

WILMINGTON PARK ELEMENTARY

LOS ANGELES, CA

INTERDISCIPLINARY ENVIRONMENTAL JUSTICE CASE STUDY

An Exploration of Environmental Governance Needs, Challenges and Opportunities

MARCH 2024



GROUP NO. 9

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ABOUT

This case study report was developed by students at the University of California Irvine for the undergraduate class "Environmental Injustice," taught by Kim Fortun, Margaret Tebbe, Prerna Srigyan, Ina Kim, and Luc McKenzie for the Department of Anthropology, Winter 2024. The University of California Irvine is on the ancestral homelands of the Tongva and Acjachemen nations.




COVER PHOTO

Image description: Photo of the Wilmington Phillips 66 Refinery at Night. Image source: 27 August 2012 by [Pickens](#) "<https://researchandideas.com/index.php?title=File:Wilmingtonrefinery.jpg#filelinks>".

¹ One or more authors have redacted their names per their request.

LAND ACKNOWLEDGEMENT

Long Beach is currently located on the Tongva (Gabrieleno) nation while the county of Los Angeles encompasses the Ventureño Chumash, Fernandeno Tataviam, Tongva (Gabrieleno), Chumash, and Yuhaaviatam / Maarenga'yam (Serrano) territories. In 1771, The Spanish conquered the land that the Tongva people lived on and enslaved them to build the Misión de San Gabriel Arcángel. By 1824, Mexico became independent, and all natives could live freely in their villages. Changes were made to this in 1834 where the natives were treated as slaves once again and by 1846, the Mexican government wanted the native villages destroyed. A few years later on April 22, 1850, the California State Legislature took away all the rights Mexico had given them, in order to turn the land into a portion of the United States' 31st state, California. The Santa Ynez Band of Chumash Mission Indians of the Santa Ynez Reservation, California and the Yuhaaviatam of San Manuel Nation [previously listed as San Manuel Band of Mission Indians, California]are the only tribe located near our premises of Wilmington who are federally recognized as a tribe. The Tongva (Gabrieleno), Fernandeno Tataviam, and Maarenga'yam (Serrano) tribes and territories are not federally recognized. There are just over 2500 members of the Tongva nation currently, and none of the Tongva people live on a reservation as the Tongva, or Gabrielino as they're commonly referred to, never received a reservation from the federal government. A recent superior court case won on August 8, 2023 preserves agricultural heritage in the Santa Ynez Valley. They are working to protect their land from further industrial and recreational development, to preserve the wildlife and cultural ties to their land. We can support Indigenous people and their work by teaching/attending courses like Anthro 25A that raise awareness of the struggles and injustices that they face. With the knowledge learned from that, we can take action by going into the community and educating about how they can maintain the land in our setting as best as they can.

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ABSTRACT

Problem statement: Various sources of pollution, such as nearby oil refineries, ports, and highways have contributed to serious environmental hazards and detrimental health effects in the area of Wilmington, CA.

Aims: This case study is designed to describe the setting, hazards, stakeholders and health harms resulting from nearby pollution sources, noting divergent perspectives among stakeholders and in reporting about the refineries, ports, and highways. In addition we plan on mobilizing and illustrating key environmental health concepts. Translating the research findings of this case into further research and action proposals will finalize our case study and allow the utilization of our research in future proposals.

Methods: The case study is organized to address the ten questions in an Interdisciplinary Environmental Health Case Study Framework developed to allow comparison between cases. Utilizing methods of basic and applied research in order to create a comprehensive report on the interworking network of the society surrounding Wilmington Park Elementary. While also considering the human aspect within these communities and interdisciplinary aspects.

Findings: Our analysis of environmental and health hazards resulting from Wilmington's pollution sources shows Wilmington's unacceptable air quality due to pollutants such as ammonia, hydrogen cyanide benzene, and diesel exhaust. In addition,, the racial demographics display how Wilmington residents are disproportionately impacted as the area is primarily Hispanic. These factors solidify the case of Wilmington's environmental injustice, subsection into regions of economic, social, language, and direct environmental injustice.

Intellectual Significance: This case study initiates discussions and presents the negative effects residents of Wilmington have faced due to socioeconomic status and factors ranging from lack of advocacy to being forgotten by state government.

Practical Significance: This case study highlights the need for increased initiative from local representatives to establish regulation on emissions produced by local refineries and ports, as well as a need for greater education about pollutants in the community in order to facilitate the basic human requirements and more to all citizens of Wilmington.

INTRODUCTION

This case study report examines environmental health and governance challenges and opportunities near Wilmington Park Elementary School, located in Los Angeles County, California, USA.

The report addresses a series of ten questions (Fig. 1) that draw out local details in a manner that encourages comparison with other places. The research has been done in a short time-frame so is limited and points to the need for further research and community engagement. The goal is to help build both a body of research on radiation governance around the world and a network of researchers ready to help conceptualize and implement next-generation radiation protections.

Environmental Injustice Case Study Framework

1. What is the setting of this case? What are its assets? What opportunities and challenges will there be in this setting in coming years?
2. What environmental threats are there in this setting?
3. What intersecting factors -- social, cultural, political, technological, ecological -- contribute to environmental health vulnerability and injustice in this setting?
4. Who are stakeholders, what are their characteristics, and what are their perceptions of the problems?
5. What have different stakeholder groups done (or not done) in response to environmental problems in this setting?
6. How have environmental problems in this setting been reported on by media, environmental groups, companies and government agencies?

7. What local actions would reduce environmental vulnerability and injustice in this setting?
8. What extra-local actions (at state, national or international levels) would reduce environmental vulnerability and injustice in this setting and similar settings?
9. What kinds of data and research would be useful in efforts to characterize and address environmental threats in this setting and similar settings?
10. What intersecting injustices -- data, economic, epistemic, gender, health, infrastructure, intergenerational, media, procedural, racial, reproductive -- contribute to environmental injustice in this setting?

FIGURE 1: This is the analytic framework that guided research for this case study.

Key Concepts

Historical disadvantages play a major role in the community surrounding Wilmington Park Elementary school. The city was originally founded with a population of dock and harbor workers. Since then, the city of Wilmington has remained populated by blue-collar workers, as well as a majority latino population due to the area's lower housing cost. This has led to developments such as the refineries being easily passed, due to the inability of the community to fight such an action, via economic, linguistic, or social disadvantages.

The community faces a large economic disadvantage compared to the surrounding areas such as Palos Verdes. The average income of a citizen of Palos Verdes, just 5 miles away from Wilmington, is over \$300,000 per year. While the typical citizen of Wilmington earns just over \$16,000 per year, which is under the poverty line for Los Angeles County. This is an unfair difference which has resulted in the communities inability to resist industrialization.

To further these issues, the community faces linguistic isolation from many of the services that would normally be available to help a suffering city. Nearly 30% of citizens

within Wilmington cannot speak proficiently in English which makes great difficulties in receiving services such as healthcare, and can make organizing against pollution difficult.

In addition the community lacks assets which would normally be available to the community. Food banks, emergency shelters, and cooling centers are examples of these deficiencies which stem from a lack of community assets.

Focal School Location

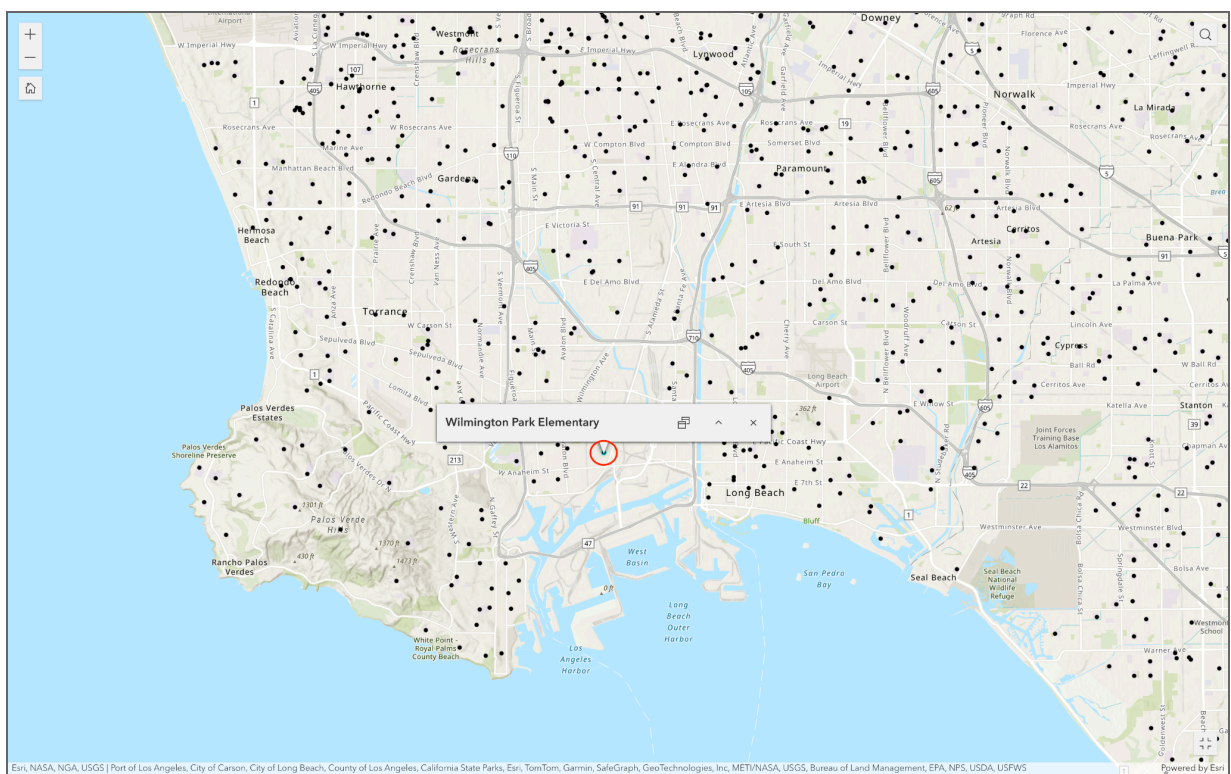


FIGURE 2: This is Wilmington Park Elementary School, located in Wilmington, CA. The school has a population of 662 students, a majority of whom identify as Latino/a, around 96.70%. With the other demographics nearing 1% for those with a Caucasian, Asian, or other background.

Lead Researcher: Chase Kneller

Source:

https://experience.arcgis.com/experience/24133d4eb5af4af2abf8e92b3f8fe65f/?dataid=dataSource_7-18d1e72700b-layer-12%3A5251

Geographic Context

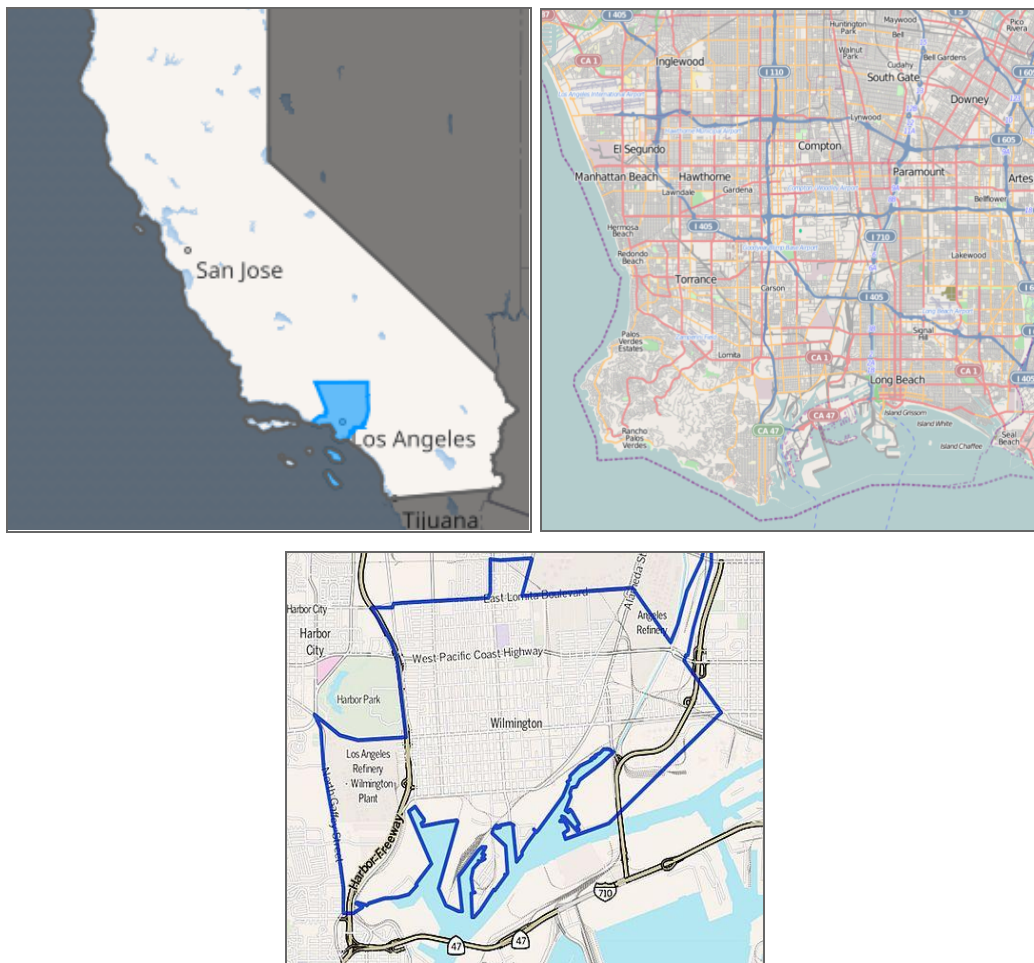


Figure 3: “Wilmington is a neighborhood in the South Bay and Harbor region of Los Angeles, California, covering 9.14 square miles (23.7 km²).

Featuring a heavy concentration of industry and the third-largest oil field in the continental United States, this neighborhood has a high percentage of Latino and foreign-born residents. Nearly 20 percent of Wilmington’s total land area is taken up by oil refineries – roughly 3.5 times more area than is dedicated to open and accessible green spaces. During the COVID-19 pandemic, Wilmington had one of the highest death rates in all of Los Angeles County, exacerbated by elevated levels of industrial pollution”(Wikipedia).

Lead Researcher: Chase Kneller

Source: https://en.wikipedia.org/wiki/Wilmington,_Los_Angeles#cite_note-12

1. COMMUNITY ASSETS & SETTING

Oil, Pollution, and People - Some Mix, Others Don't *Andrew Liang & Shashank Bypan*

The school that this case study revolves around is Wilmington Park Elementary School, which is located in Wilmington, CA. Wilmington is located in Los Angeles County and covers a total area of 9.14 square miles (Wilmington, n.d.). It is located right by the Los Angeles Harbor, which is a major harbor for United States imports and exports. The area of Wilmington, although highly suburban, is influenced by ocean air circulation due to its proximity to the ocean, with an annual rainfall ranging from 10 to 17 inches. Despite its coastal nature, the city's access to the ocean is hindered by a system of ports, resulting in flat, concrete land along the ridge. These ports provide 40% of all United States imports (Estrada, 2024). Notably, to the south lies the Port of Los Angeles, known as one of the largest ports in the Western United States. During recent years, the port has experienced fluctuations in pollution levels, with a noteworthy incident occurring during the Covid-19 pandemic, particularly in November of 2020. At that time, the Marine Exchange of Southern California reported that more than 100 ships were "anchored or loitering" near Long Beach, awaiting entry to the ports. In response to these challenges, a queuing system has been implemented, requiring ships to wait at a considerable distance from California's coastline. Ships are now required to anchor either 150 miles off the state's coast or 50 miles to the north or south of the ports. This strategic shift in the queuing process has yielded significant benefits for the communities in terms of reduced emissions. Consequently, the concerted effort to relocate the waiting area for ships has led to a

substantial decrease in pollution levels, thereby positively impacting the environmental well-being of Wilmington and its neighboring areas.

Wilmington is characterized by the presence of seven major oil refineries in Wilmington as well as in the nearby surrounding areas. These refineries are: Marathon Petroleum (Carson, CA), Chevron (El Segundo), Marathon Petroleum (Wilmington), PBF Energy (Torrance, CA), Valero (Wilmington), AltAir Paramount, LLC (Paramount), Phillips 66 (Wilmington) (California Refineries, 2020). The city shares borders with urban areas such as Carson, Long Beach, and Harbor City, while being surrounded by the low-range mountains of San Pedro and Palos Verdes. Major California freeways surround Wilmington. To the north lies PCH, to the East lies the 110, to the south lies the 710, and to the west lies the 47 freeway (Kneller, 2024). The city faces environmental risks, with about 5% of its properties having a 26% chance of flooding over the next 30 years, particularly due to rising sea levels and stronger storms. The extensive industrial infrastructure, including oil refineries, raises concerns about the potential spread of toxic pollutants through waterways and their impact on groundwater and soil in the event of flooding. Additionally, the presence of the Wilmington Blind-Thrust fault line near the ports poses a risk of significant seismic activity, potentially causing damage to local refineries and posing hazards to the surrounding area. (Kneller, Willoughby, 2024).

Wilmington is home to a relatively large population of people of color, with about 97% of the 55,000 population being POC, primarily Hispanic. It has many homeless and rehabilitation centers, which results in a higher amount of substance distribution and usage. These centers include Volunteers of America, Beacon Light Mission, and Transitional Living Center. It has a high rate of shootings and violence in the area, resulting in a high prevalence of policing. According to CrimeGrade.org, Wilmington falls within the 96th percentile for overall crime in California, meaning that 96 percent of other cities in California are safer than Wilmington. Additionally, on average, 154 of every 1,000 Wilmington residents experience crime annually (Imtiaz, 2024.).

Wilmington, along with its neighboring cities of Carson and West Long Beach, were some of the first communities to be selected for California's landmark environmental

justice program,” which aims to clean up air pollution in the state’s hot spots” (Yee, 2022). As mentioned previously, various sources of pollution that contribute to Wilmington’s poor air quality are nearby highways, ports, and surrounding oil refineries. Additionally, Wilmington is also home to the third largest oil field in the U.S. (Yee, 2022). The Wilmington Oil Field, located on the Wilmington Anticline spanning from onshore San Pedro to offshore Seal Beach has an estimated recovery of three billion barrels of oil. The field, divided by faults into separate producing entities known as Fault Blocks, covers a 13-mile length and 3-mile width. Oil extraction occurs from five major sand intervals at depths ranging from 2,000 to 11,000 feet, resulting in a recovery of over two and a half billion barrels of oil. The recovery processes involve primary production, secondary water flooding, and steam flooding, with a total of 6,150 wells drilled to date (Historical, n.d.).

Nearby to Wilmington, CA are many local community colleges and public universities. These are especially highlighted by schools such as Cal State Long Beach, one of the most prestigious schools within the CSU system. Other schools that are similarly located locally include but are not limited to are Los Angeles Harbor College, Compton College, El Camino College, Long Beach City College, and Los Angeles Southwest College. Many of these schools are great pathways for students to transfer to also later transfer to many of the great universities in the state from the University of California system to even many of the great private schools located in the state. A notable college located in Wilmington is the Los Angeles Harbor College (LAHC). This college provides a variety of programs for its students including public health & safety courses. LAHC offers leadership in offering general courses and education programs that are “designed to educate candidates on the cutting edge green building and sustainable design practices, and enables participants to designate that expertise with an internationally recognized professional credential” (“Online Leadership in Energy and Environmental Design (LEED) from Los Angeles Harbor College,” n.d.). Students who are interested in a career path in this area have the potential to help their community stay healthy and combat environmental pressures causing health implications in the population. Further looking at the educational prospects of higher education in Wilmington, it can be noted that public

universities help achieve the goal in preventing environmental disasters. Through education, these institutions raise awareness and equip individuals with the knowledge to think critically about ways to mitigate environmental challenges. The impact goes beyond just awareness, as higher education can inspire students to pursue careers dedicated to finding solutions for environmental issues. Even for those in fields unrelated to environmental sciences, informed students are likely to conduct their activities with mindfulness toward potential environmental risks. California State University, Dominguez Hills, and UC Irvine are cited as examples, with the latter actively educating students on environmental injustices to enhance awareness (Author³, 2024).

Public facilities are a great place to encourage local development as well as give a space for a community to develop. Sports clubs and facilities are assets to the community as they promote physical activity, social interaction, and a sense of belonging, contributing to overall well-being. In terms of preventing or mitigating environmental disasters, these spaces can serve as hubs for community education and engagement, fostering awareness and collective action towards sustainable practices that help protect the environment and reduce the risk of disasters (Haley, 2024). Wilmington, CA's most frequented parks include the Wilmington Waterfront Park and the Wilmington Recreation Center. The Wilmington Waterfront especially has seen large investments, with nearly a one billion dollar investment by LA County. These include sustainable access to waterfront events, educational programs, and economic development projects ("Invest | LA Waterfront," n.d.). These green spaces are valuable assets, serving as hubs for joy and social interaction within communities. They promote improved physical well-being and cultivate a sense of community. Additionally, these parks play a role in addressing environmental challenges by offering a space for individuals to connect with and appreciate their surroundings. This connection encourages gratitude for the existence of green areas and facilitates discussions about issues related to environmental disasters (Willoughby, 2024). Looking at other public services, we can see how libraries play a crucial role in disseminating local news, particularly concerning environmental disasters. By offering complimentary access

³ One or more authors have redacted their names per their request.

to local newspapers, they empower residents with information about potential future events. Beyond serving as information hubs, libraries serve as community gathering spaces where individuals can engage in conversations with fellow community members, facilitating the organic spread of news through interpersonal connections. The broader the dissemination of ideas, the greater the awareness within the community. This becomes especially vital in the context of environmental disasters, as it allows people sufficient time to prepare and take measures to ensure their safety. The main library is the Los Angeles Public Library Wilmington Branch (Gunderson, 2024).

Wilmington also houses many environmental organizations from the the Torrance Refinery Action Alliance advocates for the ban of Hydrofluoric Acid, a highly lethal chemical, in Torrance and Wilmington refineries. Communities for a Better Environment is a national organization focused on providing underprivileged communities across America, particularly in Wilmington, CA, with access to clean water, air, and safe spaces ("Torrance Refinery Action Alliance," n.d.). They work towards creating a healthier and safer living environment by raising awareness about the risks of residing near oil refineries and the Port of LA. Additionally, they distribute personal protective equipment (PPE) to mitigate potential harm during leakages or on days with poor air quality due to chemical exposure (Kneller, 2024) (Luis A. Martinez, n.d.). These organizations frequently organize rallies and protests to help encourage change and offer differing solutions to the wide variety of problems that are frequently seen. These organizations also provide a great benefit to the community as they are able to watch over and protect the vital resources that enable that sense of community.

Wilmington also has multiple avenues for affordable community healthcare. Especially as access to affordable community healthcare is vital for fostering community development, especially in areas facing environmental challenges. In Wilmington, a low-income community with high levels of pollutants, affordable healthcare is crucial due to increased susceptibility to respiratory and other illnesses. The Wilmington Community Clinic plays a key role in providing services such as wellness visits, school physicals, women's health services, STD testing, health maintenance, primary care, prenatal exams,

pediatric care, and mental health services. Additionally, specialized clinics like Behavioral Health Services- El Puerto Health Center and Tzu Chi Community Clinic offer mental health therapy and acupuncture services, contributing to comprehensive and accessible healthcare in the community (Imtiaz, 2024). The Tzu Chi Acupuncture clinic is well known and is recognized for their holistic and acupuncture techniques. They combine Chinese herbal medicine and serve the following surrounding communities including Lomita, West Carson, Carson, Long Beach, Signal Hill, Torrance, Palos Verdes Estates, and Rancho Palos Verdes “Tzu Chi Acupuncture clinic is well-recognized for its acupuncture and holistic medicine. Combined with traditional Chinese herbal medicine, its acupuncturists deliver compassionate trusted health and wellness treatments to their patients” (“Wilmington Health Center,” n.d

Native Land Acknowledgement

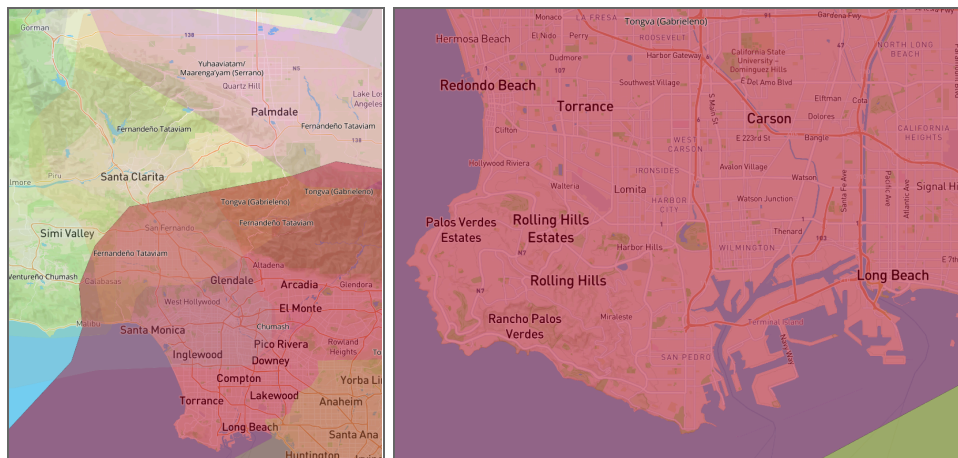


FIGURE 4: (Left) Five native territories make up the land that most people call Los Angeles County. These territories include Ventureño Chumash, Fernandefio Tataviam, Tongva (Gabrieleno), Chumash, and Yuhaaviatam / Maarenga'yam (Serrano). **(Right)** The city of Long Beach—located within Los Angeles County—is located within the borders of the Tongva (Gabrieleno) nation and Wilmington Park Elementary was placed on this unceded land.

Lead Researcher: Shi Wen Gunderson

Source: <https://native-land.ca/>

Native Representations of Land



FIGURE 5: This map shows the locations of Tongva (Gabrieleno) villages before colonization. Shows the original land along the Rio Hondo River where they occupied.

Lead Researcher: Andrew Liang

Source: <https://anapr.com/2014/04/29/san-gabriel-valley-did-you-know/>

Setting Photograph



Figure 6: This image depicts a Wilmington neighborhood within close proximity of an oil refinery, putting local residents, including children, at risk of serious health effects due to poor air quality.

