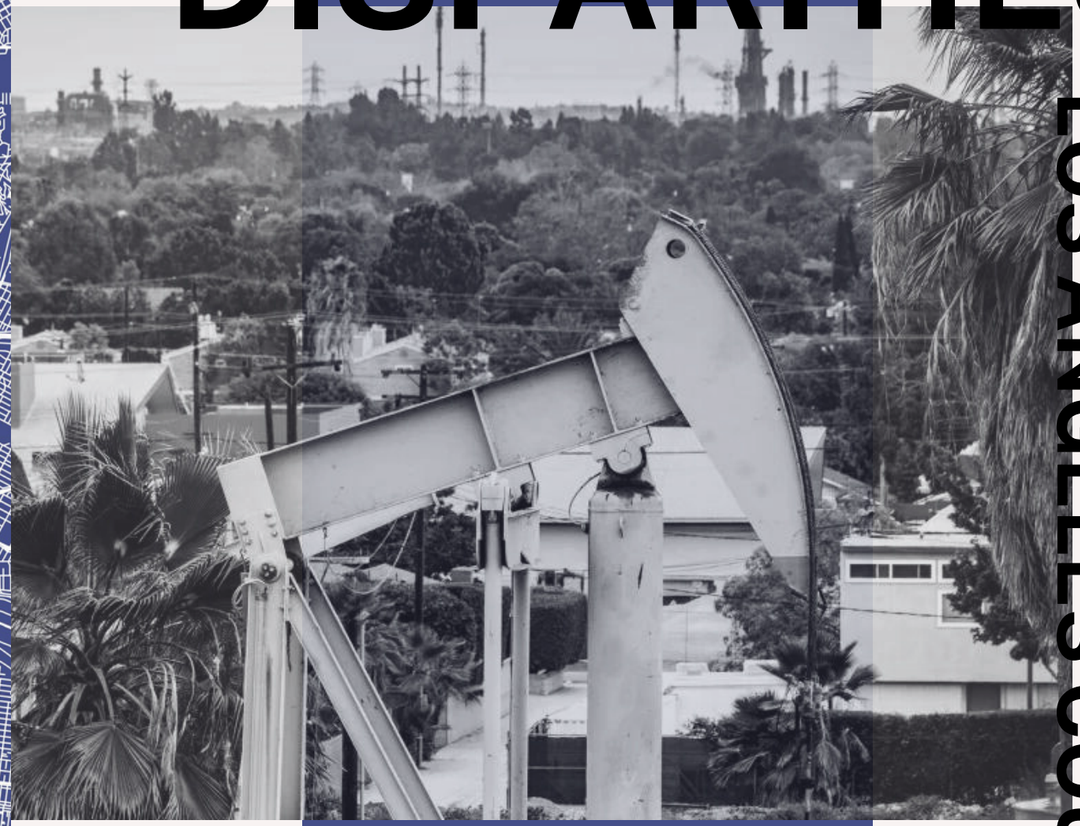
STEVEN DELA CRUZ DUNCAN

SPATIAL DISPARITIES

ASSESSING OIL WELL DISTRIBUTION IN LOS ANGELES COUNTY



GIS FALL 2023

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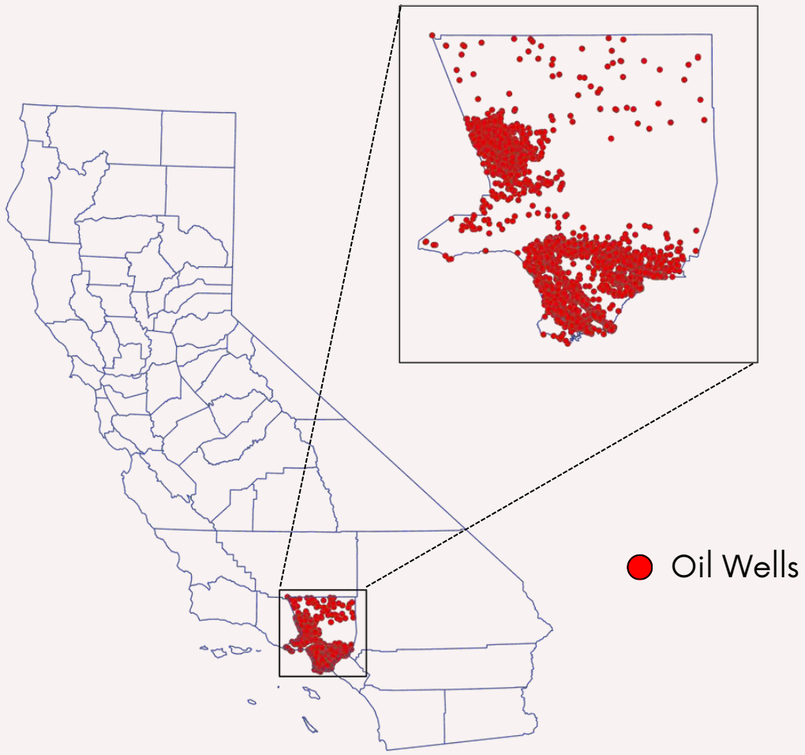


INTRODUCTION

MESSAGE FROM THE CARTOGRAPHER

Dear Reader,

I share with you a research project born out of my personal account of living in Los Angeles County, a region that is (after speaking with several of my peers) unknown to be one of the largest oil reserves in the continental U.S. My time in this city has been marked by a stark confrontation of the harsh realities of unchecked industrial practices as well as the urgent need for sustainable community engagement.

Before I begin my investigation, I want to recognize the unyielding determination of communities struggling against environmental degradation in LA County. More specifically, I want to highlight People Not Povos, an organization dedicated to environmental justice and community engagement, which has played a pivotal role in shaping my perspective. Their tireless work, focused on amplifying the voices of marginalized communities, has added depth to my understanding of the intricate web of environmental and social issues linked to the oil industry.

As I undergo this exploration, my intention is to uncover and expose the challenges faced by communities in LA County and beyond, contributing to a more comprehensive understanding of the profound environmental impact of the oil industry. Through shared knowledge and collaborative efforts, I aspire to contribute to a more informed discourse on environmental justice.

Sincerely,

SDD

HISTORY & BACKGROUND

Los Angeles has a complex and longstanding relationship with oil, dating back to 1892 when the discovery of oil in Modern-day Echo Park transformed the city almost overnight from a small agricultural hub to a thriving hotspot (Witt, 2022). However, this prosperity came at a cost, as the needs of the oil industry took precedence over the well-being of the city's residents.

From the outset, neighborhoods were structured around drilling sites, and parks were sacrificed once oil was found. Fast forward to 2020, and Los Angeles County boasted approximately 4000 active wells, many situated close to residential areas, parks, and schools.

This juxtaposition creates ongoing challenges as the interests of the oil industry and the well-being of the community continue to intersect.

The presence of active oil wells near populated areas raises concerns about air and water quality, noise pollution, and potential safety hazards. Balancing the economic benefits of oil extraction with the need to protect the health and quality of life for residents remains an ongoing challenge for local authorities and communities in Los Angeles County.

