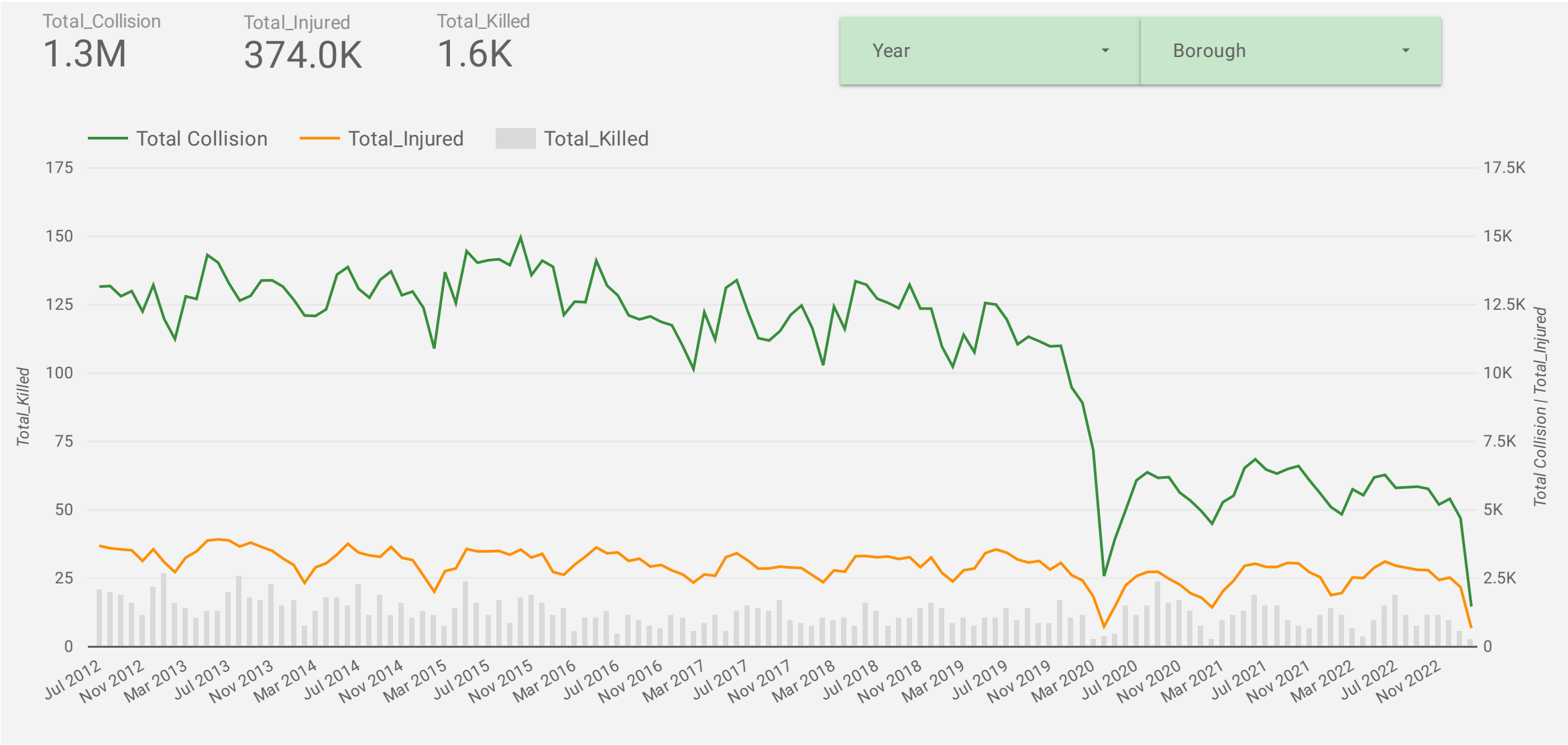


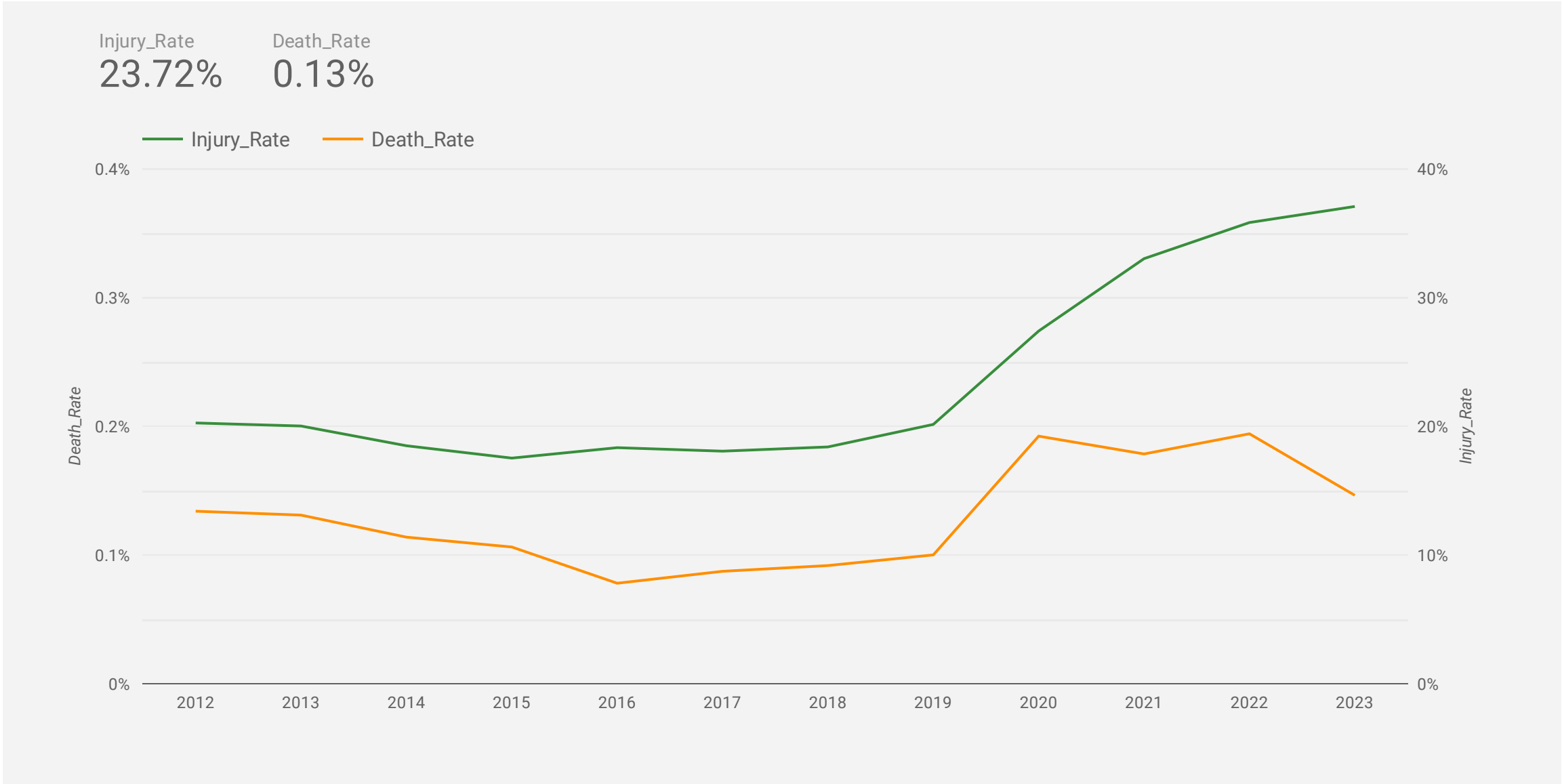
VISION ZERO

OVERVIEW

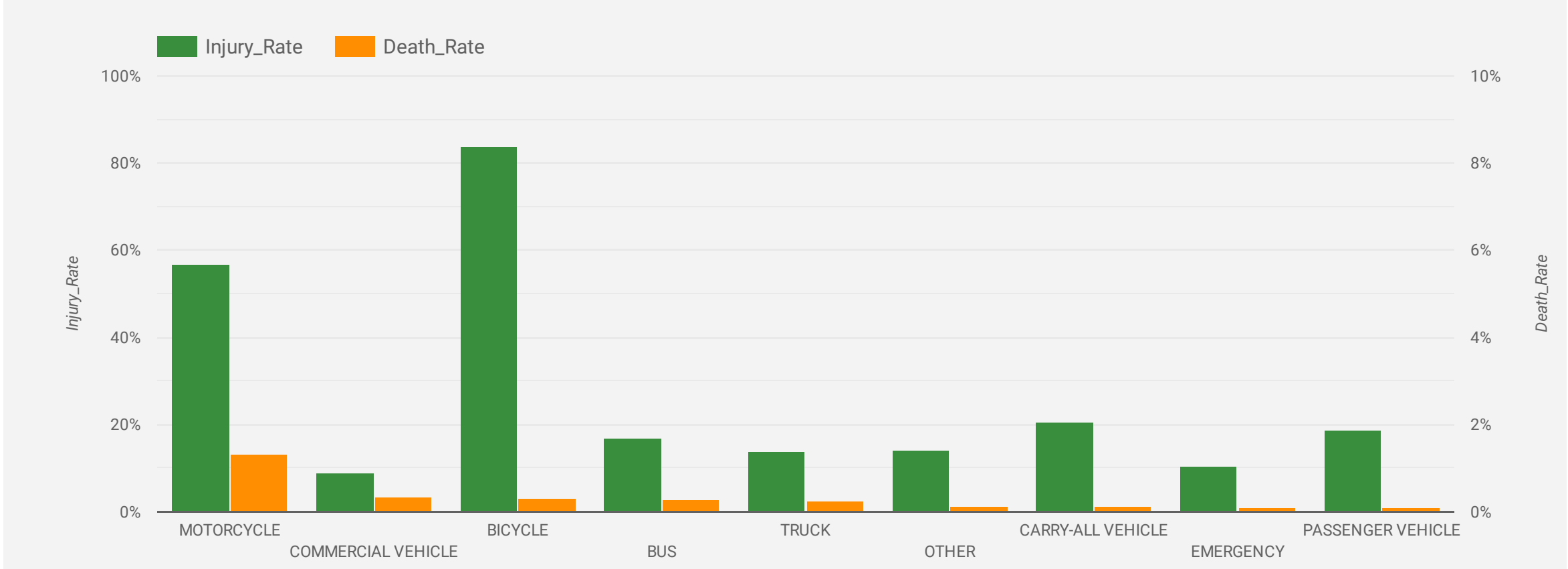
Total Number of Collisions By Year and Month