Lead Researcher: Gracie Haley

Source:

<https://www.hcn.org/articles/pollution-a-new-generation-of-activists-born-next-to-an-oil-refinery>

Biodiversity Map



FIGURE 7: Wilmington Park is located in an industrial area with very low biodiversity and even lower climate resilience. The areas surrounding Wilmington and further away from the refineries and ports have more biodiversity.

Lead Researcher: Alison Coffman

Source: [Biodiversity Explorer \(arcgis.com\)](https://arcgis.com)

Crops Map

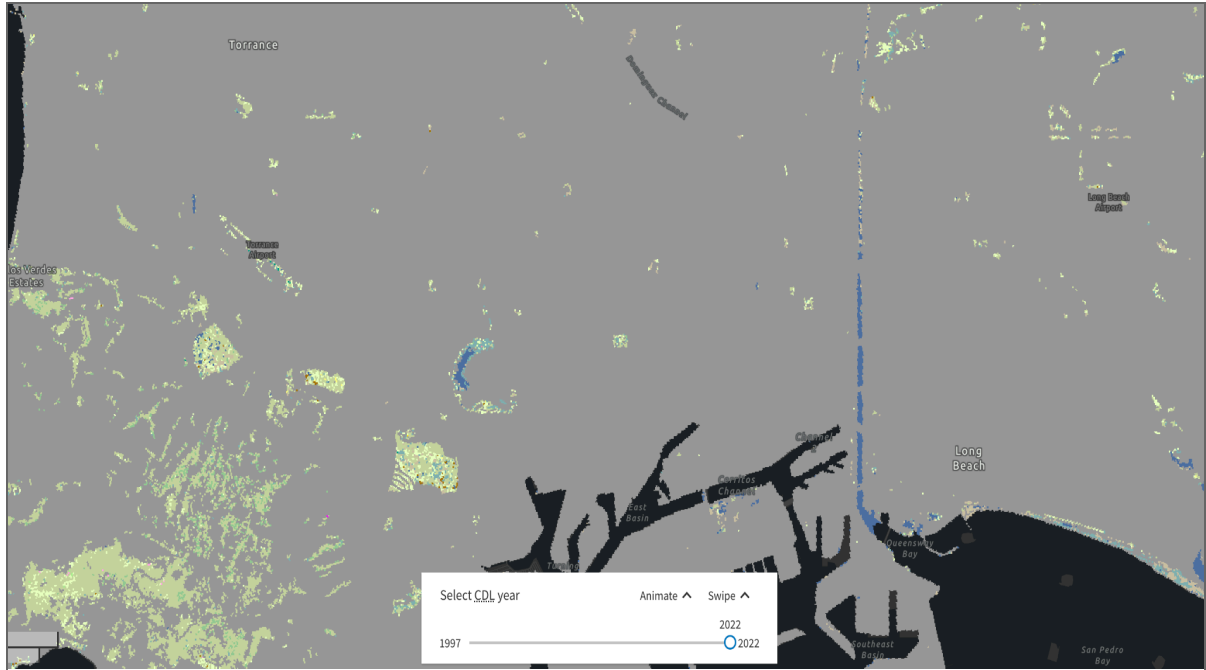


FIGURE 8: There are no agricultural operations located near Wilmington, CA. The landscape around Wilmington is entirely urbanized and has a large percentage of its land used for industrial operations. The area of shrubland located to the Southwest is in the hills of Palos Verdes, and is mostly shrubland with some trees.

Lead Researcher: Chase Kneller

Source: <https://croplandcros.scinet.usda.gov/>

2020 Presidential Election Results

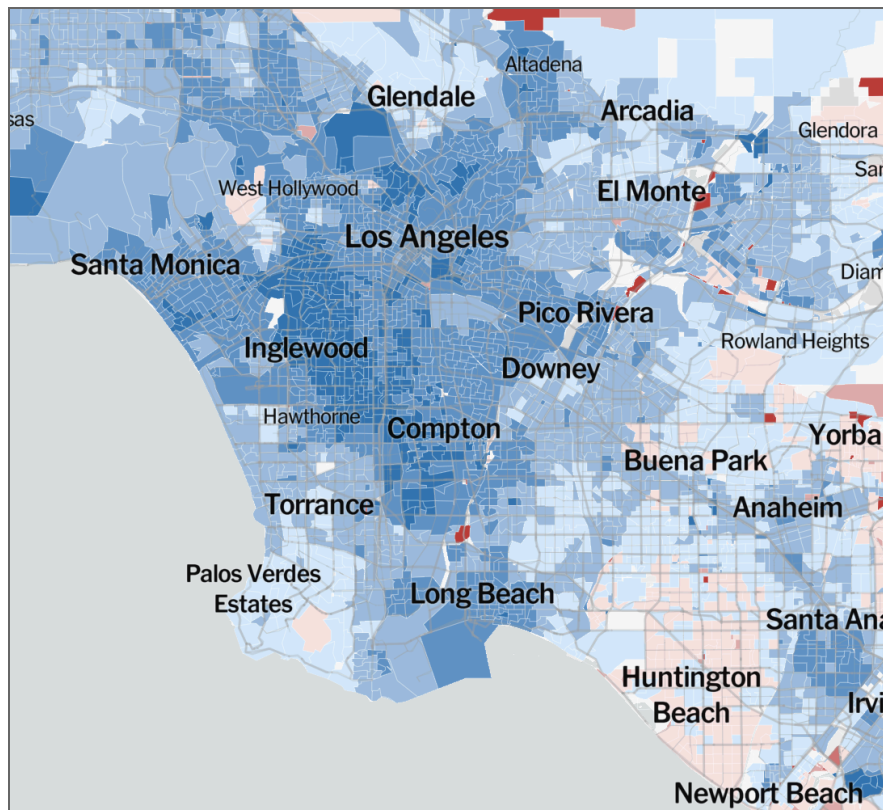


FIGURE 9: Los Angeles County is one of the country’s democratic strongholds encompassing an average of about 65 point lead over the other candidate. This is especially apparent in Inglewood where there is nearly a 90 point lead over the other candidate. About 77% of voters in the precinct of Wilmington Park Elementary voted for Biden in 2020.

Lead Researcher: Andrew Liang

Source: <https://www.nytimes.com/interactive/2021/upshot/2020-election-map.html>

Yale Climate Change Opinion Map

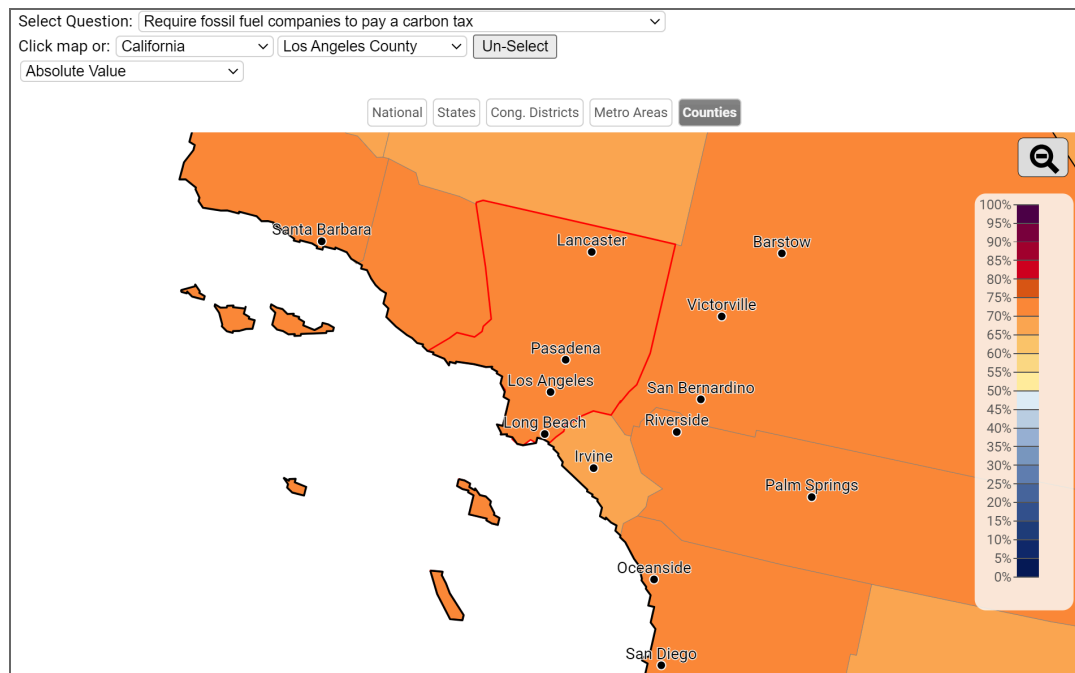


FIGURE 10: This map reveals the percentage of people in a county who believe that fossil fuel companies should be required to pay a carbon tax. 73% of Los Angeles County adults believe fossil fuel companies should be required to pay, which is 5% higher than the national average of 68%.

Lead Researcher: Arianna Estrada

Source: <https://climatecommunication.yale.edu/visualizations-data/ycom-us/>

Higher Education Map

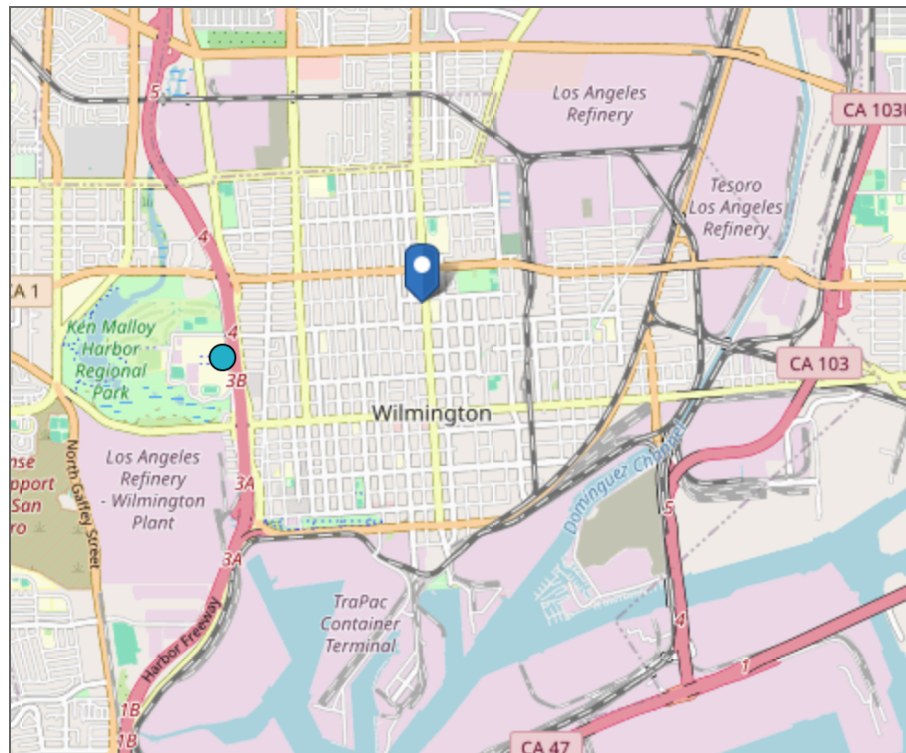


FIGURE 11: Within Wilmington, CA, there is a single institution of higher education labeled in blue; Los Angeles Harbor College, a public institution. There are no private non-profit or for-profit institutions within reach of Wilmington Park Elementary School.

Lead Researcher: Arianna Estrada

Source: <https://nces.ed.gov/ipeds/collegemap/>

Playgrounds Map

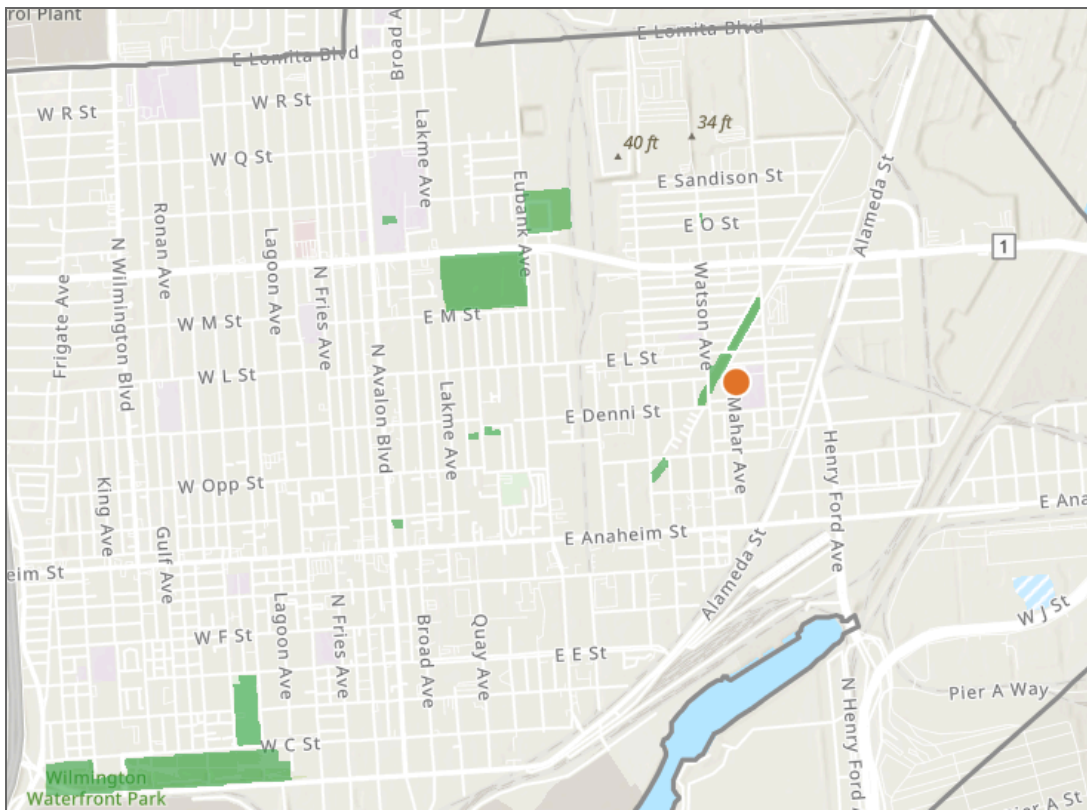


FIGURE 12: Wilmington Park Elementary is directly next to East Wilmington Greenbelt Park, and there are a few more parks not too far from the school.

Lead Researcher: Kyra Thacher

Source: <https://parkserve.tpl.org/mapping/index.html#/?CityID=0644000>

Libraries Map

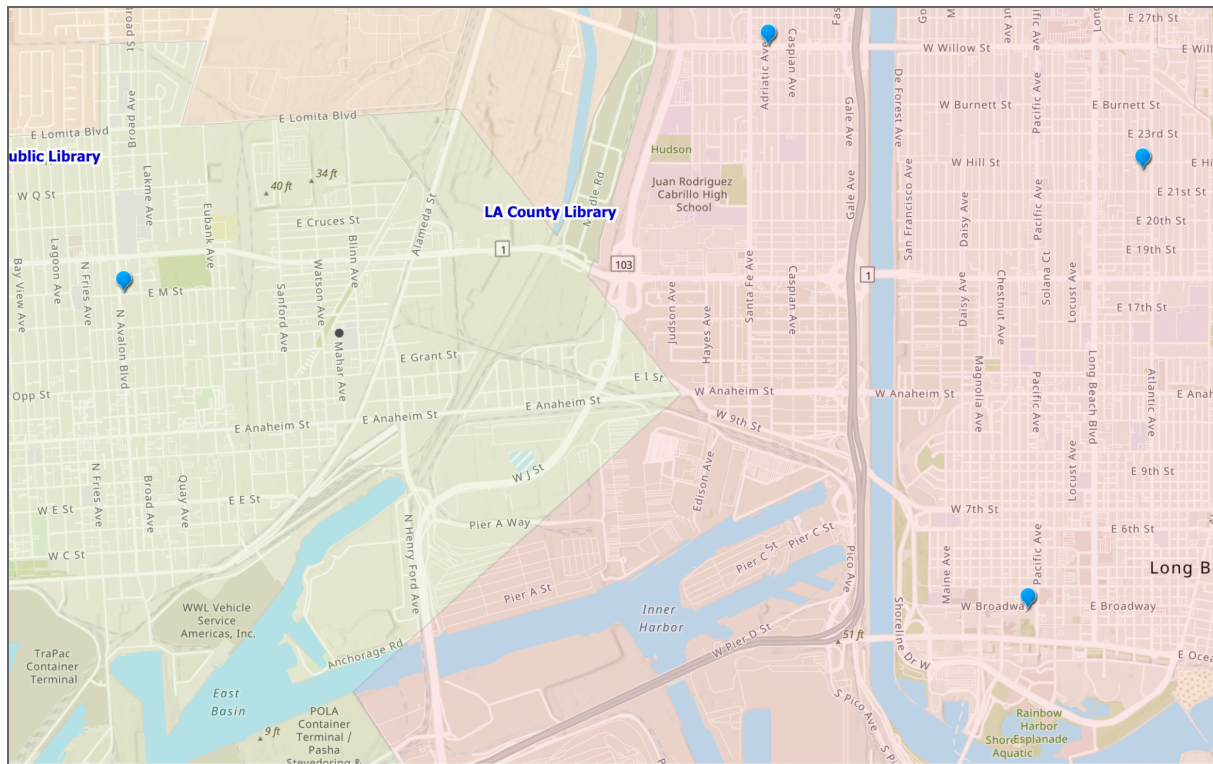


FIGURE 13: There are four library locations near Wilmington Park Elementary School: three Long Beach Public Libraries and one Los Angeles Public Library.

Lead Researcher: Shashank Byan

Source:

<https://castatelibrary.maps.arcgis.com/apps/webappviewer/index.html?id=0cb00b3ff0774122969f3b3b1cbcbef4>

2. ENVIRONMENTAL HAZARDS

Refineries, Wells, and Warehouses

Arianna Estrada

Wilmington Park Elementary School resides within Wilmington, California, a city flanked by freeways and ports, and littered with oil wells, industrial warehouses, factories, and oil refineries. As these forms of infrastructure conduct their daily processes, hazardous substances are released into the surroundings threatening the environment, health and prosperity of Wilmington. Among these environmental hazards are benzene, ammonia, and volatile organic compounds (VOCs) from local oil refineries, formaldehyde from oil wells, diesel exhaust from warehouse-based traffic.

The city of Wilmington contains five major oil refineries; the Phillips 66 Refinery and the Marathon Los Angeles Refinery, both consisting of two separate facilities in nearby Carson and Wilmington, as well as the Valero Refinery. These refineries occupy such a significant presence in Wilmington's landscape that approximately 18% of the city's land area is dedicated to their facilities (Mahoney, 2022). As oil refineries these facilities process oil, and produce a variety of petroleum-based products, with gasoline, diesel fuel, propane, and asphalt being among the most commonly produced. These production processes require complex procedures including "crude distillation, naphtha reforming, fluid catalytic cracking, alkylation, hydrocracking, and delayed coking units," all of which result in the release of pollutants like benzene, ammonia, and VOCs ("Los Angeles Refinery", n.d.). The Phillips 66 Refinery, in particular, is widely recognized as a significant emitter, accounting for two-thirds of the million pounds of pollutants, including ammonia, released in Wilmington since 2000 (Mahoney, 2022). In 2018, the same refinery emitted

more than 100,000 pounds of benzene (Mahoney, 2021). Meanwhile, all the refineries combine to release about 1,600 tons of VOC per year, accounting for half the total emissions from all refineries in Los Angeles County (May, 2009). As airborne contaminants, these chemicals have the capacity to reach across the residential areas of Wilmington, posing a serious threat to the health and well-being of more than 50,000 residents (Mahoney 2021). In particular, VOCs can undergo chemical reactions on hot days, creating an ozone layer that remains near the ground. This process can trigger asthma attacks and affect respiratory functions (May, 2009). Benzene, on the other hand, can irritate an individual's skin, eyes, and throat, and is heavily linked to leukemia and other blood cell cancers ("Benzene and Cancer Risk," n.d.). Similarly, ammonia can cause irritation of the skin, nose, and throat, with increased exposure affecting memory and brain functions ("National Pollutant Release Inventory: Ammonia," 2021). The exposure risks of these harmful chemicals have contributed to increased frequencies of cancer and other health problems in residents spanning generations. The Phillips 66 Company on its own is responsible for about 87% of the city's elevated cancer risk, largely due to its benzene emissions (Mahoney, 2022). By 2018, Wilmington was recorded to have a 35% greater risk of cancer from toxic air than the entirety of the Los Angeles basin (Becker, 2022). As toxic pollutants including benzene, ammonia, and VOCs make their way across Wilmington, they can also be retained in the soil, air, and groundwater. Chemicals in the soil can seep into the aquifer and contaminate the drinking water supply, further exacerbating the existing health effects. This contamination can affect all residents of Wilmington, particularly those who consume tap water rather than bottled water (Author⁴, 2024). Refineries pose a major source of environmental hazards including benzene, ammonia, and VOCs that graduate to threats on various fronts.

Beyond the five refineries, oil processing in Wilmington also includes a vast network of oil wells sprawled across the city. With more than 3400 wells, 1500 of them active, Wilmington is situated within the third-most productive oil field in the United States (Herr & Aldern, 2021). Arianna Estrada While oil is retrieved from drilling sites and

⁴ One or more authors have redacted their names per their request.

oil pump jacks, dangerous chemicals are expelled. Among them is formaldehyde, a classified human carcinogen capable of causing sensations of irritation and burning in the eyes, throat, nose, and skin (“Formaldehyde and Cancer Risk,” 2011). In the greater Los Angeles area, residents living besides oil wells exhibit higher rates of asthma, cancer, and heart disease (Herr & Aldern, 2021). Pregnant women are particularly vulnerable, with those residing near oil wells experiencing an increased risk of delivering low-birthweight babies (Newburger, 2021). Despite the evident risks posed by oil wells and their formaldehyde emissions, California lacks statewide regulations mandating the distance between oil wells and residential areas (Herr & Aldern, 2021). Consequently, oil well sites are commonly found within feet of Wilmington parks, schools, and homes, leading to frequent complaints of chronic coughing, skin rashes, and asthma among residents (Newburger, 2021). While active wells continuously emit these hazardous substances, inactive wells can combine to pose an equally serious threat. Within Wilmington, 91% of oil wells are within a groundwater zone, meaning sources of drinking water for nearby residents are contaminated with pollutants (King, 2023). The presence of formaldehyde in the air and pollutants in the water, stemming from the extensive amount of wells in Wilmington, represents significant environmental hazards.

Alongside refineries and markers of oil drilling sites, the Wilmington landscape is also shaped by the overwhelming presence of industry. There are about nine mega warehouses within or around Wilmington (Sierra Club, 2022). Amongst these warehouses are the KPAC and Lineage facilities, both specializing in cold/freezer storage of goods sourced worldwide (“Lineage” n.d.; “Services | KPAC General.,” n.d.). Transportation of cargo imported worldwide requires collaboration with the nearby ports and distant facilities. This results in a constant flow of large freight vehicles Arianna Estrada traveling to and from these warehouses, generating significant amounts of the environmental hazard known as diesel exhaust. The combination of nine warehouses exacerbates this issue, contributing to an annual rate of 0.125 tons of diesel particulate matter around Wilmington Park Elementary School (California Office of Environmental Health Hazard Assessment, 2021). These levels of diesel exhaust can create unsafe conditions for the

nearby inhabitants, as diesel exhaust can consist of more than 40 carcinogenic compounds (“Summary: Diesel Particulate Matter” n.d.). Although oil refineries and wells contribute to the cancer rate in the area through benzene and formaldehyde, diesel exhaust is regarded as the primary culprit. In Wilmington 664 out of every million individuals exposed face an increased risk of cancer, of which 442 cases are attributed to diesel exhaust (Yee & Geahun, 2022). Diesel exhaust is especially aggravating for individuals with pre-existing conditions, as it can exacerbate heart and lung diseases, and trigger more frequent asthma attacks (Yee & Geahun, 2022). The Wilmington warehouses serve as a hub for diesel exhaust, and further contribute to environmental hazards amassing in the city.

EJScreen Indexes

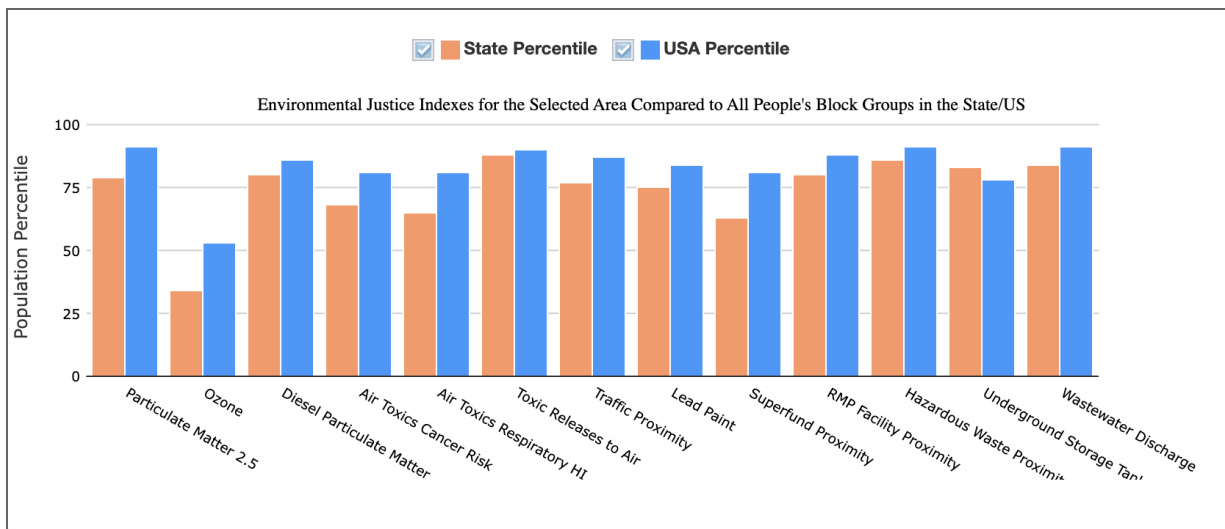


FIGURE 14: Wilmington residents have very high exposure to hazardous and health affecting pollution. Ranges from 50th percentile for Ozone, 90th percentile for PM 2.5, Hazardous Waste 90th percentile compared to the rest of the country.