MORE BACKGROUND

THE OIL & GAS DRILLING ORDINANCE

The Oil and Gas Drilling Ordinance marks a transformative legislative step in Los Angeles, amending the Municipal Code to proactively curtail new oil and gas drilling activities, deeming them nonconforming uses across all city zones.

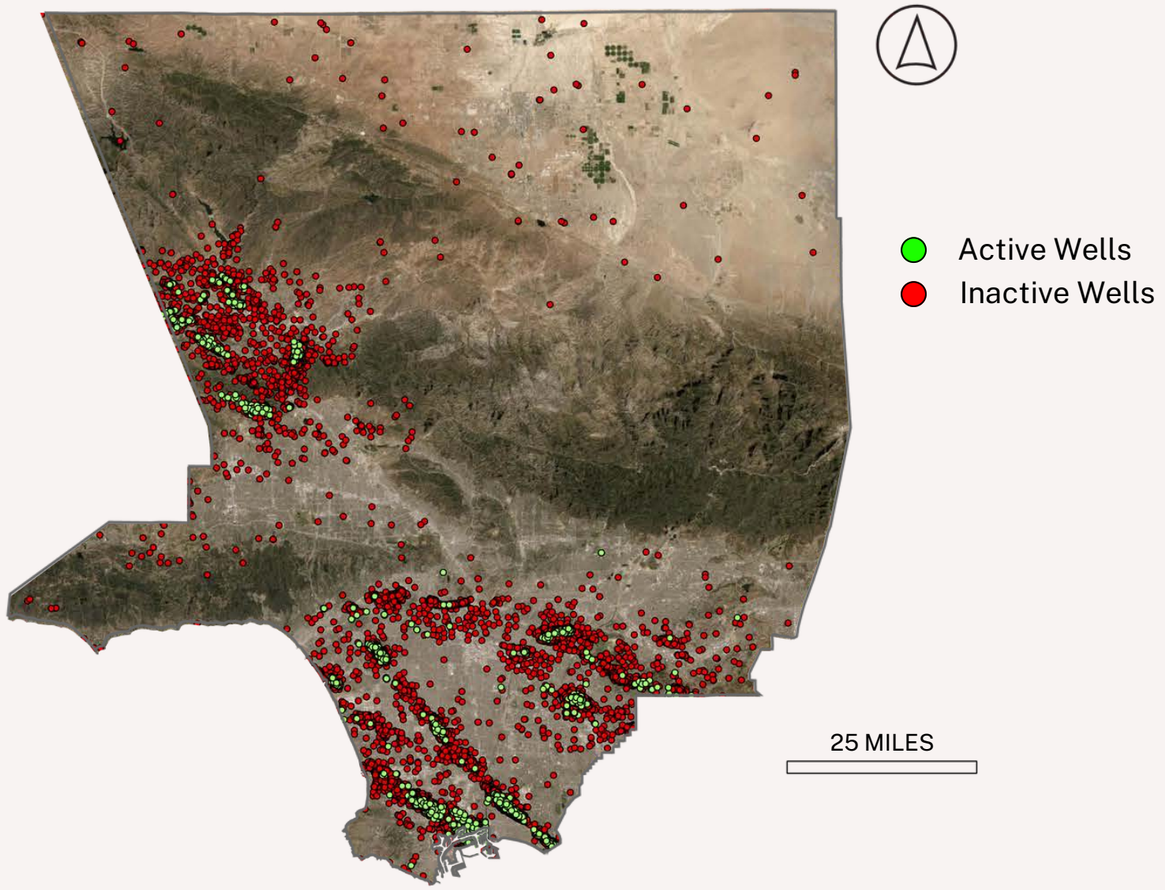
Enacted in 2022, this progressive ordinance not only set a precedent for environmental stewardship within the city but also catalyzed a wider impact as LA County adopted the same policy, extending the ban to all regions within the county. Designed to address the well-documented hazards to public health and safety posed by oil drilling activities, the ordinance mandates a phased-out approach.

Immediate prohibitions on new oil and gas extraction activities are accompanied by a stipulated amortization period for the removal of existing operations, aligning with the overarching goal of prioritizing the well-being of residents and safeguarding the environment.

Effective since January 18, 2023, the ordinance designates existing drill sites and oil/gas wells as legally nonconforming, with strict prohibitions on drilling, redrilling, deepening, or maintenance—except under circumstances deemed necessary by the Zoning Administrator to address threats to public health, safety, or the environment.

RESEARCH QUESTIONS

WHICH OF LA COUNTY'S ACTIVE OIL WELLS SHOULD BE PRIORITIZED FOR REMOVAL/DEACTIVATION BY COUNTY OFFICIALS?

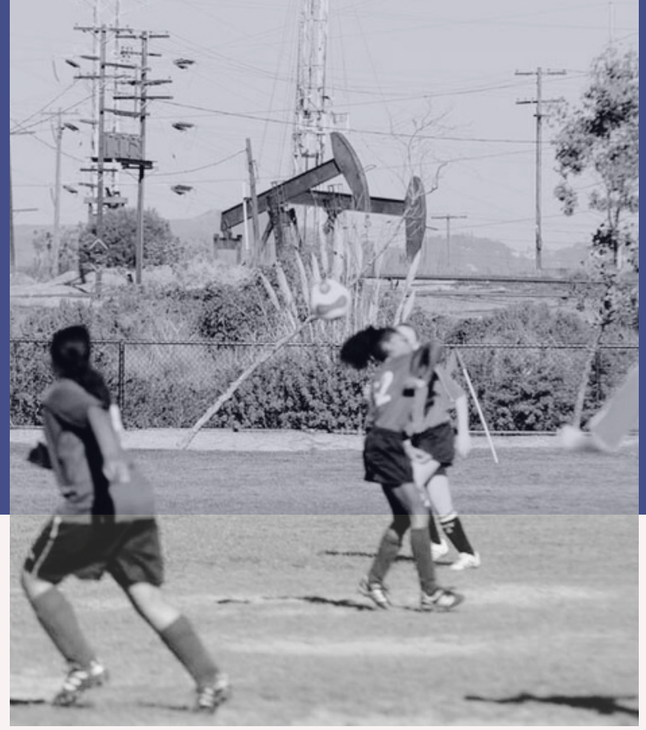


WHICH AREAS/NEIGHBORHOODS ARE MOST AFFECTED BY ACTIVE OIL WELLS?

DEFINING VULNERABLE COMMUNITIES

Racial Disparities:

Historical patterns of injustice (such as redlining and racial segregation) have shown that the distribution of oil wells disproportionately affects communities of color, particularly Black and Hispanic populations in Los Angeles County. These communities often find themselves at the epicenter of industrial activities, facing a multitude of challenges ranging from environmental pollution to socioeconomic disparities. By considering the racial dimension, this research aims to shed light on the inequities that have persisted over time and continue to shape the experiences of individuals residing near oil wells.



