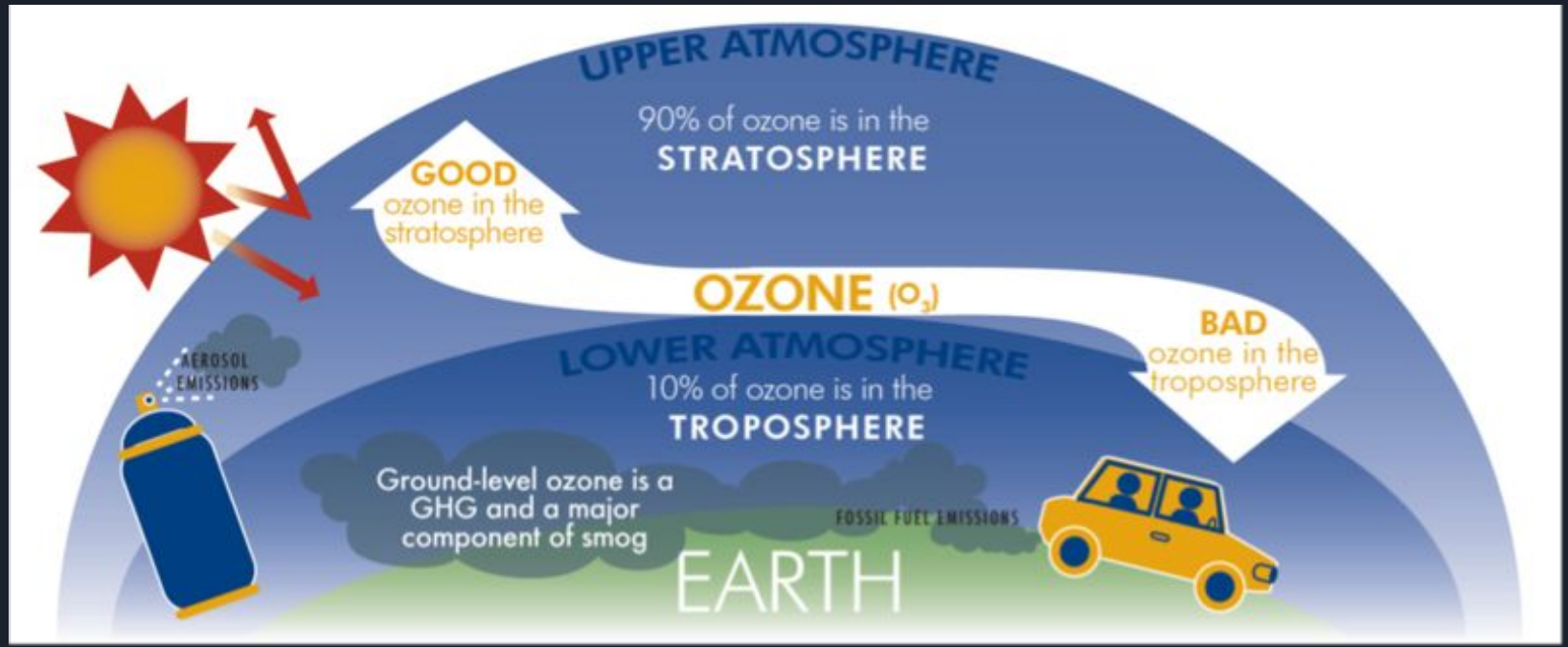
EV Sales vs. AQI

Presentation by: Leo, Julie, Ted, and Danielle

Troposphere or Ground Level Ozone



Nitrogen Dioxide (NO_2)

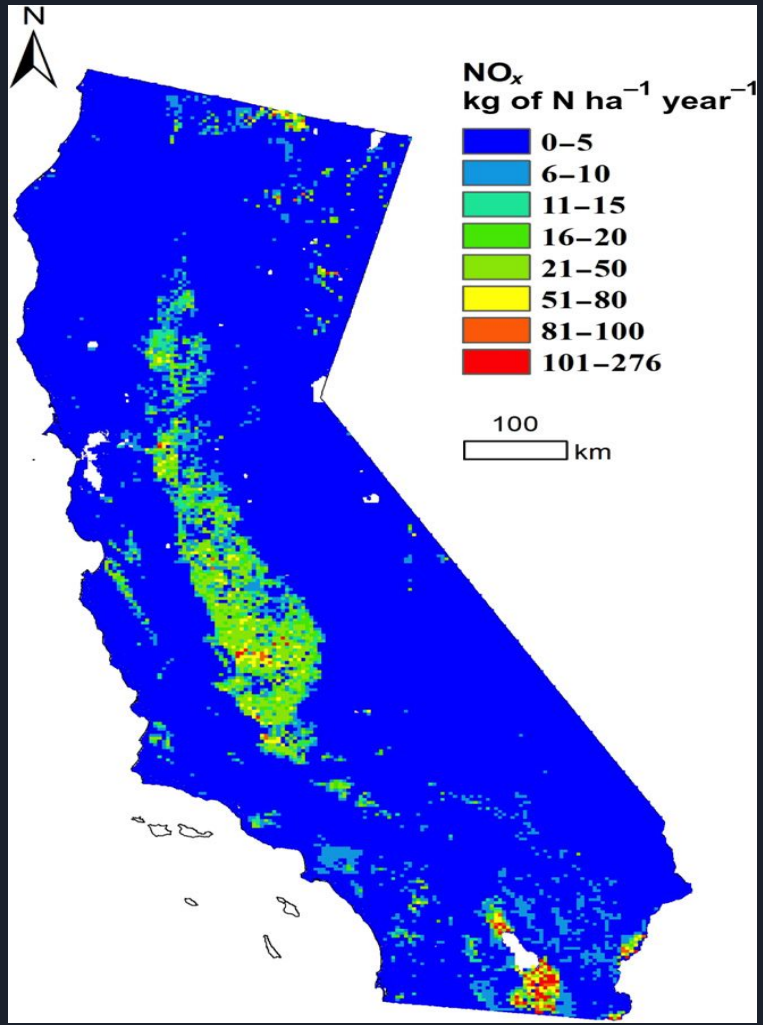
- Most Toxic
- Smog
- Damages Living Cells