Lead Researcher: Andrew Liang

Source: <https://ejscreen.epa.gov/mapper/>

Fenceline Zones

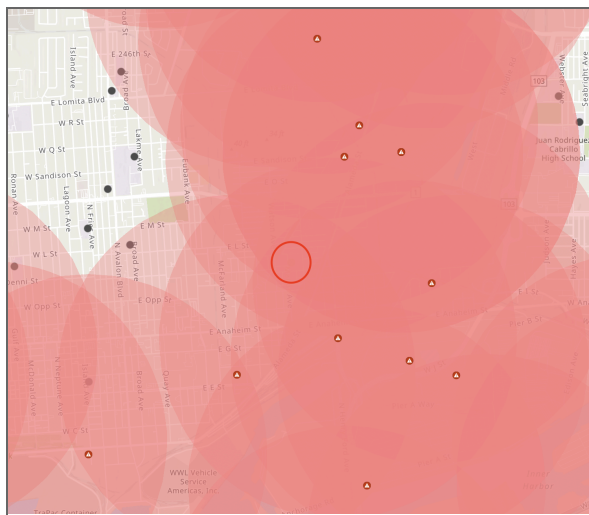


FIGURE 15: Wilmington Park is located within a mile of seven CalARP facilities, ranging from two associated with oil refining to the manufacturing of chemicals.

Lead Researcher: Andrew Liang

Source: <https://arcg.is/DqaOi0>

Daily Air Quality Tracker

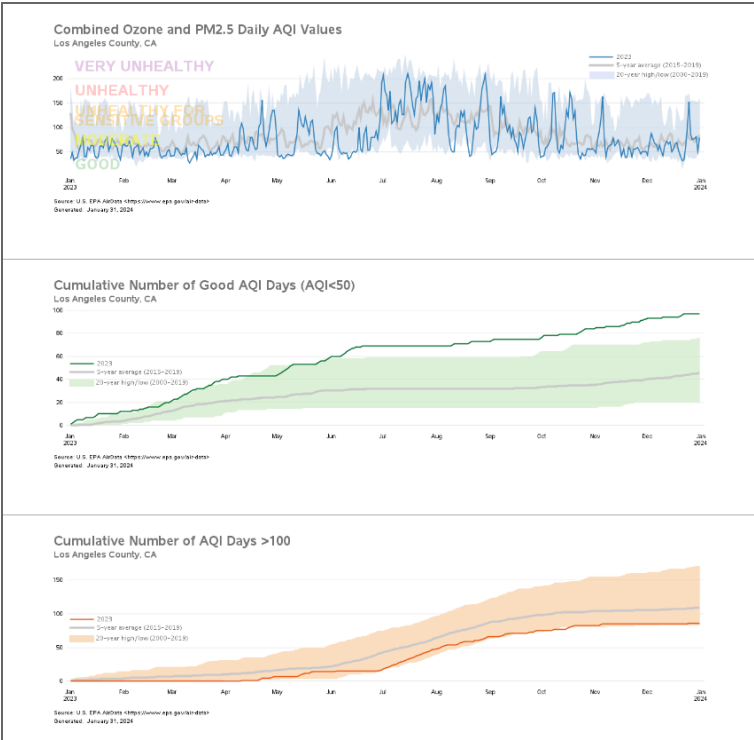


FIGURE 16: The air quality in Los Angeles County had some high levels of ozone and PM2.5 in the summer months of 2023, but overall, there were more good air quality days than in past years.

Lead Researcher: Kyra Thacher

Source: <https://shorturl.at/gxAY7>

Government Air Quality Monitors

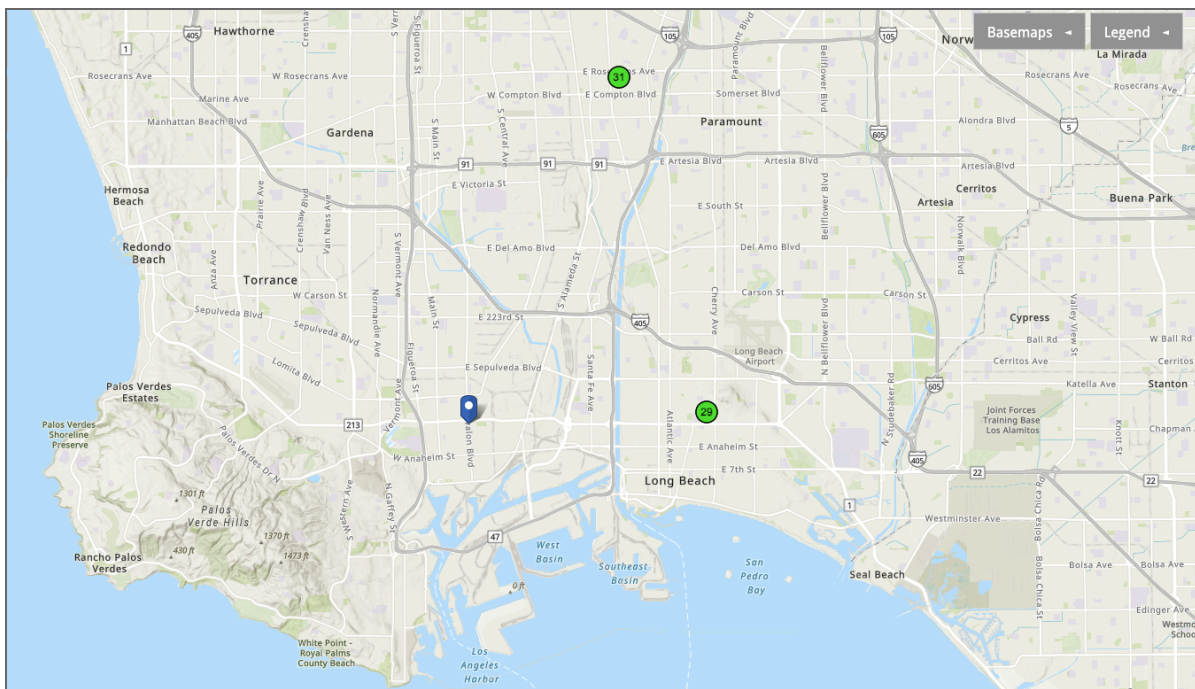


FIGURE 17: When this map was generated, the surrounding areas of Wilmington, generally in the Los Angeles area, had good air quality. There are 2 monitors in the area, with one being in Compton, and the other in Long Beach. There are currently no monitors in Wilmington, however we can estimate that air quality is poor.

Lead Researcher: Raena Imtiaz

Source: <https://shorturl.at/qR235>

Purple Air Quality Monitors

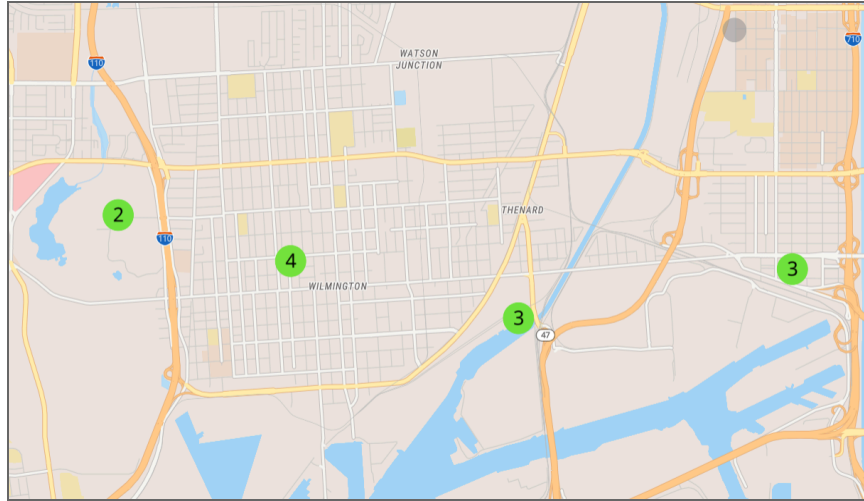


FIGURE 18: There are many community air monitors in and around Wilmington, with none near Wilmington Park Elementary.

Lead Researcher: Kyra Thacher

Source: <https://shorturl.at/EGJY6>

CalEnviroScreen Score Overall

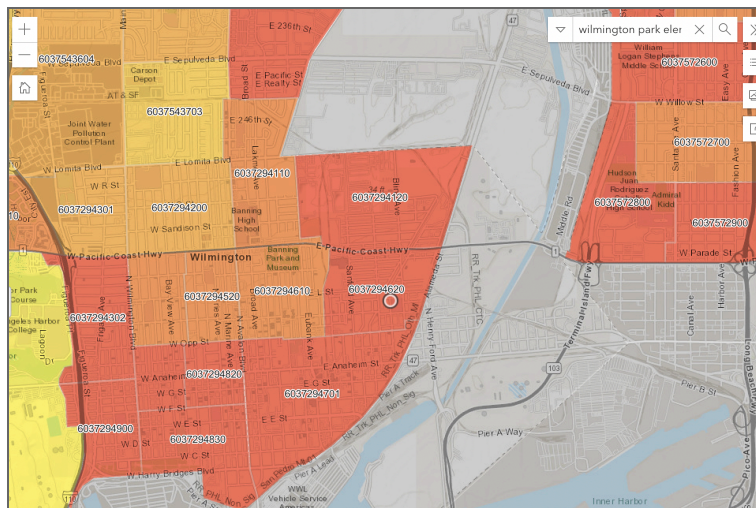


FIGURE 19: Wilmington Park Elementary is located in a census tract that is in the 91st percentile of CalEnviroScreen scores, which means that it has more cumulative impacts of environmental injustice than 91% of other tracts in California.

Lead Researcher: Shashank Bypan

Source: <https://shorturl.at/mvIKX>

CalEnviroScreen TRI

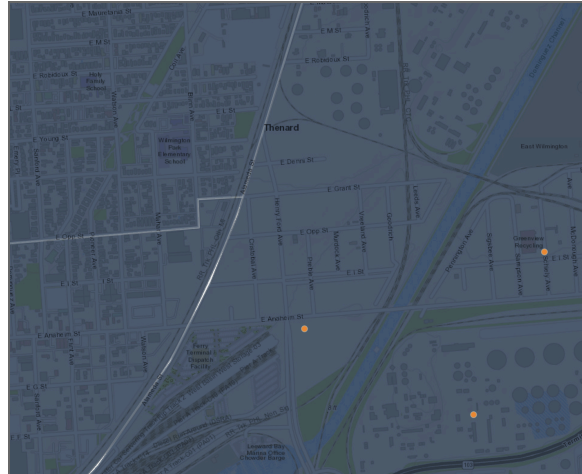


FIGURE 20: Wilmington Park Elementary School is located in a census tract that is in the 98th percentile for toxic release exposure in California.

Lead Researcher: Shashank Bypan

Source: <https://tinyurl.com/3dnns6cf>

Particulate Matter 2.5 (PM2.5) Exposure

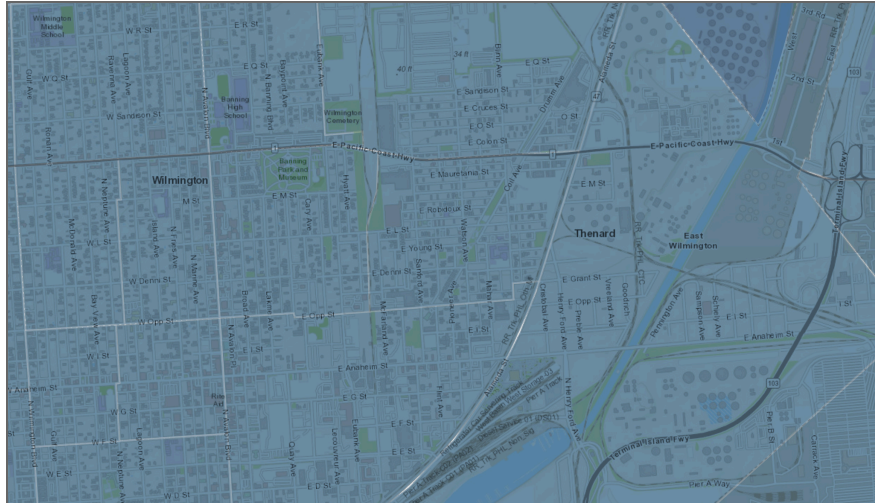


FIGURE 21: Wilmington Park Elementary School (circled in yellow) is located in an area of Long Beach with a PM2.5 concentration of 11.7 micrograms per cubic meter. This value is in the 66th percentile of all California tracts.

Lead Researcher: Shi Wen Gunderson

Source: <https://tinyurl.com/3c3d3cc6>

Ozone Exposure

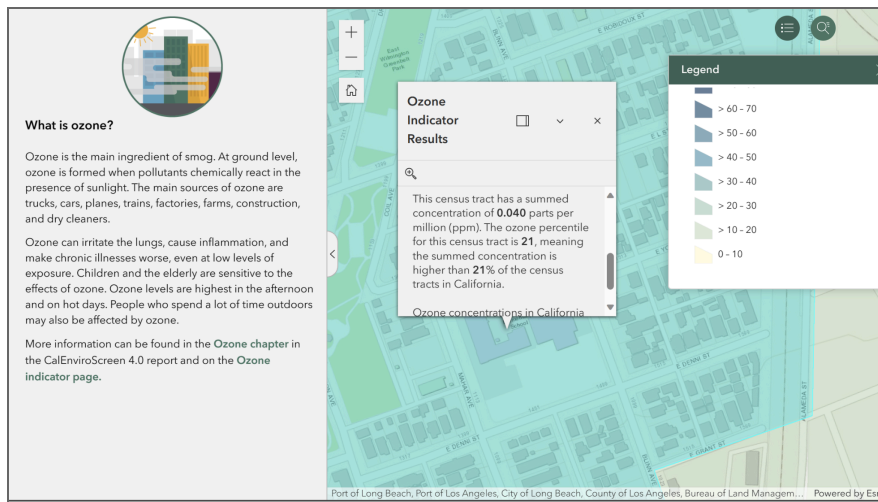


FIGURE 22: Ozone levels in Long Beach, CA are higher than 21% of the census tracts in CA. Concentration of 0.040 ppm. Concentrations in CA range from 0.03 → 0.07ppm.

Lead Researcher: Alison Coffman

Source: <https://tinyurl.com/rwvj7vpx>

Diesel PM Exposure

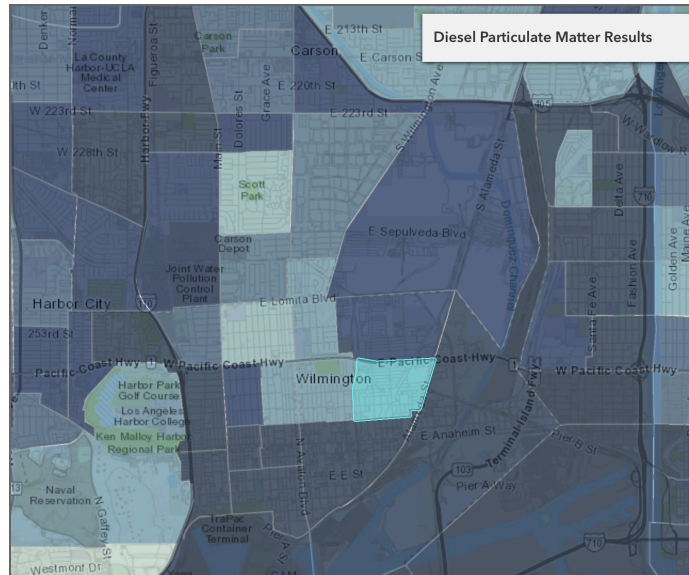


FIGURE 23: The diesel particulate matter exposure in the area surrounding Wilmington Park Elementary schools sits at a level of 45/100. The people in this area are exposed to around 0.125 tons of diesel particulate matter per year. However, right next door, the neighboring area is at a level of 100, with residents breathing in 1.7 tons of diesel particulates per year due to the Port of Los Angeles.

Lead Researcher: Chase Kneller

Source: <https://tinyurl.com/yxfz944d>

Drinking Water Contaminants

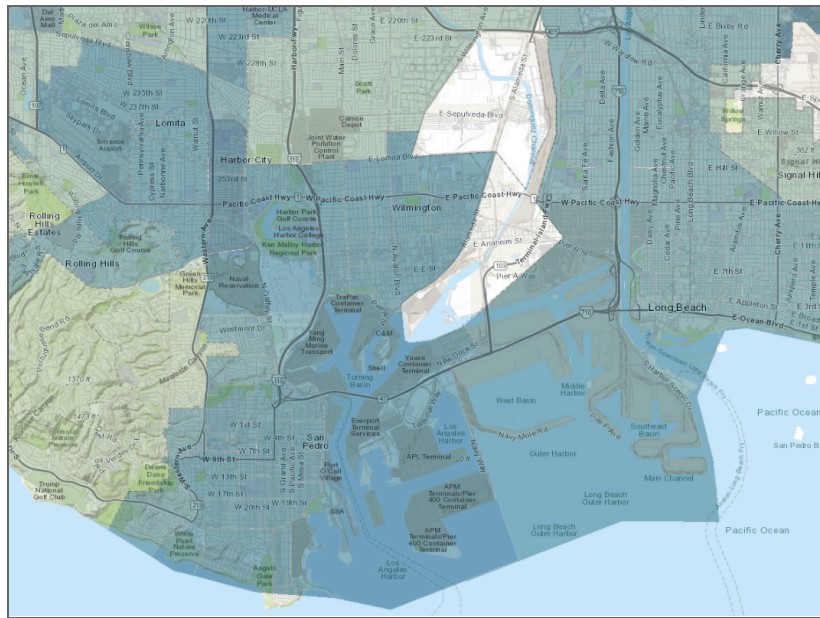


FIGURE 24: Wilmington Park Elementary School is located in a census tract that is in the 42th percentile for drinking water contaminants in California, meaning the amount of contaminants is higher than nearly half the country. The water supply of Wilmington is contaminated with high levels of arsenic, haloacetic acids, lead, and total trihalomethanes (THM).

Lead Researcher: Raena Imtiaz

Source: <https://tinyurl.com/3dnns6cf>

The Dangers of Ports and Roads

Raena Imtiaz

Wilmington Park Elementary School sits approximately 5 miles from The Port of Los Angeles, one of the largest ports in America. Rated the top container port in the Western Hemisphere consecutively from 2000 to 2022, the Port of Los Angeles holds numerous records including handling the first (10.7 million TEUs in 2021) and second-highest number of TEUs (9.9 million TEUs in 2022) in a year (“The Port of Los Angeles”, 2022). During the Covid-19 pandemic, especially in November 2020, "more than 100 ships at a time were "anchored or loitering" (Yee and Getahun, 2022), close to shore

off Long Beach, waiting to enter the ports, according to the Marine Exchange of Southern California (Kneller, 2024). The Port of Long Beach also sits 10 miles from Wilmington Park Elementary School. It handles cargo valued at \$200 billion and is one of the few U.S. ports that can welcome some of the largest shipping vessels in the world (Port of Long Beach, 2023). While these records are impressive, this magnitude of production results in massive emissions of pollutants; Wilmington Park Elementary's proximity to the port makes it especially vulnerable to these pollutants. The Los Angeles Times found that "at the Port of L.A., cancer-causing diesel particulate matter rose 56%, smog-forming nitrogen oxides jumped 54%, and greenhouse gas emissions increased 39% compared with 2020 levels. At the Port of Long Beach, diesel particulate matter increased by 42%, nitrogen oxide emissions were up 35%, and greenhouse gasses rose by 35%" (The Times Editorial Board, 2022). These, and many others, concerning emissions that are emitted enable the environmental injustices that occur in Wilmington and contribute to 1,200 premature deaths each year (Mahoney 2022) (Thacher, 2024).

Greenhouse Gas Emissions from Ships

The most prominent pollutants from ports are from ships that burn large quantities of heavy fuel oil, emitting air pollutants. In 2022, international shipping was solely responsible for nearly 3% of the world's greenhouse gas emissions and for about 20.2% of the world's total CO₂ emissions, making it the second-largest contributor to global carbon pollution (Sinay Maritime Data Solution, 2023). Ports, especially as busy as Los Angeles and Long Beach, already produce intense GHG emissions which make the residents of Wilmington who live so close substantially vulnerable. A study found that "the cancer risk – predominantly from diesel exhaust spewed by trucks, ships, and trains -to be 98% higher in Wilmington than in the rest of the Los Angeles basin" (Yee and Getahun, 2022) (Kneller, 2024).

The most significant GHG emissions from these ports are carbon dioxide, nitrous oxides, and sulfur dioxide. Carbon dioxide, which is essential to both bodily processes and the atmosphere, can become harmful in large amounts because it acts as a simple

asphyxiant. A simple asphyxiant is a gas that reduces or displaces the normal oxygen in breathing air (USDA Food Safety and Inspection Service, n.d) This can cause symptoms such as nausea and vomiting but can't be serious to the point of convulsions, coma, and death. Simple asphyxiants can be especially dangerous to those who are already struggling with respiratory issues, children and pregnant women, and those who consistently work in confined spaces. Nitrous dioxides are one of the largest emissions from ports and can cause inflammation of the airways. It can also increase susceptibility to respiratory infections and allergens and contribute to the formation of ground-level ozone and fine particulate matter, which can cause respiratory conditions like asthma and bronchitis (Department of Environment Food & Rural Affairs, 2023). This also explains why “LA-LB Harbor communities exposed to one or more Asthma Danger Zones experience 37% more asthma ED visits than the Los Angeles County average” (SmartAirLA, 2020). Studies have also found that long-term exposure to high concentrations of nitrous oxide can lead to megaloblastic bone marrow depression and neurological symptoms (Weimann, 2003). Nitrous oxides are highly toxic to all groups of people, however, they should especially be avoided by those with neurological disorders and respiratory issues as this GHG can worsen the symptoms. Sulfur dioxide can be severely irritating to the eyes, mucous membranes, skin, and respiratory tract. According to the CDC, it can also lead to “mucous membranes, skin, and respiratory tract irritation, as well as bronchospasm, pulmonary edema, pneumonitis, and acute airway obstruction” Even low concentrations of sulfur dioxide can be dangerous to individuals with chronic pulmonary diseases like asthma and emphysema (Centers for Disease Control and Prevention, n.d.).

As a whole, greenhouse gasses are especially harmful to the atmosphere because of their interference when the sunlight strikes the earth's surface and reflects back as infrared radiation. Greenhouse gasses absorb and trap the heat from this radiation, resulting in the greenhouse effect which is responsible for global warming and climate change. To make matters worse, these intense emissions do not seem to be slowing down contrary to promises by the ports to lower their GHG emissions. According to the 2022 'Inventory of Air Emissions report, “greenhouse gas emissions from the ports of Los

Angeles and Long Beach shot up last year”; SO_x increased 45% increase from 2020 from POLA and 38% last year from the Port of Long Beach, and NO_x rose 54% in Los Angeles and 35% in Long Beach in 2021. (Hutchings, 2022).

Hazards in Water From Ports

The Port of Los Angeles and the Port of Long Beach produce additional hazards through the water when ships periodically release sewage and wastewater that can be hazardous to human and wildlife populations that are exposed to it. Ships often discharge sewage after long voyages—which “is generally prohibited under the new regulations, except when the ship has in operation an approved sewage treatment plant that has been certified by the Administration” (International Maritime Organization, n.d.). However, sewage in the water of the ports is an extremely common occurrence for ports in general and the Los Angeles area. This remains under-regulated due to the financial benefits of a port—especially one so financially prosperous—that functions undisturbed. Wastewater can be harmful to humans, other organisms, and the environment in a multitude of ways. Any wastewater that is released into the ocean can cause bacterial and viral contamination of commercial fish and shellfish, depletion of oxygen in water, and bioaccumulation of certain toxins in fish (Natural Resources Defense Council, 2004).

A study from the University of Waterloo found that waters contaminated with sewage are “particularly enriched in pathogenic bacteria most associated with human infection including bacteria that cause food poisoning such as *Clostridium perfringens*” (Craig, 2017) While *Clostridium perfringens* is a common bacteria that causes diarrhea and stomach cramps, it can often be deadly with a mortality rate of 27–44%. These bacteria are often difficult to detect and are ingested by humans on a daily basis. It is not uncommon for more deadly bacteria to spread to humans through commercial fish and shellfish, and these contaminants can build up in your body over time culminating in larger health issues such as Ciguatera fish poisoning. Ciguatera is an illness caused by eating fish that contain toxins produced by a marine microalgae called *Gambierdiscus toxicus*. It can cause long-lasting neurological symptoms such as fatigue, arthralgia, myalgia, headache, pruritus, depression, and anxiety (Centers for Disease Control and Prevention, n.d.)

Similarly, mercury can spread through sewage and a process called bioaccumulation through multiple fish can occur when an organism that consumes mercury will not be able to fully digest it, so when it is eaten by a larger organism this mercury will pass on. This mercury can ultimately end up in commercial marine life, which can then spread to humans. In both fish and humans, mercury can cause impaired reproduction, growth, neuro-development, and learning ability. Another contaminant that can spread through sewage is endocrine disruptors, which are commonly found in human excrements when humans ingest certain medications. These disruptors can spread to both fish and humans; one study states that “EDCs may interfere with synthesis, action and metabolism of sex steroid hormones that in turn cause developmental and fertility problems, infertility and hormone-sensitive cancers in women and men” (Yilmaz et al., 2020). Pregnant women are especially vulnerable to mercury and endocrine disruptors because they can cause fatal damage to fetuses.

Bilge water is another common hazard that comes from ports and is a mixture of lubricants, cleaning solvents, and metals such as lead and arsenic, which collect at the bottom of the vessel. Oftentimes, ships will dispel this water into the ocean rather than send it to a treatment plant to cut down on operational costs. While this may seem a shocking practice in a modern age of environmental regulation, the EMSA recorded 7,672 detections of potential oil spills from bilge water (Paddison et al., 2022). Bilge water is highly toxic to humans, marine creatures, and the environment. Oftentimes, these substances cannot be filtered out, so they can get into drinking water; or they can get into human systems when people go swimming in the ocean, which is not uncommon in the Los Angeles-Long Beach area. This can cause cancer and developmental disorders due to the toxic substances in the solvents and metals mixed in. Lead is a significant hazard that stems from this; according to the CDC, children from low-income households and those who live in housing built before 1978 are at the greatest risk of lead exposure (Centers for Disease Control and Prevention, 2021). This implies that the children of Wilmington Park Elementary School are a highly vulnerable population to this as the school enrolls 75% economically disadvantaged students (U.S. News & World Report, 2022).