Health Factors:

Health outcomes are intimately tied to environmental conditions, and proximity to oil wells introduces unique health challenges. The research includes an examination of health factors such as asthma, cardiovascular disease, and low birth weight as provided by the California Office of Environmental Health and Hazard Assessment. Research has indicated a correlation between exposure to pollutants from oil extraction activities and an increased risk of respiratory issues and cardiovascular problems. Furthermore, the impact on maternal and child health, as reflected in instances of low birth weight, is a critical aspect of my assessment.

ASSUMPTIONS & LIMITATIONS

My research focuses on pinpointing and prioritizing active oil wells in Los Angeles County for removal or deactivation by county officials. A crucial aspect is figuring out which areas and neighborhoods are most affected by these wells. To understand vulnerabilities and potential risks, I rely on assumptions gathered through community engagement and insights from a thorough literature review. More specifically, for this exploration, I will use vulnerable communities as defined by the California Office of Environmental Health and Hazard Assessment (COEHHA), which will be highlighted in the following sections.

Limitations in this research include the absence of a universally agreed-upon distance to live away from oil wells, potentially outdated demographic data (as the research uses census information from 2019), limited public information on active oil well shutdown locations, and complexities arising from unincorporated areas in LA County. These factors may impact the precision of vulnerability assessments and necessitate careful consideration when interpreting the findings.

METHODOLOGY & DATASETS

The research will use a standard methodological approach wherein each process builds from previous steps. In order to understand who is most vulnerable to oil well activities, the analysis will begin by collecting data from the American Community Survey and the OEHHA. Visualizing information from these datasets will help demonstrate concentrations of vulnerable communities.

Data on public facilities within a 3200 ft. buffer zone will be used to determine civil infrastructure where communities would also be at-risk. Following this, a Multi-Criteria Decision Analysis will be ran with the aforementioned variables to determine which areas are most at risk. I will then spatial join the MCDA to active oil wells to show which wells pose the most risk to certain areas/ neighborhoods. After doing so, I will create an Oil Well Index which will rank the wells from “No Risk” to “High Risk”

PRIMARY DATASETS

1) LA County Boundaries (Municipal & Census Tract)

LA County, 2020

2) Public Facilities (Parks, Public Schools, Hospitals)

LA County, 2018

3) Demographic Data

American Community Survey, 2019

4) Environmental Health Data

California Office of Environmental Health and Hazard Assessment (2019)

The Study Area

The Data

The Visuals

HOT SPOT

MCDA

The Goal

OIL WELL INDEX

DEMOGRAPHICS

METHODS &VISUALS

GOVERNOR NEWSOM CALLS OUT BIG OIL

“It’s one thing for Big Oil to make record profits as they rip off Californians at the pump. It’s quite another to push to continue harmful drilling near daycares and schools and our homes.” - Gov. Gavin Newsom

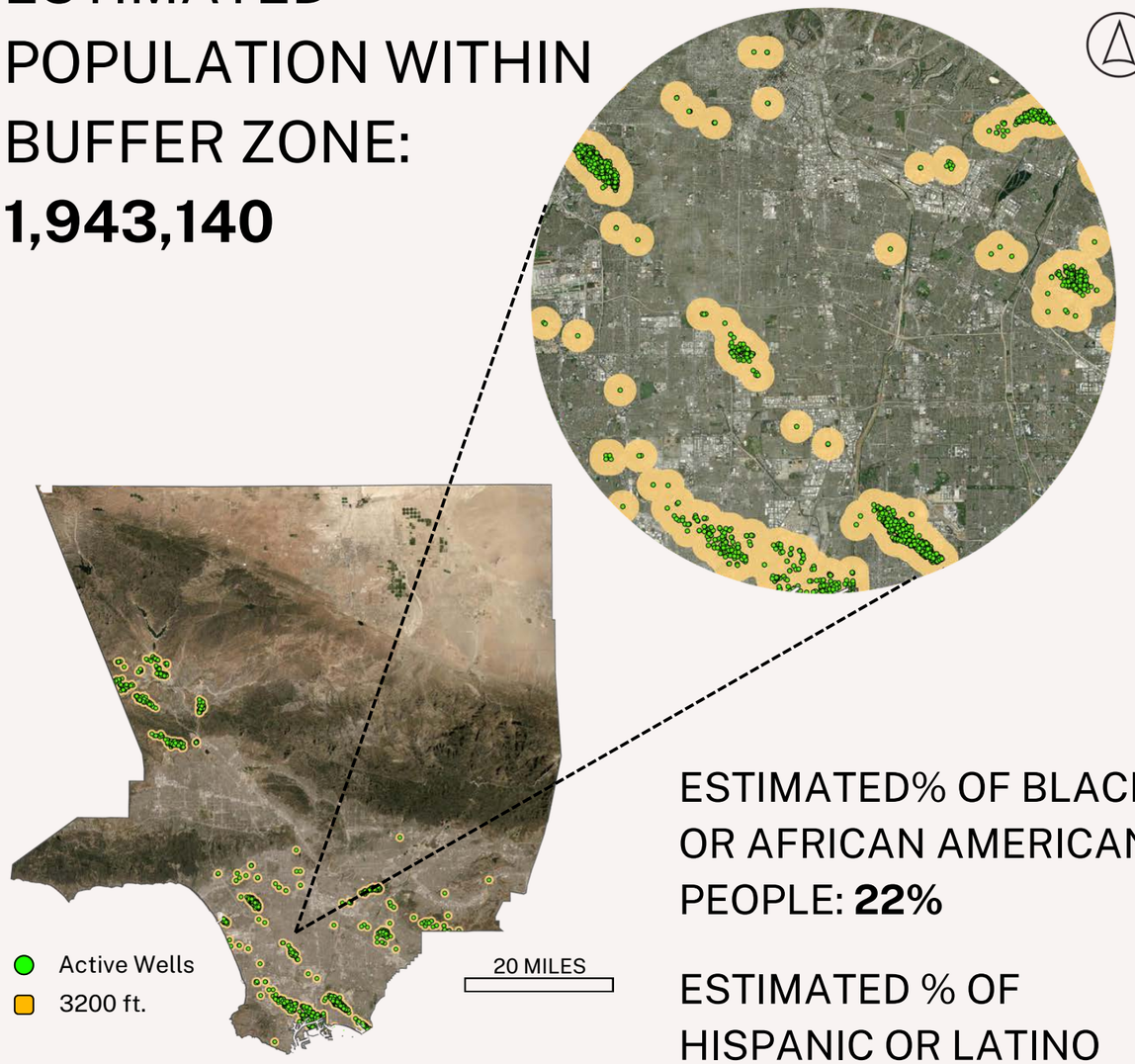
In September of 2022, The Governor signed to keep new oil wells **3,200 feet** away from hospitals, schools and parks. The research will use this metric to define what is a “suitable” distance to live away from an oil field

The research will use 3200 ft. as a metric to define what is a “suitable” distance to live away from an oil field

In the following sections, the maps will show demographic breakdowns of the various communities affected by oil well activity .