Can electric vehicles help to increase air quality?

If more people buy electric cars, will air quality increase or decrease?

Data Exploration

- Alameda
- Los Angeles
- Orange
- San Diego
- Santa Clara



Cleanup process

	year	no2 avg	no2 aqi	ozone avg	ozone aqi	county	City Name
0	2018	8.8514	16.5973	0.0269	37.1507	Alameda	Livermore
1	2019	7.8973	15.8595	0.0267	37.4274	Alameda	Livermore
2	2020	7.6827	15.5464	0.0265	37.4563	Alameda	Livermore
3	2021	6.4024	13.6630	0.0280	38.4000	Alameda	Livermore
4	2022	7.2281	14.4565	0.0270	36.8777	Alameda	Livermore

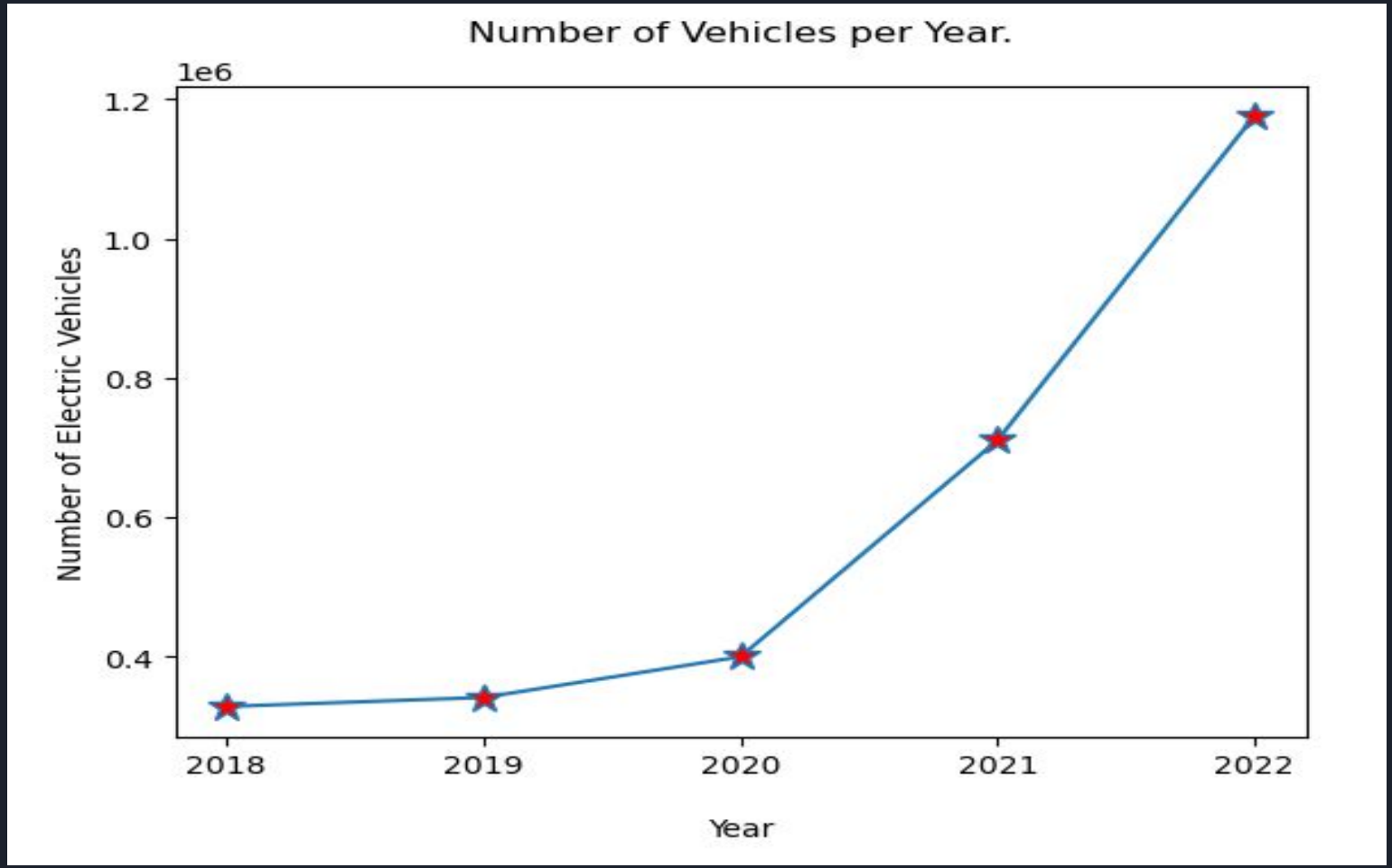
NO2 and Ozone data

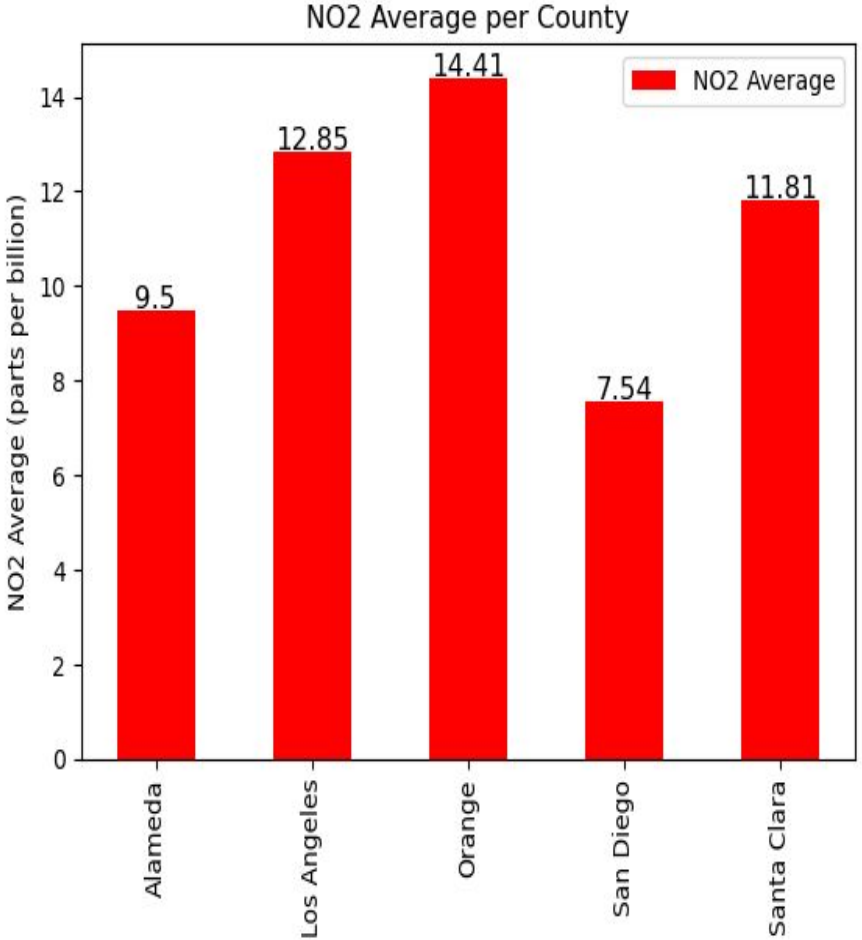
	year	county	Number of Vehicles
0	2018	Alameda	8357
1	2019	Alameda	8290
2	2020	Alameda	7492
3	2021	Alameda	11690
4	2022	Alameda	17111