Hazards from Nearby Roads and Freeways

The ports of Los Angeles and Long Beach that Wilmington is flanked by contribute to emissions from 6 million vehicles daily, making it a significant source of numerous hazards (Mahoney, 2022) (Estrada, 2024). With the booming success of both ports, they bring in large shipping trucks daily that encourage the constant burning of fuel with packs of vehicles that emit large amounts of pollutants such as nitrogen dioxide, carbon monoxide, particulate matter, hydrocarbons, benzene, and formaldehyde.

Carbon monoxide makes up a huge percentage of CO emissions; the U.S. EPA estimates that in cities, as much as 95 percent of all CO emissions may come from motor vehicle exhaust (Environmental Protection Agency, 2008). With 6 million vehicles (usually freight trucks) emitting almost 161.8 grams of CO₂ per ton-mile so close to Wilmington, the residents are at high risk of significant health impacts. Carbon monoxide is deadly to all individuals as it binds to hemoglobin in the blood, reducing the ability of blood to carry oxygen to the body's organs. This can result in a lack of oxygen in the brain which can lead to fatigue, headaches, confusion, and dizziness; in large amounts, it can be fatal. (California Air Resources Board, n.d.). Those that are most likely to get carbon monoxide poisoning are infants, the elderly, and people with chronic heart disease, anemia, and breathing problems. Benzene is another common emission that comes from the burning of car fuel as a natural component of both crude oil and petrol. Benzene is especially deadly due to its ability to easily penetrate the skin and enter the body, carry over long distances into the skin, and remain in the soil for long periods. Benzene causes harmful effects on the bone marrow and can cause a decrease in red blood cells, leading to anemia. Children are already the most vulnerable groups for anemia, and benzene exposure amplifies this risk. Benzene can also cause excessive bleeding and can affect the immune system, increasing the chance of infections which can be lethal to immunocompromised groups. (Centers for Disease Control and Prevention, n.d.). Benzene evaporates very quickly, making it an easy air pollutant that often goes overlooked. However, it can be extremely dangerous and lead to serious blood disorders such as anemia and leukemia.

Childhood Lead Exposure

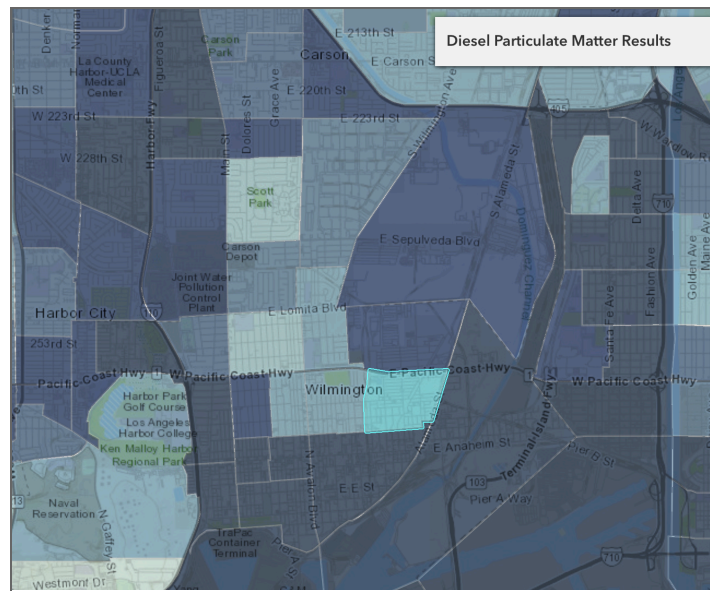


FIGURE 25: Children growing up in the area surrounding Wilmington Park elementary school are at a 85% higher risk of being exposed to lead in their house, compared to the rest of the state. A majority of the lead is based in paint, this means that these houses were built before the national lead ban in 1978, and this may correlate to income and other socioeconomic factors.

Lead Researcher: Chase Kneller

Source:

https://experience.arcgis.com/experience/ed5953d89038431dbf4f22ab9abfe40d/page/Indicators/?data_id=dataSource_39-17c3c368683-layer-1%3A7154&views=Children%E2%80%99s-Lead-Risk-from-Housing

CalEnviroScreen Traffic

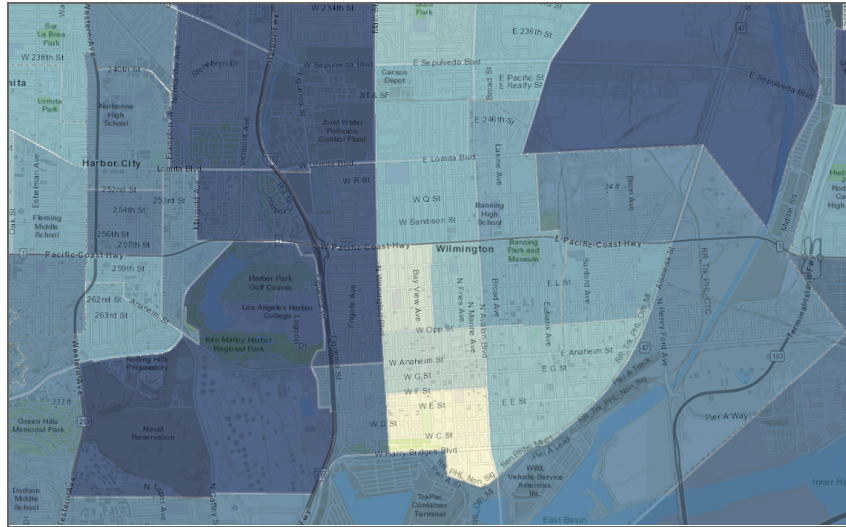


FIGURE 26: The census tract that contains Wilmington Park Elementary is in the 59th percentile for traffic impacts in California.

Lead Researcher: Kyra Thacher

Source:

https://experience.arcgis.com/experience/ed5953d89038431dbf4f22ab9abfe40d/page/Indicators/?data_id=widget_314_output_0%3A0&views=Traffic-Impacts

Cleanup Sites

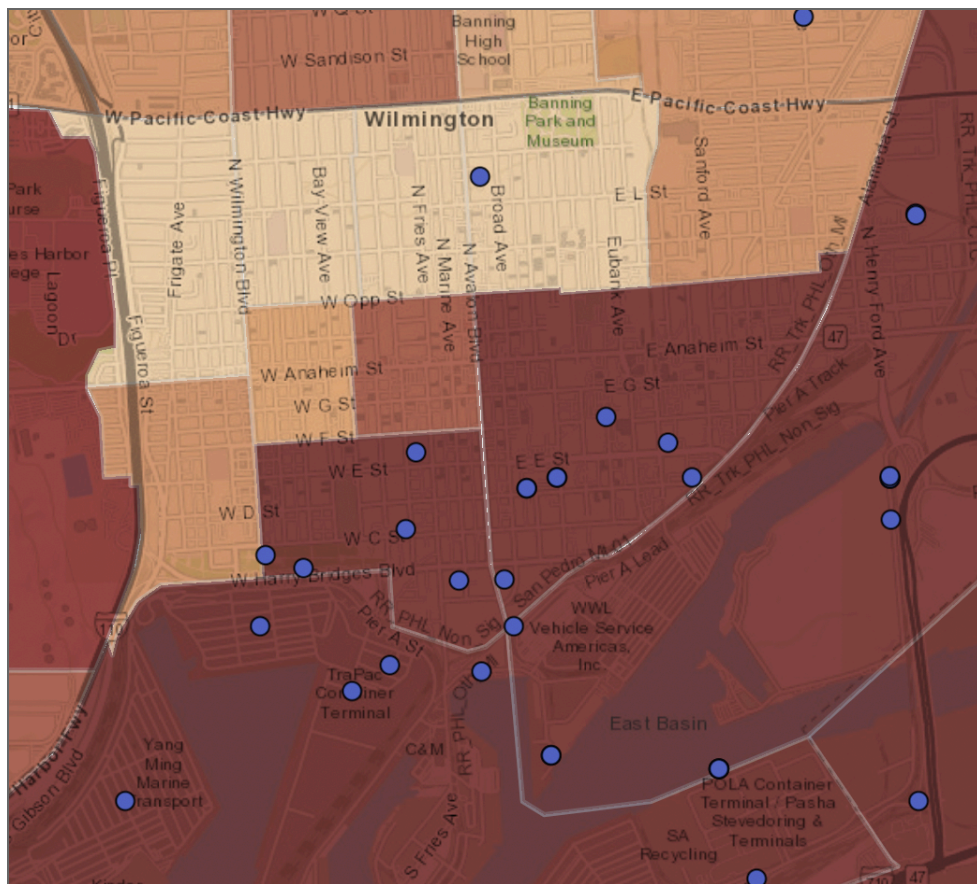


FIGURE 27: The census tract that contains Wilmington Park Elementary is in the 59th percentile for traffic impacts in California.

Lead Researcher⁵

Source: <https://oehha.ca.gov/calenviroscreen/indicator/groundwater-threats>

⁵ One or more authors have redacted their names per their request.

Groundwater Threats



FIGURE 28: Wilmington Park Elementary is located in the 78th percentile of groundwater threats based on distance from threats and number of groundwater clean up sites.

Lead Researcher: Alison Coffman

Source:

https://experience.arcgis.com/experience/ed5953d89038431dbf4f22ab9abfe40d/page/Indicators/?data_id=widget_314_output_0%3A0&views=Traffic-Impacts

Hazardous Waste

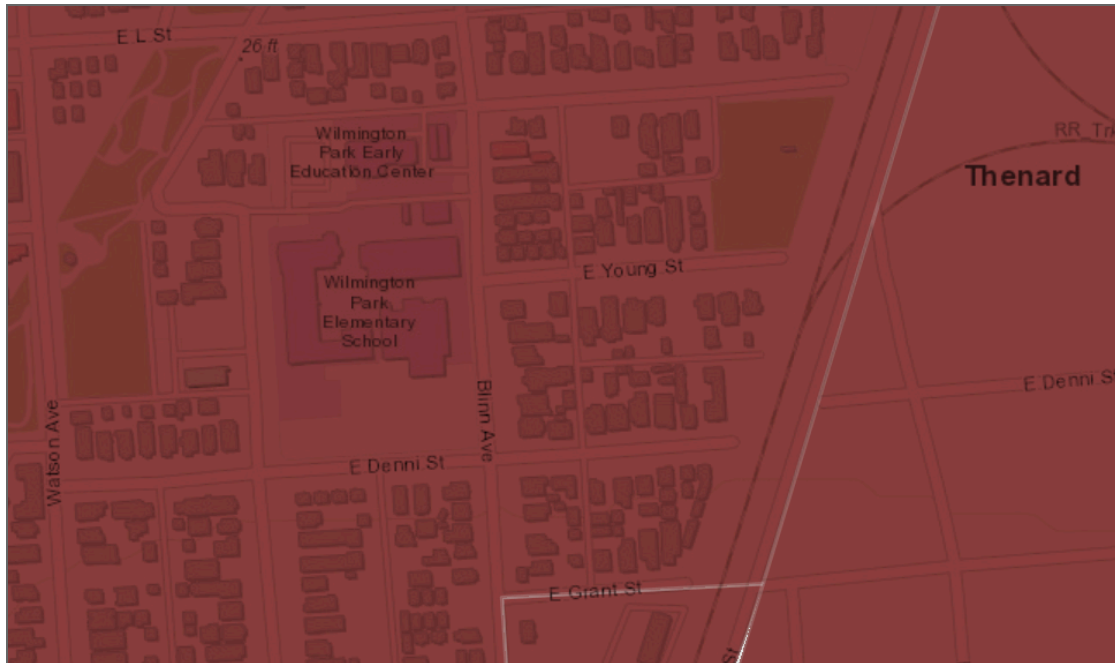


FIGURE 29: Wilmington Park Elementary School is in a census tract that is in the 100th percentile for proximity to hazardous waste sites in California.

Lead Researcher: Shashank Bypan

Source:

https://experience.arcgis.com/experience/ed5953d89038431dbf4f22ab9abfe40d/page/Indicators/?data_id=widget_317_output_0%3A0&views=Hazardous-Waste

Impaired Waters

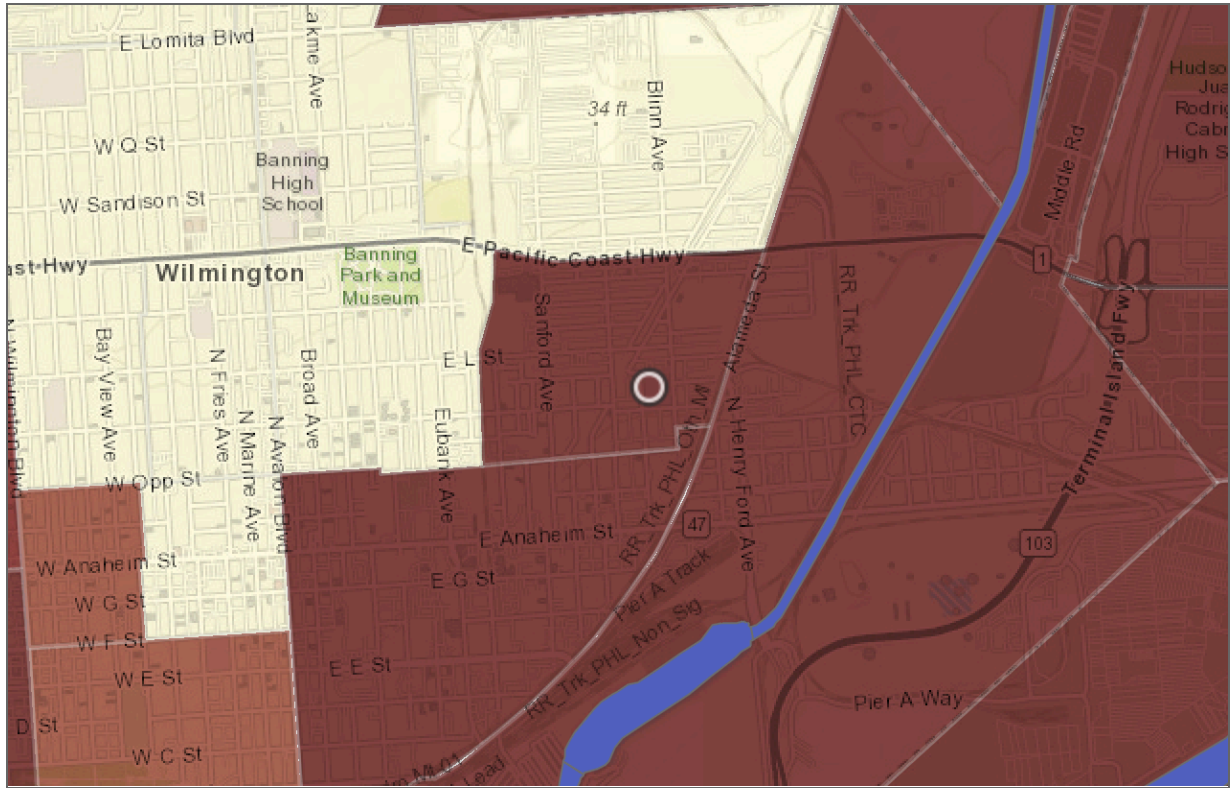


FIGURE 30: There are 6 water impairments nearby Wilmington Park, meaning that their water is contaminated by pollutants. It is higher than 96% of the census tracts in California.

Lead Researcher: Alison Coffman

Source: <https://oehha.ca.gov/calenviroscreen/indicator/impaired-water-bodies>

Superfund Sites

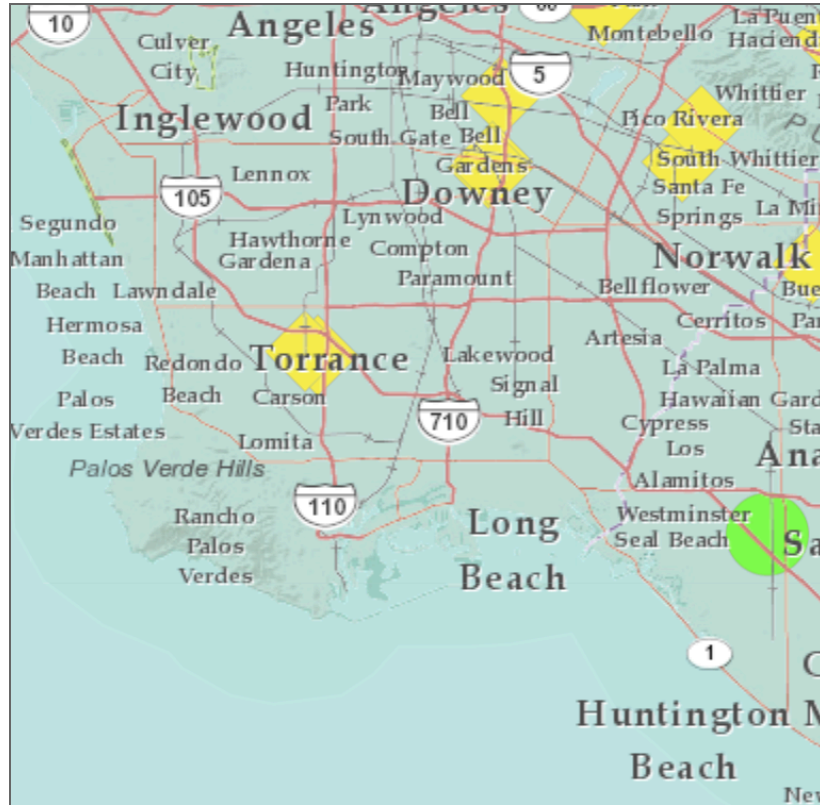


FIGURE 32: There is one Superfund Site near Wilmington that is the MONTROSE CHEMICAL CORP. They were best known for being the producers of DDT. The site is still in remediation.

Lead Researcher: Andrew Liang

Source: <https://www.epa.gov/superfund/search-superfund-sites-where-you-live#map>

Traffic Proximity



FIGURE 33: Significant due to the shared industrial and commercial activities, leading to congestion on major roadways connecting the two cities, such as the I-710 freeway. For the latest and most accurate information, it's advisable to check current traffic reports or maps.

Lead Researcher: Gracie Haley

Source:

<https://portcitydaily.com/local-news/2013/10/30/dot-eyeing-innovative-design-for-desired-wilmington-interchanges/>

Current Climate Disasters

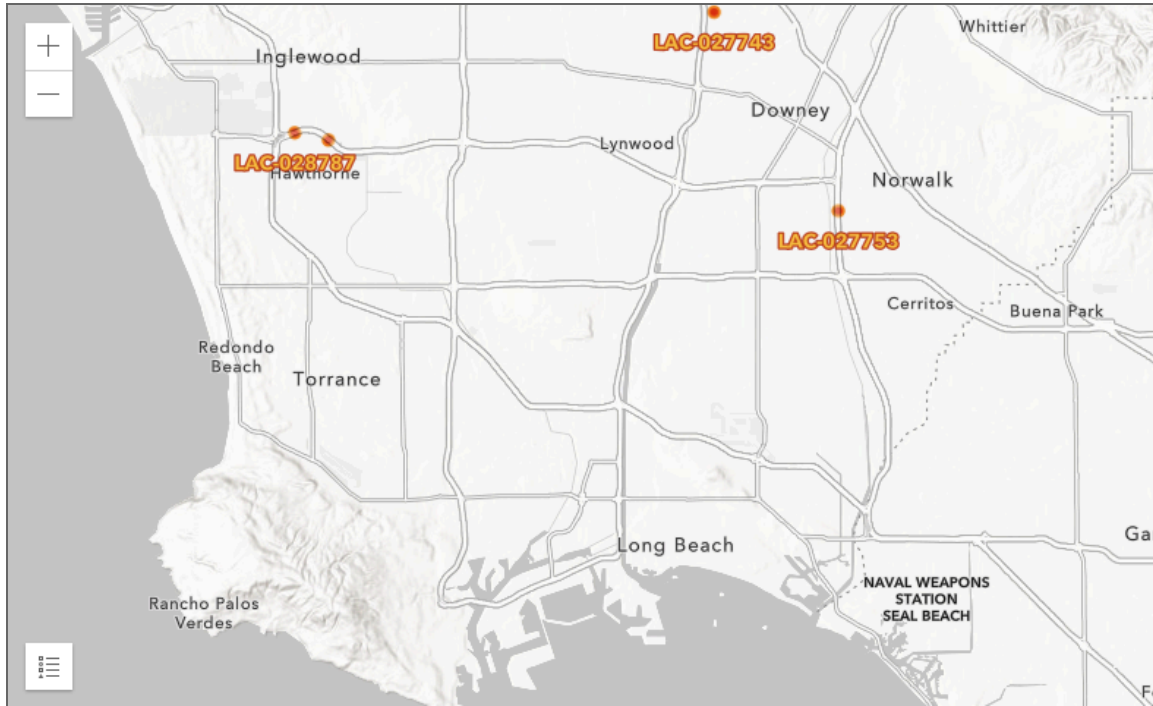


FIGURE 34: There are currently no major climate disasters threatening Wilmington. There is no drought risk due to adequate rainfall and no flood risks. There are a few wildfires nearby, but nothing significantly close enough to pose a threat to Wilmington especially because Wilmington does not have many trees. Air pollution is the prominent hazard in Wilmington.

Lead Researcher: Raena Imtiaz

Source: <https://resilience.climate.gov/>

Drought Projections

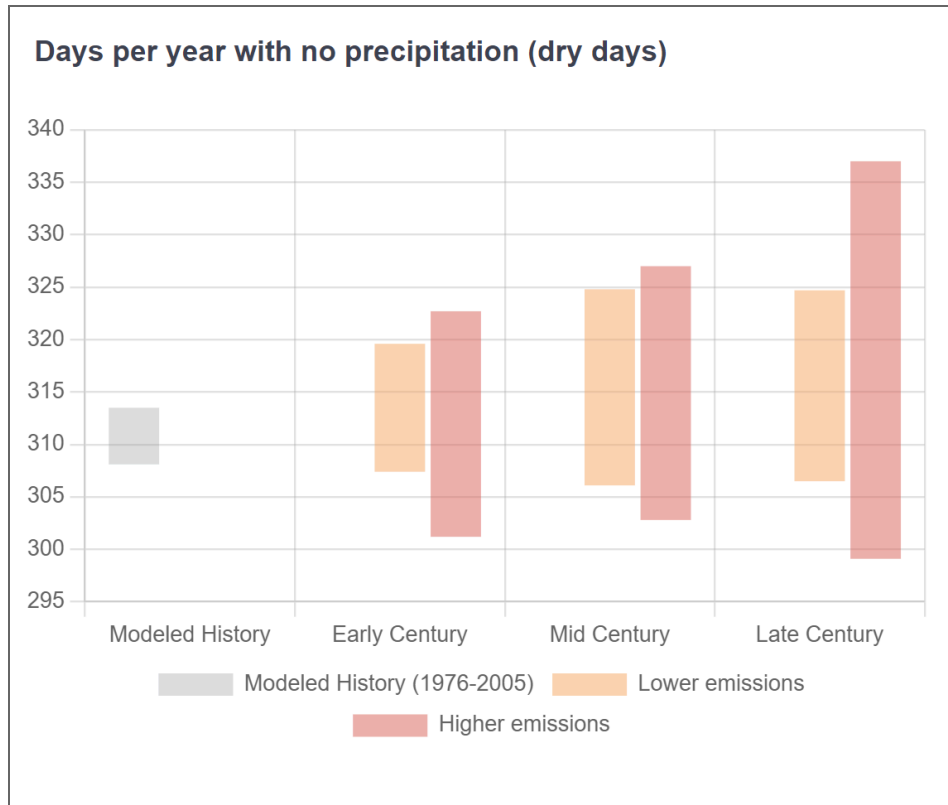


FIGURE 35: Los Angeles County, which the town of Wilmington is located in, could expect to have up to 337 days without rain in the future. In the past, the county only experienced 313 days with no precipitation. This shows that higher emissions drastically exacerbate drought conditions.

Lead Researcher: Shi Wen Gunderson

Source: <https://livingatlas.arcgis.com/assessment-tool/explore/map>

3. COMPOUND VULNERABILITIES

Intersecting Factors

Gracie Haley

Wilmington Park, a community grappling with a complex web of environmental and socioeconomic challenges, stands as a stark example of the insidious impact of environmental racism. This community, predominantly composed of people of color, has historically borne the disproportionate burden of pollution and hazardous waste, revealing a deeply rooted pattern of environmental injustice. Beyond this, the residents of Wilmington Park face socioeconomic disparities, policy failures, technological and cultural invisibility, and the exacerbating impacts of climate change. The intersectionality of these issues underscores the urgent need for comprehensive and equitable solutions to address the community's multifaceted vulnerabilities.

Historical Environmental Racism: Wilmington Park has a history of environmental racism, where minority communities have been disproportionately exposed to pollution and hazardous waste. "Environmental racism is the practice of placing toxic waste sites, landfills, and other environmental hazards in communities that are predominantly composed of people of color" (Bullard, 1993).

Socioeconomic Disparities: The socioeconomic status of many residents in Wilmington Park contributes to environmental vulnerability. Low-income communities often lack resources to advocate for themselves, resulting in limited access to clean environments

and health care (Perlin et al., 2019).

Policy Failures: Weak environmental regulations and enforcement contribute to the vulnerability of Wilmington Park. "Inadequate regulation and lax enforcement create an environment where industries can pollute with impunity" (Harrison et al., 2020).

Technological Disparities: Lack of technological resources and infrastructure in Wilmington Park hinders the community's ability to monitor and address environmental issues effectively. "Technological disparities exacerbate environmental injustices by limiting communities' capacity to collect and analyze data on pollution and its impacts." (Schlosberg, 2007).

Cultural Invisibility: The cultural invisibility of Wilmington Park's community in decision-making processes exacerbates environmental injustice. "Minority communities often experience cultural invisibility, where their needs and concerns are overlooked in environmental policymaking" (Mohai & Bryant, 1992).

Climate Change Impacts: The ecological factor of climate change is disproportionately affects vulnerable communities in Wilmington Park. Rising sea levels and extreme weather events pose significant threats, particularly in low-lying areas. "Climate change exacerbates existing environmental health disparities, disproportionately affecting marginalized communities" (IPCC, 2018).

Lack of Community Engagement: The lack of community engagement in environmental decision-making processes contribute to vulnerability. "Communities that are excluded from decision-making processes face increased environmental risks and reduced access to resources" (Agyeman et al., 2016).