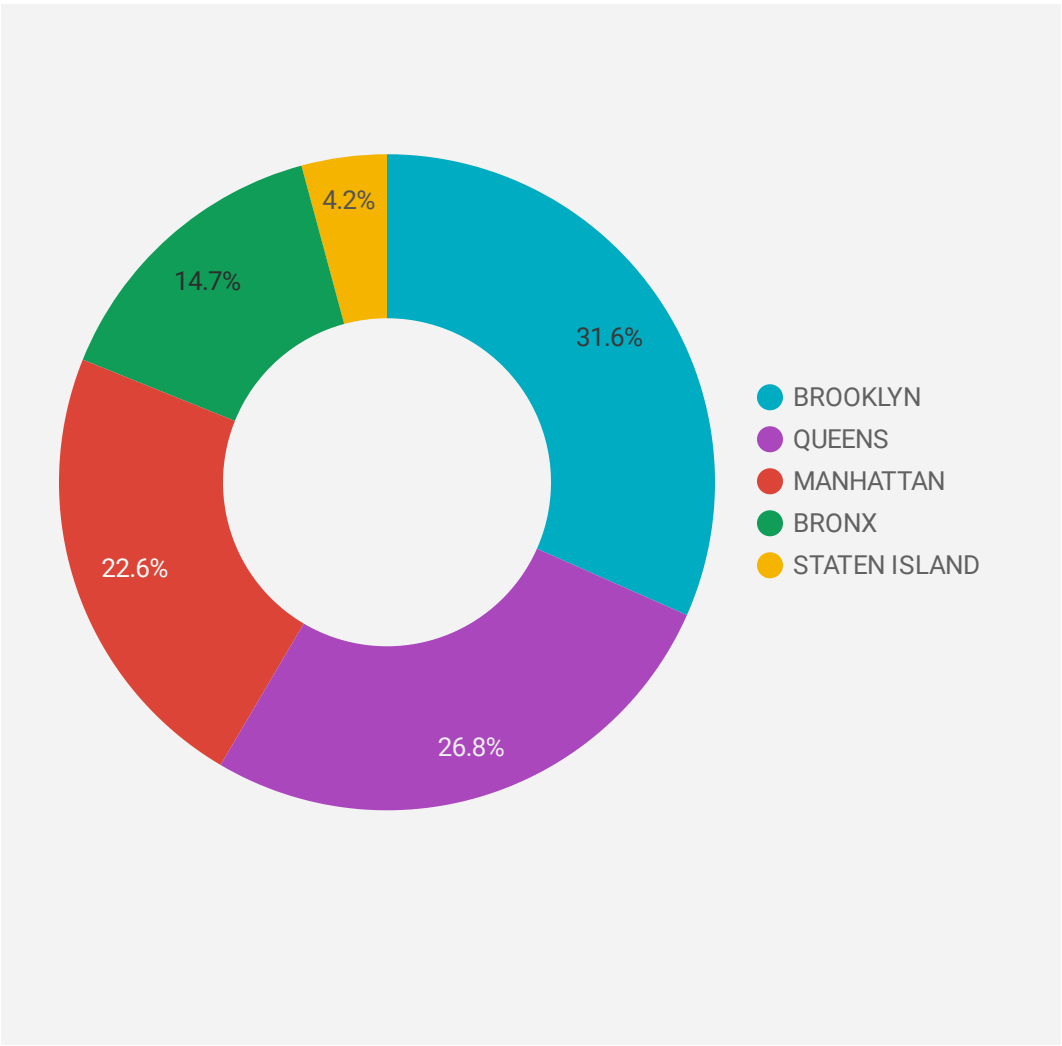
Rate of Injury and Death From 2012 to 2023



Casualty by Vehicles Types



Collisions by Borough



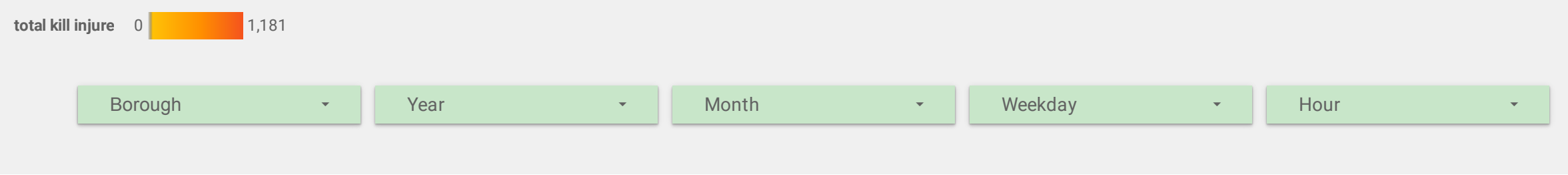
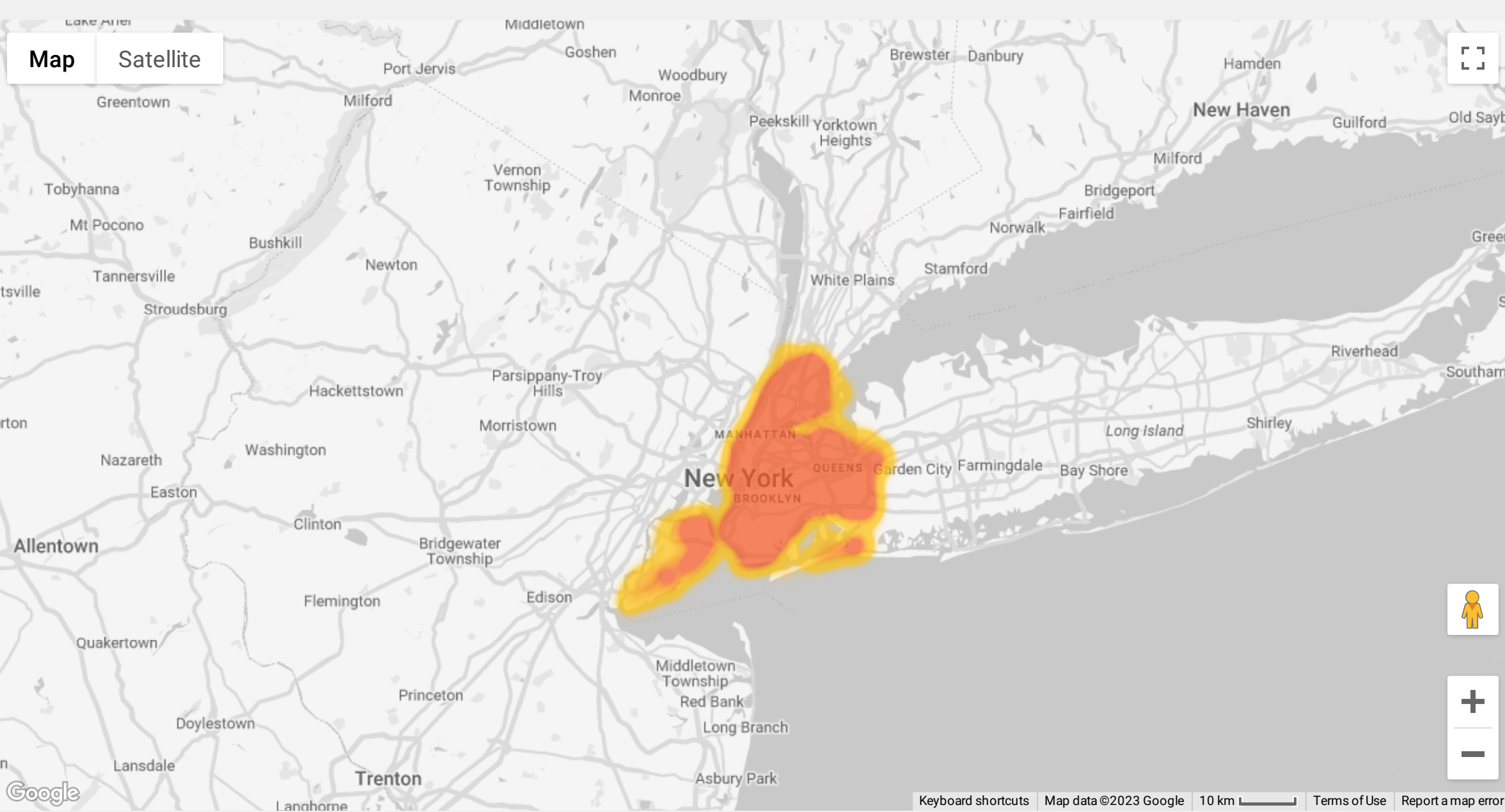
Collisions by Contributing Factors

Primary_Factor		Collisions
1.	Driver Inattention/Distraction	25,978
2.	Failure to Yield Right-of-Way	8,755
3.	Backing Unsafely	8,598
4.	Other Vehicular	7,543
5.	Following Too Closely	4,787
6.	Fatigued/Drowsy	3,740
7.	Driver Inexperience	2,874
8.	Lost Consciousness	1,868
9.	Passing Too Closely	1,793
10.	Passing or Lane Usage Improper	1,682
11.	Alcohol Involvement	1,621
12.	Aggressive Driving/Road Rage	1,009
13.	Traffic Control Disregarded	975
14.	Oversized Vehicle	936
15.	Prescription Medication	514