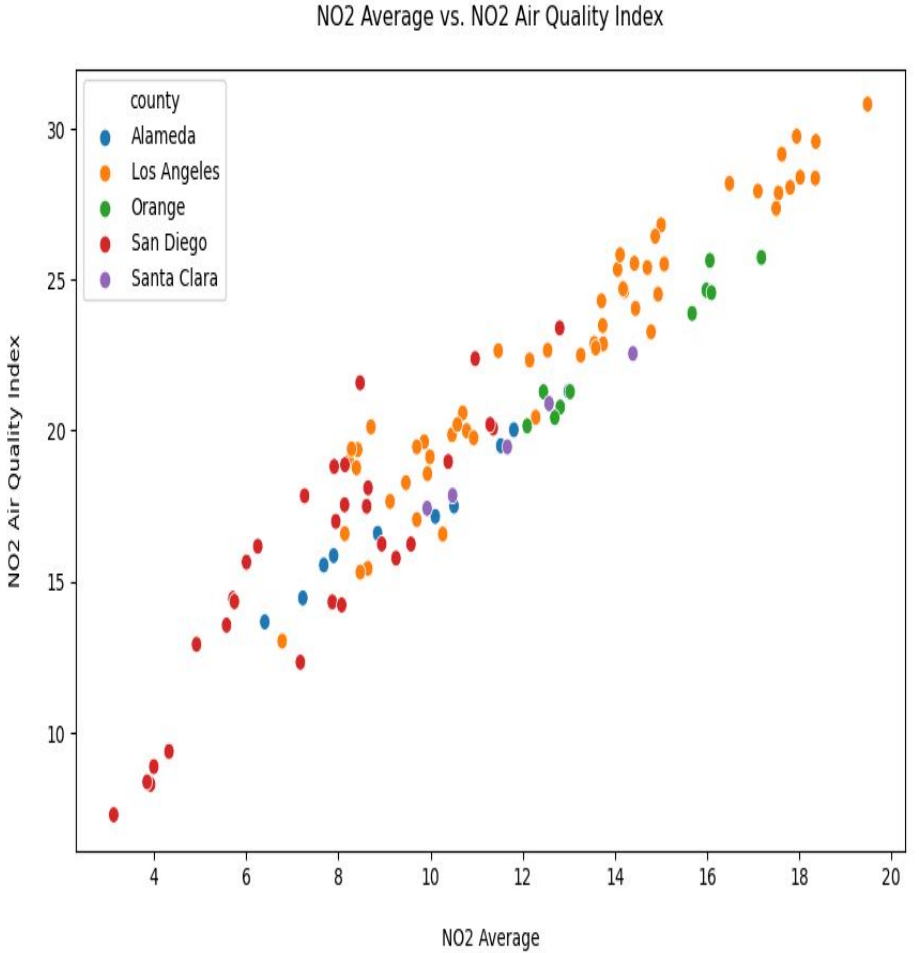
EV Population data

	year	no2 avg	no2 aqi	ozone avg	ozone aqi	county	City Name	Number of Vehicles
0	2018	8.8514	16.5973	0.0269	37.1507	Alameda	Livermore	8357
1	2019	7.8973	15.8595	0.0267	37.4274	Alameda	Livermore	8290
2	2020	7.6827	15.5464	0.0265	37.4563	Alameda	Livermore	7492
3	2021	6.4024	13.6630	0.0280	38.4000	Alameda	Livermore	11690
4	2022	7.2281	14.4565	0.0270	36.8777	Alameda	Livermore	17111

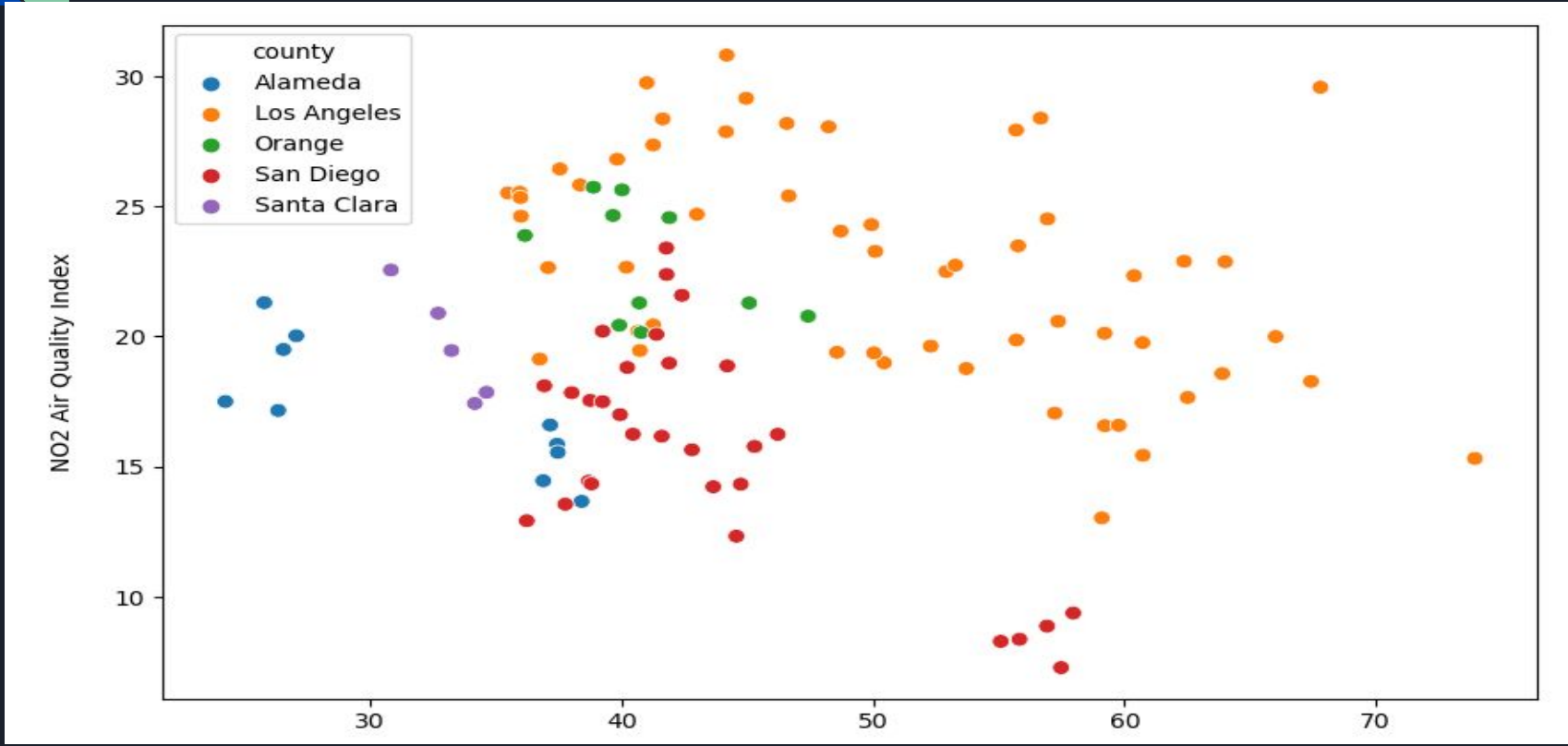
Merged the dataset based on the common columns "county" and "year"

