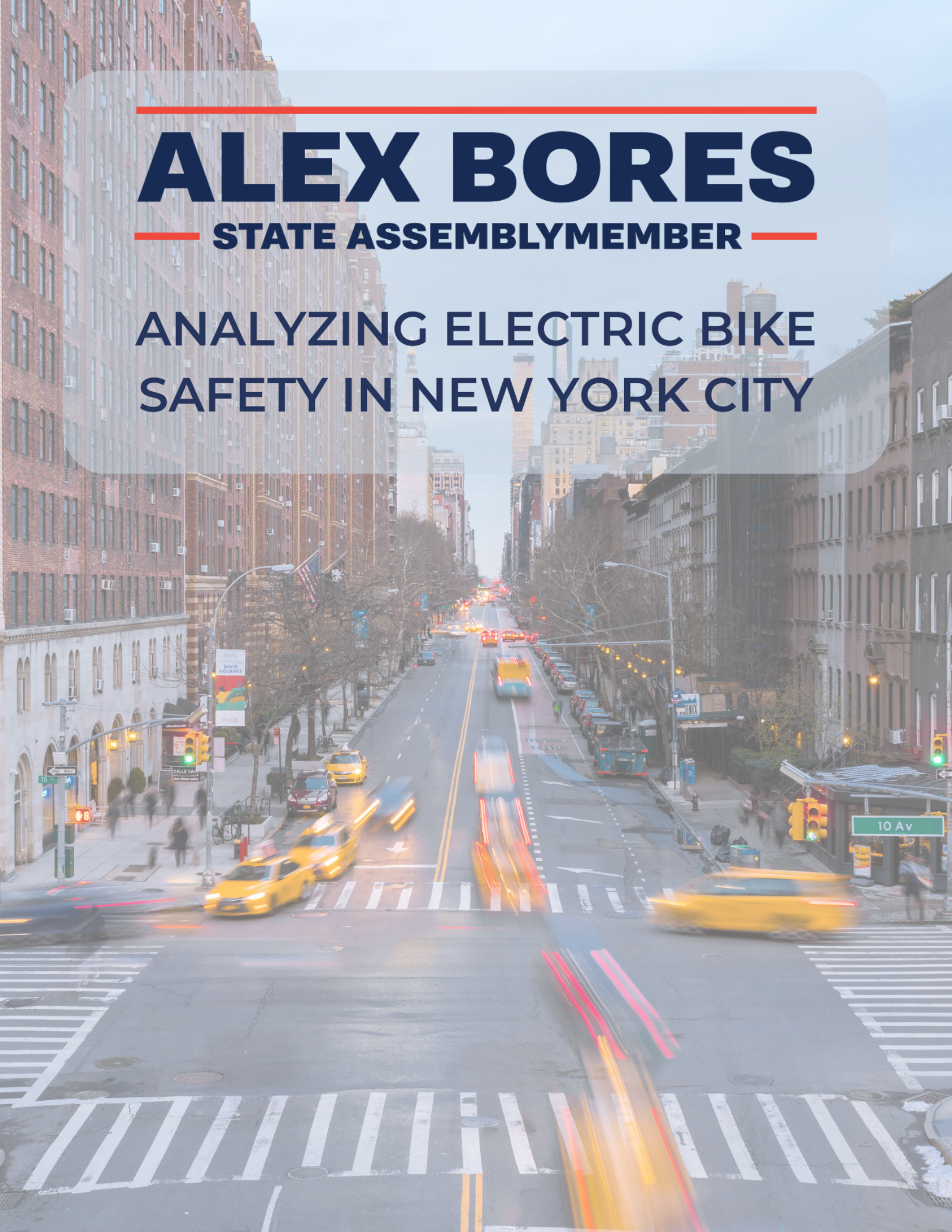
ALEX BORES

STATE ASSEMBLYMEMBER

ANALYZING ELECTRIC BIKE SAFETY IN NEW YORK CITY



Introduction and Summary

After being legalized in 2020, bicycles with electric assist (e-bikes) have become a growing and conspicuous presence on NYC streets. They have become integral to food delivery citywide and many New Yorkers rely on e-bikes for their jobs. The use of e-bikes, like all compact no- or low-emissions vehicles, has potential to reduce greenhouse gas output and modernize transit — they have also, conversely, become a public safety concern.

