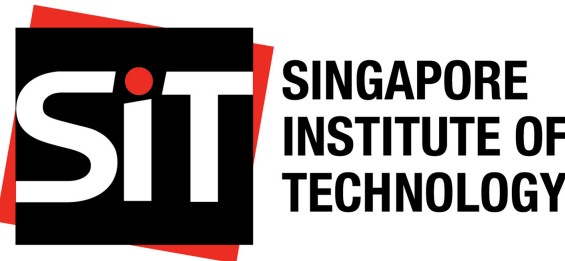# Number of Traffic Accidents Resulting in Injured Persons

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Introduction

Traffic accidents in Singapore have become a pressing concern in recent years, with a noticeable uptick in incidents. Recent statistics reveal a troubling rise in injury-causing accidents, reversing a decade-long trend of declining road accidents. Lawmakers and safety experts are now scrutinising potential causes, ranging from distracted driving to the effectiveness of existing penalties under the Road Traffic Act. With road accidents increasingly capturing public attention, we aim to better visualise the causes of road accidents in hopes of aiding Singapore in implementing better measures to improve road safety through higher prevalence causes[1].
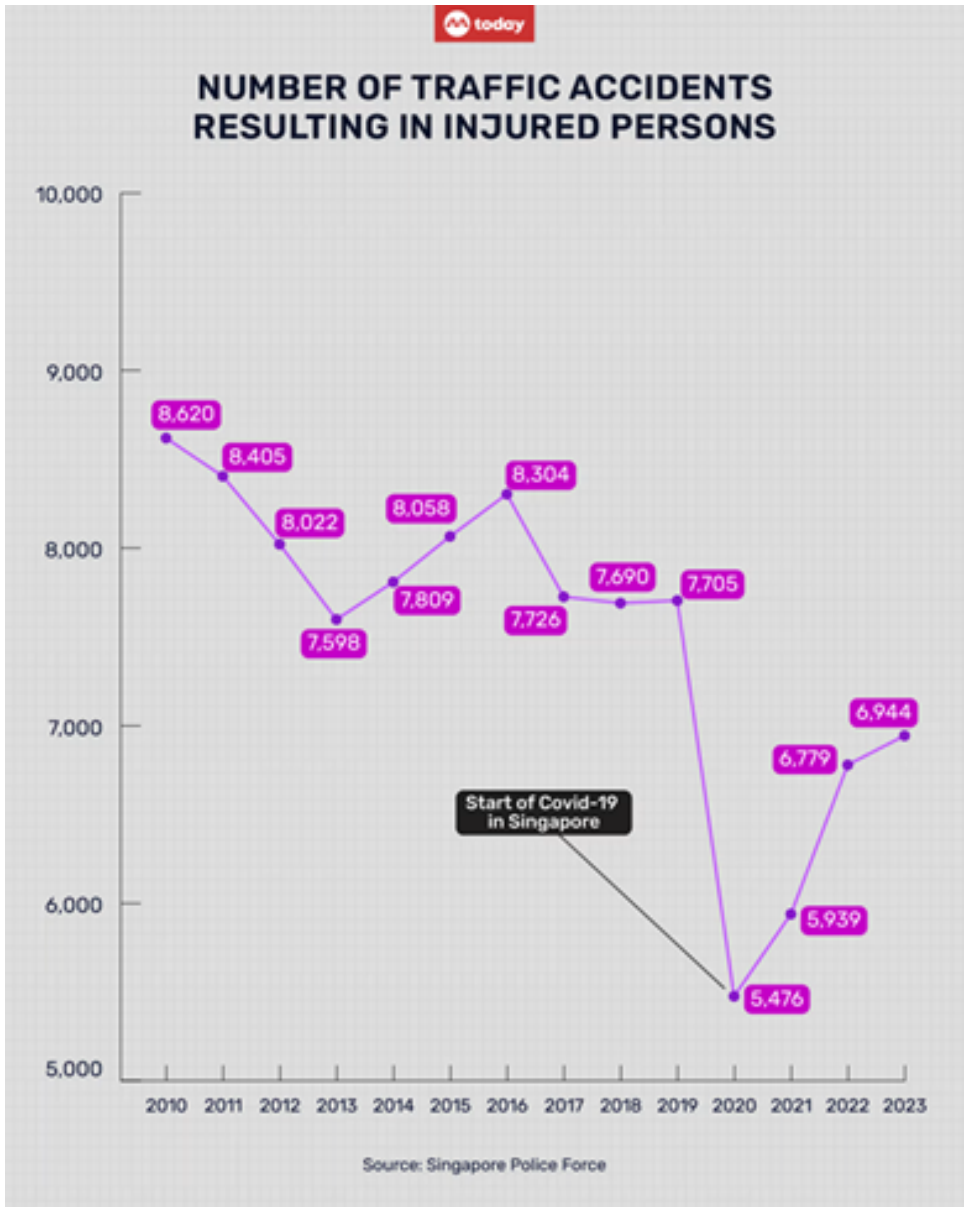
Previous Visualization

