WAREHOUSES, POLLUTION, AND SOCIAL DISPARITIES

An analytical view of the logistics industry's impacts on environmental justice communities across Southern California

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Authored By:

Ivette Torres, Environmental Science Researcher and Analyst and
Anthony Victoria, Communications Advisor
People's Collective for Environmental Justice

Professor Dan Klooster and his Environmental Studies 277 students at the University of Redlands

This report is dedicated to the environmental justice communities of Southern California that continue to fight for clean air and environmental justice

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EXECUTIVE SUMMARY

In collaboration with the University of Redlands, the People's Collective for Environmental Justice (PC4EJ) used a collection of data to analyze the 3,321 warehouses above 100,000 sq.ft that fall in the South Coast Air Basin, which covers Los Angeles, Orange, Riverside, and San Bernardino counties. The regional board responsible for regulating air quality in Southern California—the South Coast Air Quality Management District (SCAQMD)—is considering adopting an Indirect Source Rule for warehouses in an attempt to address the air quality and health impacts associated with the goods movement industry. While warehouses do not produce pollution directly, the mobile sources of pollution they attract (the most notable of these sources being diesel trucks) contribute to the region's high levels of smog and ozone[1] that have consequential impacts on the respiratory health of Southern California's residents.

As the warehouse and logistics industry continues to grow and net exponential profits at record rates,[2] more warehouse projects are being approved and constructed in low-income communities of color and serving as a massive source of pollution by attracting thousands of polluting truck trips daily. Diesel trucks emit dangerous levels of nitrogen oxides and particulate matter that cause devastating health impacts including asthma, chronic obstructive pulmonary disease (COPD), cancer, and premature death. As a result, physicians consider these pollution-burdened areas 'diesel death zones.'[3]

Using data sources from the SCAQMD and the California Office of Environmental Health Hazard Assessment's CalEnviroScreen 3.0 tool, the following data sets were analyzed: warehouse location to a toxic facility (such as gas and oil facilities), warehouse location to e-commerce sales for 2020, warehouse location to schools, warehouse locations to traffic, and warehouse locations to a variety of other demographic variables.

It is important to note that maps with the aforementioned variables were not publicly available or accessible. Until now, no industry, research institution, or agency found it necessary to map warehouse locations with vital correlations to socio-economic demographics. It has been clear to many community members, advocates, and many others in the clean air and environmental

[1] "State of the Air 2020" (American Lung Association), https://www.stateoftheair.org/assets/SOTA-2020.pdf.
[2] "2020 North America Industrial Big Box Review & Outlook," CBRE, https://www.cbre.us/research-and-reports/2020-Industrial-Big-Box-Inland-Empire.
[3] Tony Barboza, "Freeway Pollution Travels Farther than We Thought. Here's How to Protect Yourself," Los Angeles Times (Los Angeles Times, December 30, 2017), https://www.latimes.com/local/california/la-me-freeway-pollution-what-you-can-do-20171230-htmlstory.html.

justice movement that the growth of the logistics industry in Southern California correlates with health, economic, and racial disparities.

These maps will serve to demonstrate the severity of our region's air pollution woes and raise urgency for important policies such as the Indirect Source Rule, the Advanced Clean Fleet rule, and other air quality management and community emissions reduction plans that will work to clean our air, create sustainable freight and goods movement, and protect public health.

Warehouse Locations and Proximity to Toxic Facilities

Warehouse facilities in Southern California are approved in communities already experiencing pollution burdens from toxic facilities, such as oil and gas refineries and power plants.

Through existing data, we found that the top 10 communities in the South Coast Basin with the most warehouses also fall in the highest percentiles of toxic facilities.

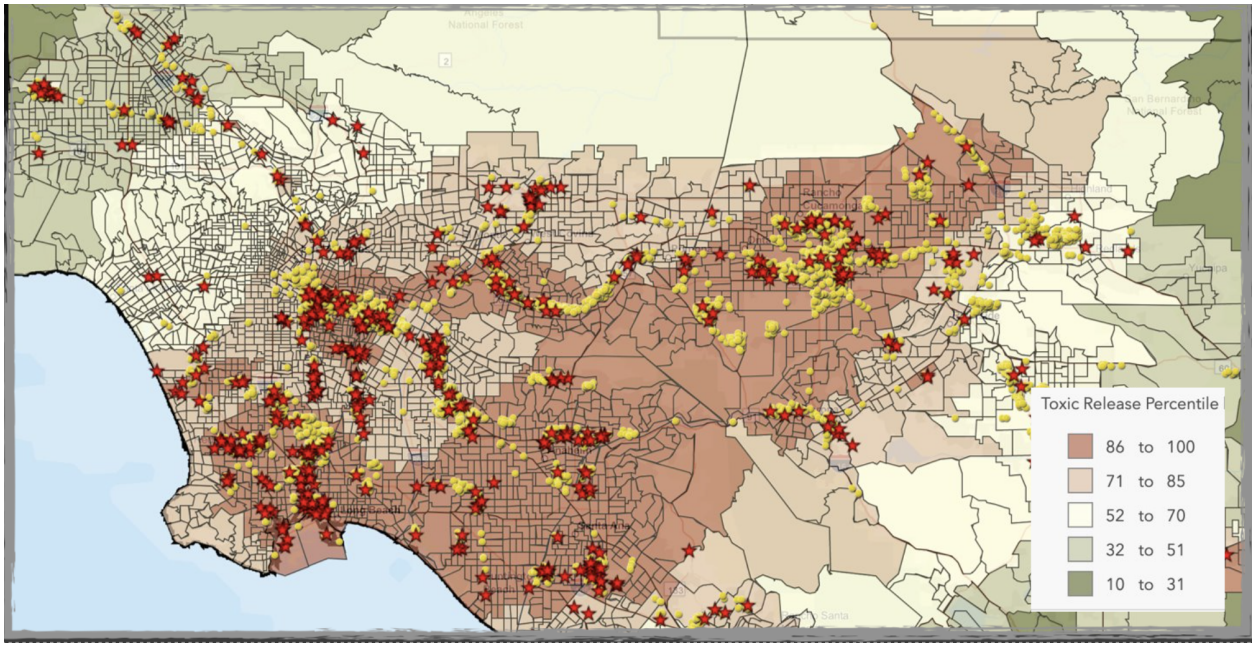


Figure 1: *In the following map an overlay of warehouse locations in yellow points and toxic facilities in red stars is seen. As well as the different shaded areas of the percentiles for toxic releases. Source: University of Redlands.*

- **The Carson/Wilmington** area that has the 7th highest amount of warehouses (126 warehouses total) falls in the toxic percentile of 92.89, meaning it is higher than 92.89% of the census tracts in California. Toxic releases in this area include railroad operations and refineries.
- **The Ontario** area, which has the highest concentration of warehouses (289 warehouses), falls in the toxic percentile of 97.26, meaning it is higher than 97.26% of the census tracts in California. Toxic releases in this area include the Cal Portland Cement plant, tool and die shops, and a multitude of interstate freeways.
- **The City of Industry** area that has the 2nd highest concentration of warehouses (197 warehouses) falls in the toxic percentile of 98.28, meaning it is higher than 98.28% of the census tracts in California. Toxic releases in this area include

chemical manufacturers, Union Pacific Railroad operations, and other processing plants such as metal manufacturers.