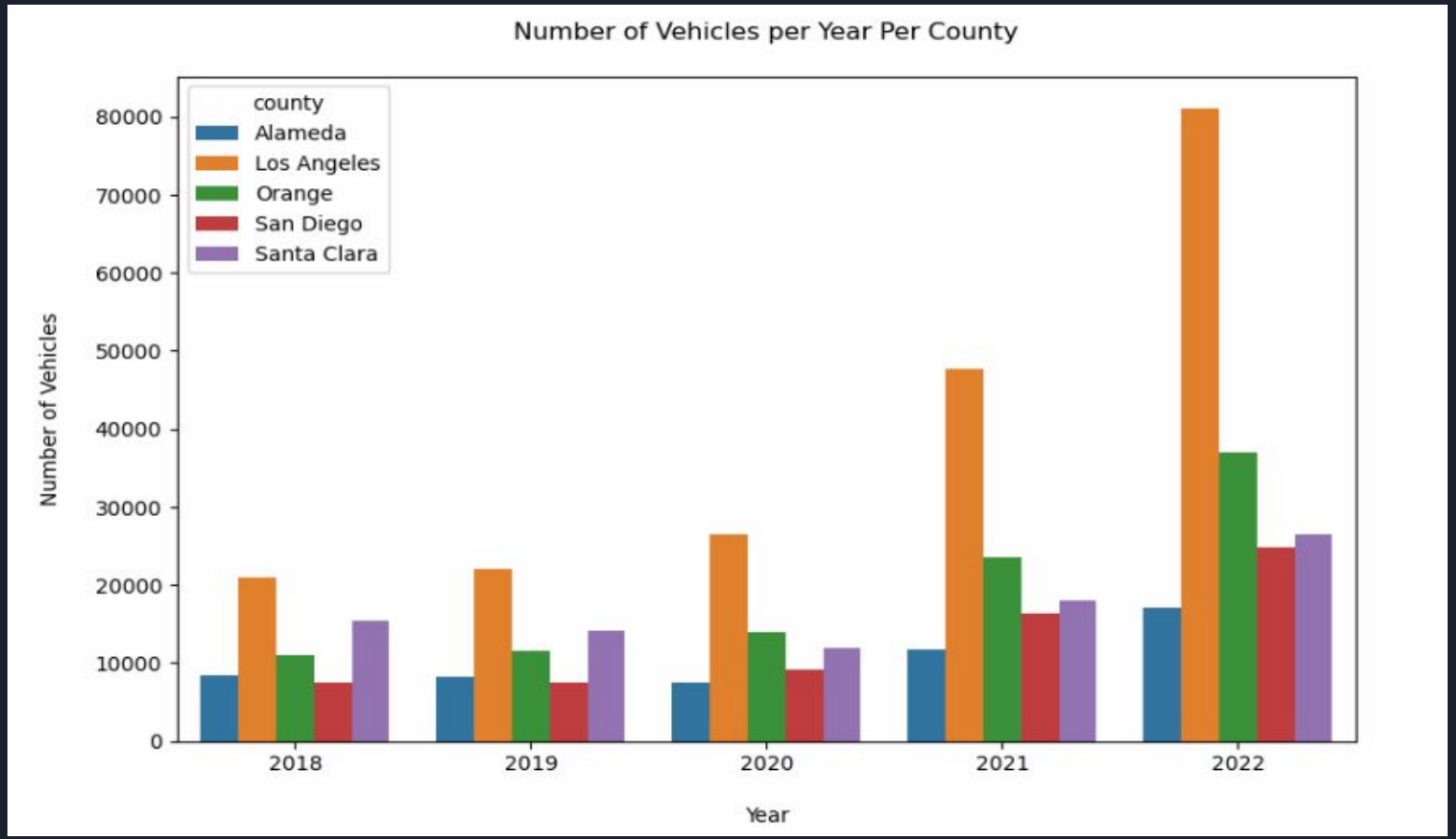

Number of Vehicles per Year.
1e6
1.2
1.0
0.8
0.6
0.4
Number of Electric Vehicles
2018
2019
2020
2021
2022
Year