The impact of e-bikes has far outpaced current regulation. Part of the reason for this is a lack of data: current collision reports do not include a way to denote whether a vehicle is an e-bike.

However, those collision reports do include a written description of a crash. By scanning the free text of every individual collision report, classifying the vehicles which were involved, adjusting for typos, noting which vehicle caused each collision, and standardizing by the number of vehicles in NYC, it is possible to get a sense of the relative risks. This report is the first to do so.

The results will surprise many. Predictably, cars are riskiest on a per-vehicle basis. However, despite the fact that e-bikes are regulated as normal bicycles, their risk (especially to their operator) is much closer to cars than to normal bicycles. In fact, **the number of collision fatalities per e-bike is 19 times greater than the number of collision fatalities per bicycle.**

This is not inevitable. Changes in policies can produce different outcomes. To that end, the conclusion of this report includes five steps to increase e-bike safety. For main takeaways, jump ahead to the results and the conclusion. If you want to get into the nitty gritty, read on.

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Definition of E-Bikes

Many use the term "e-bike" in reference to a broad range of vehicles, including mopeds and electric scooters. In this report, to the extent possible, the term "e-bike" refers to bicycles with electric assist as defined in the New York State Vehicle and Traffic Law § 102-c: two-wheeled vehicles with operational pedals and a small supplementary electric motor.

E-bikes are broken down in law and industry into three classes: "Class 1" e-bikes have a motor that only activates when a rider is pedaling (pedal-assist) and cannot exceed 20 mph; "Class 2" e-bikes have a throttle, but are similarly capped at 20 mph; "Class 3" e-bikes have a throttle, and can reach a top speed of over 25 mph or 28 mph depending on the specific jurisdiction.

Mopeds, which lack pedals, are classified by the New York State Department of Motor Vehicles as "limited-use motorcycles," and a driver license is required to operate one. While we initially wanted to include mopeds in this report, we found that only 4,900 mopeds are registered within NYC, a number we found so implausibly low that we excluded them from per-vehicle tables. Other similar vehicles (such as e-scooters, dirt bikes, etc.) are excluded where possible.[1]

Results

From January 1, 2020 to July 19, 2023 inclusive, assigning fault as discussed in the robustness checks section, we found the following:[2]

Table 1: Unweighted Collisions, Collision Injuries, and Collision Deaths, 2020–2023

Vehicle	Caused Collisions	Caused Collision Injuries	Caused Collision Deaths
Car	333,059	154,713	696
E-bike	2,254	2,172	22
Bicycle	4,804	4,379	14
Moped	1,148	1,067	11

As expected, cars cause far more injuries and deaths than any other form of transportation. The above numbers are totals and ignore the fact that there are different numbers of each vehicle. To account for this, we calculated all of the above statistics per thousand vehicles, as shown below. As noted above and in the appendix, we could not find a reliable estimate of the number of mopeds in NYC, so they are excluded from per-vehicle tables.

[1] As described below, the data from which this report is produced does not always distinguish between distinct types of vehicles. Bill A07628, discussed in the conclusion, would improve this data collection.

[2] The Python code used to generate all the data and visualizations in this report can be found in this Colab notebook. The code may be updated over time; the numbers in this report reflect the code (and underlying data) as of 9/8/2023. We welcome suggestions, code reviews, and comments, which can be sent to info@alexbores.nyc.

Table 2: Collisions, collision injuries, and collision deaths per thousand vehicles, 2020–2023[3]

Vehicle	Caused Collisions per Thousand Vehicles	Caused Collision Injuries per Thousand Vehicles	Caused Collision Deaths per Thousand Vehicles
Car	44.685	21.084	0.0931
E-Bike	3.383	3.234	0.0336
Bicycle	0.581	0.530	0.0018

Even when standardized by the number of vehicles, cars cause nearly three times as many deaths as e-bikes. However, **e-bikes cause 19 times more deaths per vehicle than bicycles**.