Political Power Dynamics: The unequal distribution of political power in Wilmington Park perpetuates environmental injustice. "Political power dynamics often favor industry

interests over the well-being of vulnerable communities, leading to policies that prioritize economic gains at the expense of environmental health" (Pellow, 2018).

Health Disparities: Environmental health disparities in Wilmington Park are reflected in higher rates of respiratory and other health issues. "Exposure to environmental hazards contributes to health disparities, with minority communities experiencing higher rates of environmentally related illnesses" (Morello-Frosch & Shenassa, 2006).

Disinvestment and Gentrification: Disinvestment and gentrification further exacerbate vulnerability in Wilmington Park. "Historical disinvestment and gentrification processes can displace vulnerable communities, pushing them into areas with poor environmental conditions" (Been, 1994).

Housing Access

As shown in the CalEnviroScreen 4.0 indicator maps, about 605 out of 925 housing units in the tracts are considered low-income. Census tract 6037294610 has 4,334 people. Of these low-income households, about 189 are considered housing-burdened. According to the California Healthy Places Index, the Wilmington Park tract 2946.20, with an HPI score of 3.0, has healthier housing conditions than 13.5% of other California tracts.

Approximately 65% of households in Wilmington fall into the low-income category. Of these, nearly 31% are considered housing-burdened, paying more than 50% of their income towards housing costs. The data, spanning from 2013 to 2017, indicates a persistent and pronounced housing affordability challenge in the community, impacting residents' financial stability and overall well-being. Housing access affects residents by imposing a severe economic strain, limiting their ability to allocate resources to other essential needs such as healthcare, education, and savings. This financial stress can lead to increased vulnerability, potentially contributing to long-term socioeconomic disparities and challenges.

California Healthy Places Index

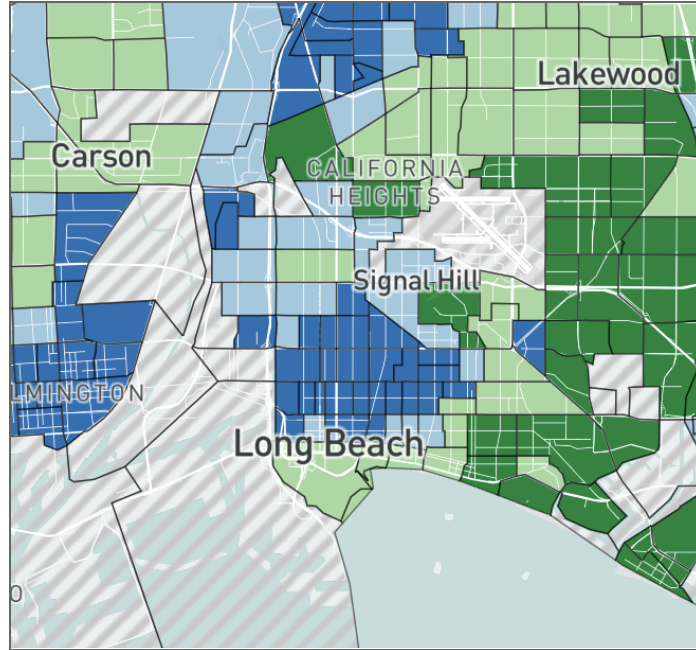


FIGURE 36: Wilmington has a lower HPI compared to the surrounding areas. It has a low percentile of <10 as does Signal Hill nearby with a percentile of 77.

Lead Researcher: Andrew Liang

Source: <https://map.healthyplacesindex.org/>

Racial Demographics

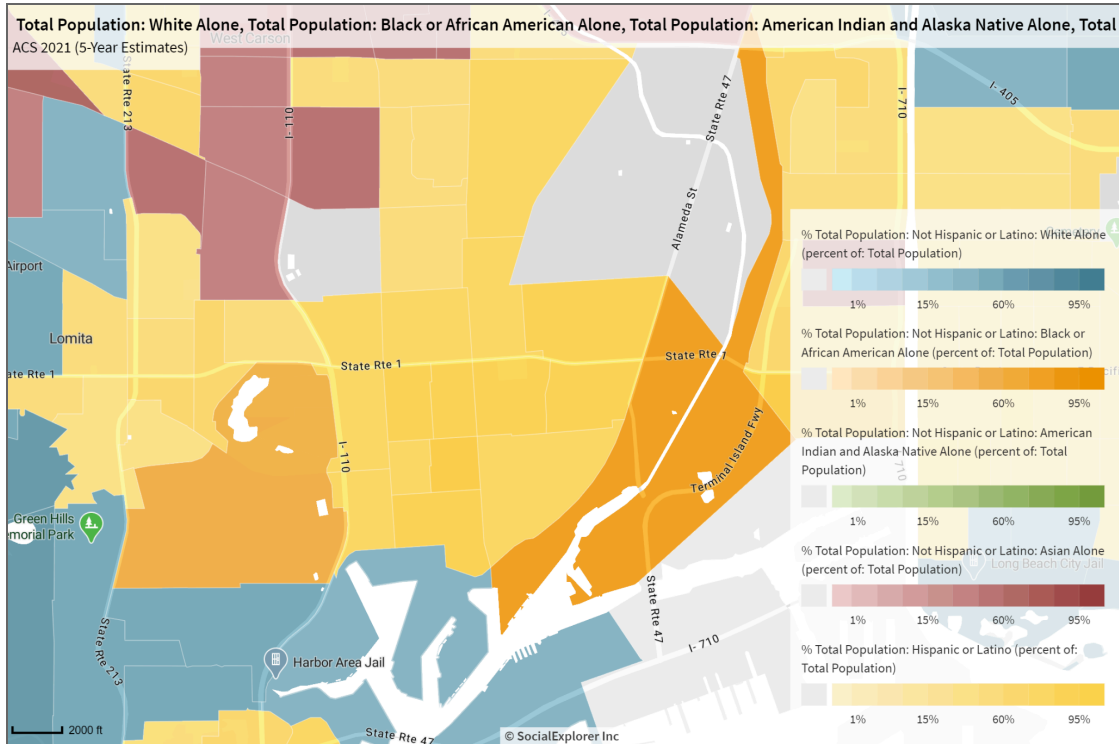


FIGURE 37: Wilmington, CA is primarily composed of an 80% Hispanic or Latino population.

Lead Researcher: Shi Wen Gunderson

Source: <https://www.socialexplorer.com/a9676d974c/explore>

Citizenship

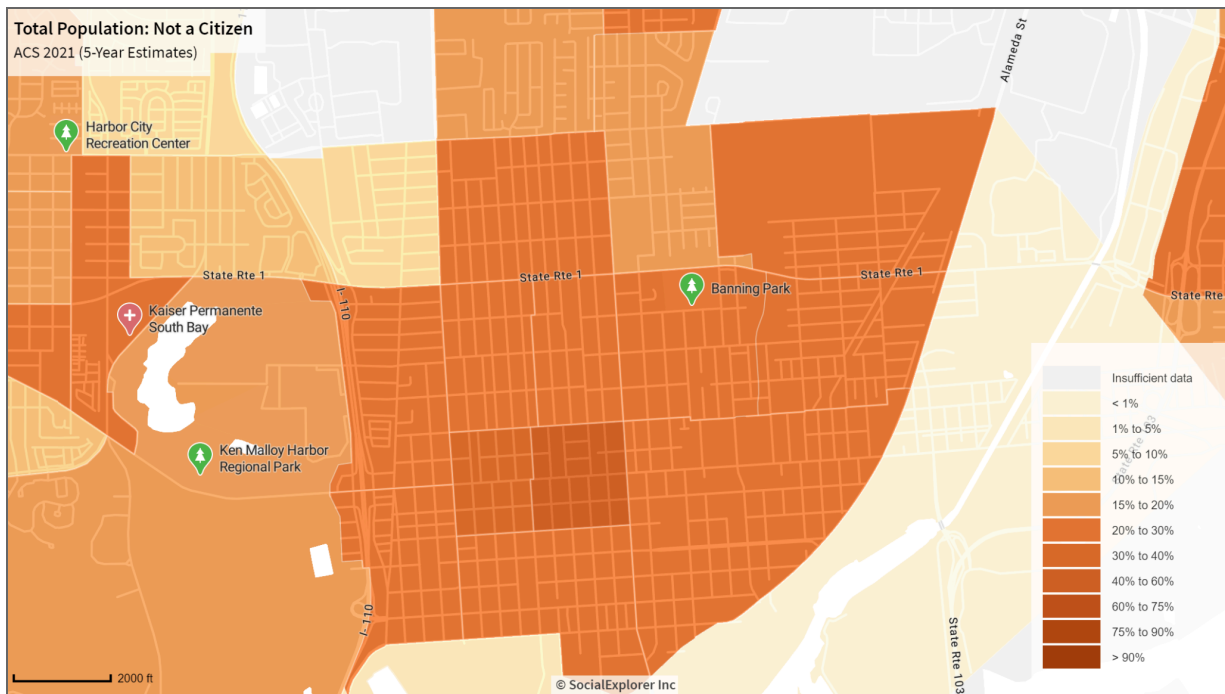


FIGURE 38: This map illustrates the proportion of residents who are non-citizens in specific Census Tracts in Wilmington, CA. Approximately 22% of Wilmington Park Elementary School’s Census Tract consists of individuals who are not US citizens.

Lead Researcher: Arianna Estrada

Source: <https://www.socialexplorer.com/fa2dafef89/view>

Educational Attainment

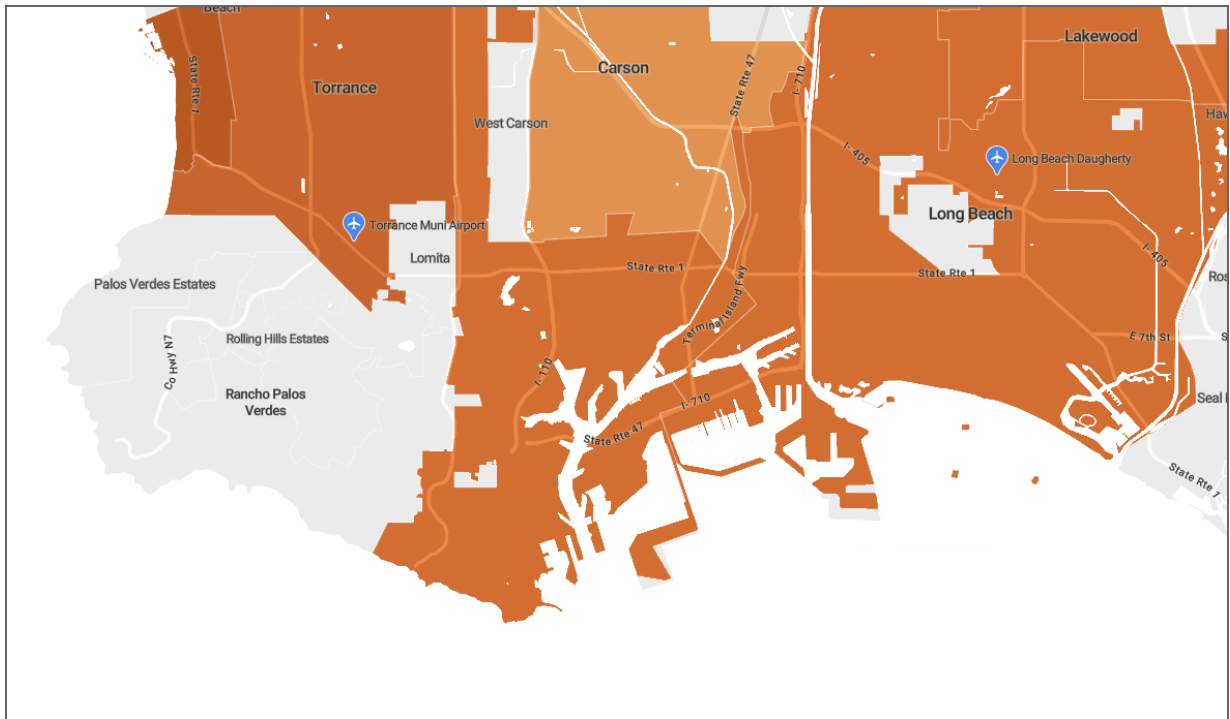


FIGURE 39: The map below measures the number of people 25 and older who hold a bachelor's degree according to the population census. In Wilmington, 24.5% of the population has achieved a bachelor's degree.

Lead Researcher: Raena Imtiaz

Source: <https://www.socialexplorer.com/a9676d974c/explore>

Poverty

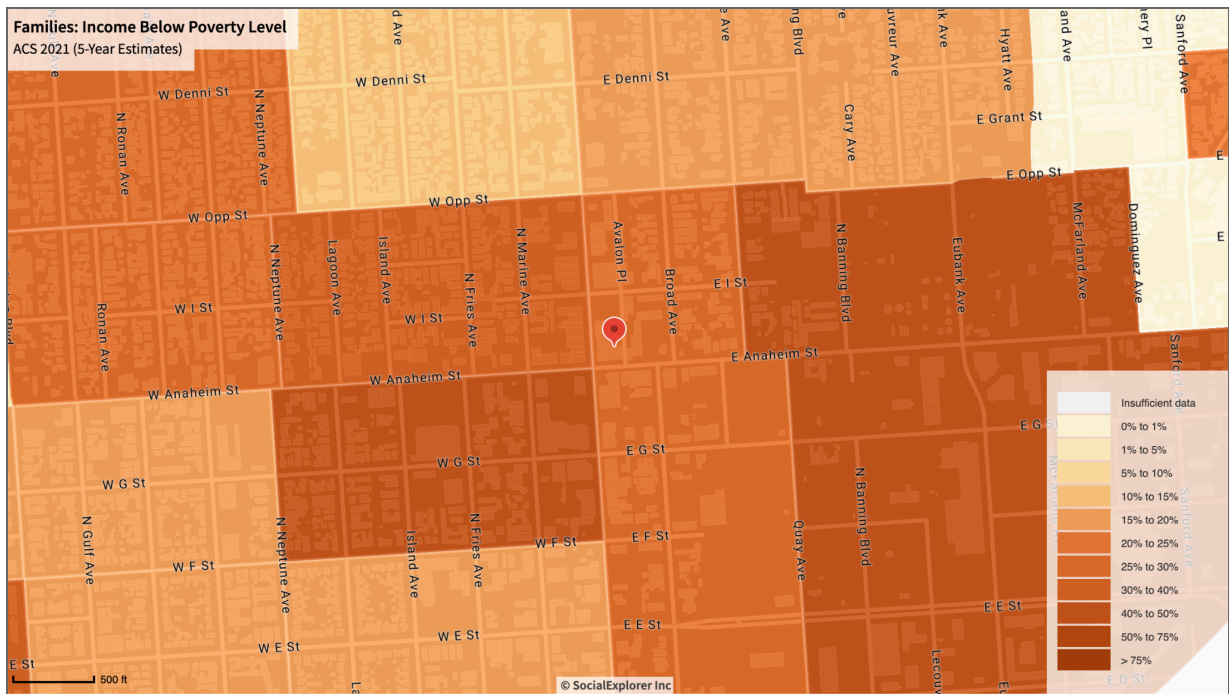


Figure 40: As shown in the image there is quite a lot of poverty unfortunately in Wilmington. Factors such as industrialization, economic disparities, and limited access to educational and employment opportunities have contributed to economic struggles for some residents.

Lead Researcher: Gracie Haley

Source: <https://www.socialexplorer.com/a9676d974c/explore>

Linguistic Isolation

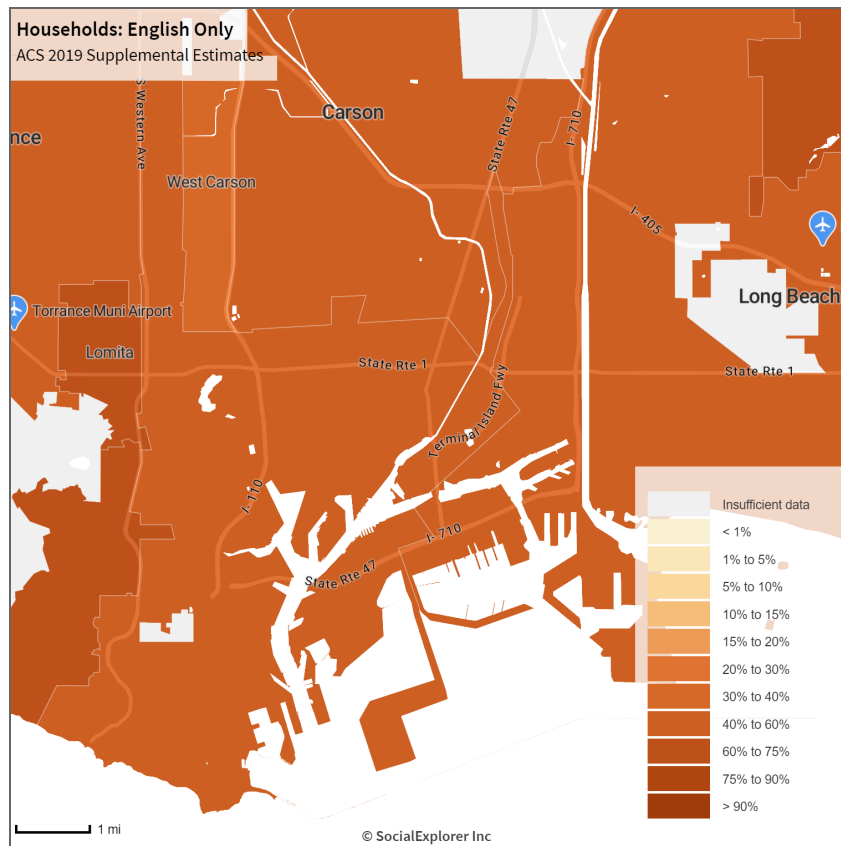


Figure 41: Around Wilmington and LA County, only 43.64% of residents are English only Households.

Lead Researcher: Andrew Liang

Source: <https://www.socialexplorer.com/a9676d974c/explore>

Income

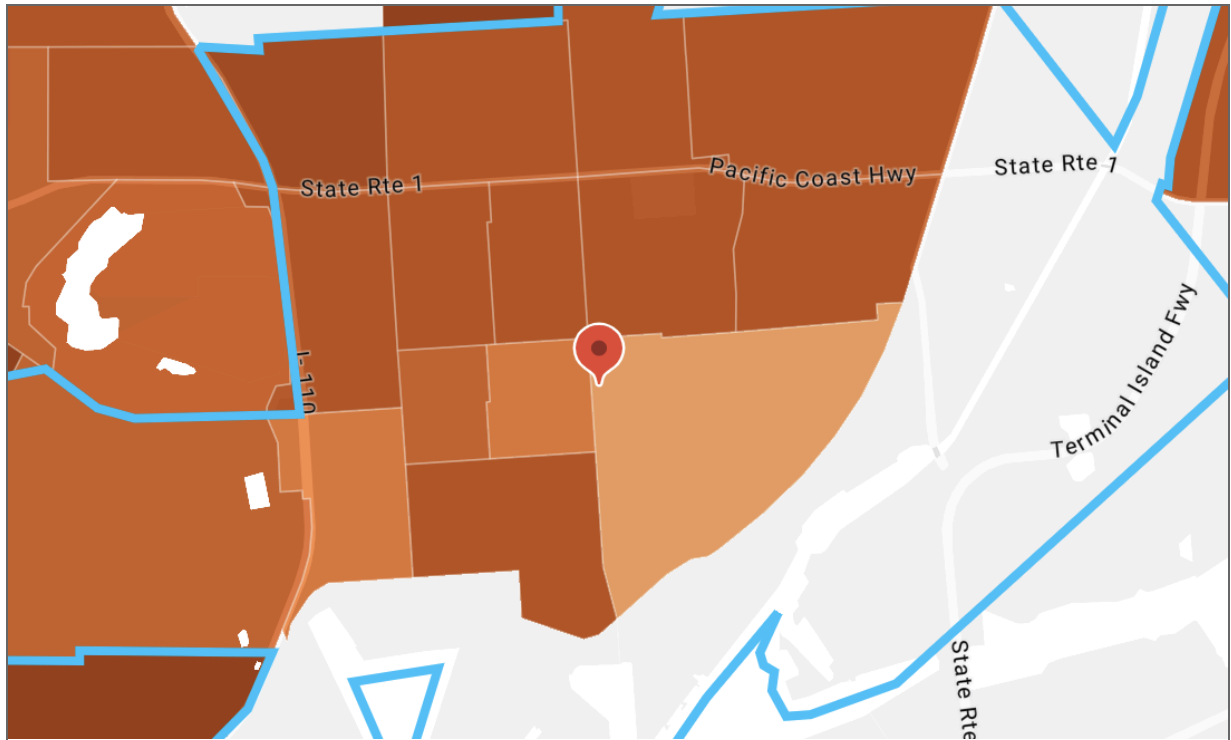


Figure 42: In Wilmington, the median household income in 2021 was \$32,282.

Lead Researcher: Raena Imtiaz

Source: <https://www.socialexplorer.com/a9676d974c/explore>

Unemployment

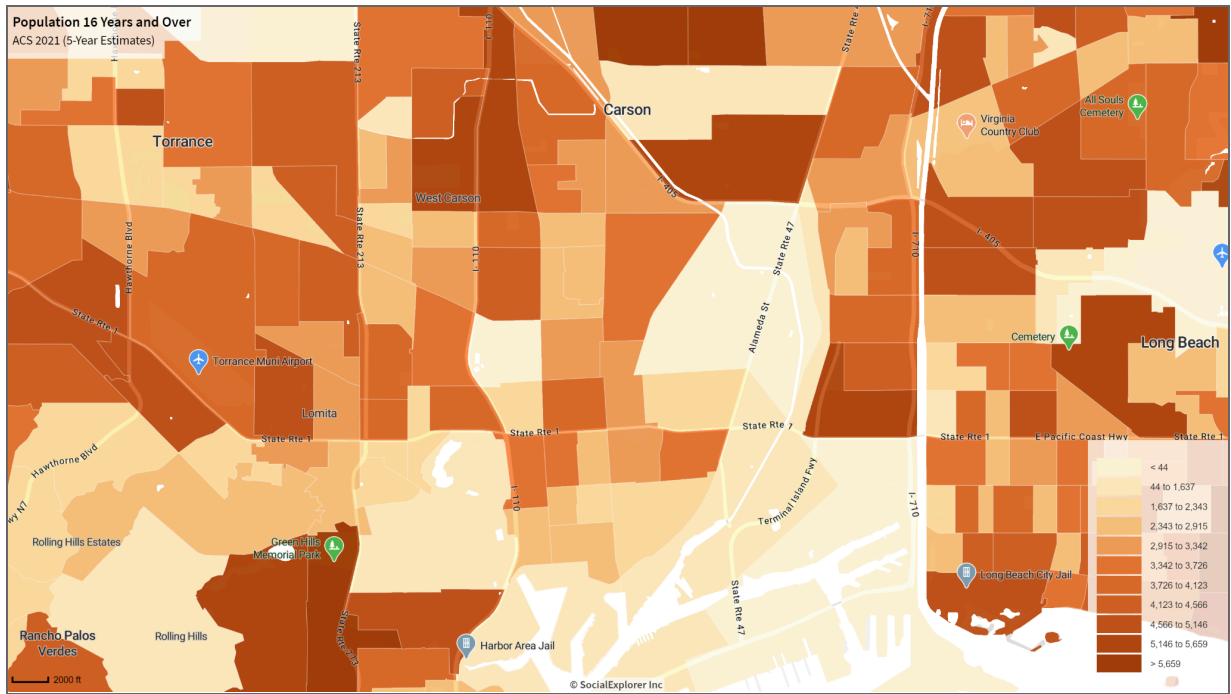


Figure 43: In Wilmington Park Elementary area, 3,000 people over the age of 16 are unemployed.

Lead Researcher: Shi Wen Gunderson

Source: <https://www.socialexplorer.com/a9676d974c/explore>

Rent Burden

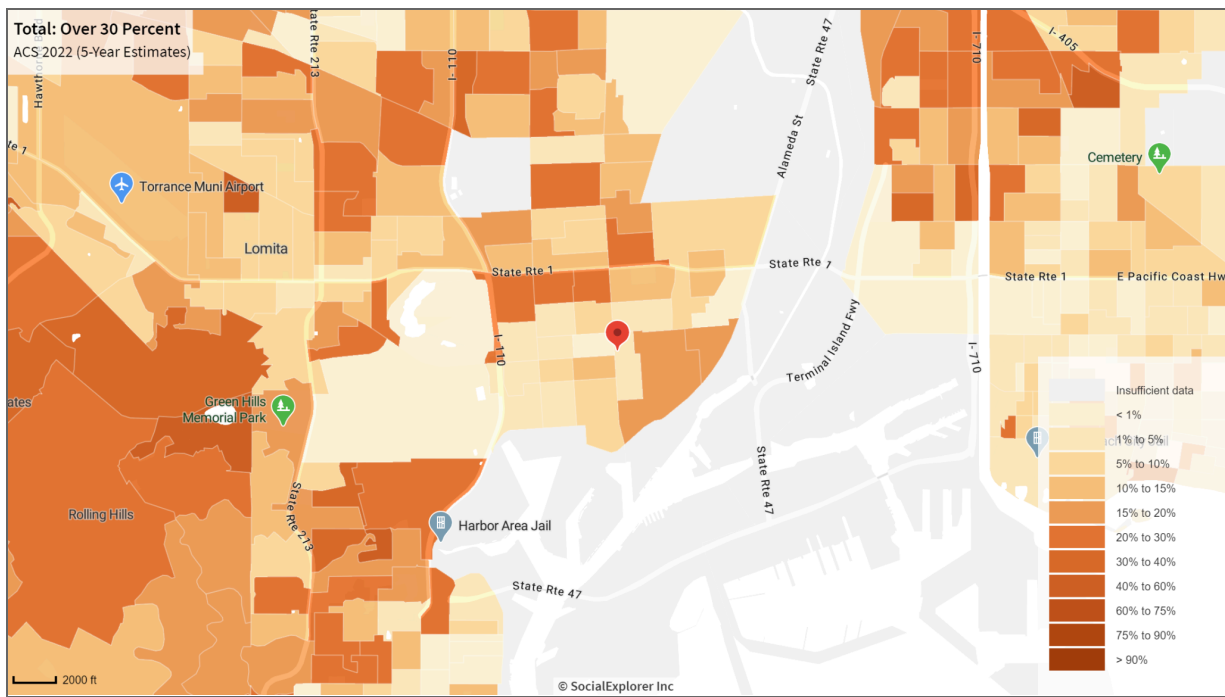


Figure 44: Most of Wilmington Census Tracts demonstrate some level of rent burden. Within Wilmington Park Elementary School’s Census Tract, about 6% of residents experience rent burden.