Figure 1: Trend analysis of traffic accidents resulting in Injured persons by Singapore Police Force.

Initial Data Analysis

The initial graph depicts the number of traffic accidents resulting in injured persons in Singapore from 2010 to 2023. It shows a general decline from 8,620 accidents in 2010 to 7,598 in 2014. However, this downward trend reverses, with fluctuations peaking at 8,304 in 2016. A significant drop was observed starting in 2019, coinciding with the onset of the COVID-19 pandemic in Singapore, with the number of accidents falling to a low of 5,476 in 2020, likely due to reduced traffic during lockdowns. Post-pandemic, there is a notable upward trend, with accidents increasing year-on-year, reaching 6,944 by 2023. This rise in traffic incidents post-2020 indicates a regression in road safety as more vehicles returned to the roads but unfortunately does not go into detail regarding the specific causes. With the introduction of PMD or similar motorised vehicles in Singapore in the early 2016s, traffic accidents no longer just include cars and motorcycles, making the data more ambiguous.

Suggested Improvements

1. Instead of just showing an overview of traffic accidents over the years, splitting the dataset into two distinct main categories – accidents caused by vehicles and accidents caused by non-vehicles – allows readers to interpret and analyze the causes of traffic accidents with greater ease

2. Further breaking down the main categories to display the occurrence of each type of accident would be more informative for readers

3. Creation of detailed sparklines for each subcategory to show the trend in the number of such accidents over the years

4. Creation of summary tables with additional context, such as minimum and maximum values, to allow readers to quickly understand the overall impact and trends without needing to interpret the sparklines alone

5. Based on previous visualisation, readers might interpret that covid-19 was an attribute of the traffic accident which might be misleading since the data is solely discussing about traffic accidents resulting in injuries and have nothing related to the pandemic.

6. Add labels for x-axis and y-axis in the main graph to allow readers to interpret the data more accurately

Implementation

Data

- Data about several traffic accidents resulting in injuries can be found in the public records of the Singapore Police Force (SPF) public data. However, SPF released publicly available Sing-Stat data only goes up from 2012 to 2022; the years 2023, 2011, and 2020 are absent[2]. We filled in the gaps with inferred information from another police report article. Records of PMD are only available after 2016.[3]

Data Manipulation

- The original dataset included multiple accident causes so we categorized similar causes together and renamed them with a more general name.
- When exporting the dataset, the CSV file displayed 'NA' for cells that have a value of 0. Hence, we manipulated the cells to display 0 to reflect the original dataset
- Original dataset's columns were not consistent in terms of data class types. Cells under columns 2017 to 2022 have the 'dbl' data class whereas cells under columns 2012 to 2016 have the 'chr' data class. We had to mutate everything from row 1 and column 2 into 'dbl' data class to allow for data combination.
- Unnecessary rows were removed. The first column was combined with their new respective columns
- Row 1 data were renamed to keep the original headers. All new data frames were combined into a single data frame, 'finalData', using rbind.

Software

Quarto publication framework and the R programming language was used, along with the following third-party packages:

- *readr* for data import. *tidyverse* for data transformation, including *ggplot2* for visualization based on the grammar of graphics. *knitr* for dynamic document generation. *patchwork* for combining overview graphs side-by-side.
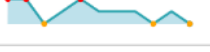- *gt*, *gtExtras*, *grid*, *gridExtra*, *sparklines* for creating sparkline table.