Importantly, the vast majority of those killed in e-bike collisions are the e-bike riders themselves: 84% of the people who died in collisions attributed to e-bikes above were e-bikers, not pedestrians or bicyclists.[4]

Robustness Checks

In order to ensure that these results were reliable, we conducted a number of robustness checks, three of which are shown below.

Different Ways of Assigning Collision Fault

First, we analyzed separate ways of attributing fault. We considered three main possibilities:

> Method 1: (Default) Use what is in the collision report, and if the report is inconclusive, assume the larger vehicle caused the crash.
>
> Method 2: Use what is in the collision report, but if it is inconclusive, assume the larger vehicle caused the crash half the time and the smaller vehicle caused it the other half.[5]
>
> Method 3: Ignore the factors assigned by the collision report and assume that the larger vehicle is always at fault.

In all cases, changing the method used to assign fault slightly affected the magnitude of the results, but did not change the ranking of vehicles by deaths or injuries per thousand vehicles.

[3] Astute observers will note that the number of injuries and deaths per crash is far higher for e-bikes than for cars. We believe this is caused by sampling bias; a collision report is only filed when there is a substantial injury, death, or $1,000 in damage, and crashes involving cars are more likely to produce $1,000 in damage without producing an injury or death. A collision report can also make it easier to file a car insurance claim, likely increasing the incentive to file a report for car crashes. As such, many car crashes are likely filed, but only the most severe e-bike collisions get reported. We thus focus this report on "per vehicle" statistics, not "per collision" ones.

[4] This is a vastly different relative risk to cars: 48% of the people who died in collisions attributed to cars were pedestrians, compared to 16% for e-bikes and 7% for bicycles.

[5] This is based on public research discussed in the methodology appendix.

Table 3: Total collision injuries from 2020–2023 by three ways of assigning fault

Method of Assigning Fault	Car-Caused Collision Injuries	E-Bike-Caused Collision Injuries	Bicycle-Caused Collision Injuries	Moped-Caused Collision Injuries
Method 1 (default)	154,713	2,172	4,379	1,067
Method 2	155,224	2,180	4,405	1,065
Method 3	149,704[6]	1,582	3,064	700

Table 4: Collision injuries per thousand vehicles from 2020–2023 by three ways of assigning fault

Method of Assigning Fault	Car-Caused Collision Injuries Per Thousand Vehicles	E-Bike-Caused Collision Injuries Per Thousand Vehicles	Bicycle-Caused Collision Injuries Per Thousand Vehicles
Method 1 (default)	21.084	3.234	0.530
Method 2	21.155	3.247	0.533
Method 3	20.378	2.343	0.369

Table 5: Total collision deaths from 2020–2023 by three ways of assigning fault

Method of Assigning Fault	Car-Caused Collision Deaths	E-Bike-Caused Collision Deaths	Bicycle-Caused Collision Deaths	Moped-Caused Collision Deaths
Method 1 (default)	696	22	14	11
Method 2	702	22	14	11
Method 3	697	19	13	4

Table 6: Collision deaths per thousand vehicles from 2020–2023 by three ways of assigning fault

Method of Assigning Fault	Car-Caused Collision Deaths Per Thousand Vehicles	E-Bike-Caused Collision Deaths Per Thousand Vehicles	Bicycle-Caused Collision Deaths Per Thousand Vehicles
Method 1 (default)	0.0931	0.0336	0.0018
Method 2	0.0939	0.0336	0.0018
Method 3	0.0931	0.0296	0.0017

Again, changing the method of assigning fault slightly affected the magnitude of the results, but did not change the ranking of vehicles by deaths or injuries per thousand vehicles.

[6] It may be counterintuitive that the number of collisions caused by cars decreases when blaming the larger vehicle. This decrease is almost totally explained by a corresponding increase in collisions caused by trucks and buses.

Comparing Across Years

Second, we looked at which years were included. By default, we searched from 2020 to 2023. We compared it to just collisions which occurred from January 1 to July 19 of 2023.