Lead Researcher: Arianna Estrada

Source: <https://www.socialexplorer.com/c101561e2c/view>

Internet Access

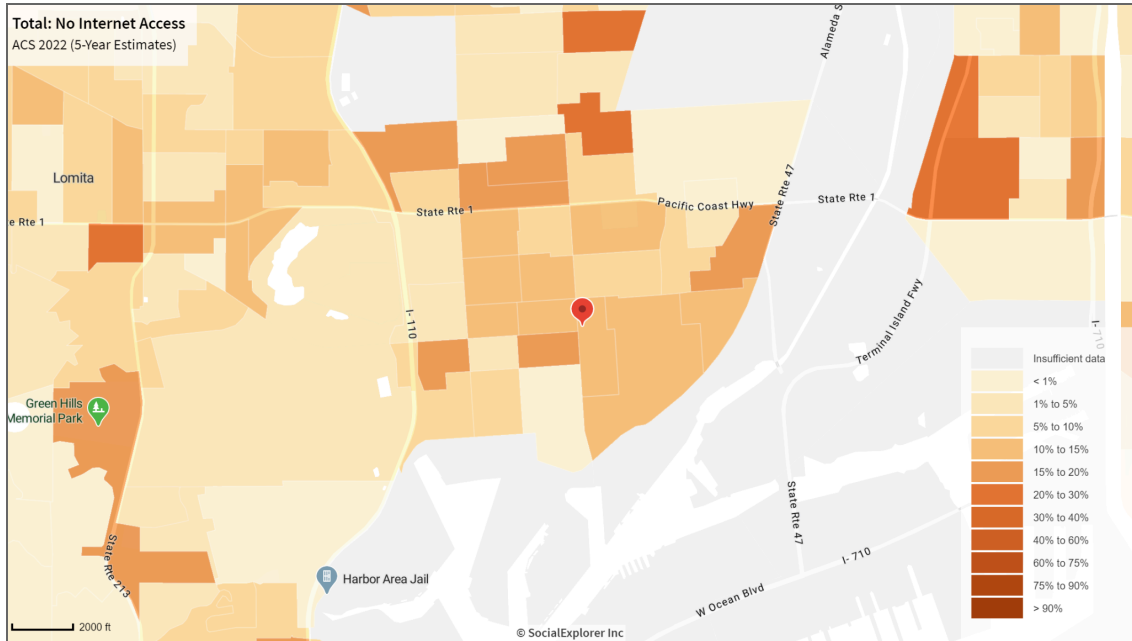


Figure 45: A majority of Wilmington has internet, however across the census tracts less than 15% of residents lack access to the internet.

Lead Researcher⁷

Source: <https://www.socialexplorer.com/5c510865e4/view>

⁷ One or more authors have redacted their names per their request.

Vehicle Access

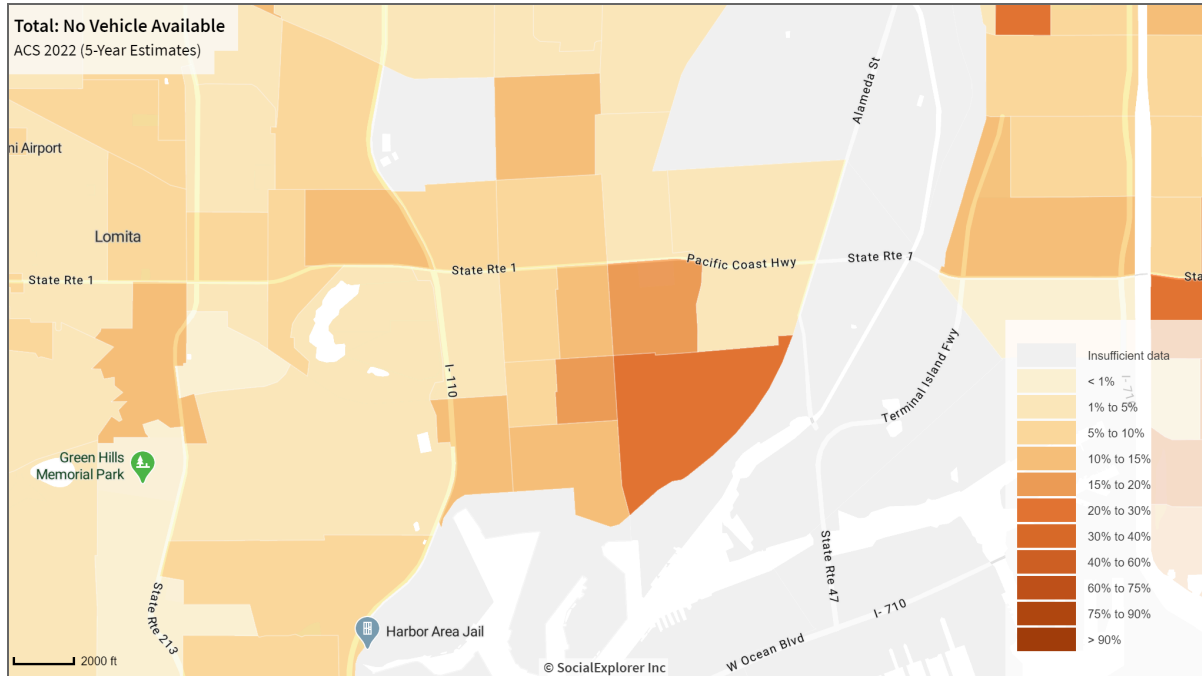


Figure 46: Overall 5-10% of Wilmington households do not have access to a vehicle. However, access decreases to about 30% of residents near South-East Wilmington.

Lead Researcher⁸

Source: <https://www.sociaexplorer.com/d75238f673/view>

⁸ One or more authors have redacted their names per their request.

Health Insurance

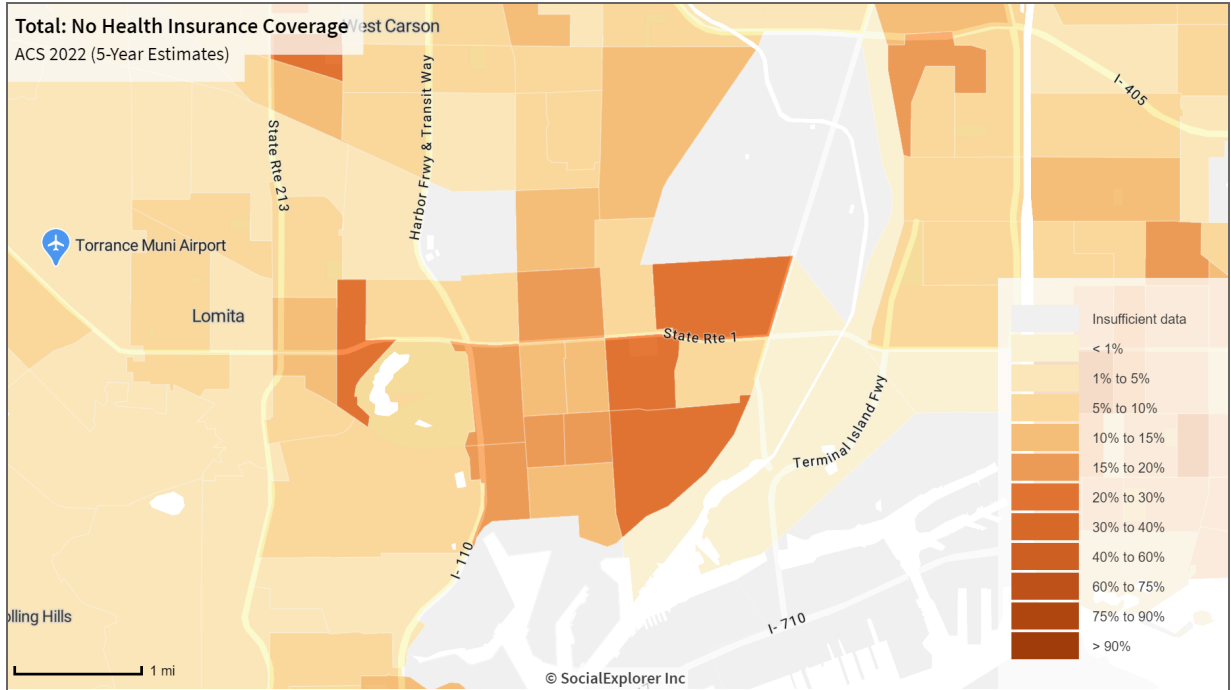


Figure 47: Wilmington has fairly low health insurance coverage. 20-30% of residents of Wilmington Park Elementary School’s Census tract do not have health insurance.

Lead Researcher⁹

Source: <https://www.socialexplorer.com/007042f0ab/view>

⁹ One or more authors have redacted their names per their request.

Physician to Patient Ratio

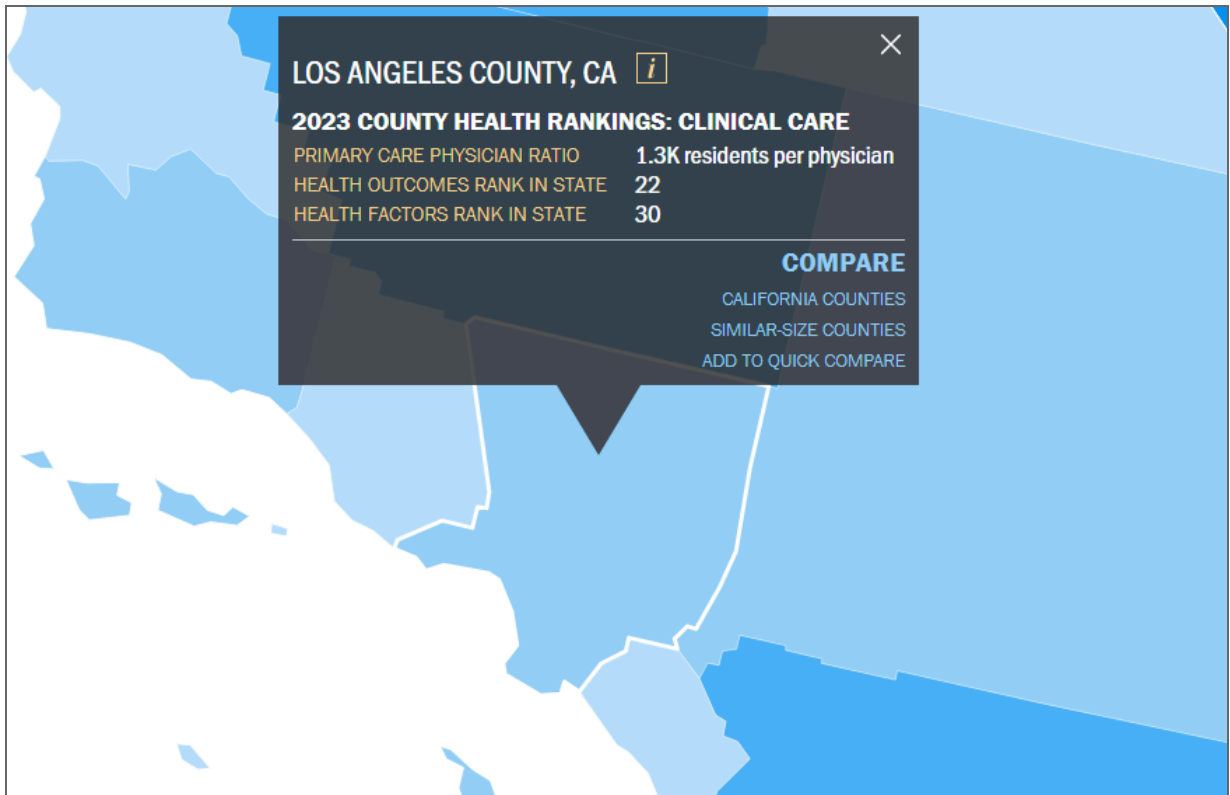


Figure 48: Los Angeles County has 1300 residents per physician, which is slightly lower than average, as it ranks 27th out of 58 counties.

Lead Researcher: Michael Willoughby

Source:

<https://ce.naco.org/?dset=County%20Health%20Rankings%3A%20Clinical%20Care&id=Primary%20Care%20Physician%20Ratio>

Healthcare Facilities

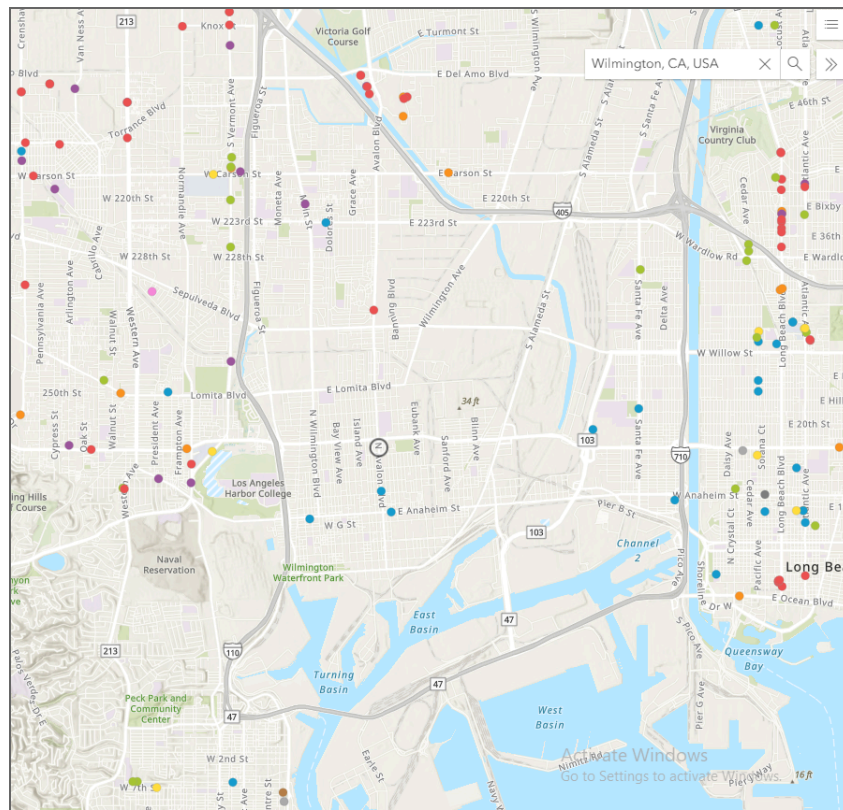


Figure 49: Wilmington has a few community clinics right in the city, but as you expand out, there are many available healthcare facilities, from chronic dialysis clinics to psychology clinics. This may prevent those within reliable transportation from seeking adequate medical treatment,

Lead Researcher: Michael Willoughby

Source:

<https://ucirvine.maps.arcgis.com/apps/instant/basic/index.html?appid=95c9abe0acbe438a8b6d7d3cd3c200a9>

Tree Cover Map

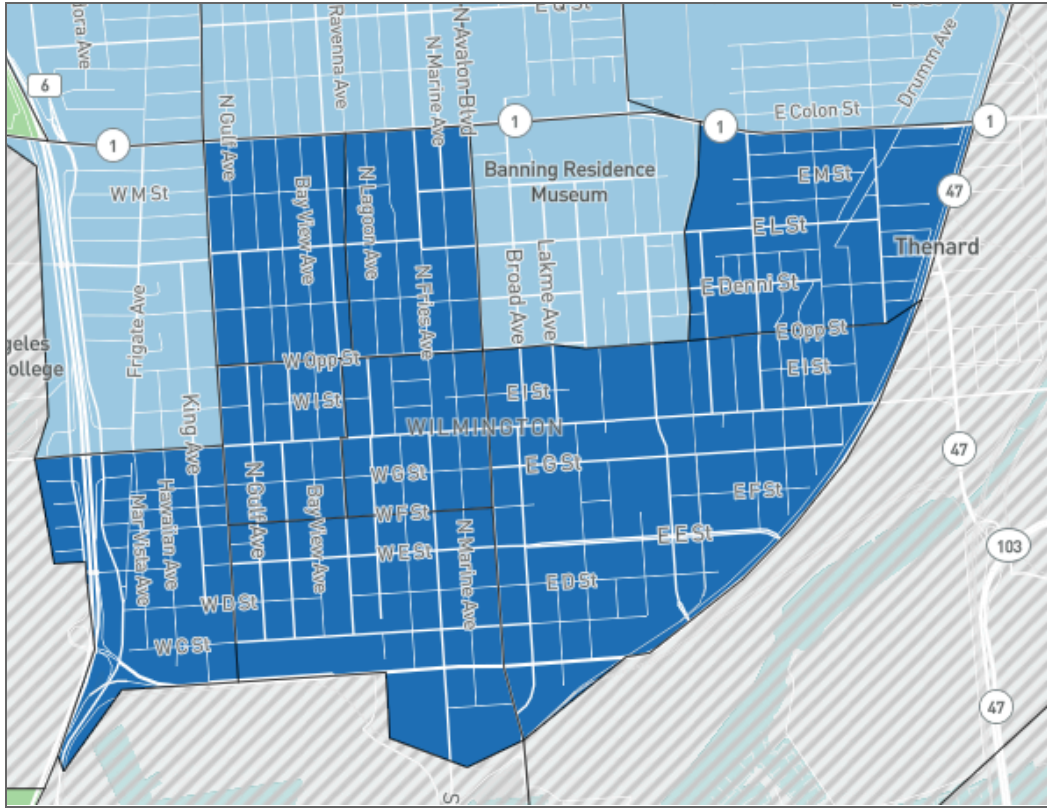


Figure 50: Wilmington has very low tree cover, with Wilmington Park Elementary School's census tract falling in the 22.5 percentile. This puts it both below the county average of 25, and the city average of 39.

Lead Researcher: Michael Willoughby

Source: <https://map.healthyplacesindex.org/?redirect=false>

ParkScore Map

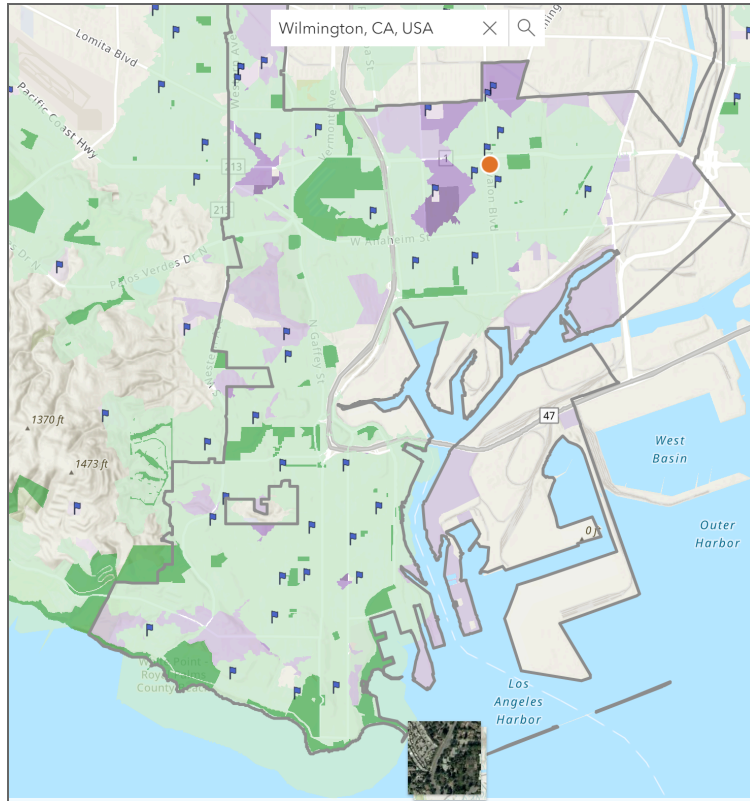


Figure 51: Wilmington Park Elementary is a school within the bounds of a 10 minute walk to a park but in total, only 63% of the Wilmington population lives within a 10 minute walk to a park.

Lead Researcher: Shi Wen Gunderson

Source: <https://parkserve.tpl.org/>

4. STAKEHOLDER ANALYSIS

Crude Oil, Children, and Caring Parents *Chase Kneller*

Wilmington, California, is an example of the complex mixing between industry, environmental concerns, and community well-being. At the heart of this community stands Wilmington Park Elementary School, surrounded by major oil refineries, ports, and freeways that shape the social, economic, and environmental landscapes. This case report explores the multitude of stakeholders within the region surrounding Wilmington Park Elementary, highlighting their interests, interactions, and the ongoing struggle for environmental justice and injustice.

Stakeholders:

Oil Refineries

The city surrounding the Wilmington Park Elementary School can be defined by multiple factors, the defining factor which holds the greatest single impact on the livelihood of residents and students are the oil refineries owned by Phillips 66 and Marathon Oil (Acquired Tesoro Corp. and Andeavor Oil in 2018). The oil conglomerate Marathon grosses nearly three billion dollars per year, and holds multiple refineries within the boundaries of Wilmington, California. It is quintessential to Marathon to maintain the operation of these plants, and to do so they have been, essentially bribing residents to not complain. A resident recalls oil companies advertising through giving young students backpacks and pencils with their logos, while another says that they'll hold community

events and youth trips in an effort to silence the activism. Additionally, in response to activists calling for oil wells to move farther from school and houses, a refinery worker said that that would “cost more than 100,000 jobs and reduce tax revenue and corporate donations,” also claiming that “a world without oil is not an option” (Hardman)(Thacher, 2024). Marathon provides subsidies for the community, jobs, investments, and funding for organizations to help keep the community of Wilmington alive.

Marathon is one of “several oil refineries that have begun operations “asserting the oil industry as a powerful employer in the neighborhood”(Moreno). The refinery companies are described as funding several organizations in return for support. Alicia Rivera [A local resident and activist] explains that it’s hard to get places like schools, churches, and libraries to support her activism because “every local community organization is approached by the refineries for funding” (Moreno)(Thacher, 2024). With the low income native to Wilmington, a variety of organizations need the funding provided by these corporations to maintain their programs. This makes resistance to these corporations difficult. If these corporations gave more to the community, they could provide immense funding for Wilmington and have a major impact on the standard of living, however, the same is true for the opposite. If Marathon Oil and Phillips 66 decide against the support of their outlying community, it could spell disaster over the already bleak conditions in which Wilmington stands.

While the decisions made by these multinationals are not decided with local interest, they may still have the ability to create change, and serve as a catalyst to change Wilmington into a healthy city. “With Phillips 66 having resided in Wilmington for about 103 years, they are described as concerned with their impact on surrounding communities. A representative offers a message on behalf of the refinery, pledging to improve operations through emissions-reduction technology”(Mahoney, 2022) (Estrada, 2024). It is hopeful that these corporations will provide for Wilmington; a recent trend to reduce employees nationwide may affect, “the three to five thousand refinery employees [from Wilmington], many working at key refineries like Valero, Phillips 66, or Marathon”(Mahoney 2022)(Estrada 2024). Marathon Oil and Phillips 66 have the unique

ability taketh away or to benefit the community of Wilmington, however the residents will have difficulty changing the outcomes of these decisions as they are currently provided substance by the same hand. It can be said in short, the lives of those within Wilmington rest on the shoulders of officials at Marathon Oil and Phillips 66.

State and National Representatives

The 44th State Congressional District is where Wilmington lies, and it is represented in the national House of Representatives by Nanette Diaz Barragánand, by former Representative Janice Hahn in the state congress, and by assemblymember Cristina Garcia in the state assembly. While the powers given to both the national and state congresses are vastly different, their perception as those who have the ability to create change does not waver. Children and parents alike look up to those with power and pressure them to push for change in the positive direction. However, there are also lobby groups such as the Western States Petroleum Association (WSPA) who can influence the needle in the other direction. These groups are backed by the support of Oil Conglomerates such as Marathon Oil, and pressure representatives to vote in favor of their backers. However, these lobbying groups have told reporters that, “ they are in support of "climate programs like cap and trade and air quality monitoring... because they'll have a profound impact on social justice, on the environment on our shared prosperity... and on our overall health and well-being" (Lavelle, 2019) (Thacher, 2024). Statements like these lie contrary to the funding these groups receive from major oil corporations, this can have a profound effect on the people who have put so much trust in their representatives.

At the national level, members of organizations such as, “EPA Administrator Michael Regan” have worked with “Rep. Nanette Diaz Barragán (D-Calif.), who represents Wilmington under the Biden Administration”(Imtiaz 2024) to create profound change for cities like Wilmington which are environmentally disadvantaged. In addition to the aforementioned, “some activists and citizens such as Bahram Fazeli, director of policy and research at Communities for a Better Environment”(Imtiaz 2024) are working towards

representing Wilmington and communities like it, at a national level. “Assemblymember Christina Garcia, who is the author of the California law AB617, created to mitigate air pollution in disadvantaged communities. Then [In addition to AB617, plans to protect] the 4 million people who live within the 15 communities gathered under the law's Community Air Protection Program. [She is] described as actively advocating for environmental justice in their communities, with residents and activists like Magali Sanchez-Hall from Wilmington, who voice their disdain with the actual implementation of the law[AB617]”(Becker, 2022) (Estrada, 2024). Magali Sanchez-Hall who is a citizen of Wilmington is right to voice her concern for how these laws are being implemented, while many of the congress members pride themselves on passing bills and legislation, the ability of these laws to create change is wildly uncertain. However, while the changes created by bills such as AB617 have not been perfect, they are a step in the right direction. Yet still, people such as “Rock Zierman, CEO of the California Independent Petroleum Association”(Imtiaz, 2024) work with lobbying groups such as the Western States Petroleum Association to roll back the implementations created by those such as Christina Garcia in favor of profits from oil conglomerates over the wellbeing and health of the workers and citizens living within towns like Wilmington.

Regional and State Representatives

The typical association for most people is the belief that those with power at the national or state level hold the greatest ability to produce change, however, those at the regional and local level have a deeper interest and are equally as willing, if not more to help their constituents. In the case of Los Angeles County and the city of Wilmington, there are many people who hold a role with the ability to create change. One of the most general examples are those of the city county officials. The Los Angeles City Planning Board is one of these committees which oversee changes within the county and city. In Los Angeles County, “The city planners are mentioned as having given permission for an energy company to conduct oil drilling operations in Wilmington”(Liang 2024). This is just one of the many examples of how the county and city government’s can give permissions

for new projects, or decline them if they wish. As aforementioned residents like Magali Sanchez-Hall from Wilmington, “voice their disdain with the actual implementation of the law”(Becker, 2022) (Estrada, 2024). The city and county officials hold the ability to make significant changes, however are slow and require a powerful plan in order to successfully integrate proposed changes.