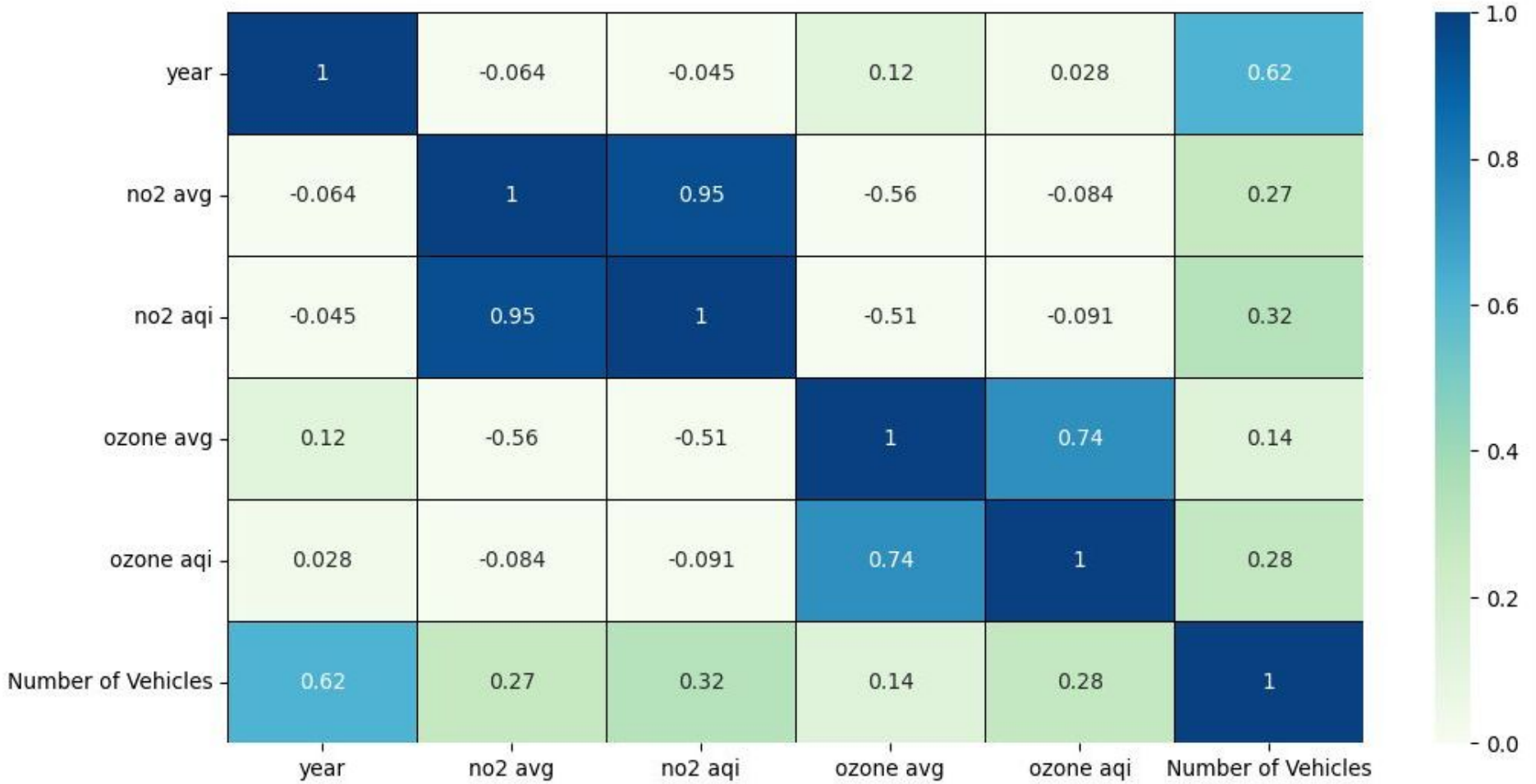

NO2 Average per County
NO2 Average
NO2 Average (parts per billion)
9.5
12.85
14.41
7.54
11.81
Alameda
Los Angeles
Orange
San Diego
Santa Clara


NO2 Average vs. NO2 Air Quality Index
county
Alameda
Los Angeles
Orange
San Diego
Santa Clara
NO2 Air Quality Index
NO2 Average