Table 7: Total collision injuries by timeframe

Year	Car-Caused Collision Injuries	E-Bike-Caused Collision Injuries	Bicycle-Caused Collision Injuries	Moped-Caused Collision Injuries
2020–2023	154,713	2,172	4,379	1,067
2023 only	45,260	407	751	264

Table 8: Collision injuries per thousand vehicles by timeframe

Year	Car-Caused Collision Injuries Per Thousand Vehicles	E-Bike-Caused Collision Injuries Per Thousand Vehicles	Bicycle-Caused Collision Injuries Per Thousand Vehicles
2020–2023	21.084	3.234	0.530
2023 only	21.443	2.629	0.542

Table 9: Total collision deaths by timeframe

Year	Car-Caused Collision Deaths	E-Bike-Caused Collision Deaths	Bicycle-Caused Collision Deaths	Moped-Caused Collision Deaths
2020–2023	696	22	14	11
2023 only	92	4	3	1

Table 10: Collision deaths per thousand vehicles by timeframe

Year	Car-Caused Collision Deaths Per Thousand Vehicles	E-Bike-Caused Collision Deaths Per Thousand Vehicles	Bicycle-Caused Collision Deaths Per Thousand Vehicles
2020–2023	0.0931	0.0336	0.0018
2023 only	0.0810	0.0269	0.0023

While bicycle injury and death rates slightly increased, car and e-bike death rates decreased. These may be a result of small sample sizes, seasonal trends, or other factors. In any case, **the changes do not substantially affect the relative ratio of risk per vehicle.**

Including Externalities

Third, we took a broader view of public safety beyond collisions, integrating deaths caused by e-bike battery fires or cars' pollution.

Table 11: Total injuries from all sources from 2020–2023

	Car-Caused Injuries	E-Bike-Caused Injuries	Bicycle-Caused Injuries	Moped-Caused Injuries
Collisions only	154,713	2,172	4,379	1,067
Collisions, Battery Fires, and Pollution	154,713[7]	2,324	4,379	1,232

Table 12: Injuries from all sources per thousand vehicles from 2020–2023

	Car-Caused Injuries Per Thousand Vehicles	E-Bike-Caused Injuries Per Thousand Vehicles	Bicycle-Caused Injuries Per Thousand Vehicles
Collisions only	21.084	3.234	0.530
Collisions, Battery Fires, and Pollution	21.084	3.450	0.530

Table 13: Deaths from all sources per thousand vehicles from 2020–2023

	Car-Caused Deaths	E-Bike-Caused Deaths	Bicycle-Caused Deaths	Moped-Caused Deaths
Collisions only	696	22	14	11
Collisions, Battery Fires, and Pollution	2,439	33	14	23[8]

Table 14: Deaths from all sources per thousand vehicles from 2020–2023

	Car-Caused Deaths Per Thousand Vehicles	E-Bike-Caused Deaths Per Thousand Vehicles	Bicycle-Caused Deaths Per Thousand Vehicles
Collisions only	0.0931	0.0336	0.0018
Collisions, Battery Fires, and Pollution	0.3467	0.0500	0.0018

[7] For measurement reasons covered in the Appendix, we did not adjust the injury counts based on pollution for any vehicle. Of course, some asthma, non-fatal cancer, and other injuries are likely linked to gas-powered vehicles.

[8] This number includes all lithium-ion battery fires from vehicles other than e-bikes, and thus may include scooters.

The number of e-bike injuries caused by battery fires was around 7% of the total injuries attributed to e-bikes (151 of the 2,172 total injuries from 2020 to 2023). The 11 e-bike deaths caused by battery fires were one third of the 33 total deaths attributed to e-bikes from 2020 to 2023.

Additionally, we considered deaths brought about by cars' air pollution. Existing academic research detailed in the methodology section finds that around 436 people die in the NYC metropolitan area each year because of car-caused pollution.

Counting fires and pollution in addition to crashes, the data shows that cars appear more dangerous, since adding 436 pollution deaths per year nearly triples the number of yearly deaths. E-bikes also seem more dangerous, with the number of deaths increasing by 50%.