- **The Anaheim** area that falls as the 14th highest in warehouses (75 warehouses) falls in the toxic percentile of 95.55, meaning it is higher than 95.55% of the census tracts in California. Toxic releases in this area include the cement and gas plants.
- **The Los Angeles/ Vernon** area that falls as the 3rd highest in warehouses (262 warehouses total) falls in the toxic percentile of 97.57, meaning it is higher than 97.57% of the census tracts in California. Toxic releases in this area include lacquer companies and other contaminated areas such as lead, metal, and chemical manufacturers.

Warehouse Locations and Proximity to Schools

There are 640 schools in the South Coast Air Basin within ½ mile radius of a warehouse. Land use and zoning ordinance changes approved through local municipal and county governments have resulted in warehouses being constructed in already pollution and economically burdened areas.

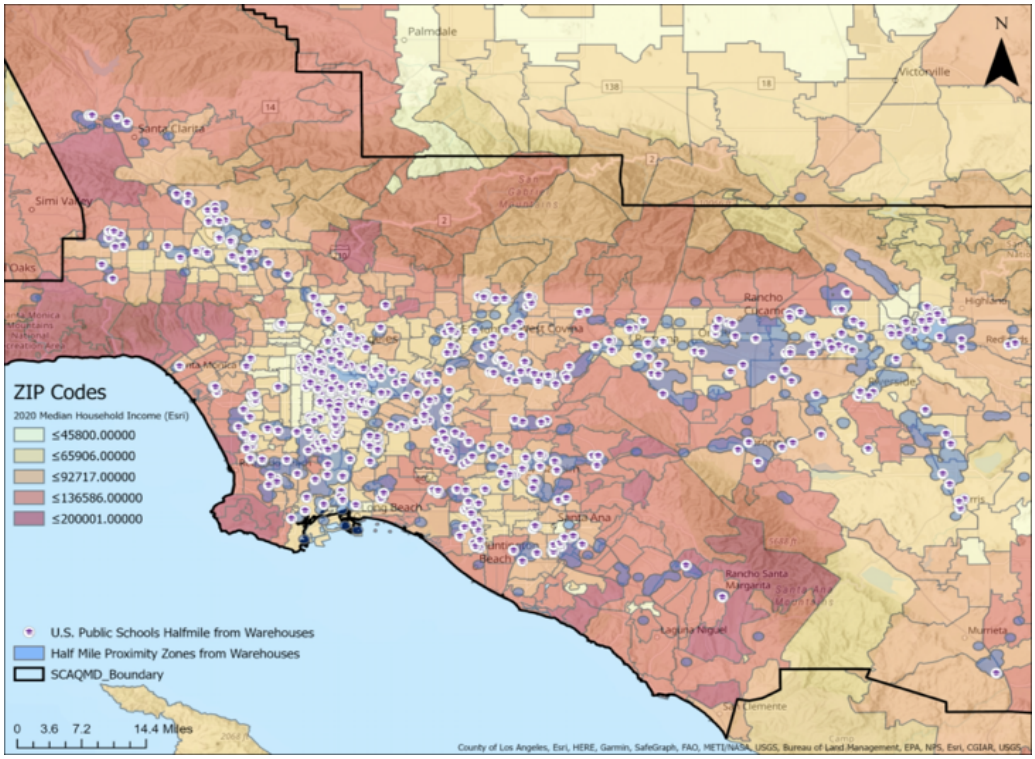


Figure 2: *In the following map you can see warehouse zones be highlighted as blue circles and schools as purple/white dots. The warehouse and school data is also overlaid with household income data. Source: University of Redlands.*

As seen in Figure 2 and Table 2, historically warehouses have been developed within .5 of a mile, if not closer, of educational institutions. Unfortunately, we see this trend growing, as warehouse developments continue to encroach on these sensitive receptors.

Comparative Statistics for Schools

Area	Variable
Entire SCAQMD	3,712 Schools $74,237 2020 Med HH Income
State of California	10,442 Schools $77,500 2020 Med HH Income
0.5 miles from a warehouse	640 Schools $60,218 Med HH Income
0.5 miles from a warehouse in a disadvantaged zone	473 Schools
0.5 miles from a warehouse in a disadvantage zone that contains at least one warehouse	242 Schools

Table 2: Comparative Statistics for schools in the South Coast Air Quality Management District ½ of a warehouse
Public Source: CDE-Data-CA, SCAQMD, CALENVIRO OEHHA

The most blaring and unfortunate example is the unincorporated community of Bloomington in San Bernardino County, which is seeing an upward trend in warehouse development near homes and schools. In fact, as of publication time for this report, Bloomington community leaders are leading an ongoing organizing effort to oppose a proposed 3 million square foot warehouse development plan located directly adjacent to several schools. If approved, the Bloomington Business Park Specific Plan will demolish 213 homes to make way for a warehousing district in an area already impacted by millions of square feet of warehouse development. Figure 2.1 contextualizes how much space of housing would become logistics near three Colton Joint Unified School District locations.

Six of the eight schools in the Bloomington community sit, or will sit, right next to a warehouse.

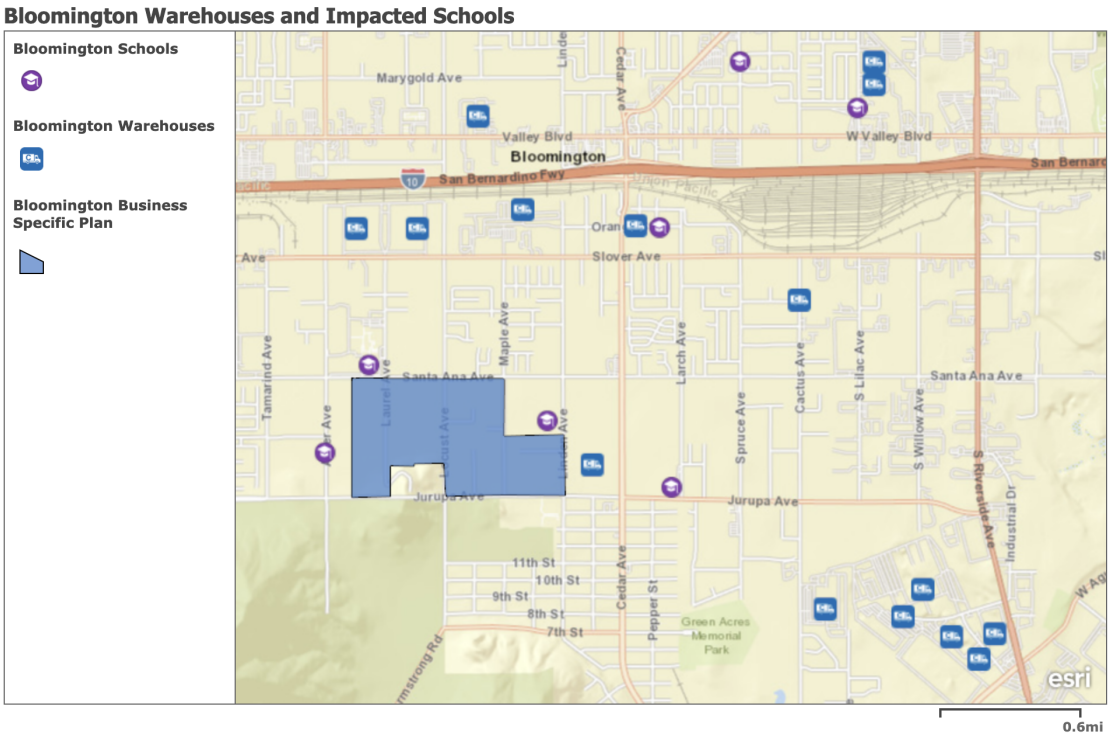


Figure 2.1 : The following map is of the community of Bloomington in San Bernardino County, with warehouses over 100000 sq ft already present mapped and schools in the community mapped, as well as a proposed project. Source: Torres, I.