OIL WELLS WITH RECOMMENDED DISTANCE

ESTIMATED POPULATION WITHIN BUFFER ZONE:
1,943,140



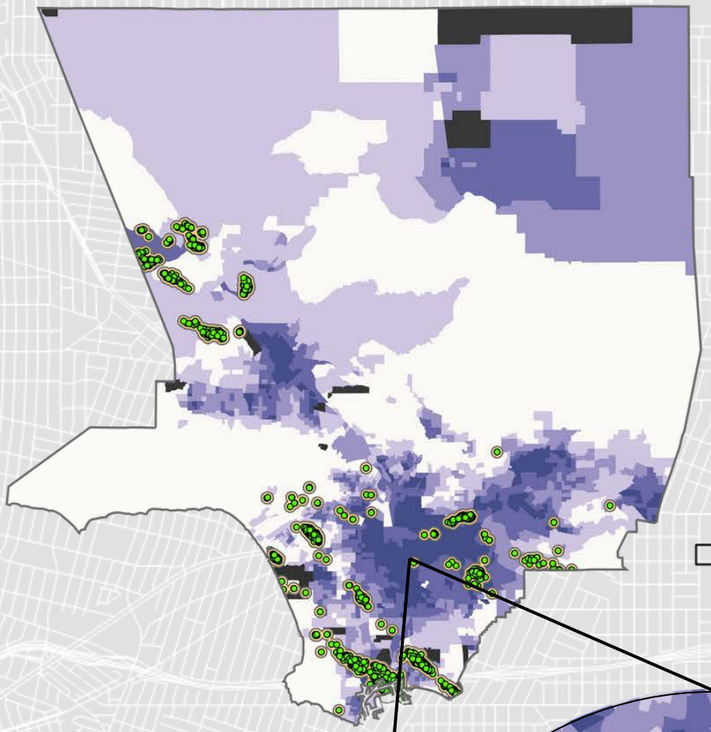
Source: LA County Public Works, American Community Survey 2019

ESTIMATED% OF BLACK OR AFRICAN AMERICAN PEOPLE: **22%**

ESTIMATED % OF HISPANIC OR LATINO PEOPLE: **44%**

ANALYSIS

RACIAL DEMOGRAPHICS IN LA COUNTY



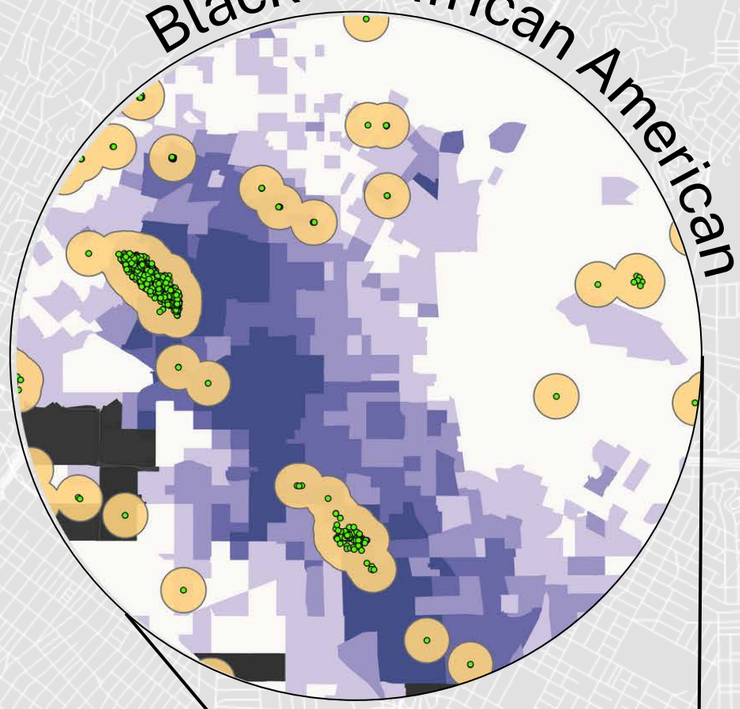
Active Wells

3200 ft.

High

Low

50 Miles



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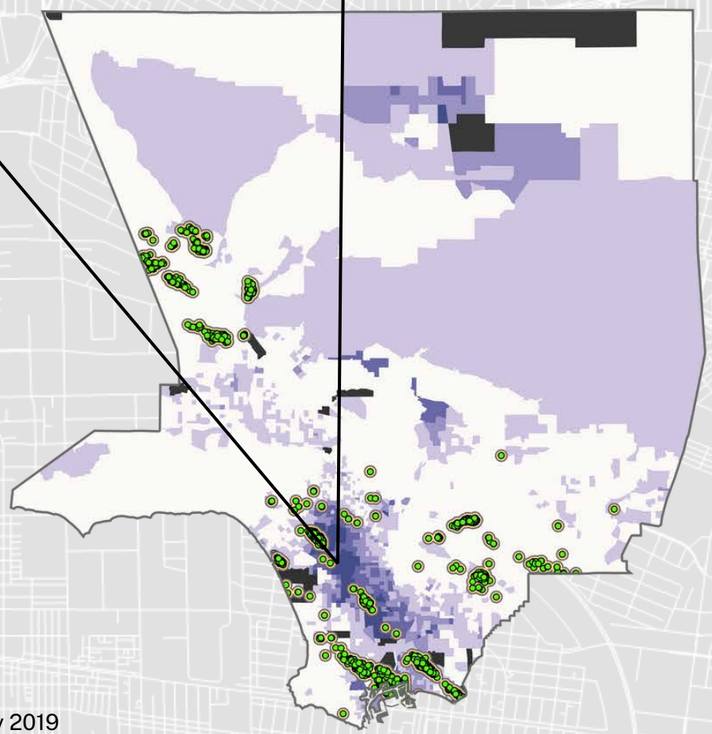
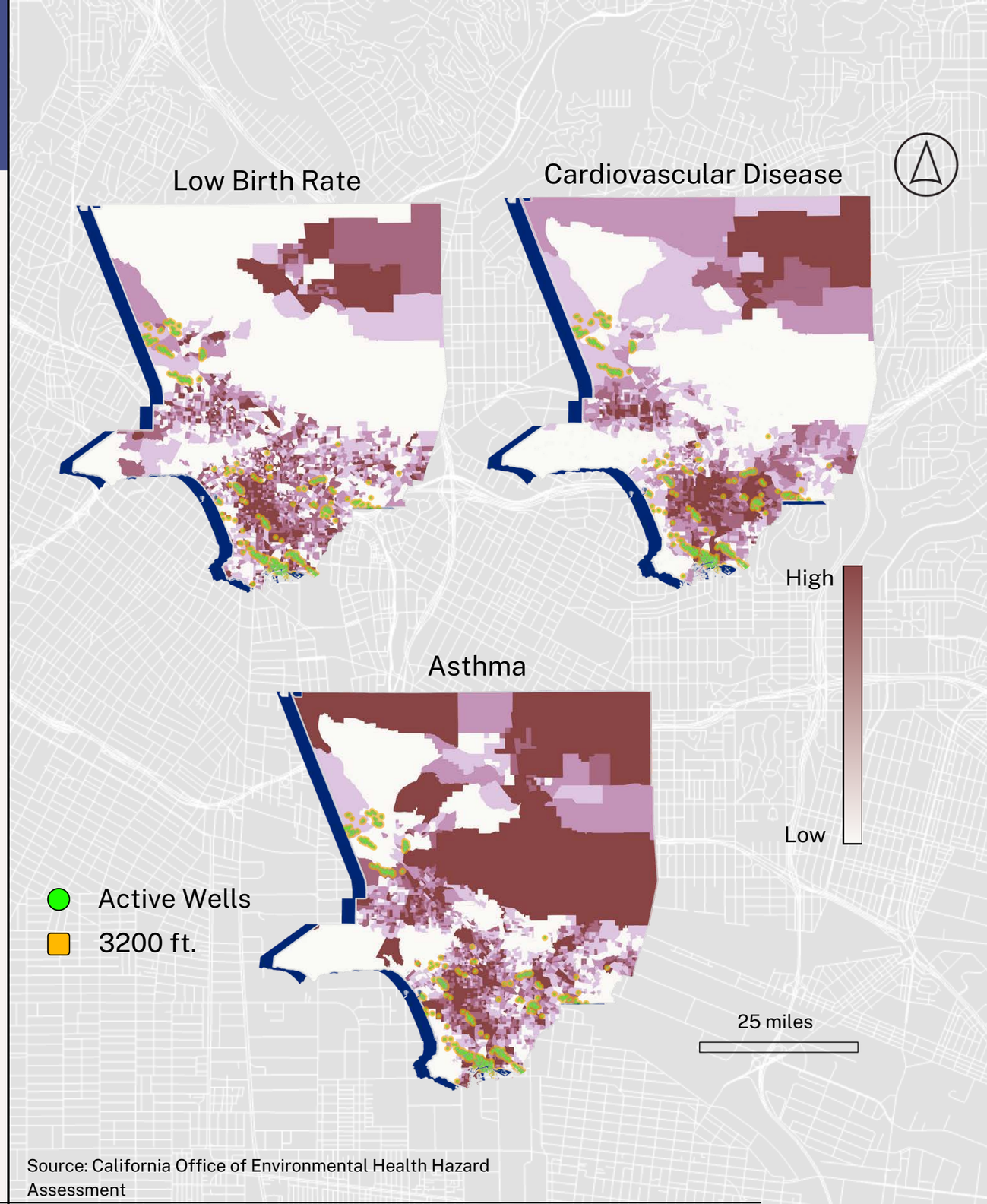