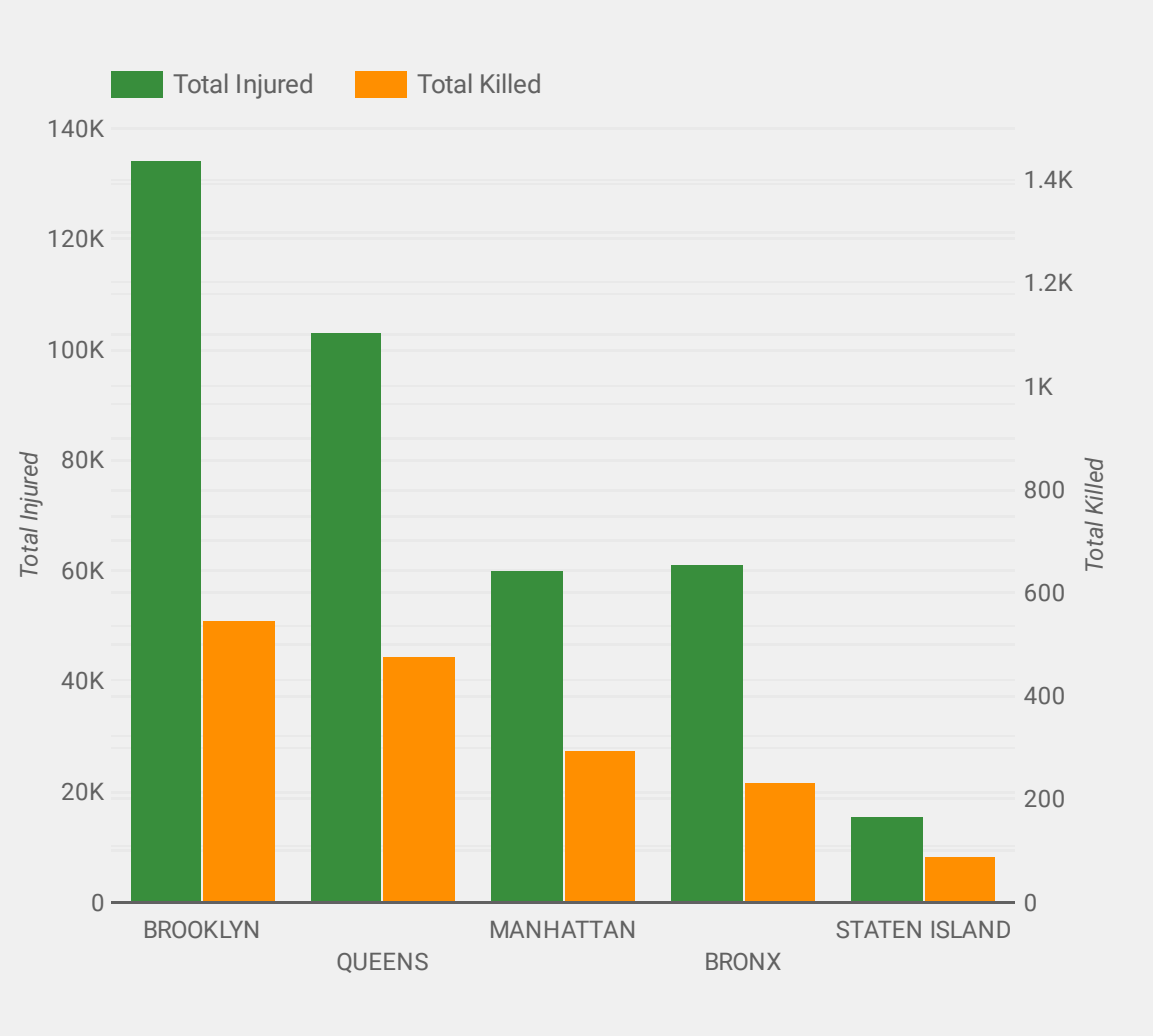


GEOGRAPHY

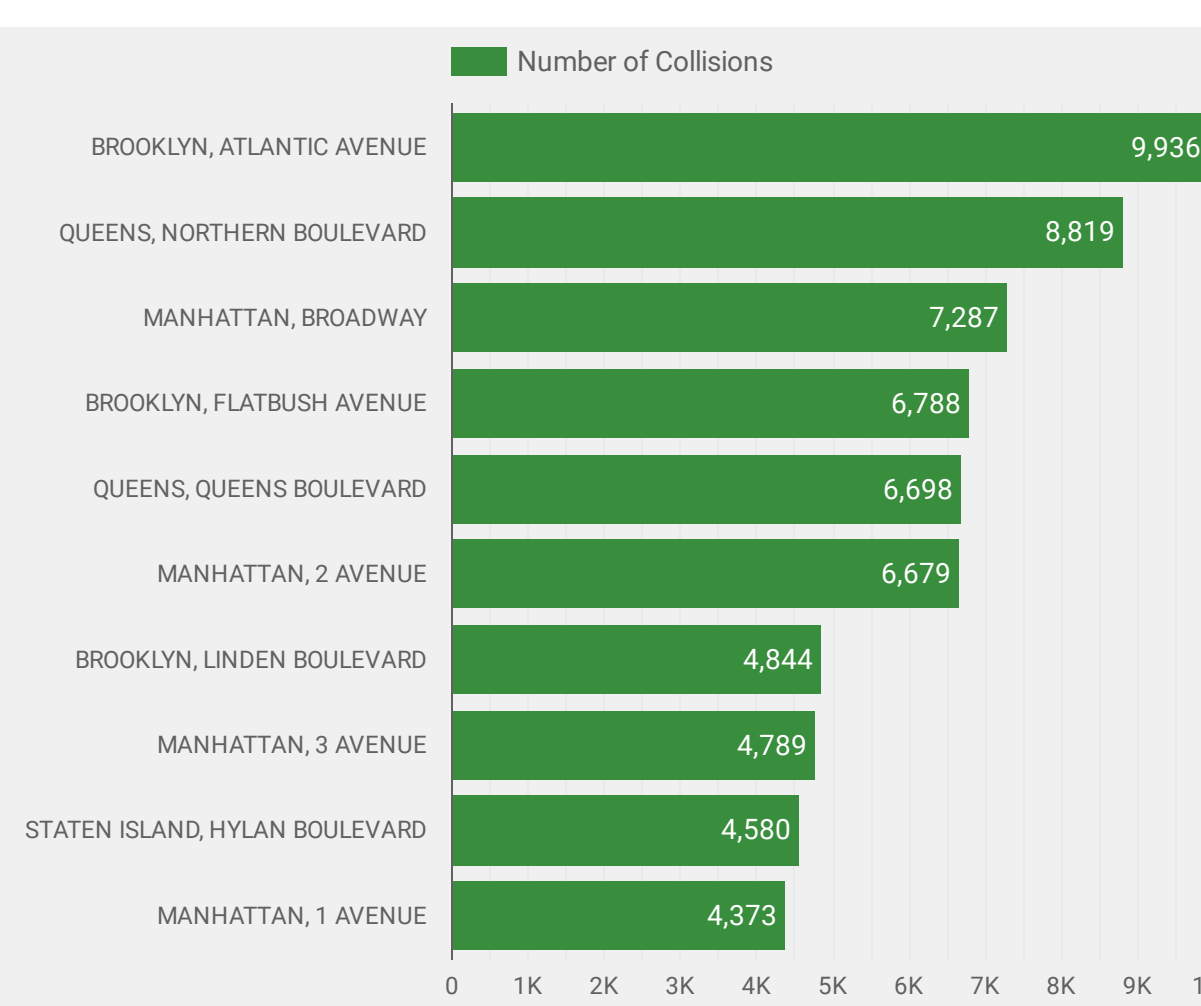
Heatmap of New York Collisions with Injuries or Deaths