If we do not count fires or emissions, e-bikes cause around three times fewer deaths per vehicle than cars but 19 times more deaths per vehicle than regular bicycles. If we do count deaths from fires and emissions, though, then e-bikes cause around seven times fewer deaths per thousand vehicles than cars but cause around 28 times more deaths per thousand vehicles than bicycles.

Conclusion: Next Steps

There are a number of additional steps that New York State should consider in regulating e-bikes. Below are five actions we recommend:

First, we should get much better data on the risks. One of the reasons this analysis required so many assumptions and caveats is because the standard **police form for collecting collision reports (MV-104) does not have a designated place for marking e-bikes**. Assembly Bill A07628 changes this, as well as ensuring that additional data on crashes is collected and standardized.

Second, the DMV should create an e-bike safety course. Other states such as California are doing this, informing riders about the risks from batteries and from not following traffic laws. Assembly Bill A07938 would create such a course, and would fine delivery companies who do not require their workers to take it.

Third, we must ensure that mopeds are registered with the DMV as already required by law. We believe that all of the enforcement powers necessary to penalize shops that sell mopeds without VINs already exist, but if there are loopholes, we should address them legislatively. Assembly Bill A08052 would require that mopeds are registered before they leave a dealer, the same way we currently treat ATVs.

Fourth, we should continue to redesign streets to incorporate safety for all users. Modern research shows that minor changes to street design like curb extensions can calm all traffic and make *everyone* on the road safer.

Fifth, we should review the regulation of e-bikes. Despite the fact that e-bikes create substantially more risk, New York City treats all three classes of e-bikes as bicycles when considering what is required to ride them and where they can ride.

Though this report focuses on e-bikes, we would be remiss if we did not stress that the fact that e-bikes are more dangerous than bicycles does not mean that cars are safe. We should limit vehicle emissions, ensure that our streets safely accommodate everyone, and ensure that every New Yorker has easy access to affordable, green, and safe transportation.

Every person in New York deserves to be safe on our streets, whether they are walking in their neighborhood or delivering food on an e-bike. But our current system is not living up to that promise. Instead, we must act as described above. We must actually track collisions, make sure that everyone on the road knows the rules, and give the people of New York the safe streets they deserve.

Appendix: Methodology, Caveats, and Assumptions

This section is long, detailed, and not meant to be read in full. Feel free to jump around to specific sections you are interested in. But if you, like us, are a data nerd, then dive in.

The conclusions in this report are mainly based on NYPD data as reported to the public, FDNY data as reported to the press, and reasonable inferences as to the number of bicycles, e-bikes, and cars in NYC from what data exists.

NYPD Collision Data

The NYPD Dataset contains information from all police-reported vehicle collisions in NYC. Officers are only required to fill out the report when a collision involves a death, an injury, or property damage above $1,000. Because cars are more likely to sustain $1,000 in damage during a collision and because car insurance claims incentivize filing a report, we expect that these reports cover a larger percentage of car collisions than e-bikes or bicycles.

These collision reports do not have a reliable field for marking an e-bike (this is one of the next steps described above). Instead, officers have a field where they can write, in their own words, which vehicles were involved in the crash. To determine whether an e-bike was involved, we searched that field and the notes attached to each report. Often, these were clear. When they were not, we made best guesses. A list of all of the mappings is available.

Of course, sometimes the notes themselves are wrong. For every death that our model attributed to an e-bike, we searched news coverage to verify the collision report. For 10.5% of those deaths, we found that a vehicle was likely misclassified; sometimes, what was recorded as an “e-bike” was actually a normal bicycle.

Similarly, the data sometimes said that a vehicle was a bicycle when it was actually an e-bike. Take, for example, a June 2021 crash in which a cyclist was killed in a hit-and-run. According to the NYPD data, the victim was riding a bicycle. However, news reports like the one linked above reported that the victim was riding an e-bike. Doing a holistic estimate of how frequently bicycles are misclassified as e-bikes is difficult to verify, though, because not every crash is independently covered in the news.