Source: American Community Survey 2019

HEALTH EFFECTS

Since the 2000s, advanced oil extraction technologies have ushered in a renewed era of oil activity in LA County, significantly amplifying extraction operations in various neighborhoods. This upswing has prompted health concerns among residents, including issues like odors, nosebleeds, blurred vision, and headaches—symptoms associated with potential exposure to extraction-related pollutants (OEHHA).

Surprisingly, despite over a century of oil drilling in the city, there's a notable dearth of research on the health impacts of these activities. What makes this situation especially interesting is the concentration of many active wells in historically marginalized black and brown neighborhoods, underscoring environmental justice issues. This highlights the urgent need for comprehensive health studies and ethical environmental policies to address the disparities faced by communities historically overlooked amid the shadows of Los Angeles' enduring oil history.

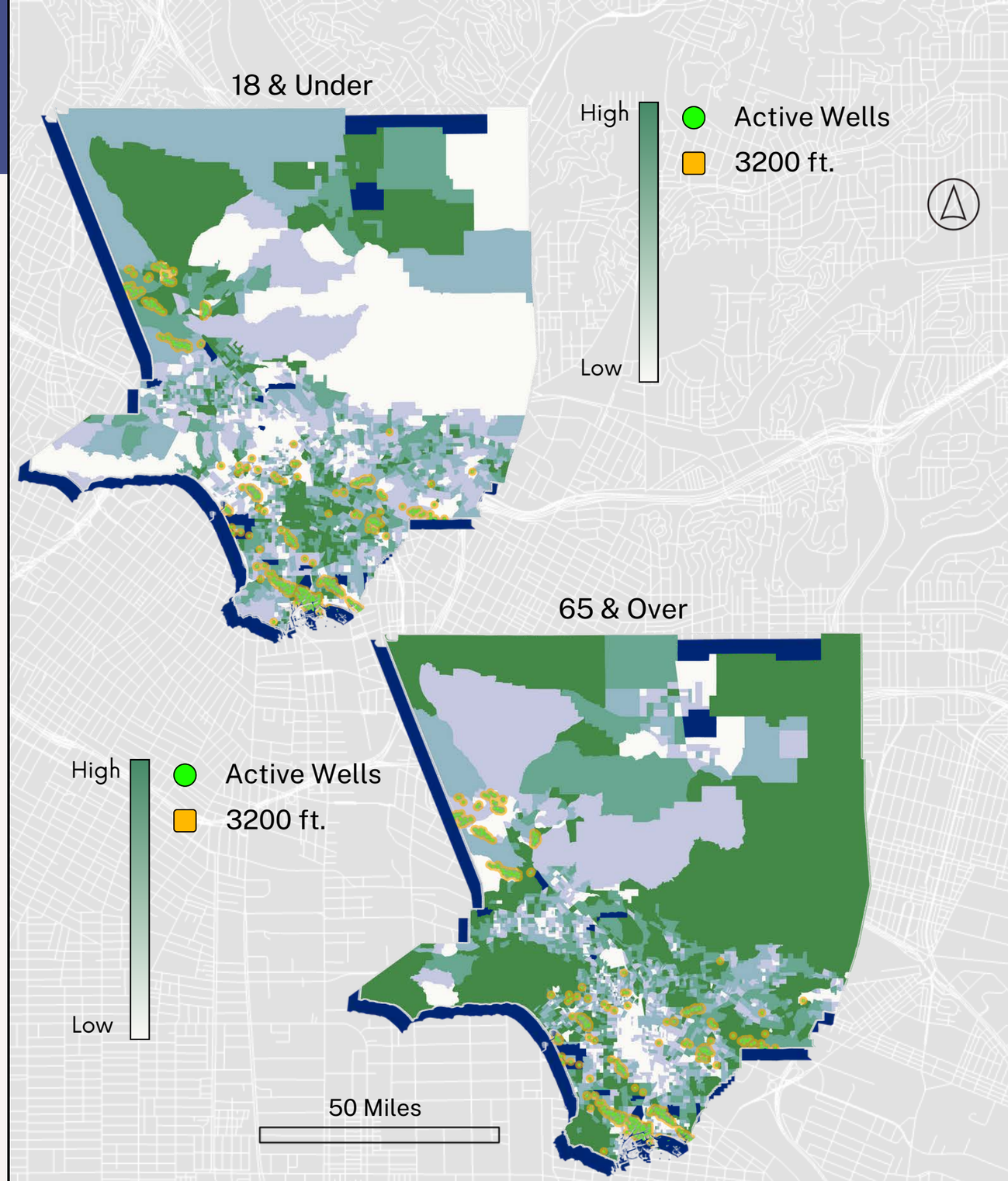


Source: California Office of Environmental Health Hazard Assessment

AGE

The research also highlights those aged 18 and under, and individuals aged 65 and older. These variables were also based on recommendations given by the OEHHA and have been included in studies on environmental hazards in the past. For this study, the groups 18 & under will be considered at-risk youth, whereas those who are 65 years & older will represent elderly populations.