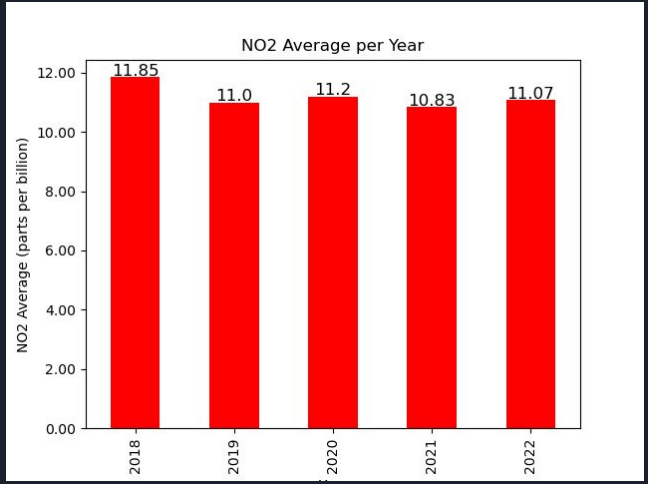
Ozone Air Quality Index vs NO2 Average

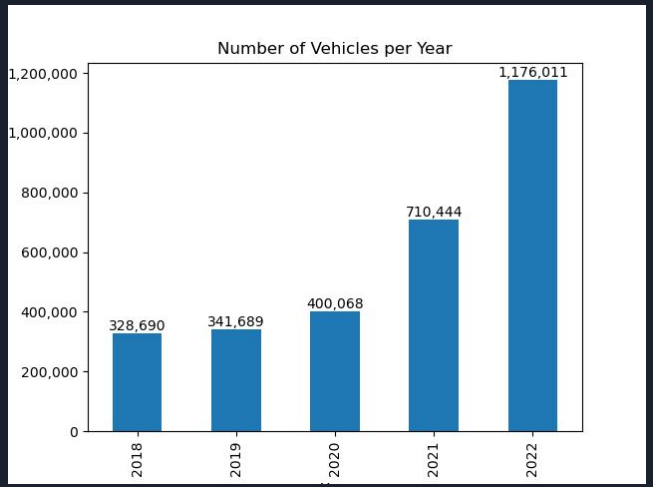


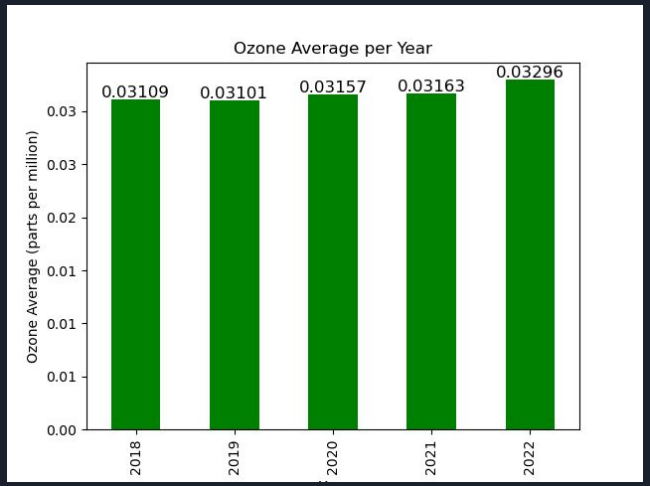

Number of Vehicles per Year Per County
county
Alameda
Los Angeles
Orange
San Diego
Santa Clara
Number of Vehicles
0
10000
20000
30000
40000
50000
60000
70000
80000
2018
2019
2020
2021
2022
Year


year
no2 avg
no2 aqi
ozone avg
ozone aqi
Number of Vehicles
1
-0.064
-0.045
0.12
0.028
0.62
-0.064
1
0.95
-0.56
-0.084
0.27
-0.045
0.95
1
-0.51
-0.091
0.32
0.12
-0.56
-0.51
1
