Aviation Crash Data Analysis Report (1950–2025)

Ashutosh Mishra

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Dataset Overview

- The dataset contains 19,796 aircraft crash records, spanning a timeline from January 1, 1950 to June 12, 2025.
- It includes a wide scope of 622 unique aircraft models, 136 distinct manufacturers, and 8,072 different operators, reflecting global coverage and aviation diversity.
- Data completeness has been verified for key fields: 'aircraft', 'manufacturer', 'total_fatalities', 'crew_on_board', and 'pax_on_board' have no missing values.
- However, the 'aircraft_age' field contains 2,362 null values, likely due to missing historical data for older aircraft, which should be considered in age-based analysis.

Crash Volume Trends

- 1951 recorded the highest number of crashes in a single year, with 491 incidents.
- In contrast, 2022 had the lowest, with just 98 recorded crashes, showing a dramatic long-term decline.
- Decade-wise, the 1970s marked the peak (3,510 crashes), a 22% rise from the 1960s, likely due to aviation expansion outpacing safety regulations.
- Since the 1980s, every decade has seen a consistent drop. The 2020s saw a 63% decline compared to the 2010s.
- Overall, crash volume has dropped by over 83% since the 1970s, despite significant increases in air traffic—proof of rising aviation safety standards.

Fatality Analysis

- Fatalities peaked in 1972 (3,354 deaths), followed by 1985 (3,023) and 1973 (2,985).
- In comparison, 2023 saw the lowest fatality count (237), with slight increases in 2022 (358) and 2017 (404).
- The steady decrease highlights the effectiveness of improved aircraft design, training, and global safety regulations.

Manufacturer Impact

- Douglas aircraft had the highest crash count (2,546), followed by Cessna (1,802) and Beechcraft (1,503)—likely due to their large fleets and long usage history.
- Douglas also leads in total fatalities (23,122), followed by Boeing (22,336) and Lockheed (9,413).
- Airbus, despite being a major player, ranks 8th in total fatalities (4,129), indicating fewer crash events historically.
- When we look at average fatalities per crash, Airbus leads with 47.46 deaths per incident, followed by Tupolev (30.99) and Shaanxi (25.00).
- The overall average across all manufacturers is 6.53 fatalities per crash, suggesting that while Airbus crashes are rare, they tend to be more severe.

Flight Phase Analysis

- Among 21,419 crashes with known flight phases:
-   - Landing phase accounted for 8,104 crashes (37.84%).
-   - In-flight: 6,473 crashes (30.23%).
-   - Takeoff/climb: 4,561 crashes (21.30%).
- Combined, these three phases cover 89.4% of known-phase crashes.
- Fatalities by flight phase:
-   - Landing: 50,796 deaths
-   - In-flight: 47,400 deaths
-   - Takeoff/climb: 30,232 deaths

Aircraft Age and Crash Frequency

- Aircraft aged 10–19 years were involved in the most crashes (5,156), followed by 20–29 years.
- This trend likely reflects mid-life usage peaks, before aircraft are retired or subjected to major overhauls.
- The oldest aircraft involved in a crash was 108 years old—a Beechcraft 1900C, used for non-commercial purposes like ceremonial or experimental flights.

Country-Level Breakdown

- The United States had the highest number of crashes (5,527), followed by Russia (1,301), Canada (919), and Brazil (638).
- These figures likely correlate with flight volume, fleet size, and reporting history.
- In terms of fatalities:
-   - USA: 20,778 deaths
-   - Russia: 10,285 deaths

- - Brazil: ranks third
- - India: ranks sixth with 3,447 fatalities

Most Fatal Accidents

- The deadliest recorded crash involved a Boeing 747-200, with 520 fatalities.
- The second deadliest involved a Douglas DC-10, claiming 346 lives.
- Boeing appears 6 times in the top 10 deadliest crashes, underscoring its dominance in the large commercial jet market and exposure due to fleet size.

Conclusion

- This analysis confirms a significant long-term improvement in aviation safety, both in terms of crash frequency and fatality rates.
- While older manufacturers like Douglas and Boeing dominate crash counts due to scale and history, newer entrants like Airbus show lower crash frequency but higher average severity—likely a function of wide-body, long-haul aircraft.
- The data also highlights critical moments in flight—landing, takeoff, and in-flight operations—as the most accident-prone, pointing to areas where further technological and procedural advancements can continue reducing risk.