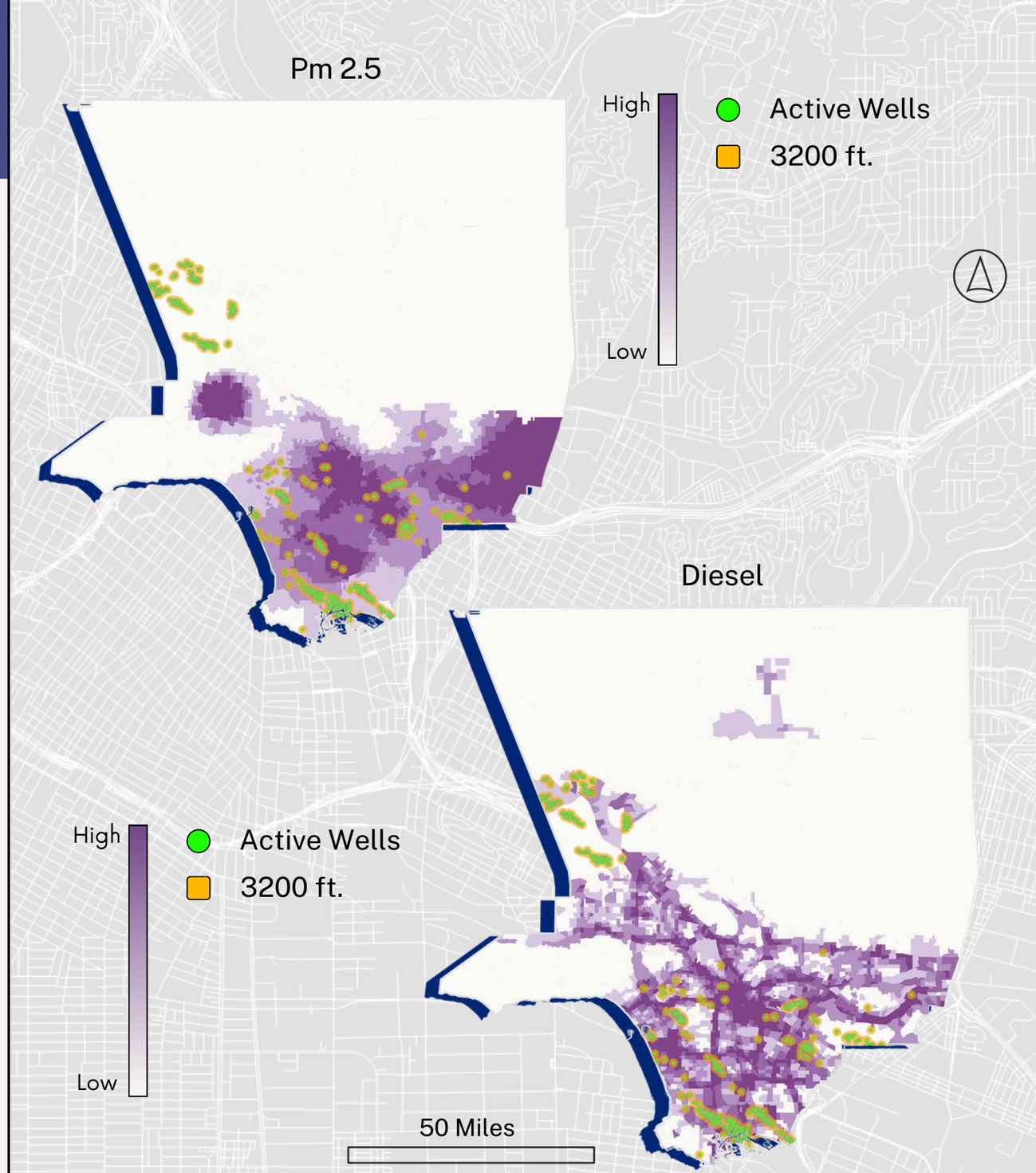
Air pollutants and industry have had a major impact on these communities in LA county since the early 20th century. As mentioned by the OEHHA, elderly populations often experience health problems that render them more susceptible to illnesses caused by industrial activities. On the other hand, youth populations who are exposed to oil well activities may experience adverse physiological developments. Thus, in including these groups, the impacts of pollutants and environmental stressors can be further explored with age as an additional.



Source: American Community Survey 2019

POLLUTANTS

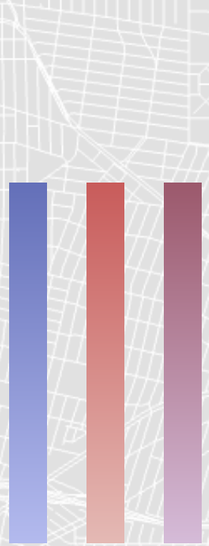
The type and size of particulate matter plays a critical role in its impact on respiratory health, as smaller particles can penetrate deeper into the lungs upon inhalation. Fine particle pollution, often identified as PM2.5, and Diesel has been linked to a range of severe health consequences, notably affecting the cardiovascular and respiratory systems. The repercussions of exposure to these pollutants extend beyond respiratory discomfort, contributing to a significant number of deaths across California. Particularly vulnerable to these adverse effects are children, the elderly, and individuals with preexisting conditions such as heart or lung disease, asthma, or chronic illnesses. This heightened sensitivity underscores the urgent need to address and mitigate the risks associated with PM2.5 exposure for the well-being of these susceptible populations.