Improved Visualisation
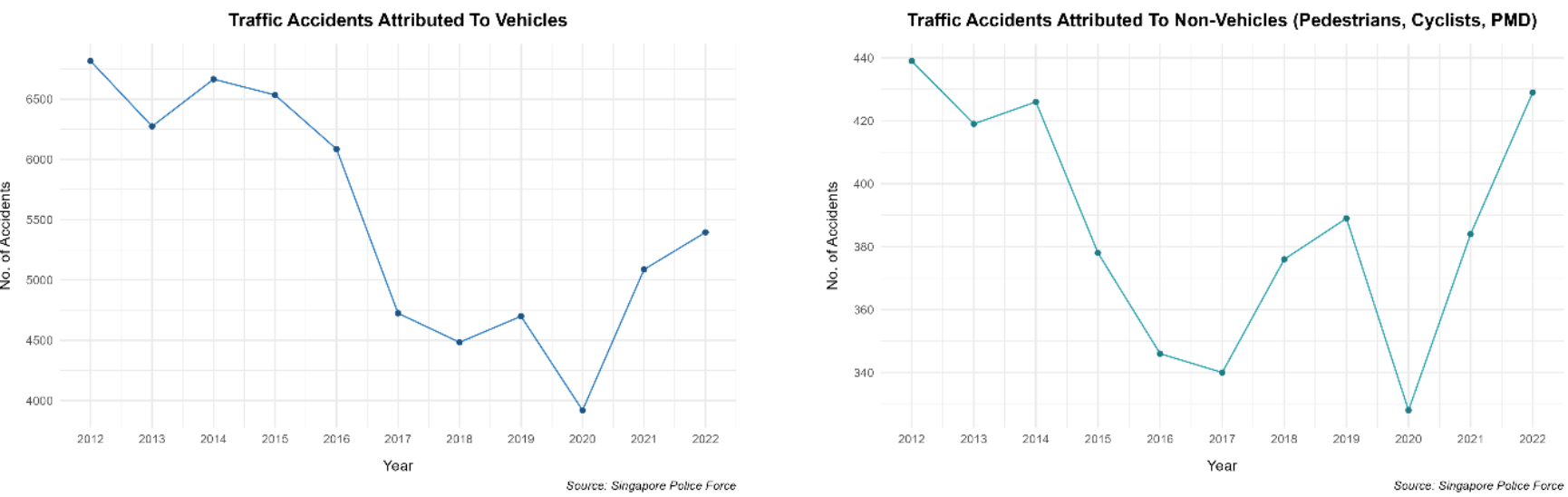
Vehicle Causes	Min Accidents	Max Accidents	2012 to 2022		Accidents
Driving Under Influence	11	164	88	173	1097
Failure to Give Way	750	1173	751	996	9932
Improper Lane and Speed Management	458	924	677	811	8030
Improper Parking and Vehicle Control (While Stationary)	0	43	17	0	220
Improper Vehicle Control (While in Motion)	2273	3947	3683	3447	35980
Other Causes Of Accidents Attributed To Vehicles	0	808	0	808	3264
Reckless and Distracted Driving	0	31	31	0	133
Traffic Signal Violations	140	284	158	237	2025

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[1] R. Loh, "The big read: To tackle rising fatal traffic accidents and worsening road culture, we need to first understand the problem," CNA, https://www.channelnewsasia.com/singapore/big-read-rising-traffic-accidents-road-culture-4328841

[2] https://tablebuilder.singstat.gov.sg/table/TS/M651361
[3] https://www.police.gov.sg/-/media/4E82276DD8944CD798DCB65EEDFDCA7B.ashx

Non-Vehicle Causes	Min Accidents	Max Accidents	2012 to 2022	Accidents
Other Causes Of Accidents Attributed To Pedestrians	55	134	62 128	1057
Substance Influence	2	4	4 2	33
Unsafe Activities in Public Areas	2	151	151 6	554
Unsafe Crossing Behaviors	181	303	212 303	2610

Further Suggestion

It is not possible to include interactive elements in a static poster. However, if interactivity is allowed, we can enhance our poster by giving each sparkline a hover function. Hovering on the sparkline would provide more in-depth information about each accident per year. Furthermore, the static poster could include a QR code that links to a webpage to showcase a re-enactment video of each accident. Each video would showcase the key information on how to avoid being in such a situation. This way, it would give readers more in-depth information that they can learn from.

Conclusion

The team has effectively implemented the improvements into a visualisation poster. Readers can comprehend and quickly determine which accidents are more common if additional context regarding the events is provided. Moreover, the poster makes excellent visuals by using a colorblind-friendly palette, for better visualisation. Sparklines were included to make it possible for readers to rapidly comprehend and make sense of each accident.