Establishing the cause of a crash is also an imperfect science. First, the NYPD’s collision dataset did not always say which vehicles were involved in a crash — around 4,500 collisions had no vehicles specified at all.[9] Most of the collision reports establish what vehicle was at fault, but there was no cause listed for 17% of collisions that, according to the data, involved e-bikes. Other research finds that when a car and an e-bike collide, the e-bike is responsible about 50% of the time (see this Minnesota study, see this Arizona study). For this report, we took a more conservative estimate; if the collision report established a vehicle at fault, we used that. If not, we assumed that the larger vehicle was at fault. The ‘Robustness Checks’ section above covers the effect of other assumptions here.

[9] When no vehicle was specified, we blamed the collision on a car.

Once we could say what type of vehicle caused each crash, we then grouped all collisions by the type of vehicle that was at fault. We counted how many people were injured and how many people died in collisions caused by each type of vehicle.

FDNY Fire Data

ABC News reported the fire department's numbers for citywide fire injuries and fire deaths from 2020, 2021, and 2022. The NY Daily News lists all 2023 NYC e-bike fires in which someone died. Though a complete list is not present, TechCrunch reported on July 3, 2023 that 74 people had been injured in e-bike fires so far in 2023. We are not aware of any e-bike fires after July 3, 2023 and the cut-off of this report on July 19, 2023.

Not all lithium-ion fires, however, are e-bike fires. To take this into account, we reviewed news reports for every fire in which someone died to determine whether the battery which started the fire came from an e-bike. We specifically reviewed fires in which people died because, unfortunately, fires in which nobody dies often receive no media coverage.

Based on our literature review, we attributed seven of the 13 deaths in NYC lithium-ion fires in 2023 to e-bikes, with the other six being attributed to e-scooters or unknown causes. We attributed three of the six deaths in NYC lithium-ion fires in 2022 to e-bikes, with the other three being attributed to e-scooters or unknown sources. We attributed one of the four lithium-ion fire deaths in NYC in 2021 to e-bikes, with the other three being attributed to e-scooters or unknown causes. The FDNY did not report any deaths in NYC from lithium-ion fires in 2020.

Thus, we assign to e-bikes 11 of the 23 deaths from lithium-ion battery fires in NYC since 2020.

Fires in which nobody dies often receive no media coverage, so we were unable to determine how injuries from lithium-ion fires can be attributed to e-bikes and their batteries. Therefore, we assume that the fraction of fire injuries that can be attributed to e-bikes is the same as the fraction of deaths that can be attributed to e-bikes: 11/23. This would mean that 35.4 of the 74 injuries so far in 2023, 67.9 of the 142 injuries in 2022, 37.8 of the 79 injuries in 2021, and 11 of the 23 injuries in 2020 would be due to e-bike batteries specifically, instead of lithium-ion batteries more generally. This would mean that, since 2020, 151.1 injuries can be attributed to e-bike battery fires in NYC.

We attributed all remaining injuries and deaths to mopeds. This likely overstates the risk from mopeds, as some of those fires may have been caused by e-scooters or other similar vehicles.

Emissions Data

To determine how many people in New York City die from the air pollution generated by cars and trucks, we relied on a 2021 paper in Environmental Research Letters entitled "Mortality-based damages per ton due to the on-road mobile sector in the Northeastern and

Mid-Atlantic U.S. by region, vehicle class and precursor." In the supplementary information section, they note that air pollution from automobiles and light trucks was responsible for 1,008.1 deaths in 2016 in the NYC metropolitan area.[10]

To estimate the fraction of deaths in the NYC metro area were actually in NYC, we multiplied the number of deaths in the metro area by the fraction of people in the metro area that live in NYC. That is, we assume that the ratio of NYC deaths to NYC metro area deaths is roughly equal to the ratio of NYC population to NYC metro area population. To get the population of the New York metro area, we used a table from the U.S. Census Bureau: Annual Resident Population Estimates for Metropolitan and Micropolitan Statistical Areas and Their Geographic Components for the United States: April 1, 2020 to July 1, 2022. That table is available here. For the population of New York City itself, we used the Census Bureau's QuickFacts page on New York City, available here. From those data, we assembled the following:

Table 15: Fraction of the NYC Metropolitan Statistical Area that lives in New York City

Year	New York Metro Area Population	New York City Population	NYC is ___% of the NYC Metro
2022	20,048,886	8,335,897	41.58%
2020	19,617,869	8,804,194	44.88%

As such, we estimate that 43.23% of the 1,008.1 deaths per year in the metropolitan statistical area are in the city itself. This means that we assume that 436 people die each year in New York City from car-caused pollution.

