

# Flight Safety Data

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Semester: DSC680-T301 (2213-1) Winter 2020-2021

Github Portfolio URL: <https://chrisinoakland.github.io>

## Project 3 Report

### **Abstract**

Flying has long been considered one of the safest ways to travel — particularly when compared to automobiles. However, because of recent unfortunate airline crashes, it is now being presented to the public as one of the most dangerous. In fact, numerous media outlets around the country have been touting statistics stating that flying is no longer a safe way of traveling. News and media outlets have bombarded the public with statistics and figures about airline safety trends, and are reporting, overall, that things do not look good for the industry. With that narrative in mind, a study was undertaken to look into historical data of airline and automobile incidents, crashes, and fatalities, and also to dig deeper into the underlying factors of the most recent airline crashes, to truly understand if what is being presented by the media is accurate.

### **Introduction and Background**

This report will focus on the safety of airline travel and whether more recent crashes are a cause for concern for both the airline industry and the general public. This report is intended to focus more on the data presentation and visualization component of the field of data science, and while there is more than just exploratory data analysis involved, the primary objective of this project and this report is to show the data's findings — the data story — in a manner that can be easily consumed and understood by everyone, from business executives making decisions involving billions of dollars about their airlines, to the average individual wanting to make a personal decision about whether they will be safe if they choose to book a ticket and fly to visit family.

## **Problem Statement**

The primary problem I would like to solve is determining if any of the relatively recent concerns and fear of flying are actually warranted, or if they are overblown. Is flying still safe? Are there any common underlying factors that are causing airline crashes?

## **Data Sources**

The data I'll be working with for this project will come from the National Transportation Safety Board (NTSB), the National Highway Traffic Safety Administration (NHTSA), and the Aviation Safety Network:

- Aviation Safety Network (ASN): Databases from <https://aviation-safety.net/database/>
- National Highway Traffic Safety Administration (NHTSA): Data from <https://www.nhtsa.gov/data>
- National Transportation Safety Board (NTSB): Data from <https://www.nts.gov>

## **Methods and Technical Approach**

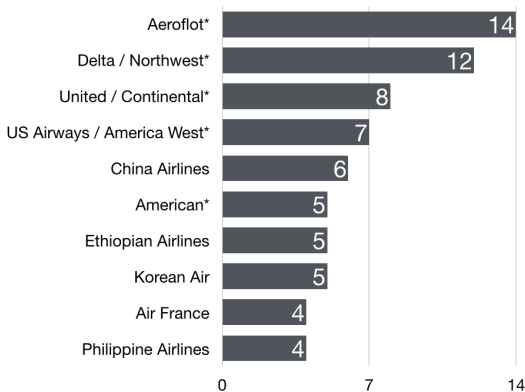
The information presented here is built upon information from airline safety data provided by the Aviation Safety Network, which has aviation safety records dating back to 1919. For the scope of this project, I will be looking into 35 years worth of airline incident, accident, and fatality information — more specifically those from the years 1985 through 2020. Using that information, I will look for trends when comparing the airline incident and fatality data from three different chunks of time, one grouping from 1985 through 1999, another from 2000 through 2014, and the last from 2015 through 2020. By comparing these three different chunks of airline safety data, any solid correlations should present themselves relatively clearly. For example, is it the same airlines that are having safety issues across this 35 year span? Are there any patterns in the geographical location of the airlines that have incidents? What about aircraft? Is there any data that shows a particular type of make or model of aircraft that is prevalent in the airline incident, crash, or fatality statistics?

As a means of comparison to one of the most common methods of travel — and to accurately have a comparison of fatality data — a supplemental data set from the NHTSA (National Highway Traffic Safety Administration) with automobile fatality information covers similar years and allows for a one-to-one study of fatality numbers across these most common uses of travel throughout the world.

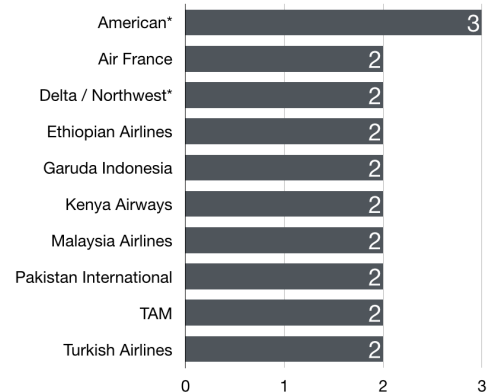
## Examining the Data

To answer the question of whether flying is still safe, we look to the data; it is telling a far different story than the one projected in media reports. The following two charts show the top ten fatal accidents in the airline industry over two different chunks of 30 years of data:

Top 10 Fatal Accidents 1985-1999



Top 10 Fatal Accidents 2000-2014



When looking at the fatal accident data from 1985 through 1999 on the left and the accident data from 2000 through 2014 on the right, it is easy to see that it is not the same exact airlines experiencing fatal accidents over these 30 years, rather, it is somewhat random: the same airlines that had fatal accidents in the past were not prone to repeat them. Another big piece of information from the airline fatality data is that the total number of fatalities is actually *decreasing*, and by a rather significant amount:

## The plane facts

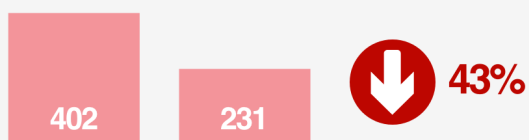


**51%  
decrease**

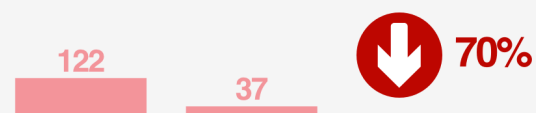
in total airline fatalities  
from 1985 through  
2014

### Decreases across the board

Total airline incidents and fatal accidents have also declined sharply over the same time period



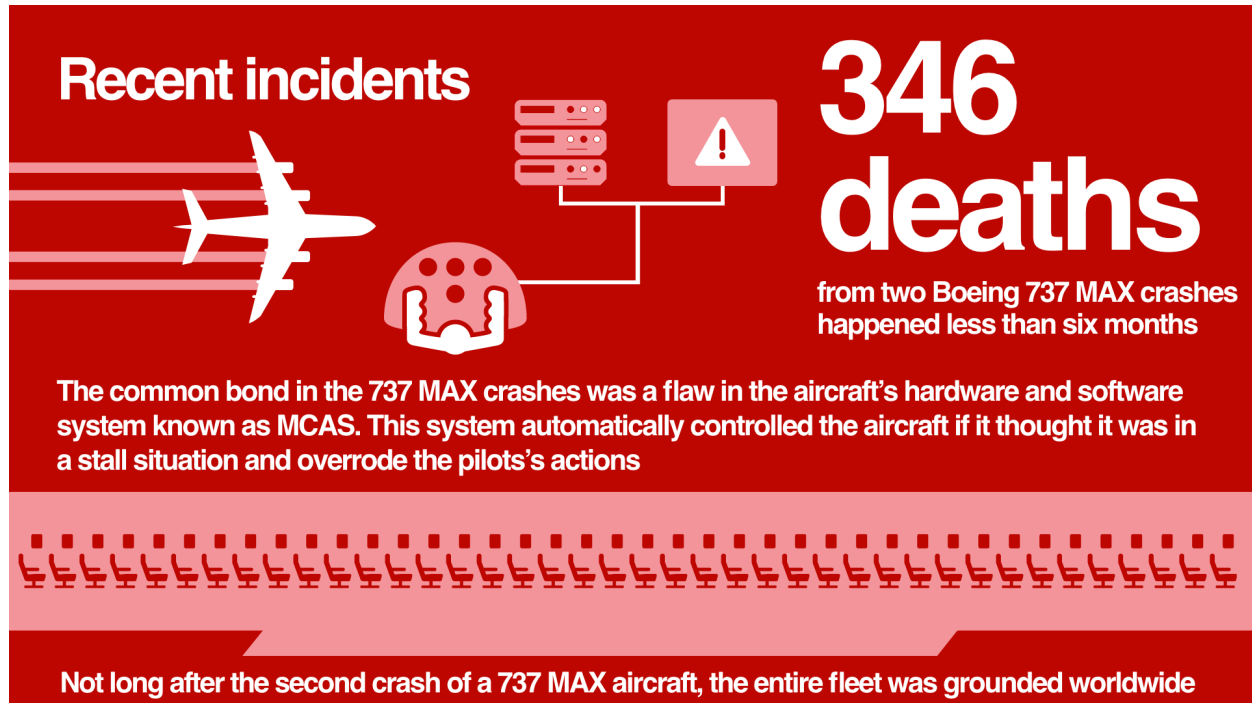
Airline Incidents 1985 - 2014



Airline Fatal Accidents 1985 - 2014

In fact, the total number of fatal accidents across all airlines from 1985 through 1999 was 122, while the number from 2000 through 2014 was 37, a decrease of 70%.