It is why communities recommend that any policy that advances the deployment and investment in zero-emissions technology (e.g. electric trucks, yard hauslers, and forklifts) take place in disadvantaged communities first.

Amazon's influence on the Inland Empire

Amazon has made record profits in the last decade, and it has come largely at the cost of communities in the Inland Empire that have seen several large fulfillment centers built near their backyards. Worse, we see a huge disconnect on warehouse locations to e-commerce sales, meaning the communities who order the least online experience the direct pollution and health impacts of the industry by living close or right next to large facilities.

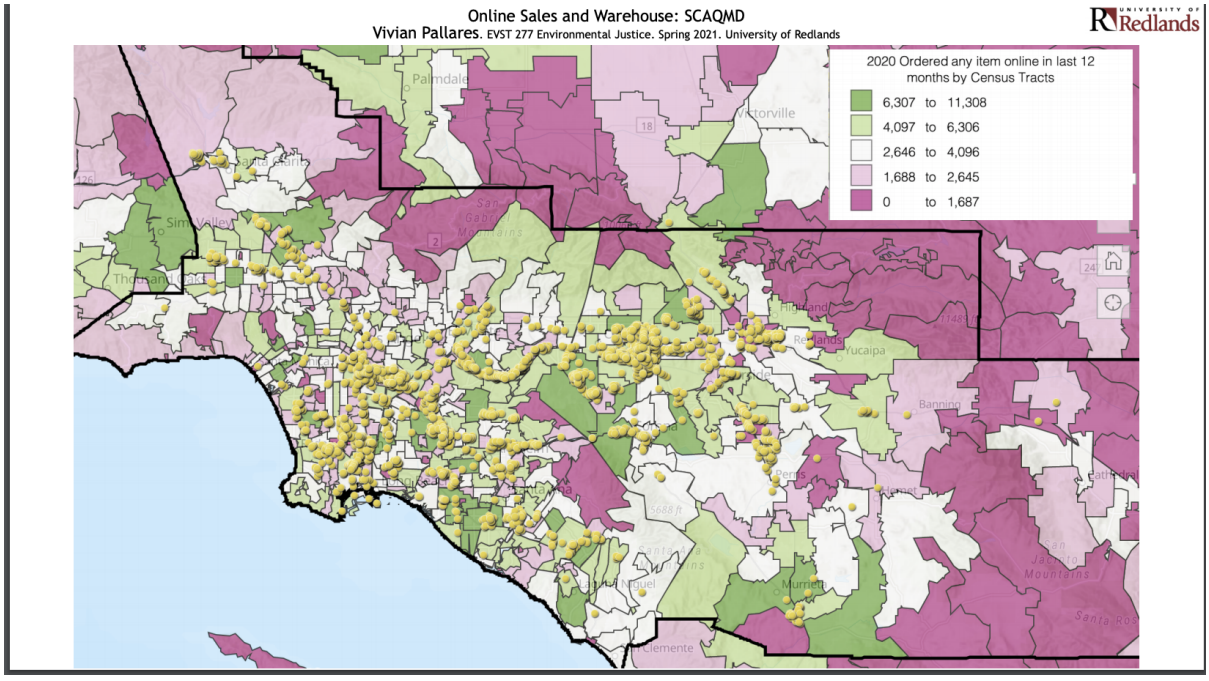
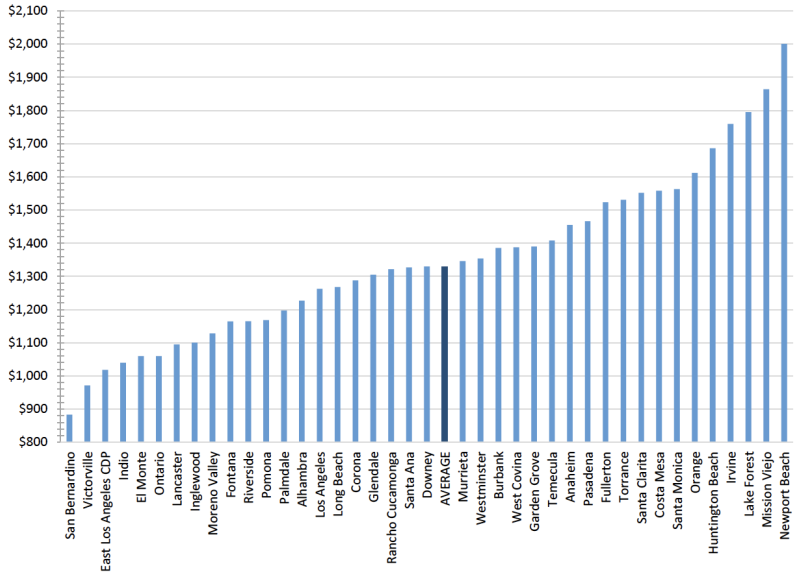


Figure 3: *The trends analyzed are e-commerce sales of 2020 per household by census tracts on scale from least (dark pink) to most ordered (dark green) overlapped by warehouse locations. Source: University of Redlands*