0.74
0.14
0.028
-0.084
-0.091
0.74
1
0.28
0.62
0.27
0.32
0.14
0.28
1
year
no2 avg
no2 aqi
ozone avg
ozone aqi
Number of Vehicles
1.0
0.8
0.6
0.4
0.2
0.0

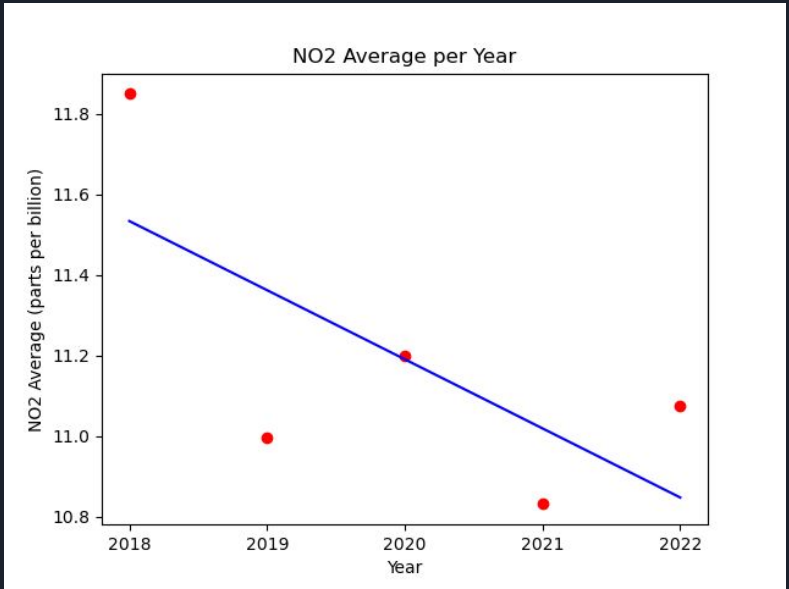
Results


NO2 Average per Year
NO2 Average (parts per billion)
12.00
10.00
8.00
6.00
4.00
2.00
0.00
11.85
11.0
11.2
10.83
11.07
2018
2019
2020
2021
2022

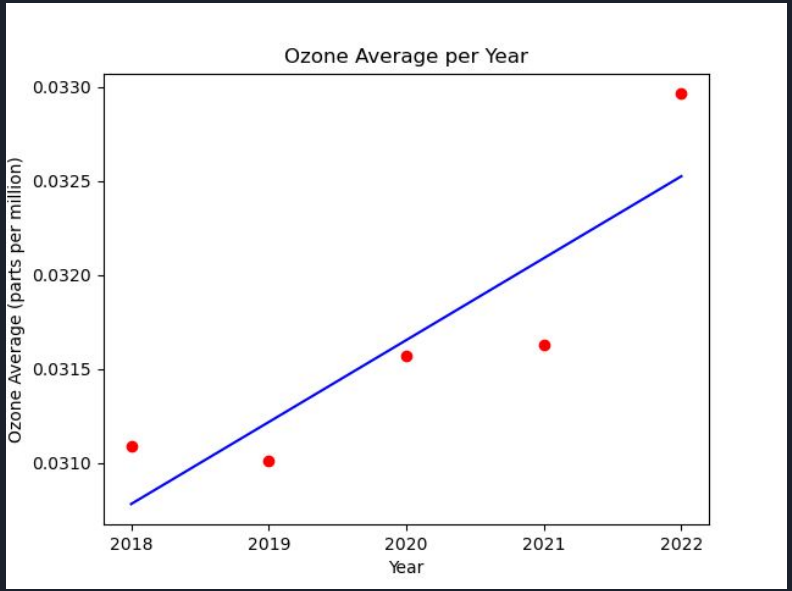

Number of Vehicles per Year
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
328,690
341,689
400,068
710,444
1,176,011
2018
2019
2020
2021
2022