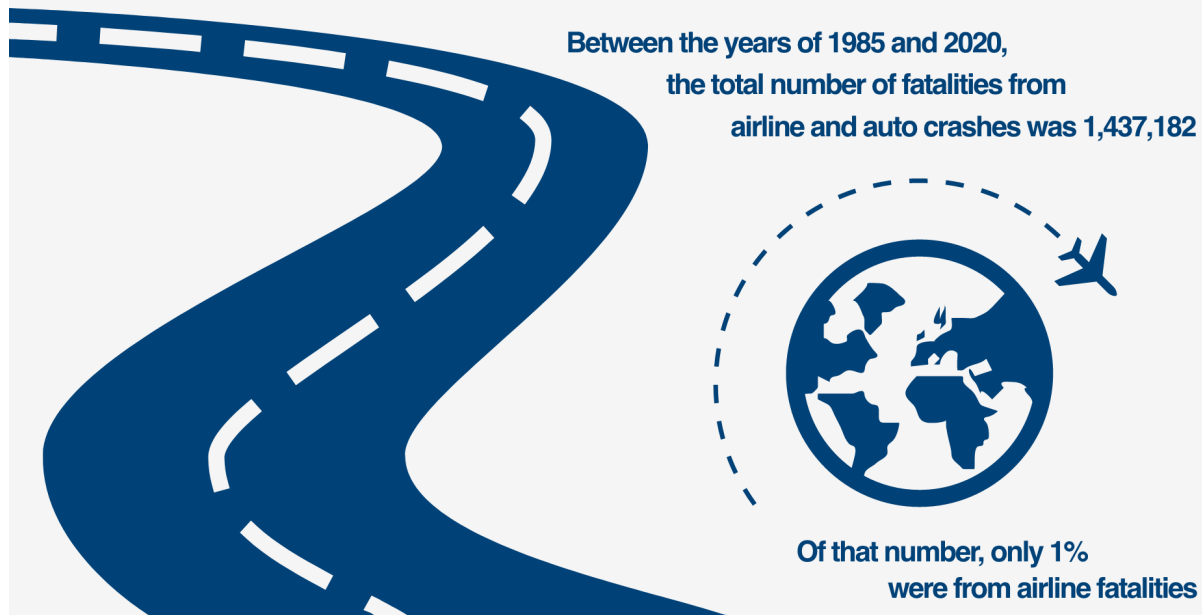
The more recent events of Boeing's 737 MAX aircraft and its MCAS problems highlight the issues driving the recent media push to question the safety of air travel. In fact, I argue that this particular aircraft and its issues are the primary impetus for the outcry:



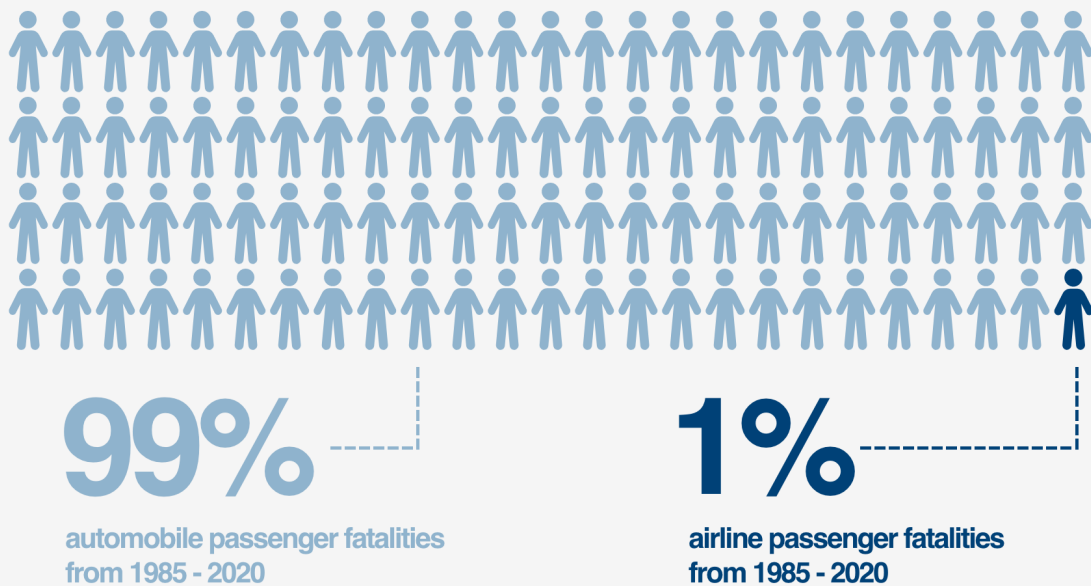
The fatalities from this particular aircraft came from two different flights less than six months apart in late 2019 and early 2019, each from different airlines. But their common bond is the flaw in the aircraft's hardware and software system (MCAS) that automatically control the pitch of the aircraft if it detects a stall position. Not long after the second crash of a 737 MAX aircraft, the entire fleet was grounded worldwide.

The last story to come from the safety data is the most compelling. This data compares total fatalities from flying and driving over the years 1985 through 2020. The difference in the fatality numbers is striking:

## Comparing airline and automobile fatalities



## Comparing airline and automobile fatalities



### Conclusion

Based upon the findings, despite recent fears of flying, with the exception of a faulty hardware and software system on one particular aircraft (Boeing's 737 MAX), traveling by plane is still extremely safe compared to other methods of travel.

Airlines that had incidents or fatal crashes in the past are not necessarily prone to have them happen again. Also, the data shows that the number of incidents and fatalities over 30 years have dropped quite a bit, and they are not particular to one geographic location, though there is evidence that airlines from developing countries are more prone to incidents, accidents, and fatalities.

Comparing the fatalities of airline travelers and those in automobiles provides a rather telling statistic: between the years of 1985 and 2020, the total number of fatalities from airline and auto crashes was 1,437,182. Of that number, airline fatalities make up only one percent of that total. Flying continues to be one of the safest methods of getting from one location to another.

### **References and Annotations:**

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