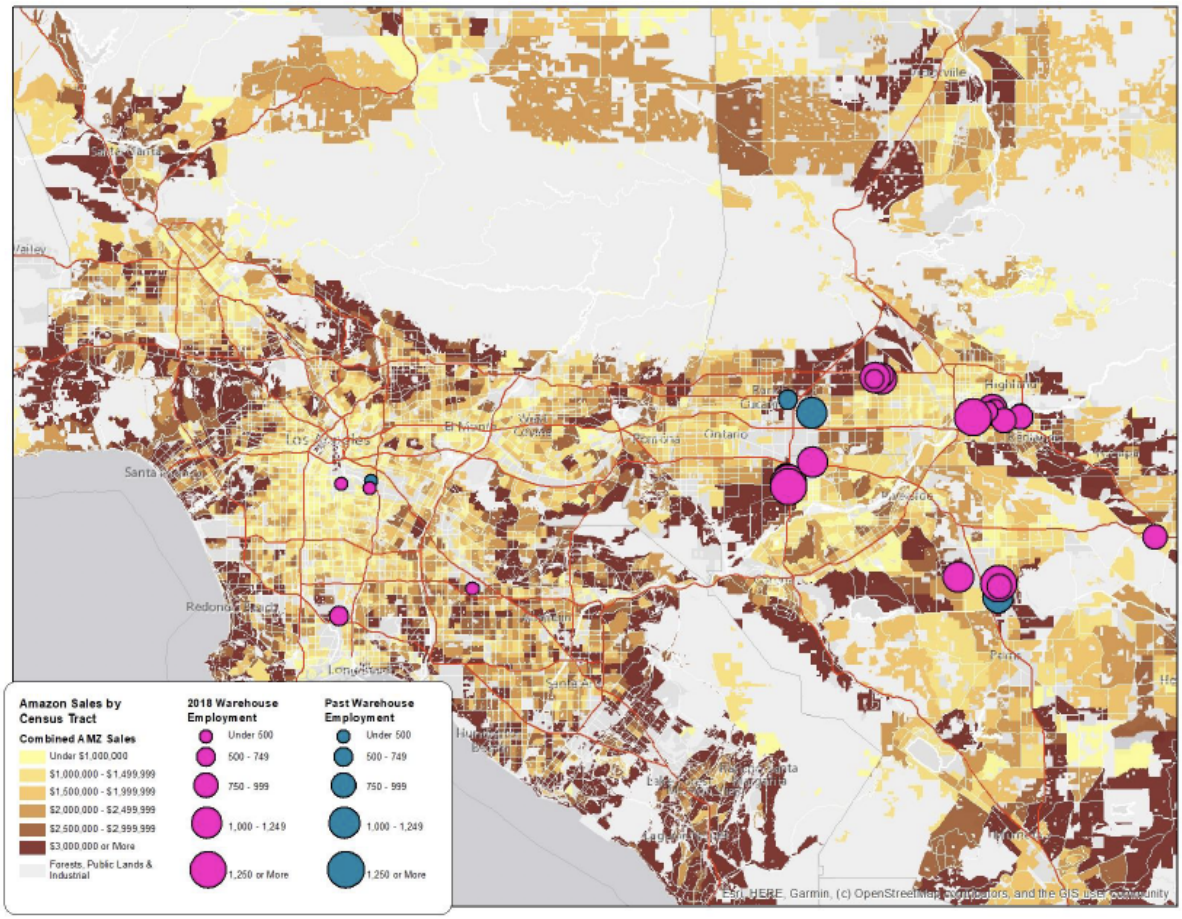
Figure 2: Estimated Amazon Sales per Household in the 40 Largest Cities in the Los Angeles Metropolitan Area



Source: Derived from U.S. Census Bureau American Community Survey 2013-2017 household income data, U.S. Bureau of Labor Statistics Household Consumption breakout of household consumption by item and income level, and Amazon e-commerce sales in the U.S. in 2018.

Figure 3.1: *Estimated Amazon Sales per household. Source: Too Big to Govern.*

Figure 6: Amazon Warehouses in the Four-County Study Area



Source: Public records of Amazon facilities, using the ratio of square feet of warehouse space to employment from city environmental impact reports.

Figure 3.2: *The map plots census tract data from 2013-2017 of Amazon sales per household and overlays it with warehouse locations and their employment rates. Source: Too Big to Govern.*

The Economic Roundtable's "Too Big to Govern" report directly looked at Amazon online sales parallel to warehouse locations from 2013-2017.[4] A parallel map to our 2020 map of e-commerce sales is the one above from the Economic Roundtable report that analyzed Amazon sales by census tracts. In the Economic Roundtable report, the census tracts with a warehouse or Amazon facility nearby spend the least online compared to the coastal, more affluent communities with higher online shopping rates that have no Amazon or other online retail warehouse facilities nearby. We see the pattern remains the same from 2013 to 2020, where sales online are higher in non-goods movement communities and extremely lower in goods movement communities with warehouses present.

University of Redlands student researcher Vivian Pallares shares the following based on the data she helped gather:

[4] https://economicrt.org/publication/too-big-to-govern/

> **"The majority of warehouses in Southern California are placed in the areas that online shopping is done the least.** This is important to investigate because it shows how the communities that are the most impacted by warehouses and their pollution are not the communities that are consuming the products. **The neighborhoods in green are free riders of pollution in this case because they are able to enjoy the benefits and convenience of online shopping and shipping without having to be in close proximity to warehouses. Those who are closest to the warehouses suffer the consequences of having pollution from warehouses and transportation in their neighborhoods and this can have a negative impact on their health at a disproportionate rate from the other communities."**

Amazon touts being strong on climate, but actions demonstrate that that they are in fact doing the opposite by continuing to build warehouses near communities of color without considering existing cumulative impacts. In addition, despite making commitments to take strong action on the climate crisis, Amazon has turned to outdated and harmful technologies that will worsen, not improve our climate. Recently, Amazon applies and received public funding through the SCAQMD to support the company's purchase of 100 natural-gas Class 8 trucks and only 10 zero-emission trucks.[5] Natural gas developments will ultimately hurt communities in the long term.

Warehouse locations and truck traffic impacts

The average percentile for traffic across census tracts with warehouses is 67% compared to the state average of 50%. While California has the strictest auto emissions standards in the U.S., our state is also known for its high number of large freeways and heavy vehicle traffic. Traffic is a significant source of air pollution, particularly in urban areas, **where more than 50% of particulate emissions come from traffic. Specifically, diesel and gas truck emissions—the main source of pollution warehouses attract—**contains a large number of toxic chemicals, including nitrogen oxides, particulates, carbon monoxide, and benzene.

In recent years, communities across the South Coast Air Basin have conducted truck counts to demonstrate the magnitude of the truck pollution issue. For example, residents held a truck count in early 2020 near the 60 freeway in Jurupa Valley and found that approximately 1,161 trucks pass through the corridor per hour.

[5] http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2021/2021-Apr2-009.pdf?sfvrsn=6

It is important to note that the traffic data also revealed 465 (16%) of warehouses fall in the top 10% worst census tracts for traffic (90-100%)

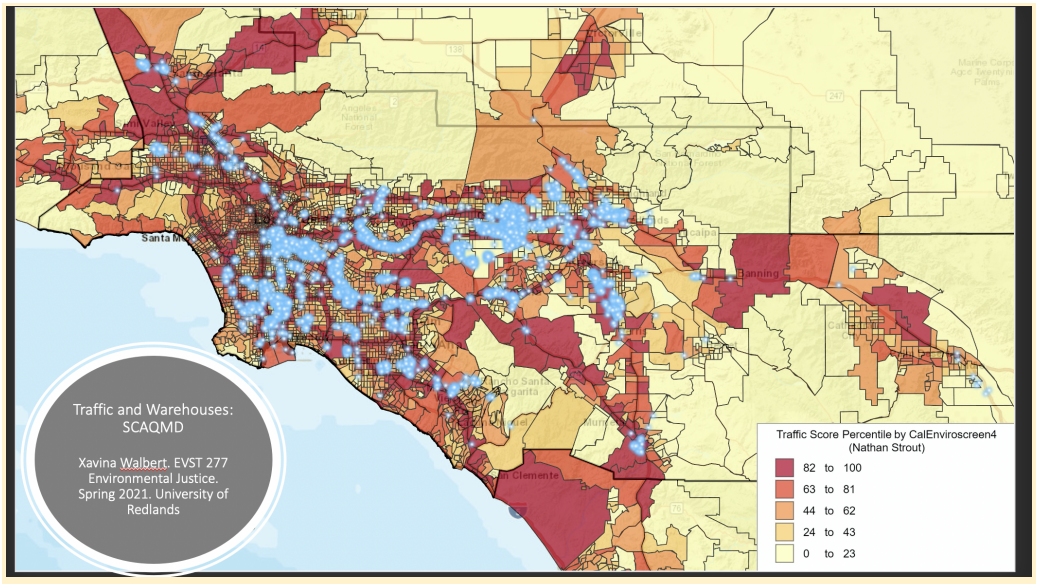


Figure 4: *Warehouse locations (blue dots) mapped with traffic score percentiles. Source: University of Redlands.*