Number of Total Collisions by Borough



Streets with Highest number of Collisions

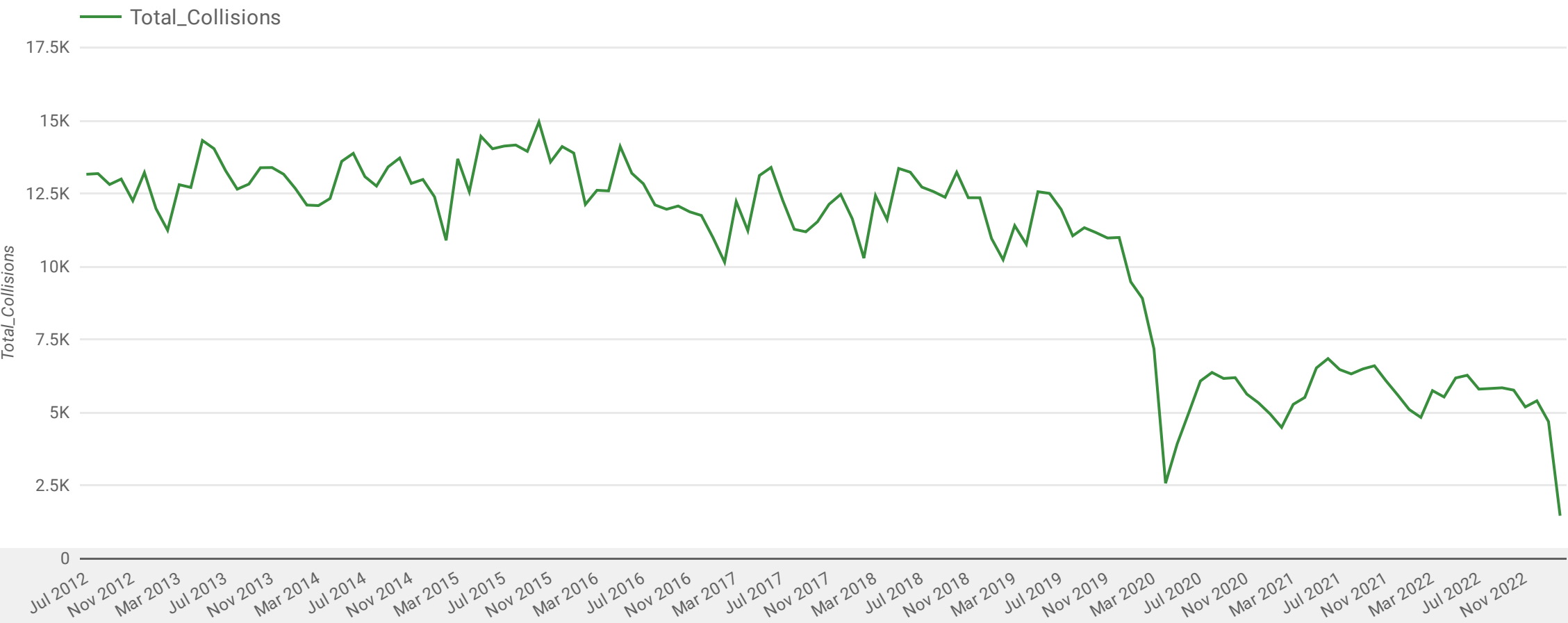




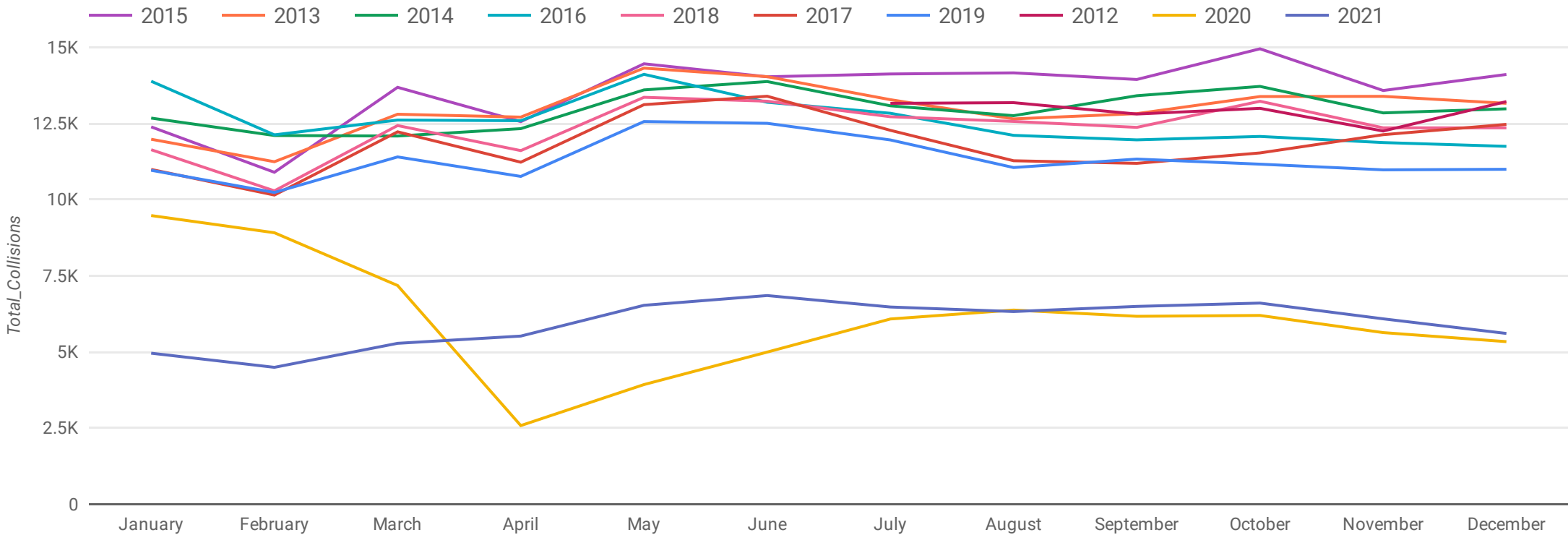
COLLISIONS

time-related pattern

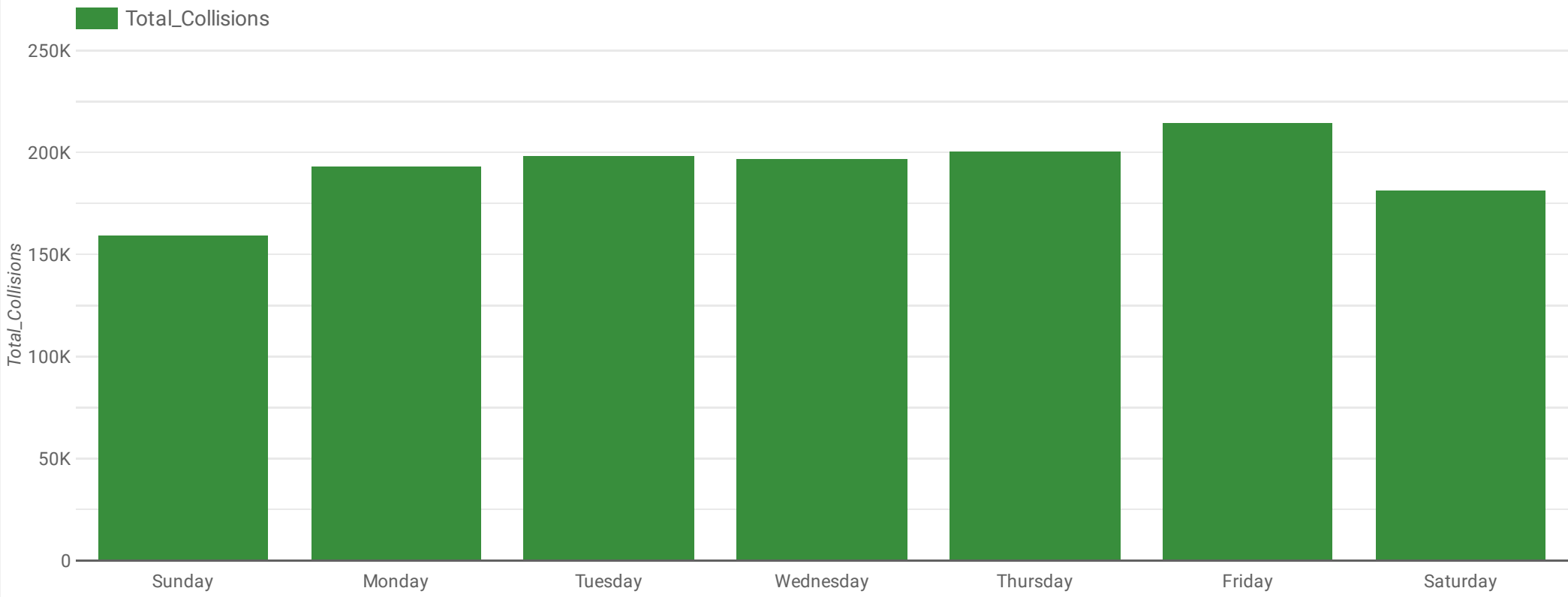
Number of Collisions by Year and Month



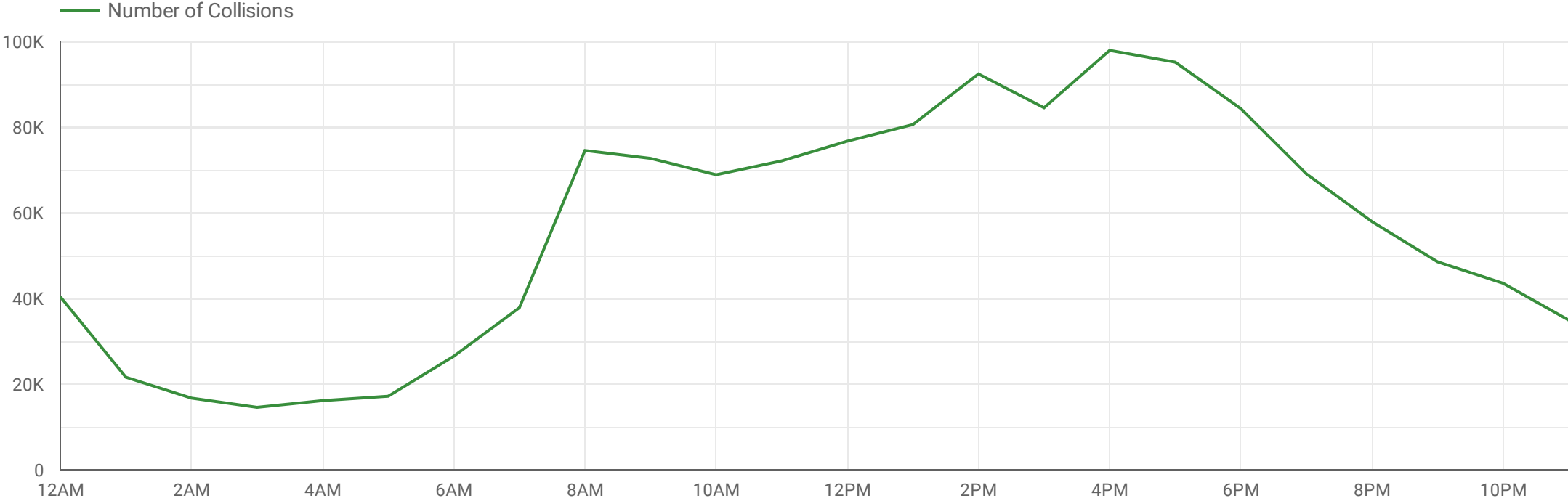
Number of Collisions by Month



Number of Collisions by Weekday



Number of Collisions by Time in a Day

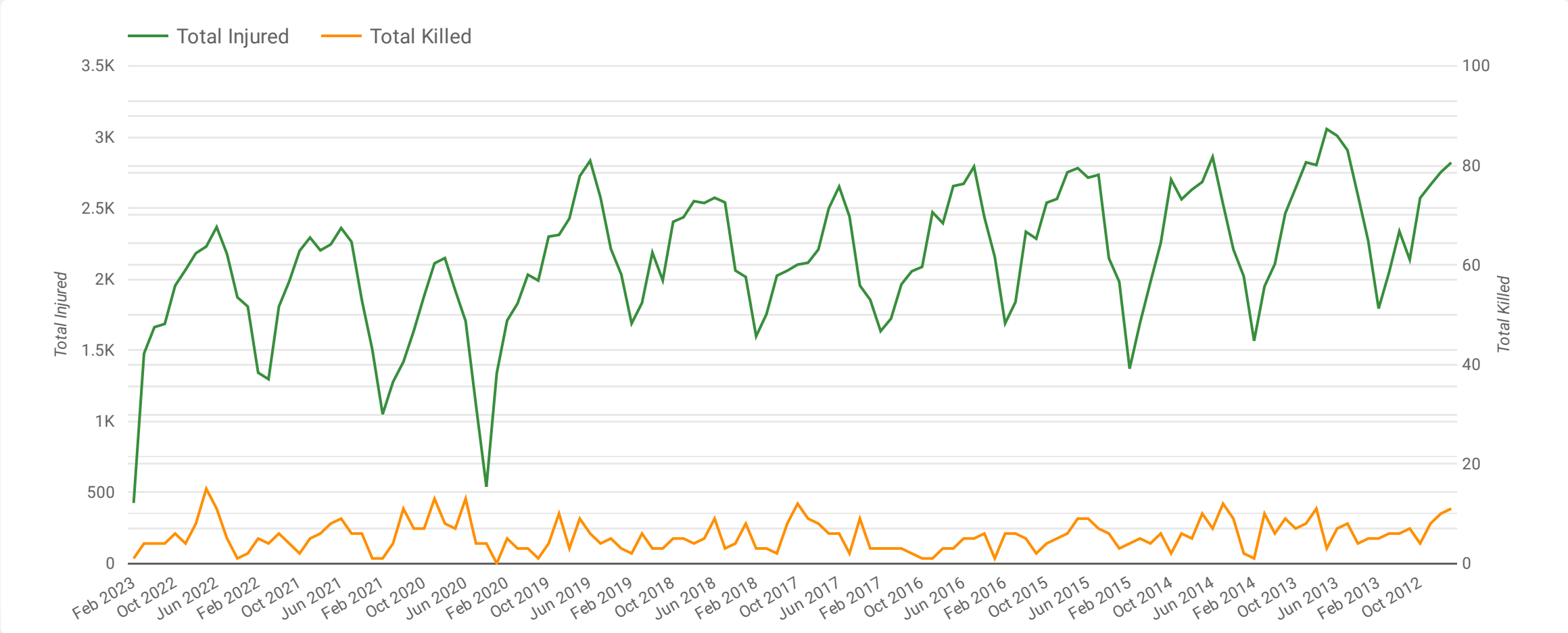