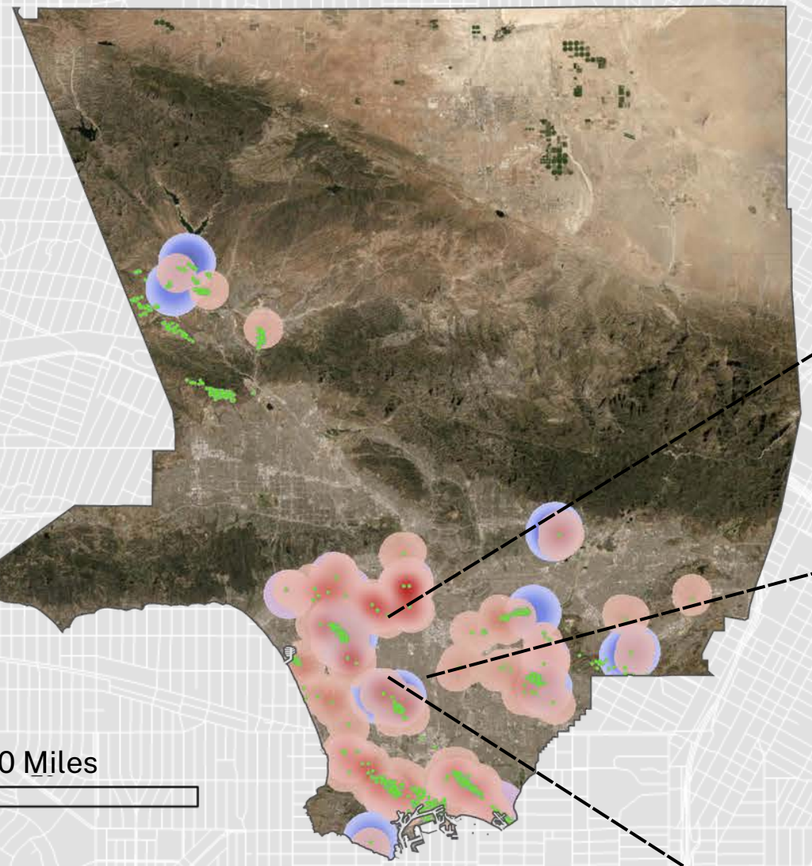
Source: California Office of Environmental Health Hazard Assessment

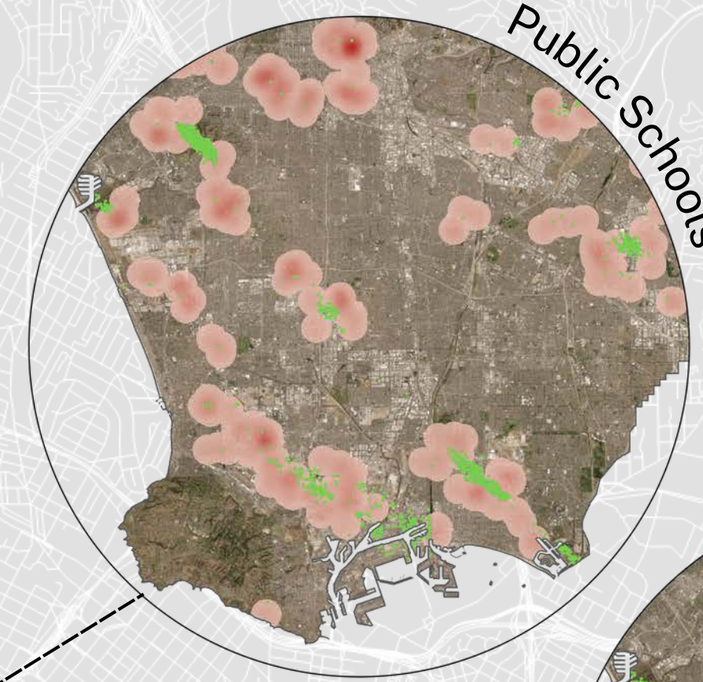
HOTSPOTS OF PUBLIC INFRASTRUCTURE IN LA COUNTY

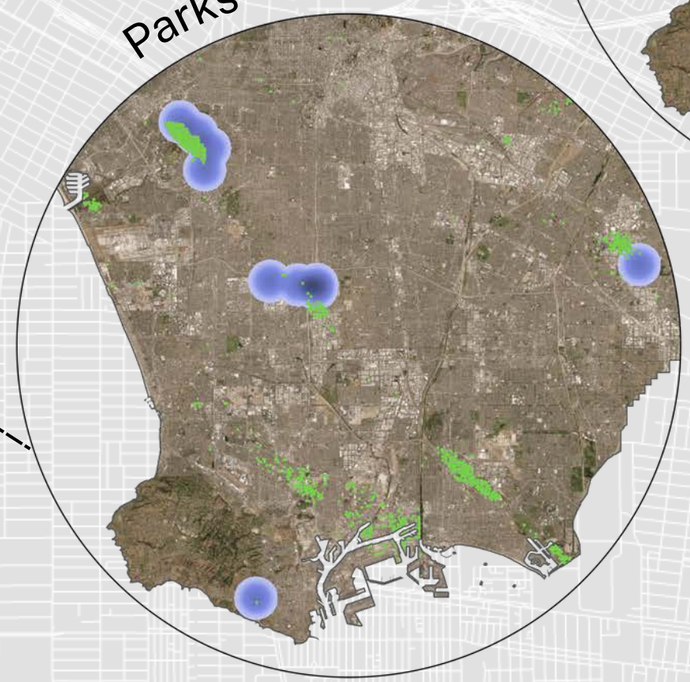
Source: LA County Public Works



Active Wells







In studying at-risk communities, it's essential to extend the analysis beyond demographics to include crucial public facilities like parks, hospitals, and schools. These spaces significantly influence residents' well-being, healthcare access, and educational outcomes. By incorporating public facilities into the study, we gain a more holistic understanding of the challenges faced by at-risk communities.

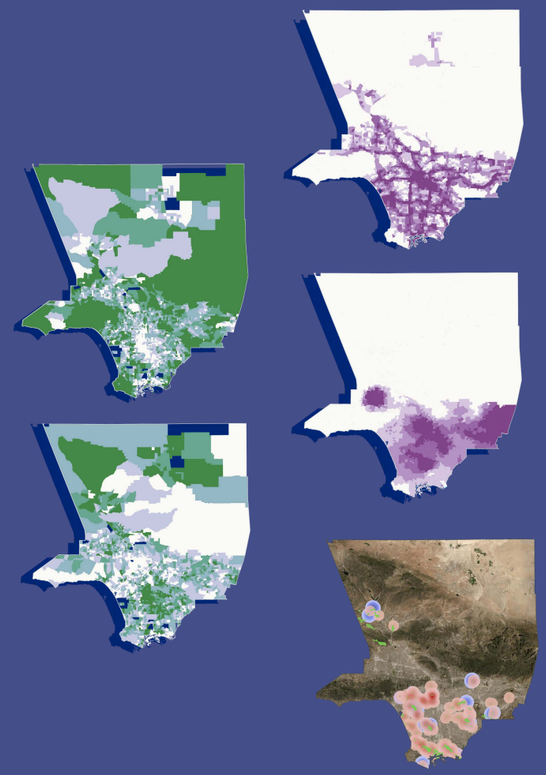
MULTI CRITERIA DECISION ANALYSIS

To determine the regions with the highest concentrations of at-risk communities, infrastructure, and pollutants, I employed a Multi-Criteria Decision Analysis. This method involves rasterizing each explored variable and overlaying them to identify overlapping areas, aiding in achieving the research objectives.

In this specific project, I opted to prioritize variables linked to direct health concerns (cardiovascular disease, asthma, low birthrate) and demographic factors (race, specifically Black and Hispanic or Latino). These variables were consistently referenced in both community engagement meetings and the existing literature, guiding the focus of the analysis.