- The overwhelming impacts of truck traffic activity related to the logistics industry is very much known in the South Coast; the unaccounted costs, however, are not.
- People who live within 1,500 feet of a highway are the most heavily exposed to air pollution from traffic, including from dirty diesel trucks, and are therefore the most harmed by diesel truck air pollution.[6]
- Asthma rates and cancer risk are drastically elevated in areas close to ports, warehouse distribution centers and other freight corridors that bring residents in contact with pollution from heavy-duty vehicles.
- A case study of truck traffic impacts in the South Coast is the community of Long Beach and the I-710 expansion.
    - Due to the overwhelming volume of cargo being moved from the ports of Los Angeles and Long Beach to logistics and warehouse facilities more inland through I-710 through diesel and gas trucks, city planners and leaders voted to expand the freeway to accommodate industry at the expense of the community. The freeway expansion will likely displace community residents and longtime community-ran businesses. Advocates are calling on Metro and CalTrans to make amendments to their expansion plans to include no displacement as well as local hiring and zero-emissions policies.

[6] "Public Comment by American Lung Association," Regulations.gov (U.S. Environmental Protection Agency), accessed April 6, 2021, https://www.regulations.gov/document/EPA-HQ-OAR-2014-0827-4846.

Warehouse locations and socioeconomic impacts

Warehouses are more likely to be located in neighborhoods with lower median household incomes and higher levels of poverty. Specifically, as distances between warehouses and residential neighborhoods shorten, poverty rates increase, and so do minority populations, and many other socio-economic demographics: linguistic isolation, asthma rates, housing inequality, cardiovascular rates, and unemployment rates.

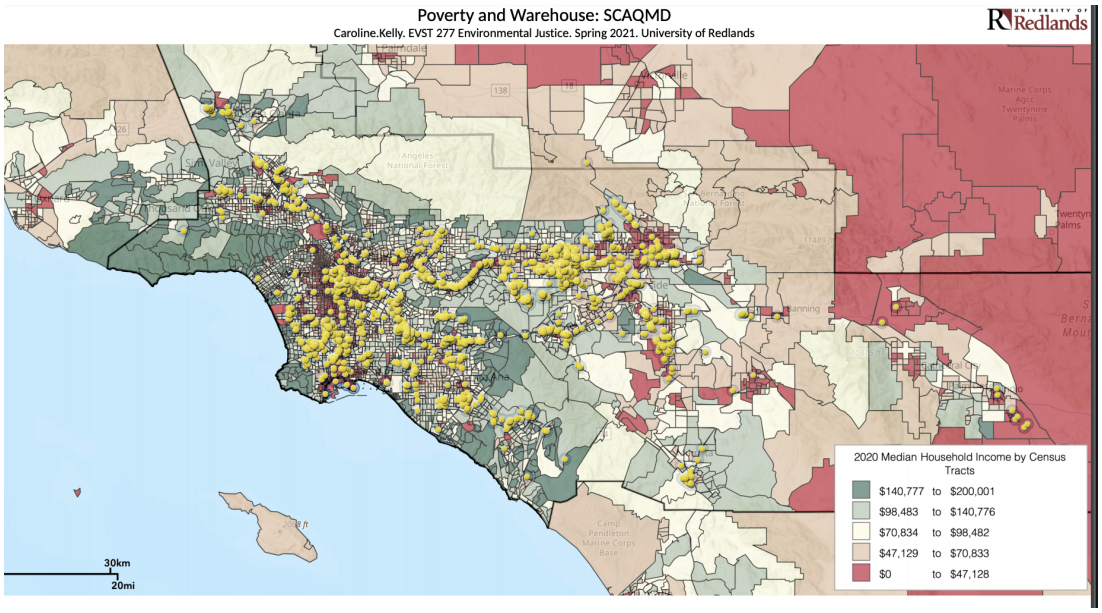
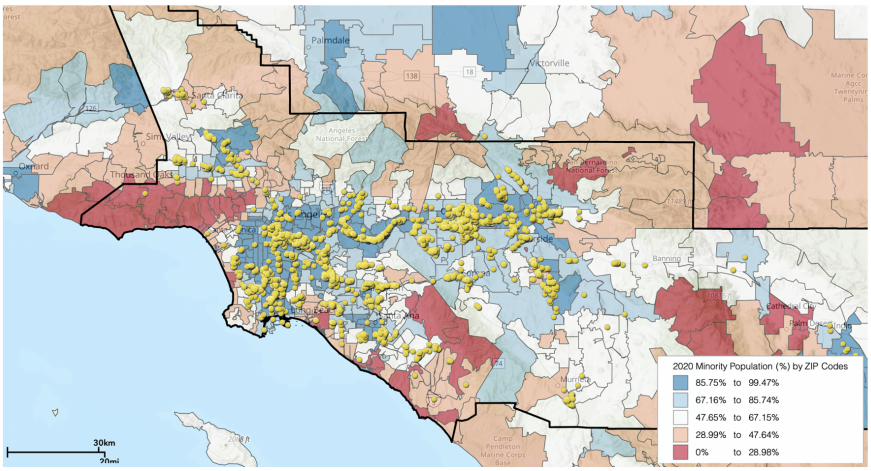


Figure 5: *Looking at the following map warehouse locations (yellow dots) are overlapped with 2020 median household income by census tract. Source: University of Redlands*

Researcher Quan Yuan points out in his research on warehousing locations in environmental justice communities that warehouses are disproportionately and deliberately built in low-income communities of color. Figure 5 confirms Yuan's academic assertions countering industry arguments that these populations move into these areas for job opportunities.[7]

[7]https://reader.elsevier.com/reader/sd/pii/S0264837717309134?token=2039D46FD4D4B3EDCD57FAADE043AD4FBDD418E81792034AAB1B2CBECCBDEB25529A0A3961C20521840A91358BBCA20E&originRegion=us-east-1&originCreation=20210405212514