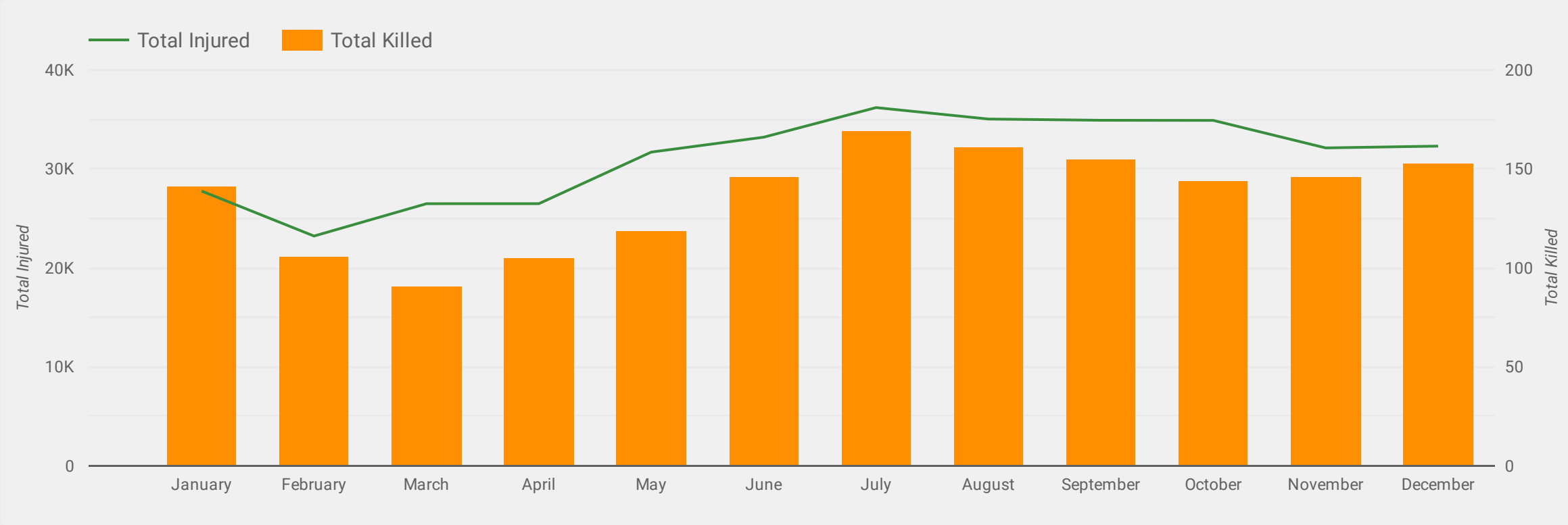
CASUALTY

time-related pattern

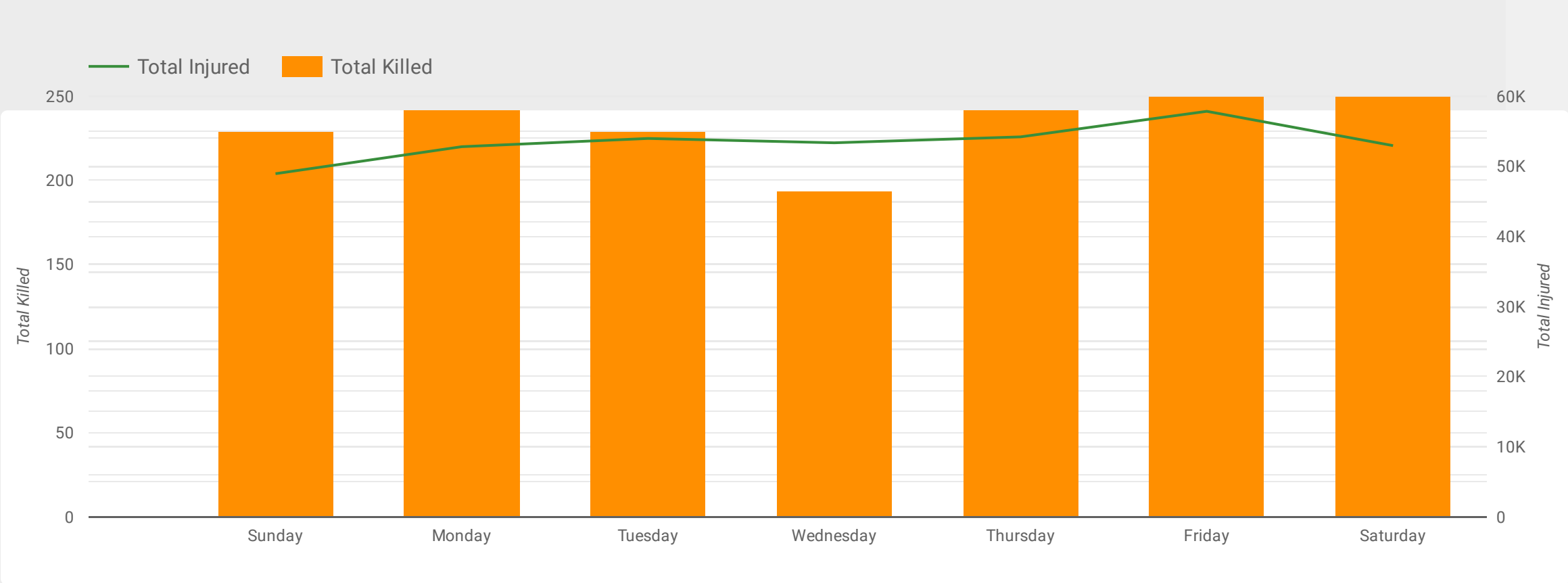
Casualty by Year and Month



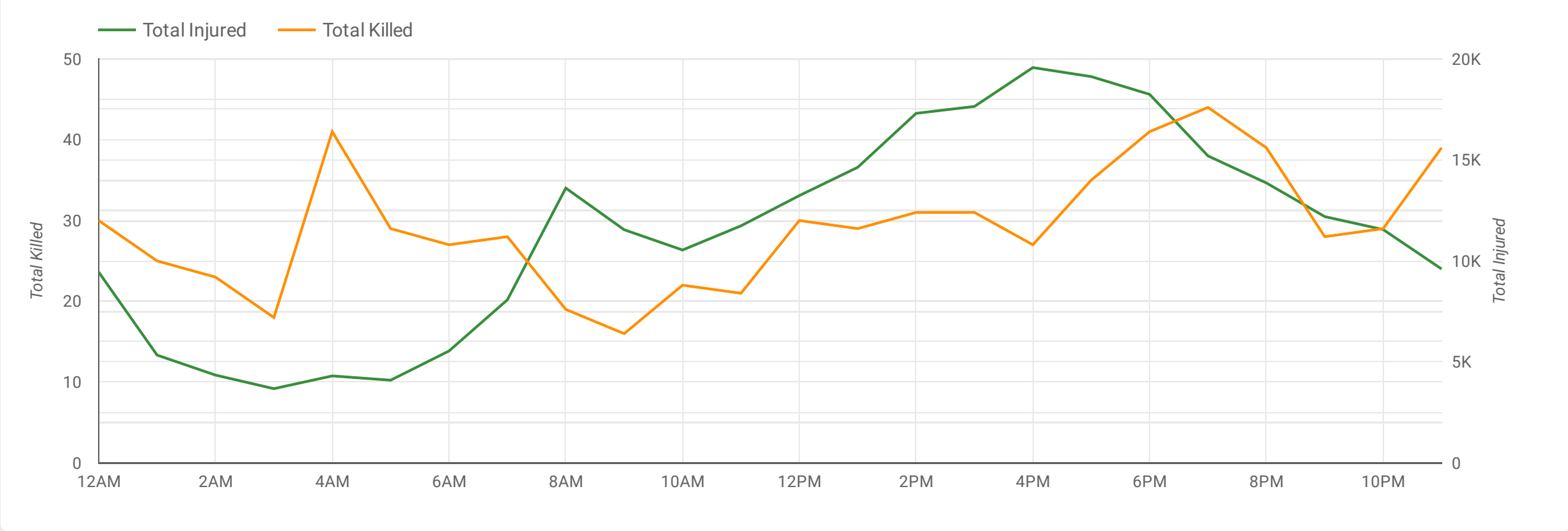
Casualty by Month



Casualty by Weekday

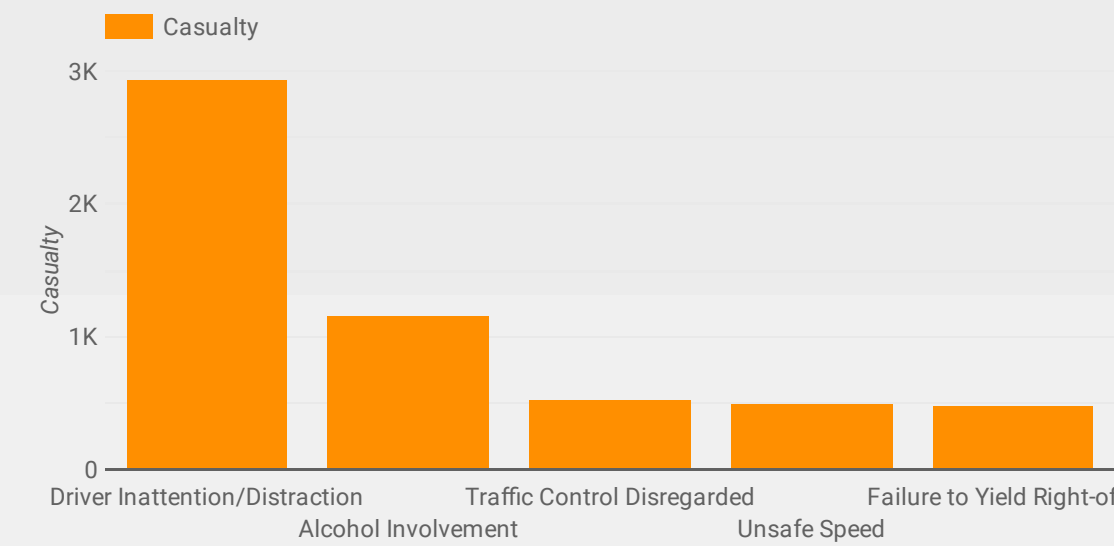


Casualty by Time in a Day



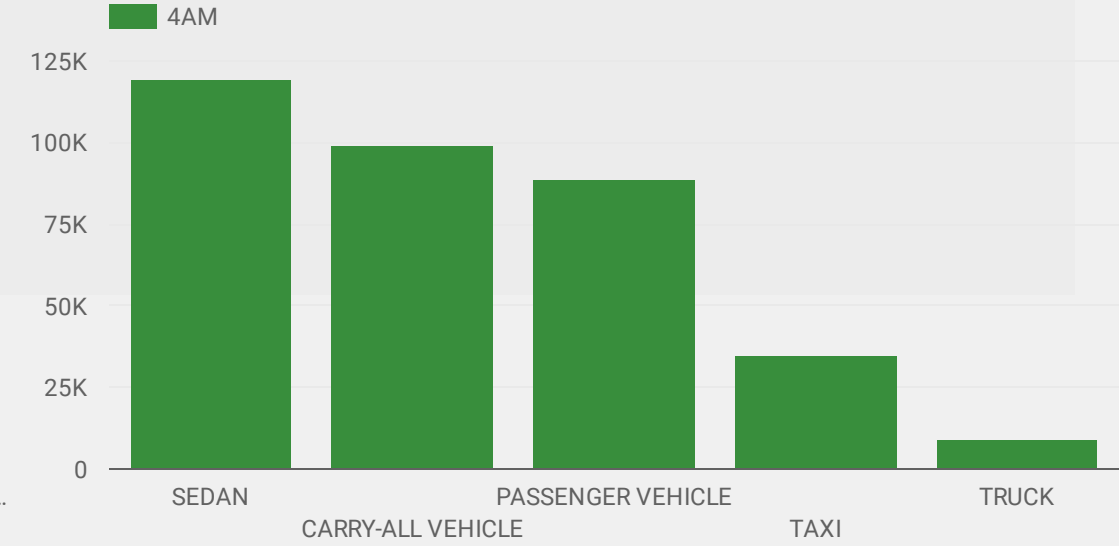
4AM Deep Insight by Contributing Factor

(Compare with all-day data,, only "Driver Inattention" and "Failure to Yield Right-of-Way" are same)

