
NAVIGATING THE SKIES:A DATA DRIVEN APPROACH TO AIRCRAFT SAFETY RISKS.

Moringa school.Phase 1 Project.

Presented by:Patrick Maina.

Date:June 2025.

PROJECT OVERVIEW

- This project helps our company assess aviation risk as we consider entering the aircraft industry. Using aviation accident data from the National Transportation Safety Board (1962-2023), I analyzed which aircraft types are associated with the lowest risk.

BUSINESS UNDERSTANDING

- Our company plans to buy aircraft for private and commercial operations.
We need to identify which makes and models have the best safety records.
The goal is to avoid high-risk aircraft and make data-driven investment decisions.

DATA UNDERSTANDING

- **Source:** National Transportation Safety Board (NTSB) Aviation Accident Data
Years Covered: 1962 to 2023
Size: Over 90,000 records
Includes: Make, model, date, injury severity, location, number of injuries
Challenges: Many missing or inconsistent values, especially in injury and model fields

DATA PREPARATION

- Converted dates to year format
- Filled missing injury values with 0s
- Created "Total Involved" = sum of all injury categories
- Removed rows with missing aircraft make or model
- Grouped rare aircraft types under "Other"
- Filtered for accidents with clear injury severity

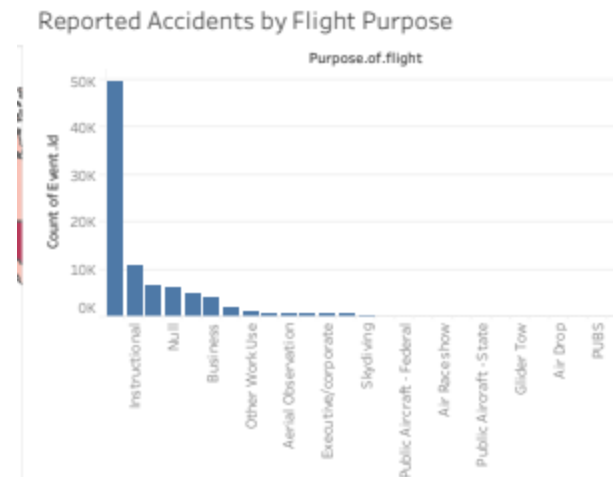
KEY ANALYSIS – FATAL INJURIES BY COUNTRY

- **Insight:** The majority of fatal injuries occurred in the United States, but other countries like Canada and Mexico also appear in the dataset. This insight could be skewed by reporting bias or dataset origin.



KEY ANALYSIS – REPORTED ACCIDENTS BY FLIGHT PURPOSE

- **Insight:** Personal and instructional flights make up a significant portion of reported accidents. Commercial passenger flights are fewer but tend to have more severe outcomes when accidents occur.



KEY ANALYSIS – TOP 10 AIRCRAFT MAKES IN REPORTED ACCIDENTS

Insight: Cessna and Piper dominate the accident reports, likely due to their wide use in general aviation and training. This needs normalization against fleet size or flight hours for fair risk comparison.

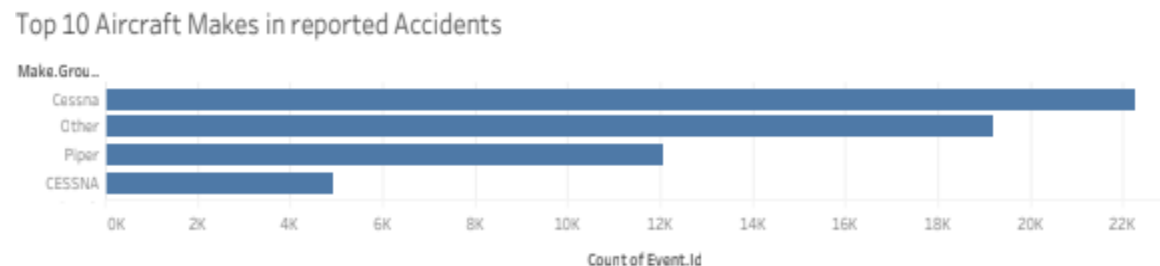


TABLEAU DASHBOARD HIGHLIGHTS

- **Map – Fatal Injuries by Country:** Clear geographic distribution
 - **Trend Line – Accidents Over Time:** Shows decline in recent decades
 - **Bar – Flight Purpose Distribution:** Reveals operational risks
 - **Top 10 Aircraft Makes:** Visualizes commonly involved manufacturers
- These visuals allow stakeholders to explore trends by geography, aircraft, and purpose interactively.

BUSINESS RECOMMENDATIONS

- **Invest in widely-used, lower-risk aircraft** such as Cessna and Piper, while still validating findings with normalized data.
- **Minimize usage of high-risk flight purposes** where possible, particularly for personal and instructional flights.
- **Focus international operations in regions with lower fatality rates**, while also exploring reporting gaps.

NEXT STEPS

- Include operational data like flight hours or number of aircraft in service for better normalization.
- Integrate external data (e.g., weather, pilot age/experience) for deeper analysis.
- Continue enhancing the dashboard and insights with stakeholder feedback.

THANK YOU

- **Name:** Patrick Maina
Email: nju9una.codes[@email.com](mailto:nju9una.codes@email.com)
Questions? Happy to discuss further!