The Regional Air Quality Board also known as the AQMD is widely regarded as the county-wide governing body over air pollution and all air pollutants. They work alongside organizations like CALGEM who distribute permits to drill oil and gas inside of California, to restrict permits when companies exceed pollution restrictions. For example, the AQMD gave the permit to, “approve the merger of the Wilmington and Carson Andeavor[Marathon] refineries, creating the largest refinery in the western states (Kneller, 2024)”. It is difficult to acknowledge how a majority of the citizens affected by these regulations feel about their governing bodies, as a majority of citizens have never heard of, or know little about the AQMD or CALGEM even though their information is available online. However, “The regional air quality board is mentioned as having issued orders to address flaring violations related to the oil drilling operations' '(Liang 2024). So while these organizations may still receive funding from lobbying agencies and private interests, they’re still the organizations of the people, and have placed some regulations on gas and oil.

Aside from governmental Organizations, there are a variety of non-governmental-organizations (NGO) which hold interests in communities such as Wilmington. These organizations are run by the people, for the people. Organizations such as, “Communities for a Better Environment (CBE) and the Stand Together Against Neighborhood Drilling coalition” (STAND-LA) (Bypan, 2024) all fight to protect the common needs of the people. However, with the freedom of being run by the people, and being able to tackle their direct needs, comes the lack of power and authority situated within the hands of the government. For example, the Communities for a Better Environment” is an “organization that works with communities of color and low-income communities to empower residents to fight for healthy, pollution-free

neighborhoods"(Mink 2023)(Gunderson 2024). The citizens of Wilmington and especially the children at Wilmington Park Elementary more likely than not view this organization as good people fighting for what is right, however they may not be able to guarantee results as would a passing bill or new county wide air quality regulation. In terms of county and city governance, there lies a takeoff between good intention and power to commit to change, both of these are necessary if we want a brighter future for Willmington park Elementary.

The Power of the People of Wilmington

The structure of society we have today uses the people to represent governing officials, however on the other side of those who we have entrusted power lies the people themselves. There are "the citizens of LA county and the representatives which support them in court and in the state government. There are also the people of Wilmington and the surrounding cities, such as "Pedora Keo, a critical-care nurse, sees people with distressing regularity: asthmatics in the thrall of attacks that can kill them or decimate their brains"(Morris 2017)(Kneller, 2024). These people may not be living in conditions suitable to ensure their best health, as evident with the regular sights of *Pedora Keo* however, the people of Wilmington are fighting for their city and hope to protect each other. Within people who suffer together comes a communal bond, and from that spirit will come a fight to receive the treatment that all people deserve, regardless of background, religion, or gender. One article explaining the condition of many residents who are stakeholder in their community states the experience of, " resident Christina Gonzalez, who has lived in Wilmington for over seventy years with her family. The resident stakeholders are described through their sicknesses. Christina has experienced lung disease, lupus and fibromyalgia, while her daughter suffers from blood cell cancer. Christina's son has experienced respiratory infections, and her husband heart attacks and testicular cancer. Other resident stakeholders include the teenagers of Wilmington's Banning High School, who Christina describes as constantly being sick and suffering pollution-related respiratory problems(Mahoney 2022) (estrada, 2024). While these

people may not have the ability to stand up against the environment that insults them alone, together as a community they have power. Power to fix what is so clearly not right.

In unity lies power is a common saying which remains true in the community of Wilmington. Residents are standing up on their own to fight for what they believe, some such as, “Bryant Odega and his Sunrise Movement organization” are standing up, others such as, “Fatima Iqbal Zubair [who] is an environmental science teacher [is] running for California's state assembly to represent Wilmington” (Mahoney, 2022) (Estrada 2022). Each member of the community holds a unique pathway towards community prosperity. Some are working to improve the government and its regulatory power, others such as Bryant Odega are working with their community directly in order to demand change. Further still, larger organizations can work with the community members to create change. There is a “Toxic Tides” project sponsored by UC Berkeley and UCLA, news organization Climate Central, environmental justice group CAUSE, justice groups Asian Pacific Environmental Network and Physicians for Social Responsibility-Los Angeles”(Rosanna 2021)(Estrada 2024) all working with the parents, children, and community members of Wilmington to foster a better tomorrow.

The effect of historical stakeholders and who can change it now

All over the United States there are communities suffering similarly to Wilmington and the students at Wilmington Park Elementary school. These cities or sections of cities are all linked together by a major stakeholder who, over the period of time spanning between 1934 to 1967 determined which communities held the keys to grow and prosper, and subsequently chose those who did not, and determined those communities as the places where industrial activities would take place. That was the Home Owners Loan Corporation, a nationally funded group under the Home Owners loan Act of 1933 and was overseen by the Federal Home Loan Bank Board.

The Home Owners Loan Corporation (HOLC) was a community chosen for determining which areas were “desirable” for new infrastructure development. Those communities which were seen as “desirable” were determined based on income,

occupation, and racial background in a set community. As seen by a majority of today's people, this was unfair, the public as it grew more conscious of system racism saw that our world has been divided by those who were deemed as "good" and those seen as "bad" or also known as redlined. Redlined communities lacked the ability to ask for loans for new housing and businesses, and instead had industrial facilities built right on them.

As seen in the film "Shelter in Place" by *Amity Doolittle* communities such as the "heights district" which surrounded Port Arthur had industrial facilities such as refineries built upon them. As said in the movie, "I didn't choose to live next to a refinery, they chose to live next to me"(Alfred Williams). This is the unfortunate reality of millions of people across America, and for towns like Wilmington, who were redlined by the HOLC and targeted by the oil industry as an easy location to build new facilities. As seen in Port Arthur, the interior of the city was a boomtown, funded by HOLC loans it was easy to open new shops and stores. However, for those without this federally sourced funding, it was nearly impossible to change their living situation.

Today we can recognize the impact of "the US government and the Home Owners Loan Corporation (HOLC) who created the "redlining" maps used throughout the mid 1900's" (Gonzalez and Frosch 2022)(Kneller 2024) and work towards a new future that grants all communities regardless of background or religion the ability to live happily. This movement has started with individuals, moving to communities, who reached out to their local county and convinced the county to petition for change at the national level. This has led to, "The Justice Department announcing the launch of the department's new Combatting Redlining Initiative today" and has led to Attorney General Merrick B. Garland stated that, "Lending discrimination runs counter to fundamental promises of our economic system,"(Department of Justice 2021). These policy changes have led to historic cases such as, "In August 2021, the Department [of Justice] announced a redlining settlement with Cadence Bank. Under the settlement, Cadence will invest over \$5.5 million to increase credit opportunities for residents of majority-Black and Hispanic neighborhoods in Houston" (Department of Justice 2021). Changes like this are happening more and more often, however the general public lacks awareness of the

redlining process which the HOLC used to segregate communities. As awareness of this issue grows, the restriction of lack of public presence will diminish, and in its place will lie new rules and regulations, made by the people, for the people, developed with the government and regulatory committees. So that these new changes will have elements from each piece of this great puzzle, but encompass the total system of society as a whole.

Stakeholder Power Grid		
What empowers this stakeholder?	Stakeholder	What disempowers this stakeholder?
Resources	Oil Refineries	Public Opinion
Federally granted power to create laws and regulations	City/County Representatives	Polarized parties and lobbying efforts
Legislative authority	State/National Representatives	Divided parties and industry lobbying
Community Collectiveness	Residents and Workers of Wilmington	Lack of authority
National authority and complete control over loans and banking	Historical Stakeholders	Nothing

Native Peoples



Figure 52: This image was displayed in the Los Angeles Times to celebrate the Tongva receiving land in Los Angeles County.

Lead Researcher: Michael Willoughby

Source:

<https://www.latimes.com/california/story/2022-10-10/after-nearly-200-years-the-tongva-community-has-land-in-los-angeles-county>

Social Groups



Figure 53: This image is showing a Latina teacher and some of her students she teaches at Wilmington Elementary School. The majority of students and teachers at the school are Latino.

Lead Researcher: Gracie Haley

Source: <https://www.facebook.com/wilmingtonparkelementaryschool/>

5. STAKEHOLDER ACTIONS

Stakeholder Dynamics in the Battle for Environmental Justice¹⁰

In Wilmington, a city deeply affected by environmental issues, a diverse range of stakeholder groups have engaged with the issue. While some have acted upon solutions to address the dire problem, others have shown a lack of contribution, potentially even neglecting the severity of the issue. The five main stakeholder groups that are examined comprise of: oil refinery and port companies, governmental agencies and policymakers, nonprofit and advocacy groups, local residents—namely schools and family households, as well as journalists and researchers.

Stakeholder Group #1: Oil Refinery and Port Companies:

Unfortunately, the main cause of such large quantities of heavy fuel and oil pollution is contributed to the pollutants from both oil refinery and port companies. Due to the rise of commerce, the ports of Los Angeles along with the oil refineries have increased in the production of barrels of oil and toxic chemicals, spewing more than 16 million pounds of toxic chemicals (Mahoney 2022). The Phillips 66 and Valero refinery are portrayed as companies that cause a catastrophic slow disaster (Coffman 2024). With an increase in demand in labor, these two major industries have also provided many job opportunities for Wilmington residents as well as nearby neighborhoods (Garner 2018). Oil companies such

¹⁰ One or more authors have redacted their names per their request.

as Chevron and Andeavor have allocated large funds towards lobbying efforts aimed at oil legislation in California, alongside inciting financial incentives to municipalities to allow refineries to stay in business. However, due to the economic shortcomings that cities like Wilmington face, the city is often left with no other alternative but to accept the financial offers. Here, racial capitalism is apparent as it treats Wilmington as dumping grounds for waste, while abusing workers for cheap labor and their health (Ramos, Morales, and Padilla 2019). In response to this dire issue, a representative from Phillips 66, one of the five largest ports in Los Angeles, has stated that the company has invested \$450 million in emissions-reduction technology since two decades ago (Mahoney 2022). That said, LA refineries are described with concern with their impact on surrounding communities (Estrada 2024). However, although most refineries are aware of the heavy pollution, there is still a lack of tangible change being implemented.

Stakeholder Group #2: Government Agencies and Policymakers:

As government officials and policymakers have the authority to incite tangible changes in policies for oil refineries and ports, it is important to understand what officials have and have not done in response to the issue at hand. The federal government has direct control and responsibility over the policies that regulate pollution, heavily influencing the city's ability to meet air quality standards and to protect the health of Wilmington residents (Bypan 2024). For example, the Long Beach City Council passed a resolution that enforces maritime shippers at the Port of Long Beach to switch to emission-reduction technology (Bypan 2024). In accordance with this goal, the city of Los Angeles also plans to make all buses electric as well as enforcing diesel trucks in ports of LA to also adopt zero emission technology (Coffman 2024). Both these actions are taking a step towards achieving a zero-emissions fleet by 2023. Besides addressing policies that affect vehicle emissions, the state has also passed a law requiring 3,200 ft buffer zones for new oil and gas wells for homes, schools, and hospitals (Gonzalez and Morello-Frosch 2022). This also is the right step in the direction as it prohibits oil drilling within short

proximity, especially with schools such as Wilmington Park Elementary School being in extreme close proximity of less than 2000 ft next to Phillips 66. With these environmental regulations implemented, research is also being conducted by state organizations such as the California Air Resources Board, the South Coast Air Quality Management District, and the San Joaquin Valley Air Pollution Control District to monitor the air quality and evaluate the emission reductions alongside the effects of implemented environmental regulations (Becker 2022). Despite these new implementations being set, uncertainty still remains around the effectiveness of these policies. For example, in regards to the installation of new technology on refinery heaters, the Western States Petroleum Association claims that “The District has no way to know whether these products will achieve commercial readiness within 10 years, or ever.” (Becker 2022). This poses data and report divergence between different perspectives (Gunderson 2024).

Stakeholder Group #3: Advocacy Groups

Advocacy groups like the Torrance Refinery Action Alliance and the Coalition for a Safe Environment (CFASE) have actively advocated for environmental justice in Wilmington. They fight against neighborhood exposure to oil drilling hazards by supporting affected families, raising awareness about pollution hazards, and pushing for greener alternatives. In response to this issue, the Torrance Refinery Action Alliance aims to seek a ban against the use of MHF and other hazardous chemicals. The group consists of nearby residents, who are in the proximity of a chemical release from the plant (Hutchings). In support of affected families, CFASE has taken actions towards this injustice by assisting families and through urban planning (Luu). Communities for a Better Environment also aims to empower low-income communities, such as the labor workers in oil refineries by eliminating discriminatory harmful practices (Bypan 2024). These efforts have been crucial in highlighting the struggles of residents and pressuring authorities and corporations to take responsibility.

Stakeholder Group #4: Researchers & Journalists

Aside from advocacy groups, researchers and journalists are also active in advocating for change, as they lobby the government in hopes to implement policies that reduce emissions and support affected residents. Christina Garcia authored and sponsored legislation such as AB617, which directs local air districts to protect communities disproportionately impacted by air pollution (Becker 2022). Certain community groups also formed “The People’s Blueprint” to call for greater accountability from air districts. Journalists like Adam Mahoney and advocates like Alicia Rivera have shed light on the environmental injustices plaguing Wilmington. Their investigative reporting and research have raised awareness regarding the health impacts of pollution and the failures of regulatory agencies.

Additionally, UCLA researchers have also contributed in response to the issue by developing a tool to portray the effects of extreme heat levels due to climate crisis on different communities in California (Ogilvie 2022). As they analyze ER visits during extreme heat days, they aim to pinpoint areas that are most affected. They envision their beta-mode heat maps guiding targeted interventions like heat mobility programs and installation of shade canopies in areas with the greatest need (Ogilvie 2022). The maps showcase the disparities that are portrayed as a result of residents living mere miles away (Imtiaz 2024).

Stakeholder Group #5: Local Residents (Schools)

Wilmington Residents have borne the brunt of environmental pollution, experiencing various health issues linked to poor air quality. School communities, such as Wilmington Park Elementary School and Banning High School, have faced severe challenges due to their close proximity to industrial sites. Christina Gonzalez describes teenagers at Banning High School as constantly being sick and experiencing respiratory health issues (Estrada 2024). School communities have also filed complaints with relevant authorities, such as the Air Quality Management District, regarding odors or pollution incidents affecting their campuses. By reporting these incidents, these schools hope to prompt investigations and action to address the underlying causes. However, although school

administrators and teachers have raised complaints and concerns regarding these issues, there is only so much that they can do. Due to their lack of authority, actions that lead to actual changes to protect the health of their students are unfortunately limited.

6. NEWS, SCIENCE, DEBATE

Media Assets and Incapacities in Wilmington.

Alison Coffman

Media is a valuable and necessary asset important in educating the public about recent events and news that may affect individuals daily lives. Media provides quick facts, in depth detail of recent occurrences, and provides opinions on situations that have the potential to be detrimental to the public. Wilmington is surrounded by more than half the oil refineries in LA county. Wilmington's residents are deserving of accurate and detailed information about what the refineries are doing to their air and land. Some of Wilmington's media assets are attributed to the Environmental Protection Agency, Toxic Tides, the American Lung Association, and numerous news articles such as the *Guardian* and *LA Times* which provides residents with maps, data, and inferences about the pollution in the area (Xia 2021). In fact, Toxic Tides provides mapping tools and reports on areas of disproportionately impacted neighborhoods (Estrada 2024). They have a case study dedicated to Wilmington which is accessible through the internet and characterizes Wilmington as an area at risk of harmful flooding and exposure to hazardous chemicals. In addition, news articles cover intersectionalities within the population. For example, an article by *The Guardian* references the connection between increasing crime rates and budget cuts to the LAPD (Mahoney 2022). This helps characterize the intersectionality in the area and is important to know the area gets consistent coverage. There is also available information about Wilmington's income demographics, poverty rates, housing prices, and racial demographics which helps provide information about Wilmington's

population and factors that might contribute to the disproportionate exposure to environmental hazards (Imtiaz 2024). It's imperative to note, the most recent catastrophic event in Wilmington was an explosion at one of the refineries that injured 9 LAFD firefighters, a multitude of news sources jumped on the story which is positive in the aspect that the residents are receiving quick news from many stations that are widely available and accessible through internet.

Although Wilmington receives relatively regular attention by local and national news sources, information about more in depth sources of environmental harm in the area is not often reported on. Wilmington does not have their own local news site which might make it difficult for residents who do not have ready access to the internet to discover immediate news about local events. In addition to being located near 5 refineries, Wilmington is also located near two of the largest ports in California, the Port of LA and the Port of Long Beach. These also contribute a large amount of emissions and pollutants to the area (Herr, et al. 2021). However, the EPA Toxic Release Inventory does not account for the pollution coming from the nearby ports (Mahoney 2022). The Toxic Release Inventory provides information on toxic releases and pollutants by industries and supports the Emergency Planning and Right to Know Act. By solely focusing on the refineries, the EPA is not educating the public about all of the sources of pollution in the area and ignoring specific chemicals from the port that can impact respiratory health. This provides the public with a divergence in data which can be confusing and makes it difficult for residents to understand the full capacity of the situation. Refineries may make up for a large source of the polluted air and water, but the ports introduce a multitude of pollutants as well. A majority of the articles covering Wilmington focus on the refineries and some on the ports. However, due to Wilmington's geographical location, there are also busy nearby freeways, large semi trucks that are often in the area, and large amounts of traffic that all contribute to the pollution but are not being reported on by media sources or the EPA (Thacher, 2024).

Furthermore, refineries contain the use of a chemical called modified hydrofluoric acid, or MHF, which has the potential to create catastrophic effects if released (Hutchings

2023). Many environmentalists tout MHF's hazardous properties, yet, refinery officials state that MHF is a safe and less reactive chemical than unmodified hydrofluoric acid (Kneller, 2024.). This creates a data divergence in information and does not provide the correct and accurate information to the public which can be misleading and therefore lead to residents believing they are not living amongst harmful chemicals and carcinogens. Finally, the California Air Resources Board and the South Coast Air Quality Management District have conducted studies to assess air quality in these regions and evaluate the implementation of environmental legislation. South Coast Air Quality district committed to halving smog forming gasses and sulfur from refineries by 2030 (Becker 2022). However, oil refinery officials claimed they needed more time in order to install new technology on their heaters. The Western States Petroleum Association claims they have no way to know if these products will achieve commercial use within 10 years, or ever (Estrada 2024). By committing to reducing smog emissions, the South Coast Air Quality District is making a promise to the residents of Wilmington and surrounding communities affected by polluted air to clean their communities, however, the oil refineries and the Petroleum Association have presented different data that asserts their new technology in order to cut smog emissions won't be ready in 10 years or even longer. This data divergence not only confuses the general public, but makes it difficult to pass environmental regulations on the refineries causing the most amount of pollution in the Wilmington area.

7. RECOMMENDED LOCAL ACTIONS

Looking into the Future for Activism in Wilmington *Kyra Thacher*

There have been a variety of efforts at the local level in Wilmington to combat the environmental injustice residents are facing as a result of many sources of pollution, and there are many possibilities for furthering the advancements that have already been made. Current actions include community organizing, advocacy for policy changes, and efforts to phase out harmful practices like oil drilling and refinery emissions. Further proposed actions focus on education in the community and local schools, labor unionizing and an increase in climate jobs, and working to diminish the imbalance in knowledge due to language barriers. In 2001, 32 years after a major refinery explosion, Jesse Marquez founded the Coalition For A Safe Environment (CFASE) with a goal "to hold oil refineries and governmental institutions accountable, demanding basic rights for his community of Wilmington" (Moreno, 2022). CFASE uses a multifaceted approach to address environmental vulnerabilities and injustices in Wilmington. The organization combines advocacy, scientific research, technological solutions, legal actions, and community engagement to work towards positive change and improved environmental conditions for the local community. Organizations such as Stand Together Against Neighborhood Drilling and Physicians for Social Responsibility - Los Angeles are actively engaged in grassroots advocacy. These groups work to raise awareness about the environmental and health impacts of oil and gas drilling and advocate for measures to reduce vulnerability and injustice (Liang, 2024). Another group, called STAND-LA, is actively working to prevent

neighborhood exposure to oil drilling hazards and improve environmental health outcomes (Bypan, 2024). A recommendation to further what all of these organizations have been working towards would be to establish a community education center similar to what the city of Anaheim has done with their Sustainability Education Center. They will offer services to the entire community such as energy and water efficiency measures and strategies, solar, and other renewable technology demonstrations, and presentations on how water and electricity get to Anaheim homes and businesses. While establishing an entire facility for sustainability education may be expensive, implementing similar programs with local community centers to offer classes and demonstrations on being environmentally conscious, can be crucial to educating the community and spreading awareness on the environmental injustices in Wilmington (Imtiaz, 2024). Another approach that can be taken is prioritizing educating the youngest generation about the severity of the pollution that their community is, and has been, facing. Going to local schools within Wilmington can educate children and families on the pressing issue of health risks associated with the close proximity to oil refineries. This aims to raise awareness and create a movement to fight against higher authorities to make changes to laws regarding a cap on pollution or to subsidize cleaner energy. The beginning steps to make this successful would include arranging to present health impacts to school board meetings, the local PTA, and children's parents (Author¹¹, 2024).

Angela Rivera and her organization, Communities for a Better Environment, engage in advocacy for accountability from industry and regulators. In addition, Rivera and other community members established initiatives like the Just Transition Fund to "ease impacts of life in industrialized communities" like Wilmington. This initiative aims to support by "funding training programs for clean energy workers, environmental remediators, and pumping cash directly into frontline communities like Wilmington." (Mahoney, 2022). One recommendation for action along the lines of this is to have IBEW11, a local labor union involved in Wilmington Refinery, implement a climate jobs program where union workers advocate for increased involvement in the regulation of

¹¹ One or more authors have redacted their names per their request.

chemicals used at their location. To put this in effect, union members could be employed in the efforts to switch from HF to sulfuric acid by creating education classes about the new chemical, and learning new practices to ensure they are as equipped with the changes (Estrada, 2024). In addition, local community organizers in afflicted coastal cities are collaborating with researchers to create the maps that identify areas of risk, by "providing insight into which data points to use - beyond race and income - as a measure of social vulnerability" (Xia, 2021). There are several other factors to take into accountability, such as voter turnout, unemployment, and language barriers that can be used to measure vulnerability. By identifying these other factors and their severity within the community we can develop plans that are better equipped to reduce the social vulnerability. Because Wilmington's population is mostly Hispanic residents, there can often be times where there is a language barrier when relaying information to the public about the pollution that they are facing from many different sources. A way to combat this would be creating a community level organization that can translate any necessary information, like proposed government action, data about local pollutants, or research done by outside organizations into Spanish so that residents will have easy access to these resources in both languages.

Individuals in the community also have the power to take it upon themselves to make changes that will better the environment. Octavio Ramirez, a resident of Wilmington, has taken it into his own hands to make community gardens at the Wilmington-based Strength Based Community Change. Ramirez hopes that these gardens will provide a place for the community members to come together and be closer to the environment in an effort to reduce violence, as well as provide learning opportunities for people who want to grow their own food (Mahoney, 2022). Since Wilmington is lacking in natural greenspaces, creating more areas similar to these gardens that Ramirez has built is a great way to provide a sense of community in the outdoors, as well as offer educational opportunities on how to be more sustainable. Another approach that activists can try is filing lawsuits challenging city approvals of oil drilling in minority neighborhoods. Legal actions can be an avenue for holding companies and regulatory bodies accountable,

ensuring compliance with environmental regulations, and seeking justice for affected communities (Liang, 2024). One journalist, Adam Mahoney, moved back to Wilmington, where he grew up, to research the physical and mental health impacts of air pollution with support from newspapers and a university. His goal is to discover “the hidden impacts of a century of environmental injustice” (Mahoney, 2022). Wilmington is just a small part of Los Angeles, so getting recognition is a really important step to solving any problems. Looking forward, a petroleum engineer suggests many solutions to high levels of pollution, including “zero-emission buses and trucks, fence-line monitoring, pollution-detecting sensors at refineries that record data on toxic leaks, and increased setback rules for residential development”, but he explains that moving is not a feasible option for both the residents and the oil companies (Hardman, 2018).

Proposed Local Education or Art Project	
PROJECT TITLE: Bubble Project	
PROJECT DESIGN	
<ul style="list-style-type: none"> ● Wall mural displaying effects of refineries on local Wilmington children ● Center of downtown Wilmington, near neighborhoods and schools. ● Children in the mural will be blowing a bubble onto the refinery. This bubble surrounds the refinery and protects the children from the pollution. ● Includes a banner on the top saying “stop polluting” ● Warm color palette ● Banner being held by different groups in the community to show the extent of the effects of pollution 	
PROJECT DELIVERY	
<ul style="list-style-type: none"> ● This mural will be displayed in a community center where people will commonly see the mural and be reminded that they have the ability to create change ● We will encourage people to attend by having either a festival or some social gathering hosted by Wilmington Park Elementary School, like a talent show ● Invite the ambassadors of the surrounding refineries to attend the event ● In addition, inviting local politicians may help to create legislation in the government that aligns with our cause ● We hope that this mural will help spread attention to the issue created by the industry surrounding Wilmington Park Elementary. This mural can generate a positive message that people have the ability to create positive change, and that we must do something in order to protect the children from the dangers around 	

them.

PROJECT EVALUATION

- Checking social media platforms for recognition/awareness of the mural
- Overall just measuring the amount of people who attend the event by the mural
- Have a post-event survey to measure attendance and gather thoughts from the community about how the art affected their attitude towards refineries and pollution
- Seeing if developments are made in the emission regulations for the refineries

Proposed Local Action Campaign

PROJECT TITLE: Port Pollution

Environmental Hazard: SO₂ and PM_{2.5} within Port Pollution

Goal: Reduce particulates overall - By raising awareness to eventually lobby the government to implement policies

Strategy: Raising awareness regarding the health risks associated with high port pollution to port workers, schools around the area, and the general public.

Tactics:

- Educating workers at the ports of hazards they may be unaware of
 - By collaborating with the labor union West Coast Dock Workers
 - Aiming for a strike
- Presenting health impacts to school board meetings, and to the local PTA and children's parents.
- Press coverage locally, and nationally about the impacts of SO₂ and PM_{2.5} from diesel particulates.