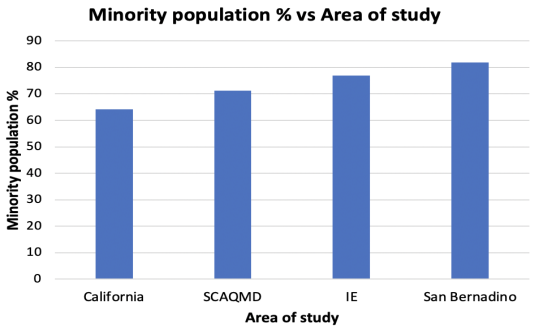
Minority Population % and Warehouses: SCAQMD

Figure 5.1: *Warehouse locations (yellow dots) are overlaid with 2020 minority population (%) by zip codes. Source: University of Redlands*

As we look at **Figure 5.1,** we again see a similar pattern seen earlier: **the closer we get to warehouses in distance, the more communities of color we see. This unfortunately is not the only socio-economic demographic that sees this trend.**

Area	Minority population %
California	64.19%
SCAQMD	71.20%
IE	76.90%
San Bernardino	81.91%

IE distance from warehouse	Minority Population %
1 mile	82.49%
½ mile	84.88%
¼ mile	85.72%



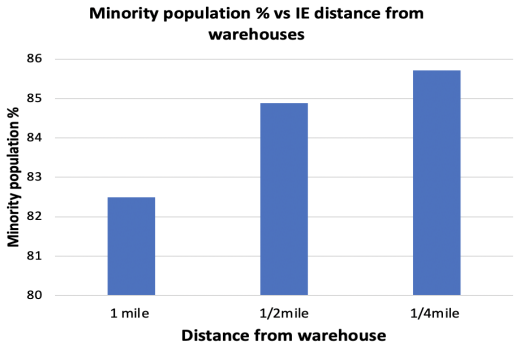


Figure 5.2: *Comparative Statistics of Minority Population (%). Source: University of Redlands*

As Figure 5.2 demonstrates, the closer in distance a household is to a warehouse, the more probable it is for the home to belong to a person of a minority group. This further raises the point that warehouses and the mobile sources of pollution they attract disproportionately impact communities of color more than to their white counterparts.

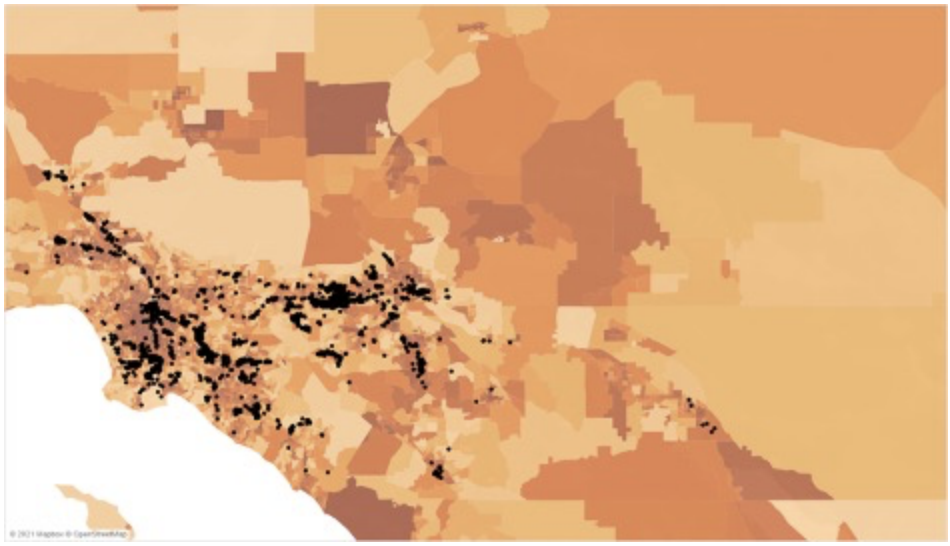


Figure 5.3: *Housing Burdened Low Income Households are looked at by warehouses (black dots) overlaid with housing needs. Source: Sierra Club My Generation.*

Figure 5.3 compares housing needs with warehouse locations. We found that the average percentile for housing burden across warehouses is 61% compared to the state average of 50%; 206 (7%) of warehouses fall in census tracts with the top 10% of housing burdened low income households (90-100%). This claim was also proven true by Quan's research and his other studies on warehouse locations: "In spite of the limitations, the study explicitly points out that the disproportionate siting of warehouses, rather than the housing market dynamics, is the dominant causal factor of the environmental justice problem in warehousing location." [8]

The following figures further emphasize the relationship between warehouses and socio-economic demographics.

[8] Ibid

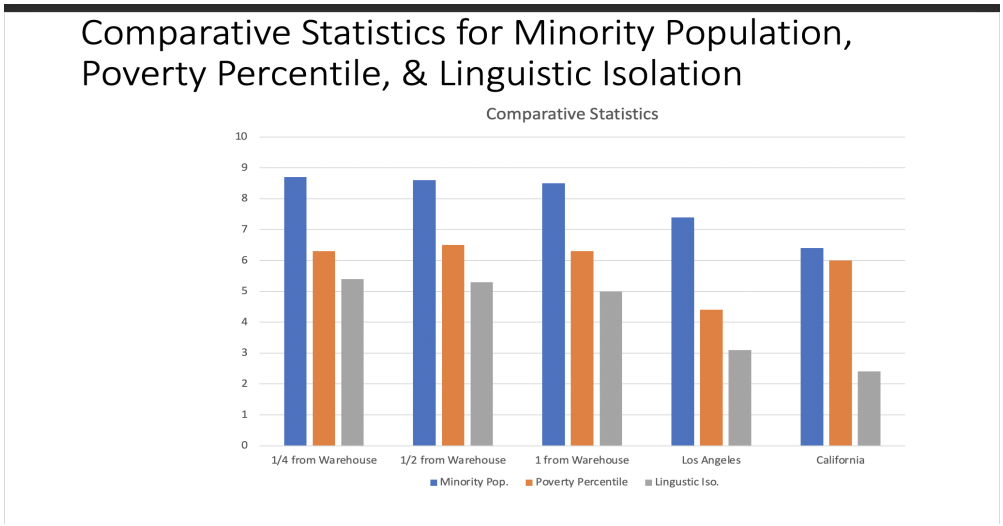


Figure 5.4: *Comparative statistics of previous mapped data of minority and poverty, with and include variable of linguistic isolation. Source: University of Redlands.*

Figure 5.4 compares two demographic variables we are familiar with, poverty and population. There is one important variable to consider: linguistic isolation. Linguistic isolation serves as a large obstacle for residents of color that use English as a second language. If a truck is idling or a new project is being proposed, community members may not be able to voice their concerns if adequate translation is not provided by local, regional, and state regulatory agencies to have translated resources. By providing proper translation local agencies will improve their oversight, and overall, air quality and community health by doing the utmost possible to address concerns around pollution from warehouses.