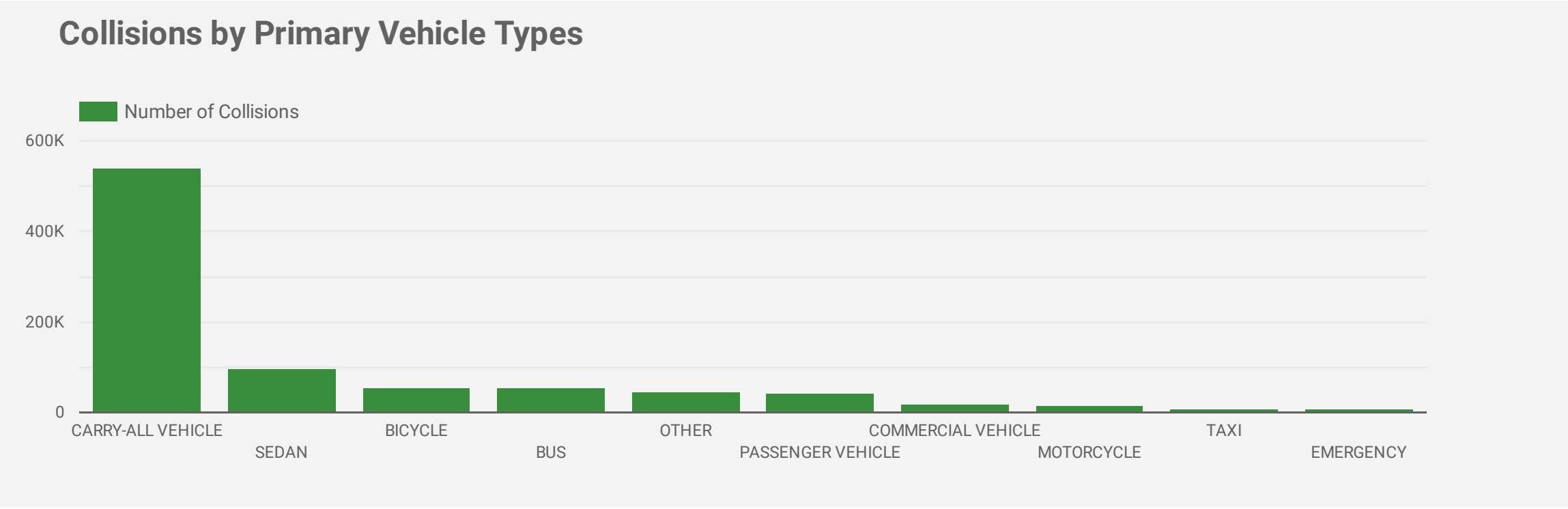


4AM Deep Insight by Vehicle Type

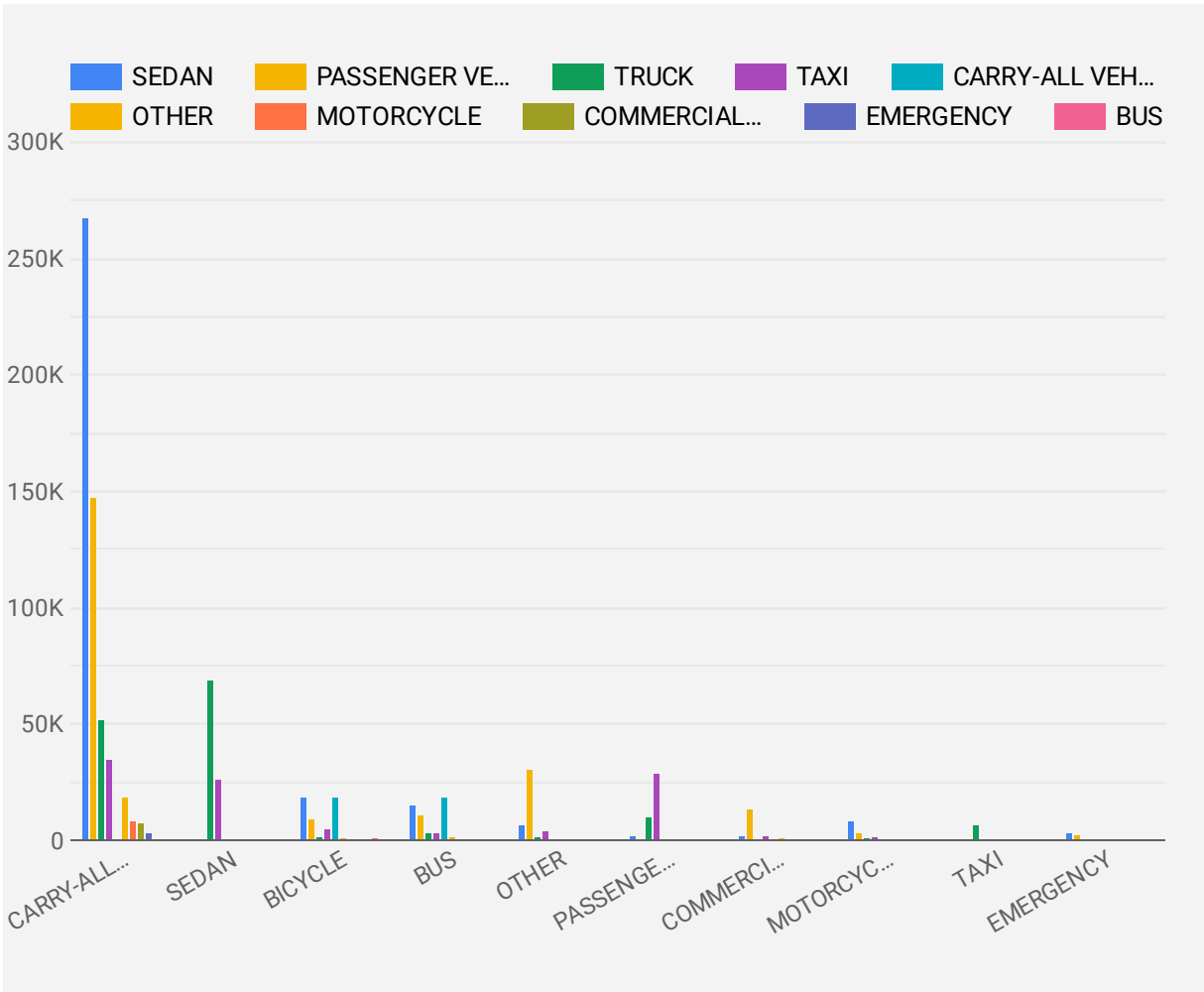
(Compare with all-day data, "Passenger Vehicle", "Taxi" and "Truck" are on the top)



VEHICLE TYPE (Total Collisions)



Collisions by Primary- Secondary Vehicle Combination



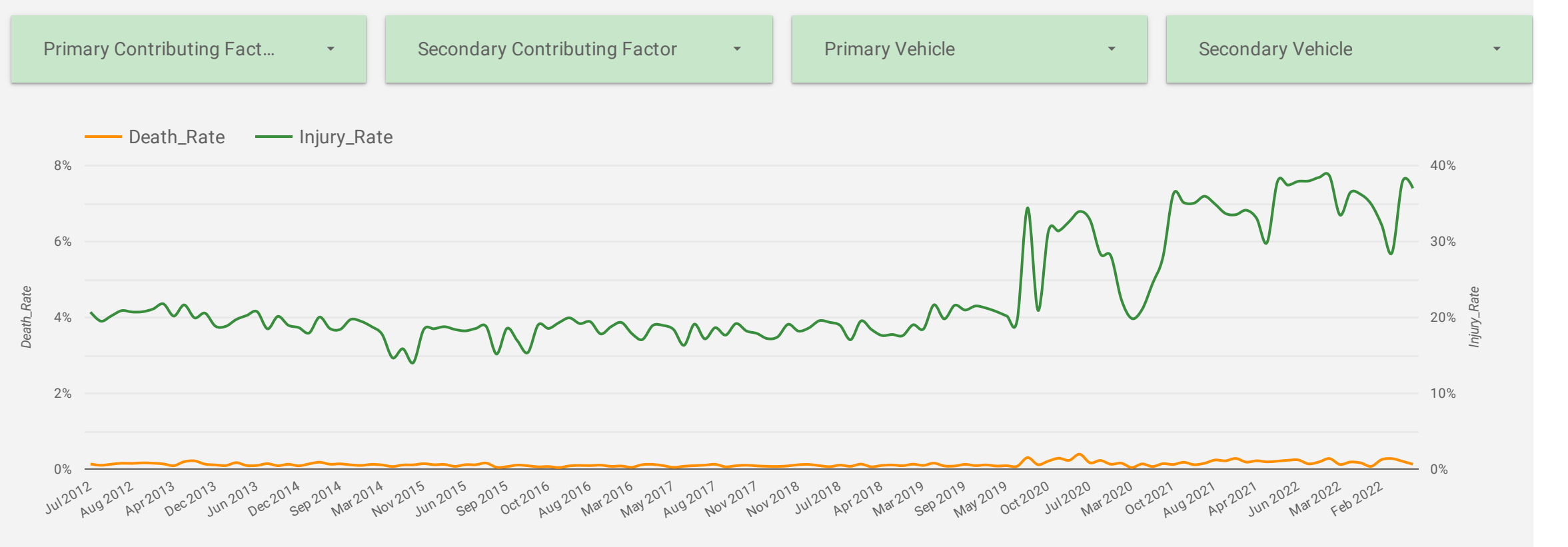
Death and Injury Rate by Vehicle Combination

	Vehicle 1	Vehicle 2	Death Rate ...	Injure Rate
1.	MOTORCYCLE	EMERGENCY	11.11	66.67
2.	COMMERCIAL VEHI...	BICYCLE	3.29	71.05
3.	MOTORCYCLE	BUS	2.82	46.48
4.	TRUCK	BICYCLE	2.79	78.58
5.	MOTORCYCLE	TRUCK	2.48	45.45
6.	BICYCLE	TRUCK	2.34	72.9
7.	TRUCK	MOTORCYCLE	2.19	54.64
8.	COMMERCIAL VEHI...	MOTORCYCLE	2.13	40.43
9.	MOTORCYCLE	CARRY-ALL V...	2.07	51.26
1...	BICYCLE	BUS	1.98	73.27

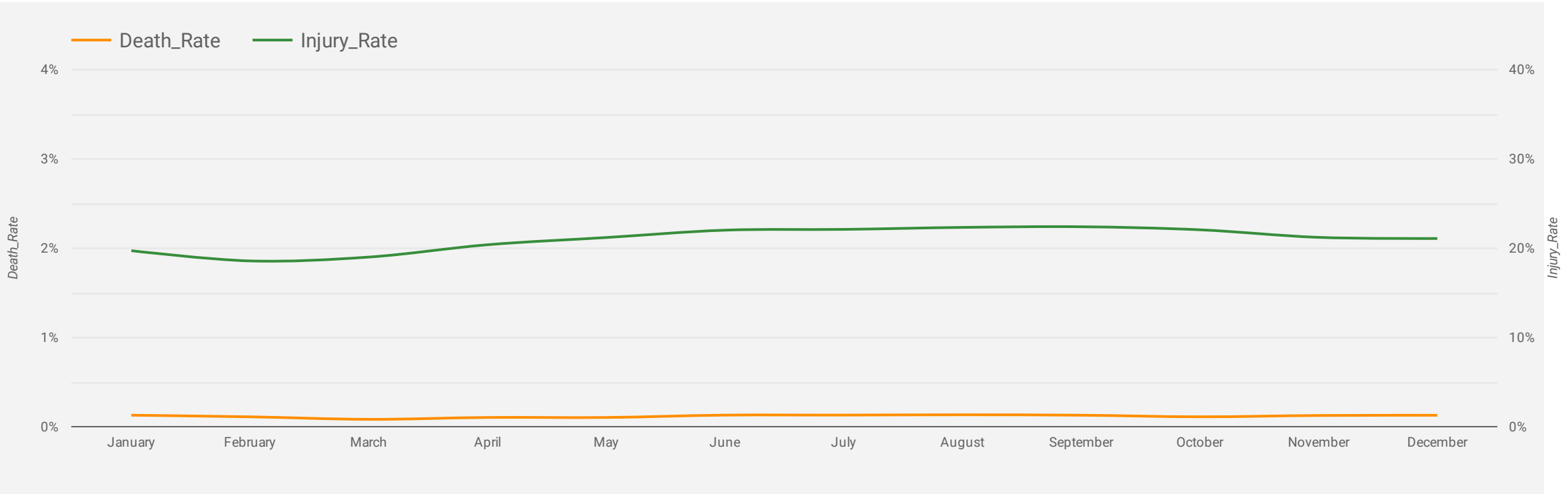


RATE (Vehicle Type and Contributing Factor)