Estimating Numbers of Vehicles

The statistics in this report are standardized per vehicle. A number of assumptions go into estimating the number of vehicles. First, while we are only looking at crashes that occur in NYC, cars might be based in NYC or traveling through. We found it difficult to estimate the number of cars commuting westward into the city from Long Island and southbound from points further upstate, but we were able to estimate that around 400,000 cars enter NYC daily from NJ based on Port Authority data on bridge and tunnel crossings. Ultimately, though, we decided to base our estimate on the number of vehicles the DMV listed as being registered to addresses in the city in their dataset of vehicle registrations. In 2023, that was 2,072,235 cars. Taking a lower estimate of cars comparatively overstates the danger they pose but eliminates the uncertainty around the number of commuters.

Though the New York City Department of Transportation automatically records traffic volume at certain key locations, no numbers are available after October 2022, which means we could not use this to extrapolate backwards from the number of cars in 2023. Additionally, the DOT dataset uses observations from completely separate locations for different years – they take automatic counts from every borough in 2020, but only from Queens and the Bronx in 2021,

[10] For consistency, we have only counted cars and light trucks (e.g. pickups) throughout.

and only from Manhattan and Brooklyn in 2022. Without a consistent measurement site, we found it unwise to try to infer any multi-year trends on vehicle use from car-counting data.

Thus, we used the number of vehicle registrations for 2023 (2,072,235) for every year.

Mopeds

We could not find a reliable estimate for the number of mopeds in the City. New York law requires that all mopeds be registered with the Department of Motor Vehicles. When we query the above-mentioned list of all vehicle registrations in New York State, though, we found that only 4,900 mopeds have been registered in New York City. This number not only fails the intuitive smell test in a city of over 8 million people but is also inconsistent with other numbers. To name one, Streetsblog reported on September 6, 2023 that the NYPD confiscated 269 unregistered mopeds over the course of three days in August. Even if there were only 5,000 unregistered mopeds, this would mean that the NYPD confiscated over 2.5% of all mopeds in New York City. Without any reliable method to extrapolate the number of unregistered mopeds, we were unable to make any reliable estimate of the number of mopeds in NYC. As such, we do not include any per-vehicle statistics for mopeds in this report.

Bicycles

The New York City Department of Transportation reported in their 2019 Citywide Mobility Survey that there were around 2,380,000 bicycles in the city in 2019.

Based on (early, subject-to-revision) estimates of the 2022 Citywide Mobility Survey, we estimated that there were 1.2 million households that had a bicycle in 2022. We used the 2019 survey's estimate of the number of bicycles per household: 1.88. Together, that gives an estimate of 2,292,525 bicycles in NYC in 2022. This number is remarkably similar to the 2019 number. As such, we used a single number of bicycles for all years between 2020 and 2023, the average of the 2019 and 2022 Citywide Mobility Survey estimates: 2,336,263.

Though we considered extrapolating the 2019 bicycle counts to future years with the City Department of Transportation's automated bicycle counters, the extrapolated estimates conflicted with the 2022 survey. Using the sums from the bicycle counters would have greatly expanded our estimate of bicycles in NYC and would have thus made e-bikes look much riskier in comparison (jumping from 19x more deadly than bikes to about 23x more deadly). Faced with conflicting estimates, we chose the 2022 survey's estimate. If the final figures for the survey differ significantly from what we show here, we may update this report later.

E-Bikes

The 2019 survey found that there were around 26,000 e-bikes in NYC in 2019. Because e-bikes were illegal to ride in New York City when the survey was conducted, 26,000 is likely an underestimate, since people would be hesitant to report e-bikes to the DOT surveyors. Two major events – e-bikes becoming legal in 2020 and the COVID-19 pandemic – make it difficult to extrapolate 2020 e-bike counts, let alone 2023 e-bike counts, from the 2019 data.