Ozone Average per Year
Ozone Average (parts per million)
0.03
0.03
0.02
0.01
0.01
0.01
0.00
0.03109
0.03101
0.03157
0.03163
0.03296
2018
2019
2020
2021
2022

Results

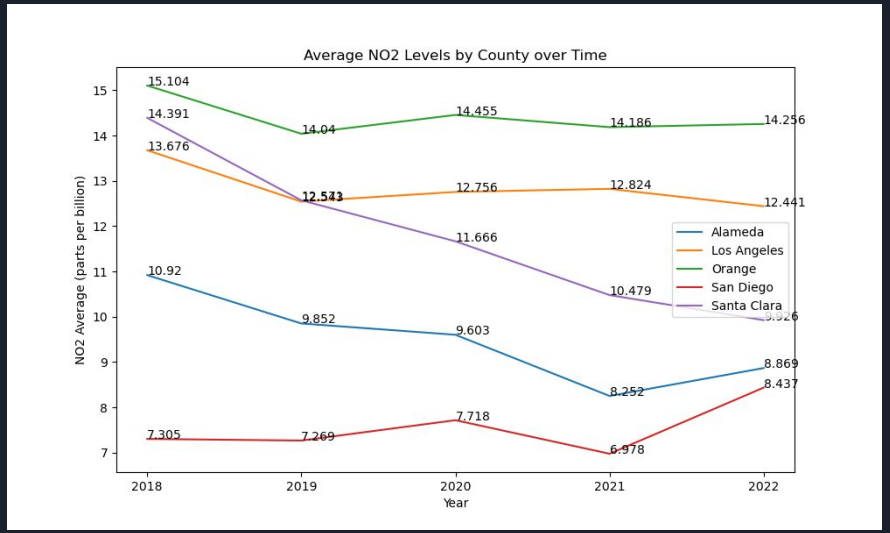


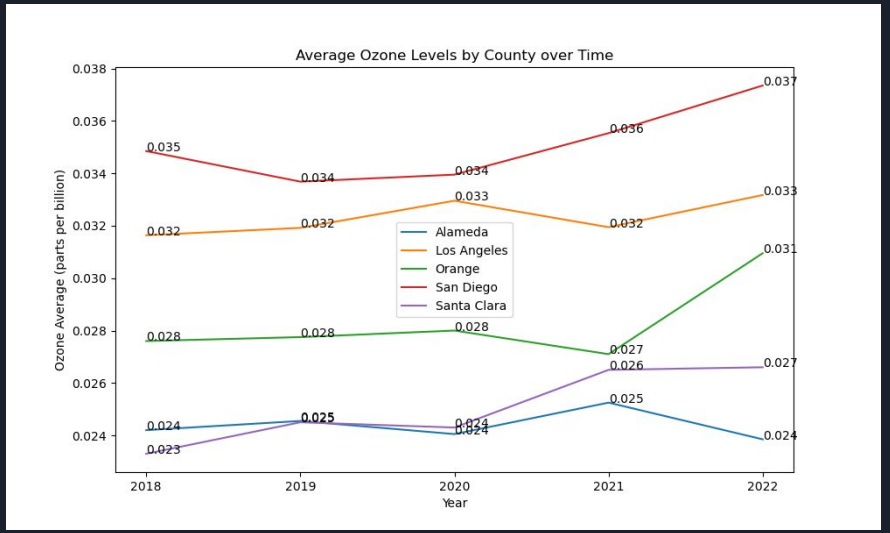
The r value is: -0.6923089216669938



The r value is: 0.8807406606421045

Results


Average NO2 Levels by County over Time
NO2 Average (parts per billion)
Year
Alameda
Los Angeles
Orange
San Diego
Santa Clara
15.104
14.04
14.455
14.186
14.256
14.391
13.676
12.571
12.756
12.824
12.441
11.666
10.479
10.92
9.852
9.603
8.252
8.869
7.305
7.269
7.718
6.978
8.437


Average Ozone Levels by County over Time
Ozone Average (parts per billion)
Year
Alameda
Los Angeles
Orange
San Diego
Santa Clara
0.035
0.034
0.034
0.036
0.037
0.032
0.032
0.033
0.032
0.033
0.028
0.028
0.028
0.027
0.031
0.024
0.025
0.024
0.025
0.024
0.023
0.024
0.026
0.027

What do our findings mean?

- These trends and patterns are limited to the data that we researched and may not be representative.
- There were many factors not included in this dataset, such as weather patterns, that can influence air quality levels.
- A more in-depth analysis would be required to draw more definitive conclusions about air quality trends in these counties.

References

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- EPA (2022, November 14). Pre-Generated Data Files.: Tables of Daily and Daily Summary Data. https://aqs.epa.gov/aqsweb/airdata/download_files.html#Daily
- California Energy Commission (2023). ZEV and Infrastructure Stats Data. https://www.energy.ca.gov/files/zev-and-infrastructure-stats-data
- Vajiram & Ravi. IAS Study Center. (2023, January 10). Ozone Layer The recent United Nations report, Scientific Assessment of Ozone Depletion: 2022 said that the Earth's ozone layer is slowly recovering. (vajiramias.com)
- Energy Education (2021, May 18). Ozone Ozone - Energy Education