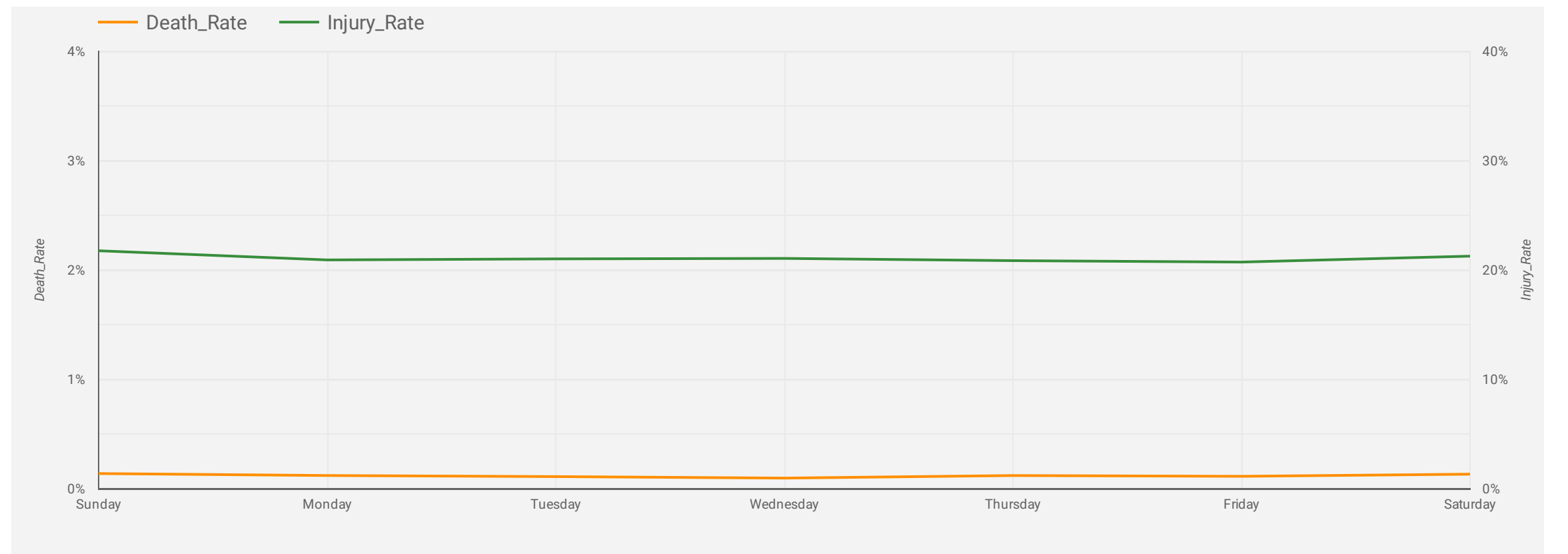
Injury and Death Rate by Year and Month



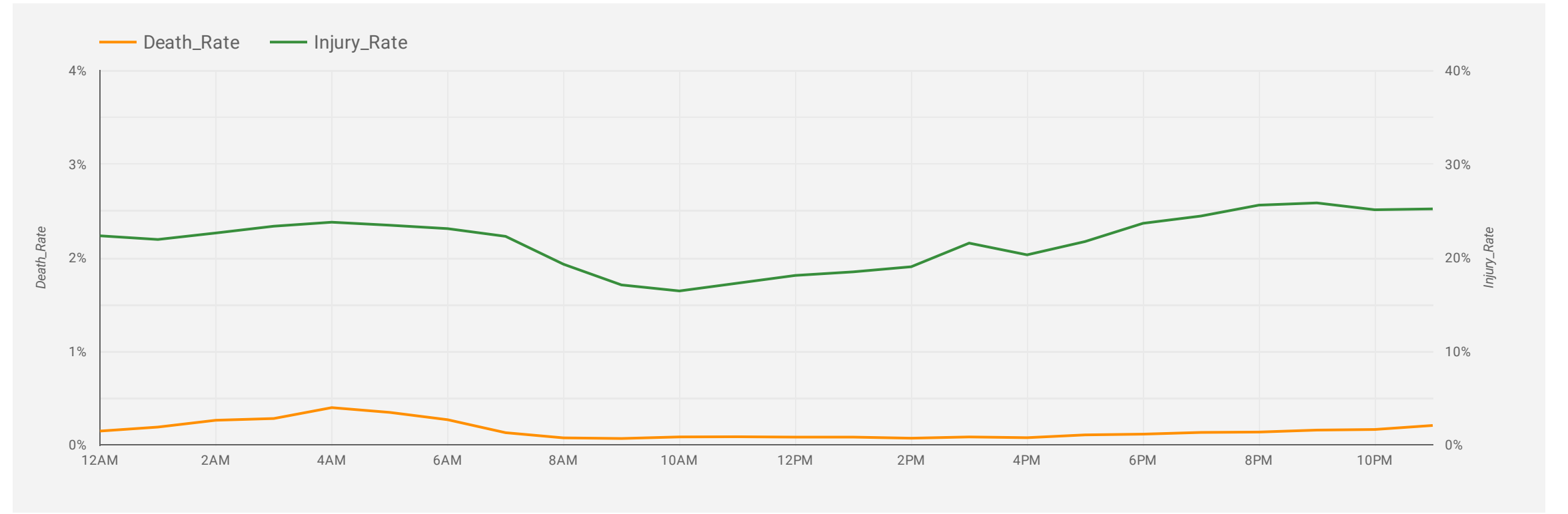
Injury and Death Rate by Month



Injury and Death Rate by Weekday



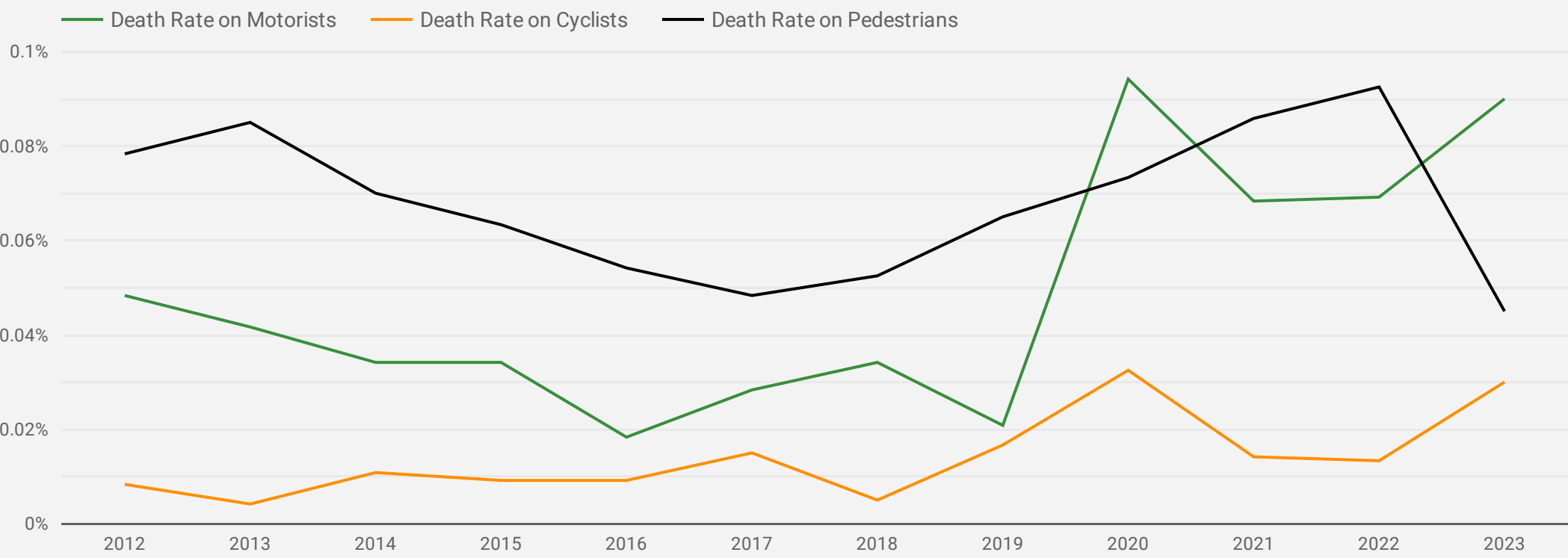
Injury and Death Rate by Time in a Day



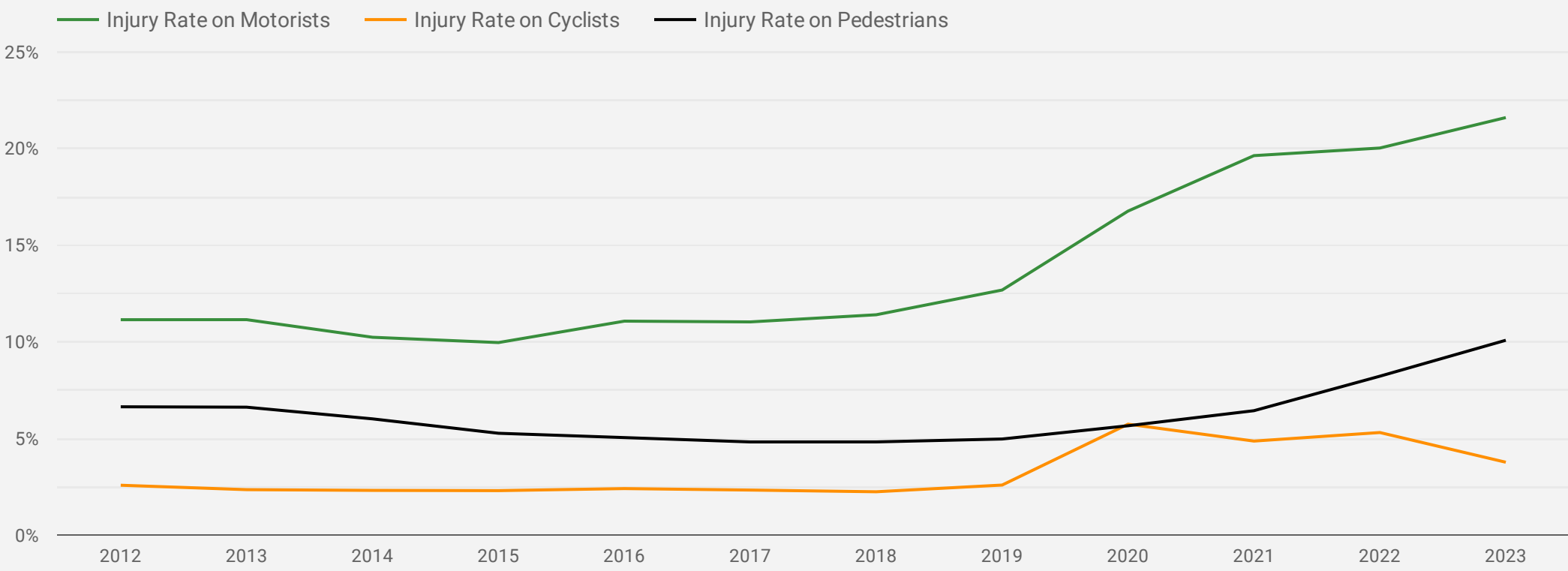


RATE (Pedestrians vs. Motorists vs. Cyclists)