Asthma

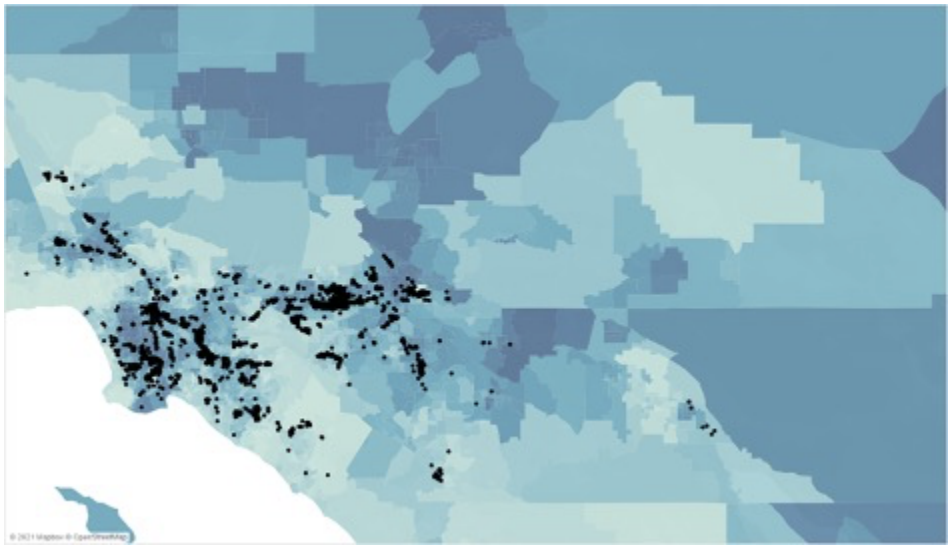


Figure 5.5: *Asthma and respiratory impacts are looked at by warehouses (black dots) overlaid with age adjusted rate of emergency department visits for asthma.Source: Sierra Club My Generation.*

Figure 5.5 reveals that the average percentile for Asthma rates across warehouses is 55% compared to the state average of 50% and 262 (9%) of warehouses fall in the worst 10% of asthma rates across all census tracts (90-100%).

Cardiovascular

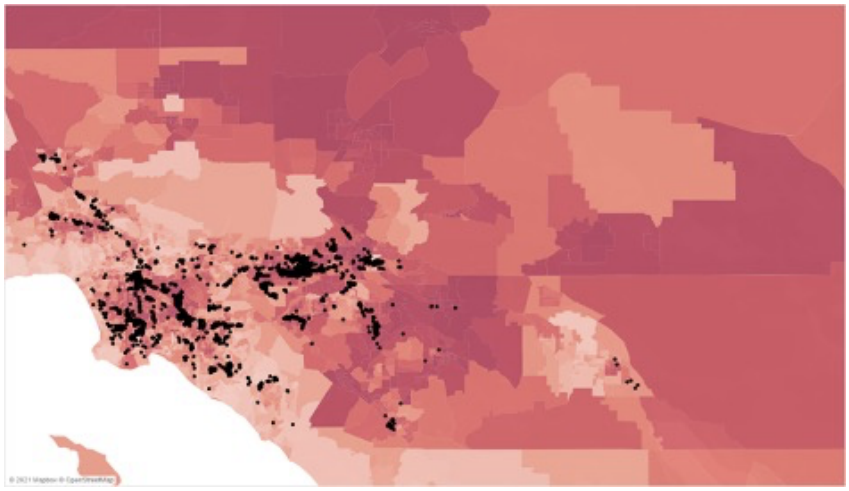


Figure 5.6: *Cardiovascular impacts are looked at by warehouses (black dots) being overlaid with cardiovascular percentiles.Source: Sierra Club My Generation.*

In figure 5.6, we see the average percentile for cardiovascular disease across warehouses is 59% compared to the state average of 50% and 436 (15%) of warehouses fall in census tracts with the top 10% of cardiovascular disease percentiles (90-100%).

Unemployment Rates

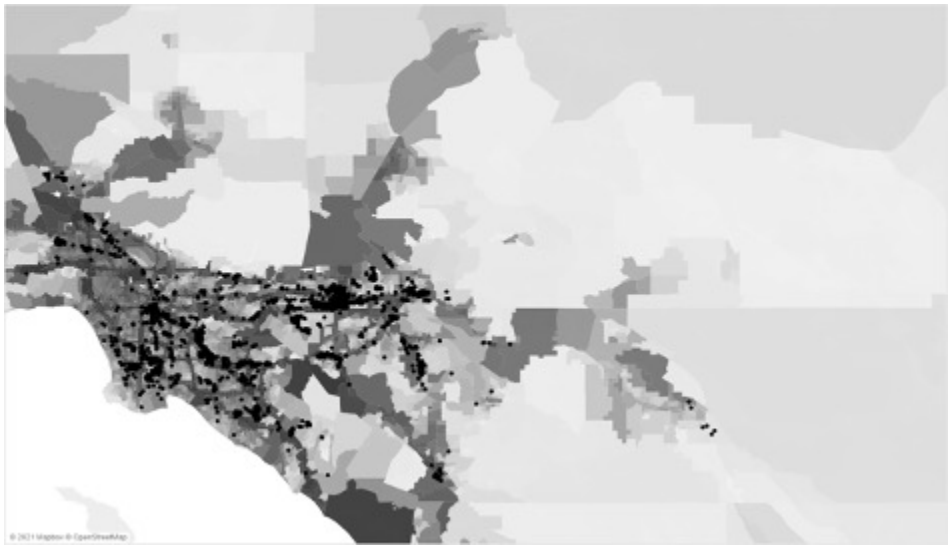


Figure 5.7: *Unemployment impacts are looked at by warehouses (black dots) being overlaid with unemployment percentiles. Source:Sierra Club*

Because low socioeconomic status often goes hand-in-hand with high unemployment, the rate of unemployment is a factor commonly used in describing disadvantaged communities. On an individual level, unemployment is a source of stress, which is implicated in poor health reported by residents of such communities. Lack of employment and resulting low income often oblige people to live in neighborhoods with higher levels of pollution and environmental degradation.

- In **figure 5.7 we see the average percentile for unemployment across warehouses is 58% compared to the state average of 50%** and 66 (2%) of warehouses fall in the top 10% worst census tracts for unemployment (90-100%)

CONCLUSION

It is clear from our collected data that building large warehouses with no consideration for public health will continue to diminish the quality of life for low-income communities of color. The prevalence of warehouses and goods movement facilities in low-income, communities of color is a textbook example of environmental racism.

As environmental justice advocates, clean air champions, and more importantly, as members of the community, we are presenting this data to make an urgent call to the South Coast Air Quality Management District to adopt a strong Indirect Source Rule for warehouses that brings 100% zero-emission technology to frontline communities of color that have the right to clean air and deserve environmental and racial justice.

METHODOLOGY

The research and data analyzed in the report was all public sourced. The sources varied from the SCAQMD, the California Office of Environmental Health Hazard Assessment's CalEnviroScreen 3.0 tool, California Department of Education, previous research reports from the Economic Round Table, and research by Quan Yuan.

In order to map the open sourced data ArcGIS Online Community Analyst was used by the researchers and student researchers of the University of Redlands. Added sourced maps were also created from ArcGIS Online/Pro. Other figures referred to the Research report "Too Big to Govern" by Daniel Flaming and Patrick Burns.

Of the 3,321 warehouses that were analyzed in the South Coast Basin only 2870 (86%) had available census tract data through Census Geocode API.

The following figure summarizes the top 20 cities that would be most impacted by South Coast AQMD's proposed Rule 2035 aka Warehouse Indirect Sources Rule.