Workplan:

- Design and hand out pamphlets regarding the health hazards to workers
- Educating the parents and public about hazards
 - Create well designed pamphlets that talk about the potential short-term and long term effects of these emissions on parents and their children.
 - Set up meetings with the local PTA and school board to discuss how the diesel particulates may be affecting the children of Wilmington.
- Have the parents then send concerns/issues to their local representative, as well as sign a petition stating for the EPA to tighten their standard on these emissions.
 - Organize community meetings for the public to write letters that explain their concerns about emissions from the ports

- Distribute the pamphlets and organize meetings with the local dockworkers and West Coast Dockworkers Union about the negative effects of Diesel pollution on the workers. Generate potential for strikes if the pollution levels from incoming ships doesn't decrease.
 - Distribute information
 - Education in-person with meetings
 - Organize rallies to generate media coverage and post on social media(Target blue-collar workers)

Incentivizing workers to go on strike

- Enable the representative to further bring this up to a higher levels
 - Lobby at each step, talk to state representatives
 - California Air Resources Board- get them involved
 - Set up meetings and pitch them the pros and the cons of not involving themselves now

8. RECOMMENDED EXTRA-LOCAL ACTIONS

Steps Beyond the Community

Shi Wen Gunderson

The state of California and the United States of America could do many things to reduce environmental vulnerabilities and injustice in Wilmington. From implementing more legislative laws on oil refineries to groups advocating on state and national levels to reversing the residual effects of redlining, Wilmington could one day become a city with healthy air where the residents do not have to live in fear of having lifelong health effects.

The Environmental Protection Agency (EPA) is a United States government agency that works to protect the environment and health of the people in the country. There is also a state-level version called "CalEPA" which works to protect California residents, including Wilmington. An action that the EPA needs to take includes not approving permit revisions that ultimately allow refineries to continue emitting emissions that negatively affect the nearby communities. In 2017, U.S. Representative Nanette Barragan wrote to the EPA to not approve of Andeavor's permit revisions due to the community-wide negative health effects that would occur if it were approved. Instead, The EPA approved of it and stated that Andoevor was working to ensure proper pollution control practices were in place (Morris, 2017). Instead, women, children, and all the residents that live a few miles from the refinery constantly live with health effects such as asthma.

Government action is often a slow process but one that is necessary to make large-scale legal changes. Alicia Rivera, a local to Wilmington, comments that "it will take more than a few legislative changes to bring justice to the residents" (Mahoney, 2022), referencing that although there have been some changes, it is only a start and more will continue to need to be done. A lack of action is often seen in areas like Wilmington, which is something that needs to change (Estrada, 2024). Located at Wilmington Park Elementary School, Susan Diller, a teacher, also knows that government agencies have to take action against the companies that violate the laws (Garcia, 1991). Diller advocates for accountability on a government scale with minimal despite there being laws in place to prevent injustice. Although the specific laws were not defined in the article, assembly bills such as AB 617 were passed in 2017, meaning that large corporations have to make the proper changes to comply with the laws (Gunderson, 2024). AB 617 outlined a way to reduce exposure in communities affected by air pollution so that the residents could feel safer in their communities similar to Wilmington (Thacher, 2024). Although there has been some action on a national government level, more laws must be passed to reduce the environmental injustice that so many small towns face.

Paying off local officials to lobby for the companies that create the pollution is a problem not unknown to Wilmington. By banning gifts and special perks to government officials, legislative rulings would more often be based on what was morally right, rather than aligning with benefactors who can help the decision-maker in their personal life. While it would be difficult to pass a bill, the elected official's decisions must represent what the people want. From 2014 to 2016, Mike Gipson, a politician in the California State Assembly, received meals and housing worth \$4,585 and \$71,950 for his campaigns from the Western States Petroleum Association (WSPA). Although these were legal, Gipson aligned his views with WSPA and voted to remove a portion of a bill that required a reduction in state oil use by 50% in 15 years (Morris, 2017). Ultimately, the negative effects will primarily hurt the low-income and communities with people of color. On a

federal level, the U.S. should be finding ways to stop bribery and gifts given to government officials in order to sway decisions to a specific side.

Advocacy for better environments by groups across the state and country can also make a difference. Organizations such as Communities for a Better Environment (CBE) have worked to fight for pollution-free neighborhoods all across the state of California. For example, in Wilmington, Communities for a Better Environment "won the most stringent refinery flaring regulations in the nation" (Victories!, 2016). By putting pressure on the Air Quality Management District (BAAQMD), refinery flaring regulations were necessary to reduce the amount of natural gas, propane, ethylene, propylene, butadiene, and butane gasses into the air (Victories!, 2016). CBE has continuously fought for environmental justice for communities that otherwise do not have enough leverage to make a change. Another group that fights for the well-being of people is the Physicians for Social Responsibility (PSR). Advocacy work is on local, federal, and international levels where health professionals can educate the public and policymakers about various dangers and their effects on people. Combined with CBE, the two groups also work with Stand Together Against Neighborhood Drilling - Los Angeles to fight against oil industries and contact Governor Newsom to work towards an economy less dependent on fossil fuels (Bacher, 2020). Advocacy groups working at the state level allow for voices to be heard, and the work must continue to make a difference.

Redlining and reversing its effects on people is something that will take time, yet critical to allow towns like Wilmington opportunities that they otherwise would not have had in the past. Redlining started around 1930 and allowed the government to target neighborhoods and mark them as "at risk". These neighborhoods were often in areas where the community members were people of color or low income. It allowed for discrimination against people's race, color, and national origin. Climate-wise, oil industries could be built in these areas where the pollution affects the people who live there. Due to the continuous effects of redlining, the discrimination continues today despite redlining being

illegal. In the present day, the residual effects of redlining could be reversed by incentivizing others to invest in areas that are continuously disadvantaged. From giving out more loans to allow for home ownership to giving benefits to others for supporting the low-poverty area, the systemic discrimination that has occurred for a long time can be reversed (Hamm, 2019).

There are an infinite number of actions possible on state, national, and international levels to reduce the effects of climate injustice in areas such as Wilmington, California. Many people will be affected in both positive and negative ways, but human health and ensuring that people have clean and safe air to breathe in is a human right that must be prioritized over the monetary benefits that only a few people receive.

Proposed Extra-Local Action Campaign
CAMPAIGN TITLE: Fight Back Against Benzene
Environmental hazard: Benzene emissions from oil refineries, Phillips 66 Company
Goal: Regulate/track the amount of benzene that can be emitted by refineries
Strategy: Raise awareness, and incite public desire to implement legislation regarding the amount of benzene emissions to ensure that oil refineries abide by these rules.
Tactics: <ul style="list-style-type: none">● Use of social media to raise awareness and educate people about the issue● Lobbying to the government for legislative changes● Gather the community to increase awareness of the health hazards from oil refineries● Create a petition & gather signatures to influence legislators● Identify already existing Benzene emissions
Workplan: <ul style="list-style-type: none">● Gather the community to increase awareness of the health hazards from oil refineries<ul style="list-style-type: none">○ Provide fact sheets in Spanish about the health effects of benzene○ Organize community meetings in English and Spanish that provide

- informational sessions to the residents about benzene and emissions
- Invite experts or health professionals to speak at town hall meetings
- Collaborate with schools, churches, and community groups to reach more audiences
- Use of social media to raise awareness and educate people about the issue
 - Posting organic videos on platforms like Instagram, TikTok, and Facebook with live footage and proven data to inform viewers on the issue at hand
 - Using paid advertising to guarantee reach a wider audience base
- Create Petition
 - Print infographics with data and information on current benzene emissions and what we need to see changed
 - Go to local schools and door to door to educate residents on the issue & goal
 - Present petition with a report to local legislators and at lobbying events
- Lobbying to the government for legislative changes
 - Schedule meetings with lawmakers and policy makers to discuss the problem.
 - Use the collected data (from air samples) to write a report about the effects of benzene emissions and provide the information to the lobbyist to present to government officials

9. RECOMMENDATIONS FOR FUTURE RESEARCH

Greening the Horizon

Michael Willoughby

Data and research are sources of information that fuel our world to be a better place. They allow us to see where we fall short, where we excel, and the circumstances where we are in between, giving us greater insight into how our world functions. Wilmington, California, demonstrates society's needs of data and research for places where we fall short. Central to the community of Wilmington is Wilmington Park Elementary School, in which it is encapsulated by countless environmental hazards, from oil refineries to diesel particulate emissions from the surrounding freeways. This case report dives deep into the problems regarding Wilmington Park Elementary School and its surrounding communities, and puts in the forefront the data and research we are missing to successfully capture the true dangers of the situation at hand.

In Wilmington, it is evident that environmental hazards are present in the everyday lives of the communities' citizens. Despite this, we lack data that gives us information regarding how many residents truly understand the significance of the environmental hazards that are impacting their day-to-day lives. According to Hutchings in 2022, there are 100,000 residents in the community surrounding the Valero refinery in Wilmington. However, as stated earlier, it is evident that many local communities are unaware of the hazards that surround them, and this is a key issue that needs to be fixed. We recognize

that the California and National Right-to-Know laws should be enforced, and residents should be told of anything potentially hazardous that surrounds them (Kneller 2024). We propose to conduct research where we would poll on the percentage of Wilmington residents that are aware of specific environmental threats in their community. Better understanding the proportion of residents who understand what is impacting them will help determine how we should approach enforcing more awareness regarding California Right-to-Know laws. Ultimately, through the better enforcement of these Right-to-Know laws and spreading awareness about the environmental hazards around Wilmington Park Elementary School and surrounding communities to their residents, we would be able to better protect citizens and begin to address the hazards at hand.

Another issue in the area surrounding Wilmington Park Elementary School is that most residents are too busy with their livelihoods and other priorities to worry or advocate for themselves in regards to the environmental justice they deserve. Wilmington residents, “don’t advocate for these issues [pollution] because they are preoccupied with putting food on the table and taking care of their families” (Colón 2021). Due to this, we want to connect the community with The Coalition For A Safe Environment (CFASE), a non-profit community based environmental justice advocacy organization. We want to have CFASE conduct research associated with public health surveys free-of charge, including surveys regarding the amount of trust that Wilmington residents have with health officials. These research efforts can help with understanding the root causes and effects of environmental injustice in Wilmington, analyzing the policies implemented by lawmakers and other higher authorities, and overall the social environment regarding health officials attempting to make Wilmington a more safe environment. This ultimately would produce more statistics on general health trends in Wilmington and build trust between the residents and surrounding organizations, so that the residents know these pillars of trust they can rely on during their stressful lives. This information can drive the entire community collaboratively to make changes step-by-step (Author¹² 2023).

¹² One or more authors have redacted their names per their request.

As mentioned previously, there are five different oil refineries in the area surrounding Wilmington Park Elementary School, with the Valero Oil Refinery being one of the most profound in terms of significance and its impact on the community's health. Despite this, the Valero oil refinery in Wilmington doesn't have much of their information and statistics regarding their emissions made public, with 0 of 18 continuously measured pollutants made public (Refinery Air Watch). Because of this, we propose to conduct research into what they are actually emitting so that we could petition to have a law passed that requires all companies to make their emissions data public for everyone to see (Thacher 2024). With this information, we would be able to know which companies and refineries are emitting the most pollutants, and what pollutants they are and how they impact the environment, in turn influencing the health of the surrounding community. With this information, we would be able to map out a strategic plan for which oil refineries are most negatively impacting the health of the area surrounding Wilmington Park Elementary School, and begin to take action on these refineries.

An issue specific to Wilmington Park Elementary School and other schools within the L.A. County School District in the Wilmington Area is that we don't know how much educational funding is distributed to environmental awareness and education from their own resources and the communities resources. Dedicating specific funding, specifically for education on environmental safety and sustainability, "plays a vital role in supporting environmental conservation efforts and addressing pressing global challenges" (Stein 2024). We want to conduct research to find out how much funding goes into each oil facility, and how this money is being spent can be researched. By going to each facility and interviewing the workers there to see how funds are being spent, as well as going to the school's treasury, we can compare different funding amounts (Imtiaz 2024). This would allow us to see the extent to which the communities surrounding Wilmington Park Elementary School are dedicating their resources, funding, and overall effort to the environmental threats posed to them. With this data, we could further advocate for environmental justice and awareness for the injustice in their communities, and also

propose new funding and resource allocation plans to schools to better support environmental awareness, advocacy, and education in these communities.

Further information that we don't have access to relates most closely to the people we are trying to help, the citizens. Although we have many statistics for how much more likely Wilmington residents are to get cancer, or how much diesel particulate they breathe in, we want to narrow the scope down to the communal level and talk about the neighborhoods where these people live. A past resident of Wilmington nicknamed the city "Smellington", due to the fact that, "it always smelled like rotten eggs, due to the extraction of sulfur from crude oil at nearby refineries" (Mink 2023). We want to conduct research that can include environmental impact assessment and health impact analyses in local Wilmington neighborhoods (Haley 2024). With this information, we would be able to have data regarding measurement such as air and water quality at the neighborhood level, and use this to be able to raise awareness for the Wilmington residents' own health and advocate for change. This data overall would be very helpful for addressing climate change on a smaller scale, and encourage those who are not particularly involved with the advocacy for their health to step up and speak for what they deserve, better health.

In the end, data and research are the backbone of progress for mankind, and in communities such as those surrounding Wilmington Park Elementary School, much progress is needed in order to right the wrongs of environmental injustice. Whether this newly gathered information results in new legislation, bonds of trust, or increased awareness, every new piece of information is one step closer to getting the citizens of Wilmington what they deserve: environmental justice.

Qualitative Research Proposal
PROJECT TITLE: Parents, Problems, and Pollutants
Research Question: How do parents understand the health hazards linked to the nearby oil refineries and pollutant emission from motor vehicles and ports in Wilmington?

Social Groups:

- Parents
- Grandparents
- Neighborhood groups/associations
- Community advocates

Access and Privacy: We will reach out through both email and a callers list to individuals in communities surrounding the Wilmington Park Elementary School Area, explaining to them that we are a university research group interested in how parents perceive the health threats in their communities. I will further elaborate on this by discussing how the results will be used to further inform the communities about information they need to know and also to determine how these parents are making decisions for their children, families, and livelihoods. We will ensure that all responses are voluntary, and will remain anonymous unless the individual requests otherwise.

Participant Observation: We will attend community meetings in these neighborhoods and other residential areas observing the information that is told to the residents, as well as what questions they ask, in order to determine what they don't know or are unsure about.

Interviewing Strategies and Questions: We will use in-depth interviewing by simply having a 1-on-1 interview with an individual and asking them questions in order to gain a deeper insight into what they truly know, common stereotypes, to discover information commonly known across different interviews, and to see how they allow this information to shape their decisions as to how they take care of themselves. Some of the questions we will ask are:

- Are you familiar with what PM2.5 is and how it affects your health? If you are, how and when did you discover this information?
- Do you know how an emergency related to the nearby oil refineries could unfold in your community and how you would protect yourself and your family?
- How often are you concerned for your own health and safety living in a community with these health hazards?
- What information do you wish you had access to or what are you unsure about?

Focus Group Strategies and Questions: We will utilize focus groups by convening in two separate groups: one of which is composed of parents, the other is of community

leaders, advocates, or major sources of information. We will pose questions similar to the interviewing questions, but also broadening the context of some of them, specifically for the group of community leaders, advocates, and sources of information. In regards to these groups, we would like to hone in more on what information they are providing their communities, to see if any misinformation is being spread, as well as to determine where the disconnect is in hopes of being able to repair this in the future.

Audience: This research would be useful to community leaders and advocates in order to better spread more helpful information effectively to better suit their communities for the health hazards that are impacting them. This research would also be useful for other researchers studying environmental injustice, as the different perceptions on these health hazards and how they impact different individuals and social groups could be applied to other studies.

10. INTERSECTING INJUSTICES

Sectors Inadequately Protecting Wilmington

Shashank Bypan, Alison Coffman, Arianna Estrada, Shi Wen Gunderson, Gracie Haley, Raena Imtiaz, Chase Kneller, Andrew Liang, Kyra Thacher, and Michael Willoughby¹³

Although most families in Wilmington have access to the internet and media, data injustices still prevail. For example, Oil refineries in the area, especially the Valero Oil Refinery, don't share data regarding their pollutant emissions. They record 18 different pollutants but none of them are made public. In order to address this, We need to conduct research into what these refineries are actually emitting and make them open to the public. With this, we could strategically plan which refineries we need to target first with emission reduction plans through advocacy and legislation (Willoughby 2024). In addition, in the most recent Toxic Release report from the EPA, pollution from the ports surrounding the area was not included. Only pollutants from the refineries were reported-it's important to note all toxic chemicals from both polluting industries. It's important to encourage the EPA to provide research on the pollutants from the ports and make the information readily accessible to the public (Coffman 2024). Marathon Oil and Phillips 66 refused to release data analytics on the numbers of toxic chemicals released.

¹³ One or more authors have redacted their names per their request.

However, they stated that it is under the regulated amount. Whilst this was occurring CALGEM (California Geologic Energy Management) has issued permits for Marathon oil and Phillips 66 to drill in Wilmington, even though they will not release the data on the gasses emitted by the wells (Kneller, 2024).

Because a majority of Wilmington's population falls below the poverty line, economic injustice is also evident in the area. For example, there is no real economic growth due to the nature of uneven wealth and access to services and Households and families who desire to move out of Wilmington due to the health risks associated with the proximity of oil refineries are unable to due to affordability. In order to address this, we need to encourage investment and development into the community to help boost economic growth and reverse historical trends. Would allow better prospects for residents regarding both jobs and living standards (Liang, Author¹⁴ 2024).

In addition, epistemic injustice is prevalent in the community mainly because residents are too busy and, "don't advocate for these issues [pollution] because they are preoccupied with putting food on the table and taking care of their families" (Willoughby 2024). An action we could take is to connect Wilmington residents with supporting, non-profit advocacy organizations such as CFASE. This would allow them to know that there are people there to help them and try to also inform them at the same time of the difficulties of their situation without taking them away from their jobs (Willoughby 2024). Residents also often downplay the injustices they face due to the fact that they simply do not understand the danger they face due to a lack of education. This is often taken advantage of by government officials in order to avoid accountability and spending funds on environmental safety (Imtiaz, 2024). In order to address this, We can emphasize the need for environmental awareness and education in the community by implementing initiatives in communities to educate adults in community centers and colleges, as well as educating the next generation by integrating environmental education in school curriculums.

¹⁴ One or more authors have redacted their names per their request.

An example of gender injustice in the area is men tend to take on physical labor jobs in the refineries and ports, as well as surrounding areas, so they are more likely to be exposed to air pollutants due to long hours outside. To attempt to fix this, we can require the refineries to provide compensation for these long hours, as well as initiatives to minimize exposure to these harmful pollutants such as face masks (Imtiaz, 2024).

Because Wilmington is surrounded by refineries and ports, health injustice is extremely evident in the area. Pollution from the refineries, ports, and freeway traffic all contribute to respiratory issues, and many residents of Wilmington don't have access to health insurance, which leads to uneven healthcare across the community. An action that could help resolve this is to get assistance from the state or federal government that would provide discounted healthcare programs for individuals living in a high risk area like Wilmington (Thacher, 2024).

An example of intergenerational injustice in the community is Wilmington residents have seen illness and disease such as cancer cross the generation lines from their parents to themselves to their children. For example, Christina Gonzalez's household next to the Phillips 66 refinery saw cancer across three generations (Mahoney, 2022). Education in children's classes about the harmful effects of pollution and what one can do to mitigate it can begin generational change. This must be supported by large changes to really go across generations; like less dependency on oil to decrease the number of factories from one generation to another to see change. Research on long-term effects of certain particulates can provide more insight for families who don't know what is causing their generational illnesses (Estrada, 2024).

Media injustice is also extremely evident in the area. Most news outlets and media coverage ignore activist groups, such as The Coalition For A Safe Environment (CFASE), hence these non-profit organizations may fail with lack of funding and exposure. To address this, we can empower individuals, namely victims of environmental injustice (e.g. students at Wilmington Park Elementary School, or households, and labor workers in Oil Refineries) to speak up about their issues, possibly to become journalists and activists to

contribute to diverse media coverage (Author¹⁵, 2024). Additionally, news media often focuses solely on the refineries and the ports but does not report on the other sources of pollution that are large contributors to Wilmington's poor air quality (freeways, traffic, trucks, lack of regulation). We can attempt to bring attention to the other sources/problems through education of the public, protests, or art demonstrations (like a mural) (Coffman, 2024).

Wilmington residents are disproportionately affected by polluted air, procedural injustice is also evident in the area. For example, refinery workers are exposed to toxic leaks and environmental hazards and aren't adequately represented in the legal system. Additionally, community residents are hardly compensated for damages to their health caused due to the extensive amount of pollutants. To address this, we need to organize a union of refinery workers to represent and advocate for workers' rights, earning a seat at the table when it comes to law and how to address and fix the environmental justices in their community (Willoughby, Imtiaz 2024).

Racial injustice is also prevalent, environmental hazards in Wilmington target minority communities given that Wilmington's population is 97% POC, primarily Hispanic. Environmental justice and advocacy groups can push for greater representation in local and state government to have their needs more appropriately represented in government (Bypan, 2024).

Due to high levels of pollution, reproductive injustice greatly affects the area. With all of the emissions, children are one of the groups most affected and have the most health issues (Lavelle, 2019) (Willoughby, 2024). Parents are often aware of the health effects (especially those that already have children but are wanting more) but may not want to bring another child into the world if they are going to have health issues (Gunderson, 2024). The best way to solve this issue would be by reducing emissions so that they would not cause such harm. There would be multiple ways to do this either by passing laws to reduce emissions or by finding ways to ensure that communities are not set up around the emitters. Placement of ports, refineries, and highways away from residential areas would

¹⁵ One or more authors have redacted their names per their request.

likely benefit the children and families allowing everyone to grow up in a more clean environment.

Technology injustice is also evident in the area, many residents in Wilmington are lower income or living below the poverty line. They aren't able to move out of the area because they can't afford housing anywhere else. Because of less affluence they have less power and funding to push for new technology or regulations. The refineries also claim placing new technology in their facilities to reduce emissions will take upwards of 10+ years. We could address this by lobbying for funding and local government support and representation would help fundraise for improved infrastructure in the area (Coffman, 2024).

CONCLUSION

Wilmington Park Elementary School resides in Wilmington, a community in Southern California characterized by a complex web of environmental hazards stemming from its numerous oil sites, industry, and adjacency to the port and freeway system of Los Angeles. In combination, these hazards present a serious threat to the health and safety of Wilmington's residents, inciting a need for action and initiative. Thus, this case study aims to outline the environmental setting, hazards, stakeholders, and health impacts stemming from local pollution sources; identify key environmental health concepts; and use the findings to instigate subsequent research and interventions. To do so, this case study utilizes the Interdisciplinary Environmental Case Study Framework to evaluate the interaction between stakeholders and environmental issues in Wilmington. In turn, our analysis has revealed the stark reality of how predominantly Latinx residents are disproportionately impacted by an aggregation of pollutants such as ammonia, hydrogen cyanide, benzene, and diesel exhaust culminating in devastatingly poor air quality and health outcomes.

Despite the presence of numerous compromising health hazards, our case study identifies several structures in place that block the achievement of environmental protection and justice in Wilmington. Notably, the Port of Los Angeles, the Marathon Oil and Phillips 66 Refineries, and national shipping and transportation interests stand in the way of environmental justice due to their own stakeholders within companies, corporations, and the state of national government. Wilmington Park Elementary School finds itself in between economic, environmental, and social concerns that prevent them from achieving environmental justice. However, while the oil and shipping industries remain a dominant force in the region, community residents and advocacy groups continue to push for greater accountability and environmental safeguards. Environmental protection actions are upheld by advocacy groups, legislative bodies, and researchers that work within the community on state, national, and international levels. Organizations

such as MELA, Stand Together Against Neighborhood Drilling, and Physicians for Social Responsibility have engaged in advocacy to raise awareness of environmental and health impacts. These organizations have taken action to reduce injustices by protesting or conducting legal action. Media resources such as Toxic Tides have also provided key mapping tools and data accessible to the public, allowing for community insight on the harmful chemicals in the area.

Building on the important strides community members and organizations have achieved, collaboration between stakeholders is key to envision a just transition in Wilmington. Notable change in policy should force companies to be up to date on modern standards for health and safety. Meanwhile, Wilmington schools can educate students on environmental issues, sparking awareness and change. Labor unions, activist groups, and nonprofits should continue to fight for their rights, lobbying governments to reconsider current unjust policies. Government officials and policymakers should incite tangible change for oil refineries and other companies that have been neglecting these unjust circumstances. Projected change in Wilmington must come from every level of stakeholders.

Identifying certain environmental governance concepts can service the collaborative efforts needed to achieve the projected change. Wilmington is a notable example of environmental injustice, historical disadvantage, and economic injustice. These are perpetuated through the various interests divided amongst multinational corporations and governments which hold economic interests in the area surrounding Wilmington Park Elementary School. Residents predominantly of color historically suffer from the interests of these groups. Factors including language barriers, immigration status, and socio-economic disparities bar Wilmington residents from achieving the economic standards needed to mitigate the environmental hazards, such as affording homes away from hot-spots of pollution, obtaining adequate healthcare to pollution-related ailments, or accessing educational resources. Commonalities such as these can become notable avenues for combating environmental injustice.

To continue necessary change in Wilmington, the research group has identified specific near-term and long-term environmental justice goals. First, beginning at Wilmington Park Elementary School and other local schools should be a priority. School authorities such as teachers and faculty should embed the spirit of learning about the environment and the importance of identifying hazards in their vicinity. This can be achieved by educating children and families about the current impacts as well as health effects of pollution from oil refineries and other emissions in Wilmington. Second, to broaden the horizon, gaining more media attention for the crisis occurring in Wilmington should be a focus as it can trigger a cascade that will inspire change at the state and federal level. Once at the government level, long-term goals must involve tackling current injustices, specifically health hazards. To further remove the red-tape that has barred change, we encourage drastic measures such as legislation that imposes stricter regulations on oil refineries with severe consequences if not followed, or the removal of policymakers who are lobbied by these big corporations. This case study demonstrates the additive effects of environmental hazards and systemic injustices on a historically disadvantaged community. By urging immediate and profound change, Wilmington can become a marker for environmental justice, ensuring the well-being of its residents while setting a precedent for safe coexistence between industry and community.

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FIGURES

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