The next batch of variables included age, public facilities, and pollution. These factors were given slightly lower weights to align with the research's emphasis on historically at-risk communities.

Prioritized 15%



Additional Factors 5%

FINDINGS

THE OIL WELL INDEX

After running my MCDA, I was able to determine which areas had the highest concentrations of at risk communities based on the variables mentioned previously.

To turn this information into an actionable visualization, I opted to spatial join these findings to active oil sites and subsequently creating a ranking system based on the classes established by the previous analysis.

It should be noted that this ranking system is based on an **arbitrary ordering system** that I determined to be the easiest way to understand the visualized information.

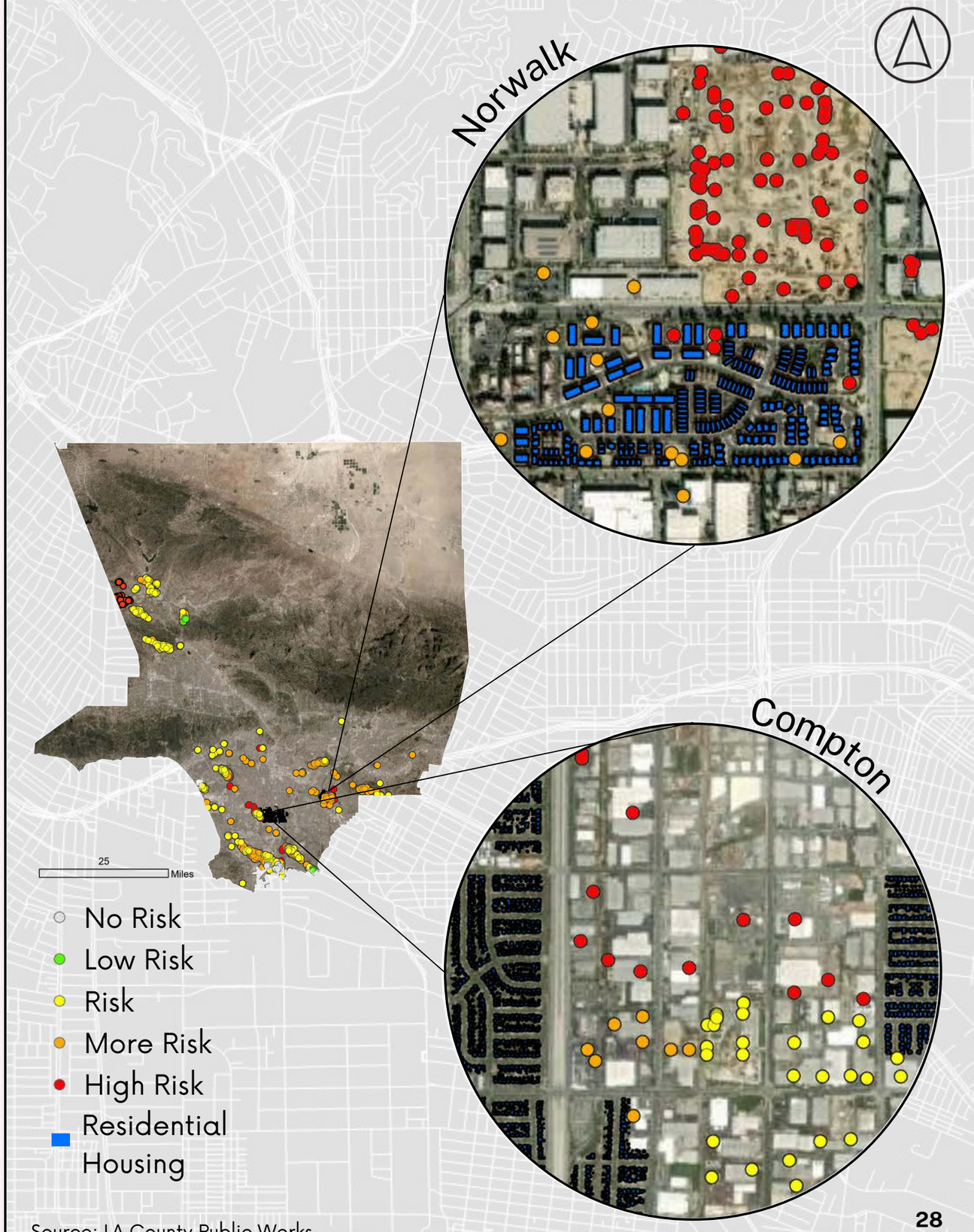
- No Risk
- Low Risk
- Risk
- More Risk
- High Risk

Source: LA County Public Works, American Community Survey 2019, OEHHA

NEIGHBORHOODS OF INTEREST

Following the creation of the oil well index, the research revealed distinct clusters of "high-risk" oil wells, within South Central LA, particularly Compton, emerging prominently (an estimated 89 wells). The correlation between the identified high-risk wells and the concerns voiced in community protests aligns with the qualitative insights I gained from speaking with community members. Compton, situated within South Central LA, has historically been a focal point of socio-economic challenges and environmental justice issues. The demographic makeup of Compton, primarily composed of black and brown communities, further accentuates the intersection of environmental concerns and social disparities. The city's history is marked by a legacy of systemic inequalities, and the presence of high-risk oil wells in this context highlights the disproportionate impact of oil activities on historically marginalized communities.

However, what I found particularly interesting after this study was seeing that Norwalk, another city in LA county, had a higher number (234) of high risk oil wells (some even right next door to people's homes. For future explorations into the effects of industrial activities on at-risk communities, the city of Norwalk could potentially serve as an interesting avenue of research.



CONCLUSIONS

01 In addition to its detrimental health impacts, it's crucial to recognize that oil drilling activities have disproportionately affected predominantly black and brown communities, perpetuating environmental injustice. The risks posed by oil drilling extend beyond demographic boundaries, posing an extreme threat to individuals from various socio-economic and racial backgrounds. It is imperative to acknowledge the pressing need for a comprehensive approach to address these inequities.

02 The implementation of an oil and gas drilling ordinance holds the potential to instigate meaningful change in these communities. The index I created serves as a compelling argument in itself, providing a transparent and data-driven tool to identify which oil wells should be prioritized for removal. By pinpointing specific locations with higher environmental and health risks, the index facilitates a targeted and efficient approach to mitigating the impact of oil drilling activities.

03 Moreover, the index can be instrumental in adopting a nuanced approach to rectify historical injustices faced by black and brown communities in Los Angeles County. By incorporating the index into decision-making processes, policymakers and community stakeholders can collaboratively work towards addressing the disproportionate burden of environmental hazards that has historically plagued these communities. The index, therefore, not only serves as a practical tool for immediate action but also as a symbol of commitment to environmental justice and redressing the historical wrongs that have adversely impacted marginalized populations.In conclusion, the oil and gas drilling ordinance, guided by the insights provided by the index, stands as a powerful means to address the negative effects of oil drilling, particularly in black and brown communities. It represents a tangible step towards creating a more equitable and just environmental landscape, fostering a healthier and safer future for all residents of Los Angeles County.

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