Fortunately, we were able to see (early, subject-to-revision) estimates from the forthcoming 2022 Citywide Mobility Survey. Based on those, we estimated that there were 130,000 households that owned at least one e-bike in NYC in 2022. Assuming that the average number of e-bikes per e-bike-owning household is 1.5, slightly lower than the corresponding number for bicycles, then there would be 195,000 e-bikes in 2022. If the final figures for the survey differ substantially from what we show here, we may update this report later.

This figure, however, does not include electric Citibikes or vehicles used by delivery workers. According to a 2022 snapshot of Citibike's About page, there were 25,000 Citibikes in 2022. Twenty percent of these Citibikes were electric, which increases the estimate by 5,000 to 200,000 total e-bikes. In March 2023, ABC News reported that NYC delivery workers use 65,000 micro-mobility devices.[11] Just how many of those micro-mobility devices are e-bikes, though, is unclear. A NYC report using data from 2021 found that the vast majority of devices were reported to apps as e-bikes; however, it also noted that "the Department [of Consumer and Worker Protection] believes that most moped users have misreported their vehicles as e-bikes both to the apps and in the Department's NYC Delivery Worker Survey."[12] Many delivery workers use mopeds, which Streetsblog recently reported can be cheaper and more convenient than e-bikes. Lacking specific numbers, we assumed a 50-50 split between e-bikes. This increases our estimate of e-bikes in NYC in 2022 to 237,500.

To account for the fact that the number of e-bikes has grown over time, we interpolated linearly between the 2019 count and 2022 count, then continued that trend to 2023 to arrive at the below table. E-bike adoption was likely a more typical growth curve from 2019 to 2022, which would mean that we overestimated the number of e-bikes in 2020 and 2021, thereby making them look safer. Without better data, though, there is little we can do without editorializing. As such, we interpolated linearly, arriving at the following numbers:

Table 16: Estimated number of e-bikes in New York City by year

Year	Number of E-Bikes in NYC
2020	96,322
2021	166,911
2022	237,500
2023	272,795[13]

[11] Some recent articles have asserted that there are 65,000 e-bikes in New York City. Since these articles do not explain how they arrived at 65,000, we believe that they are confusing the 65,000 delivery micro-mobility devices with all e-bikes in NYC, and therefore failing to count all non-delivery e-bikes.

[12] "A Minimum Pay Rate for App-Based Restaurant Delivery Workers in NYC." NYC Department of Consumer and Worker Protection. November 2022. Link here. This same tendency to report a moped as an e-bike on a survey may be increasing our overall e-bike numbers, which would have the effect of making e-bikes look relatively safer.

[13] Readers may note that the increase from 2022 to 2023 is less than the increase from 2020 to 2021 and from 2021 to 2022. This is because 2023 is not over — instead of assuming an entire year of change, we prorated the change by the fraction of 2023 that had elapsed by July 19.

As can be seen above, the lack of concrete data meant we had to make many assumptions, though we made assumptions that would be more favorable to e-bikes whenever we could. However, there is at least one place where that was difficult, and we may be overestimating the risk from e-bikes (vs. cars). That is the time on the road. It is highly likely that the average e-bike spends more time on the road than the average car. This is for a few reasons. First, proportionally more e-bikes are used for work than passenger cars. According to a survey of NYC e-bike workers, e-bikes used for delivery are used up to six hours a day, six days a week. A delivery e-bike probably spends more time on the road in NYC than, say, the personal vehicle of an office commuter. Second, e-bike sharing probably leads to more average usage. The average Citibike may spend more time on the road than the average car, since the average Citibike has more than one user per day. This of course does not undermine the statement that e-bikes per capita are more dangerous, but it is fair to say that the per-hour comparison is likely comparatively more favorable to e-bikes.

Changing the assumptions above would lead to different numbers. However, the overall trend is clear: despite being regulated in exactly the same way as pedal-powered bicycles, e-bikes are responsible for injuries and deaths on an order of magnitude above pedal-powered bicycles.