Table 1: Cities with large warehouse concentrations above 100,000 sq ft in the South Coast Basin that will have to comply with ISR. Source: Torres,I

Top 20 Cities with Large Warehouse Concentrations

Number of Warehouses	CITY	NOTES
289.00	Ontario	San Bernardino County and still expanding in warehouse development
197.00	City of Industry	Los Angeles County and surrounded by many other toxic facilities
168.00	Los Angeles	Los Angeles County and surrounded by many other toxic facilities
140.00	Fontana	San Bernardino County and still expanding in warehouse development
126.00	Santa Fe Springs	Los Angeles County
121.00	Commerce	Los Angeles County and surrounded by many other toxic facilities

119.00	Carson	Los Angeles County and surrounded by many other toxic facilities
117.00	Chino	San Bernardino County
107.00	Rancho Cucamonga	San Bernardino County
94.00	Riverside	Riverside County and still expanding in warehouse development
94.00	Vernon	Los Angeles County and surrounded by many other toxic facilities
80.00	Jurupa Valley	Riverside County and still expanding in warehouse development
76.00	San Bernardino	San Bernardino County and still expanding in warehouse development
75.00	Anaheim	Orange County
75.00	Compton	Los Angeles County
65.00	Corona	Riverside County
61.00	Torrance	Los Angeles County
48.00	Moreno Valley	Riverside County and still expanding in warehouse development
47.00	Rialto	San Bernardino County and still expanding in warehouse development
45.00	Perris	Riverside County and still expanding in warehouse development

Source: Torres,I

APPENDIX

Table 1:*Summary of How Many Warehouse +100,000 Sq Ft are in SCAQMD and perspective areas*
Total number of warehouses that will have to follow the ISR: ***3,321.*** *Source: Torres,I.*

City	Total #of warehouses Per Area	City	Total #of warehouses Per Area
Ontario	289	Wilmington	7
City of Industry	197	EL Segundo	6
Los Angeles	168	La Palma	6
Fontana	140	Panorama City	6
Santa Fe Springs	126	Burbank	5
Commerce	121	Costa Mesa	5
Carson	119	Lake Forest	5
Chino	117	San Fernando	5
Rancho Cucamonga	107	San Pedro	5
Riverside	94	Santa Clarita	5
Vernon	94	Alhambra	4
Jurupa Valley	80	Arcadia	4
San Bernardino	76	Baldwin Park	4
Anaheim	75	Fountain Valley	4
Compton	75	Hacienda Heights	4
Corona	65	Huntington Park	4
Torrance	61	Inglewood	4
Redlands	56	Rancho Santa Margarita	4
Fullerton	51	Chino Hills	3
Long Beach	50	Coachella	3
Moreno Valley	48	Duarte	3
Irvine	47	La Habra	3
Rialto	47	La Puente	3
Perris	45	Los Alamitos	3

Santa Ana	42	Mira Loma	3
Pomona	41	Montclair	3
La Mirada	40	Murrieta	3
Valencia	40	North Hills	3
Buena Park	37	Northridge	3
Rancho Dominguez	35	Panorama City	6
Cerritos	33	Placentia	3
Gardena	30	San Dimas	3
Pico Rivera	27	Seal Beach	3
South Gate	27	South El Monte	3
Montebello	24	Upland	3
Eastvale	23	Bell Gardens	2
Temecula	23	Indio	2
Brea	22	Mentone	2
Colton	22	Norco	2
Sylmar	22	San Juan Capristrano	2
Chatsworth	20	Signal Hill	2
Irwindale	20	Thermal	2
Huntington Beach	18	Westminster	2
Walnut	17	Woodland Hills	2
Bloomington	16	Aliso Viejo	1
Cypress	16	Banning	1
Garden Grove	16	Calabasas	1
Bell	14	Cudahy	1
Hawthorne	14	Desert Hot Springs	1
Azusa	13	Diamond Bar	1
Foothill Ranch	12	Glendora	1
Orange	12	Grand Terrace	1
Van Nuys	12	Hemet	1
El Monte	11	La Verne	1

Sun Valley	11	March Air Reserve Base	1
Lynwood	10	Monrovia	1
Downey	9	Nuevo	1
Pacoima	9	Palm Springs	1
North Hollywood	8	Pasadena	1
Paramount	8	Rowland Heights	1
Tustin	8	San Jacinto	1
Whittier	8	Santa Monica	1
Beaumont	7	Stanton	1
Canoga Park	7	Sunland	1
Norwalk	7	West Covina	1
Redondo Beach	7	Yorba Linda	1

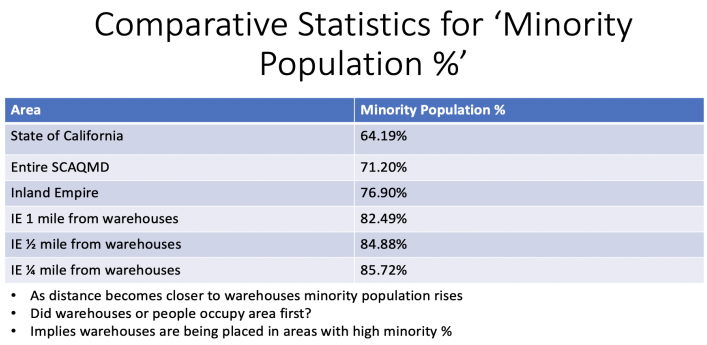


Figure 1: *Comparative Statistics for Minority Populations. Source: University of Redlands*

Figure 2: *Comparative Statistics for Traffic. Source: University of Redlands.*

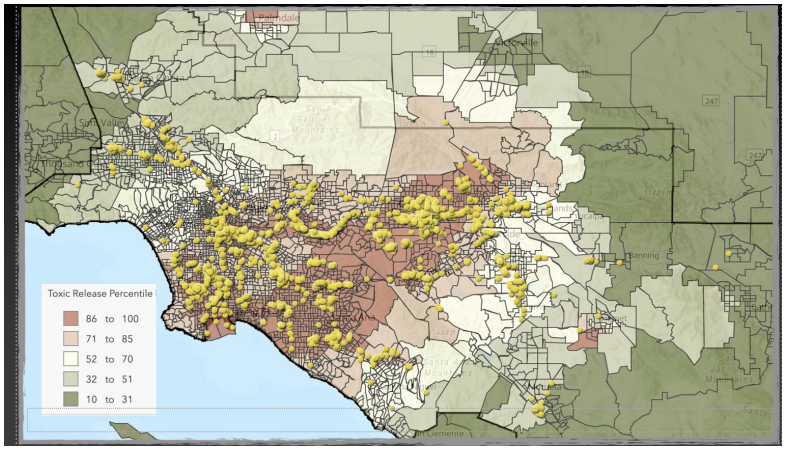


Figure 3: *Map of just Warehouses and Toxic Release Percentiles. Source University of Redlands.*

Article on I- 710 Expansion:

https://lbpost.com/news/trade-transportation/displacement-worries-those-whose-homes-businesses-could-be-in-the-710-expansions-path-as-metro-board-heads-to-a-vote/

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