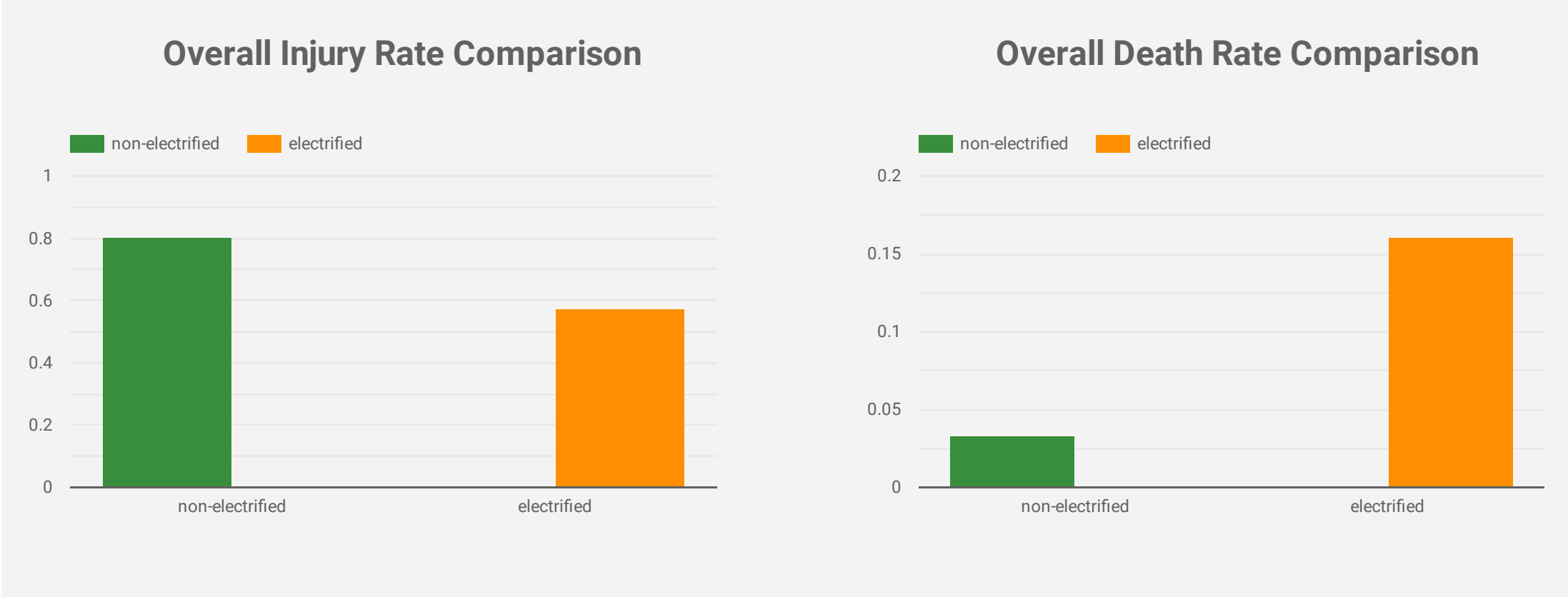
Death Rate on Specific Groups by Year



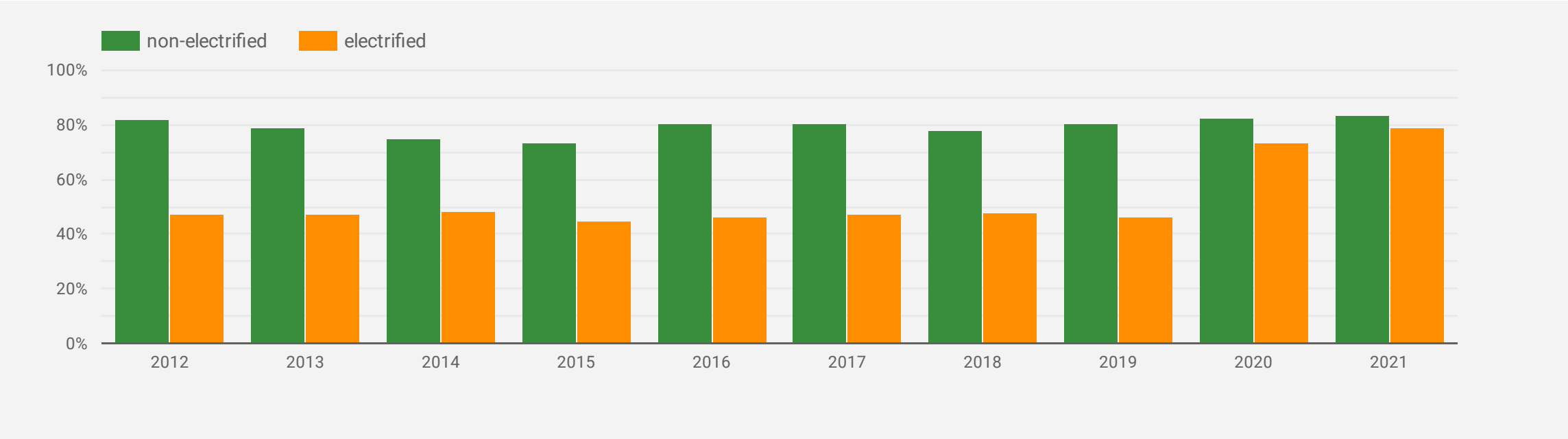
Injury Rate on Specific Groups by Year



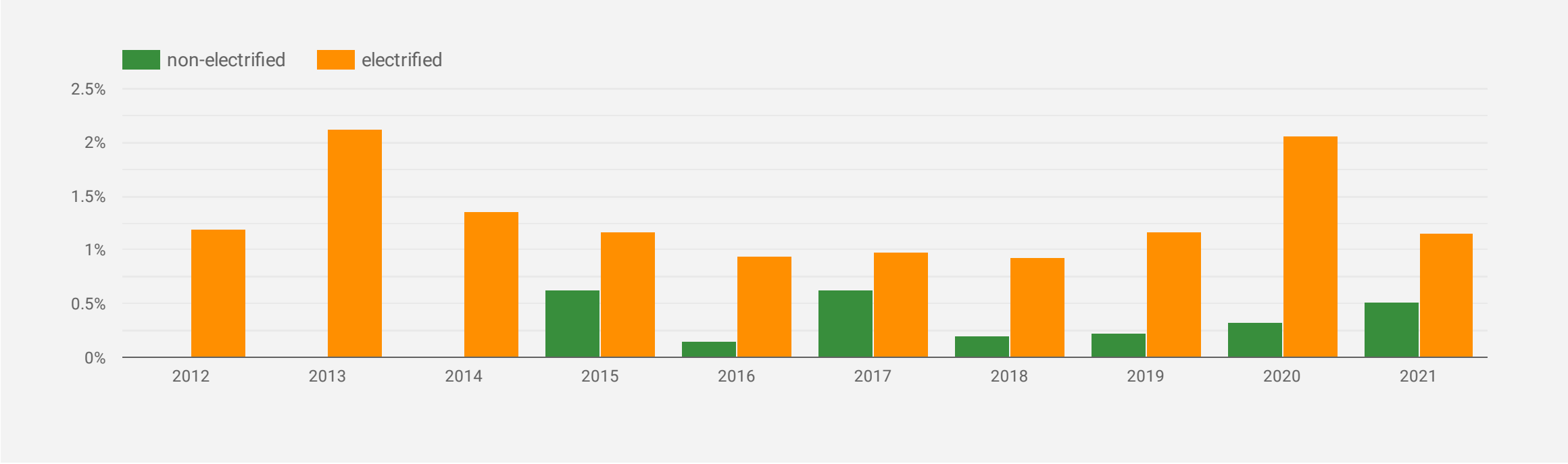
E-mobility Death & Injury Rate Differences



Injury Rate Comparison by Year



Death Rate Comparison by Year



Cluster Analysis on Vehicle Type

Dataset after Feature Engineering

	Vehicle 1	Vehicle 2	Injure Rate	Death Rate	Number of Combination	
1.	PASSENGER VEHICLE	PASSENGER VEHICLE	15.01%	0.04%	139,550	
2.	SEDAN	SEDAN	20.46%	0.03%	118,861	
3.	STATION WAGON/SPORT UTILITY VEHICLE	STATION WAGON/SPORT UTILITY VEHICLE	17.39%	0.04%	77,562	
4.	SEDAN	STATION WAGON/SPORT UTILITY VEHICLE	19.26%	0.05%	73,204	
5.	STATION WAGON/SPORT UTILITY VEHICLE	SEDAN	18.64%	0.03%	71,929	
6.	PASSENGER VEHICLE	SPORT UTILITY / STATION WAGON	13.92%	0.05%	45,115	
7.	SPORT UTILITY / STATION WAGON	PASSENGER VEHICLE	14.02%	0.03%	44,410	
8.	PASSENGER VEHICLE	UNKNOWN	3.93%	0.01%	39,740	
9.	SPORT UTILITY / STATION WAGON	SPORT UTILITY / STATION WAGON	13.20%	0.05%	35,981	
10.	SPORT UTILITY / STATION WAGON	UNKNOWN	3.27%	0.01%	15,827	
11.	TAXI	TAXI	10.48%	0.00%	10,964	
12.	4 DR SEDAN	4 DR SEDAN	16.16%	0.00%	10,220	
					1 - 100 / 4221	< >

Method 1: iterate the k-means model by using BigQuery ML and Python



n_clusters	davies_bouldin_index	mean_squared_distance
2	0.8	5.5
4	0.1	6.2
6	0.3	5.8
8	0.4	2.4
10	0.5	2.9
12	0.4	1.8
14	0.4	0.6
15	0.5	0.6

Four Clusters:

1. High kill rate
2. Low kill rate and high injure rate
3. Low kill rate and medium injure rate
4. Low kill rate and low injure rate

	centroid_id	Count	injured_rate	killed_rate
0	1	831	0.900	0.000
1	2	5	0.200	0.000
2	3	1	0.000	1.000
3	4	3384	0.100	0.000

Method 2: create the k-means model by using BigQuery ML and BigQuery

Centroid Id	Count	cnt		injured_rate		killed_rate	
1	446	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	412.8517	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	0.3759	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	0.0020
2	710	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	67.6478	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	0.9297	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	0.0210
3	8	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	76,296.3750	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	0.1533	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	0.0003
4	3,057	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	83.0331	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	0.0160	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	0.0002

Four Clusters:

1. Low combo count, medium injure rate and low kill rate
2. Low combo count, high injure rate and high kill rate
3. High combo count, low injure rate and low kill rate
4. Low combo count, low injure rate and low kill rate