

Air Crash Analysis

A Power BI

Project



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Project Development Overview

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This project focuses on analysing aviation accidents from 1908 to 2024 using Power BI. The development process is outlined below:

1. Data Preparation:

- The original dataset was cleaned by removing unnecessary columns and rows to ensure only relevant information was included in the analysis.
- Appropriate data types were assigned to columns (e.g., dates, numbers, and text) to ensure accurate calculations and seamless visualizations.

2. Insights from Calculated Columns:

- **Accident Severity:** Accidents were categorized into "High Fatalities," "Medium Fatalities," and "Low Fatalities" based on the total number of fatalities:
 - High: More than 50 fatalities
 - Medium: 10 to 50 fatalities
 - Low: Less than 10 fatalities
- **Region:** Each accident was linked to a region (e.g., North America, Europe) using a relationship with the Countries table. If a region was unavailable, it defaulted to "Other."
- **Total Fatalities:** This was calculated as the sum of air and ground fatalities for each accident to provide a comprehensive view of the total impact.

3. Creation of the Countries Table:

- A separate table was created to map countries to their respective regions. This structure facilitated geographic trend analysis and allowed data to be grouped by regions effectively.

4. Centralized Metrics:

- A dedicated **Measure Table** was developed to consolidate key calculations, such as:
 - The number of survivors
 - Fatality rate (%)
 - Survival rate (%)
 - Average fatalities per accident
 - Total accidents and fatalities
- This approach ensured consistency and reusability of these metrics across the entire report.

5. **Interactive Features:**

- Interactive buttons such as Clear Filters, Map View, and Fatality Analysis were integrated to enhance user experience and facilitate easier navigation and exploration of the data.

6. **Data Visualization:**

- A variety of charts and visuals were created to highlight key insights, including:
 - Total accidents by region and year
 - Distribution of accident severity (high, medium, and low fatalities)
 - Trends in survivors versus fatalities
 - Fatalities categorized by aircraft manufacturers and regions
- These visualizations provided a comprehensive view of the data and enabled the identification of meaningful patterns and trends.

7. **Final Presentation:**

- The completed report was exported as a polished PDF, incorporating all visuals, metrics, and insights. The final design aimed to deliver an intuitive and engaging experience for users.

This project reflects my efforts to clean, organize, and analyse complex data while creating an intuitive and interactive report. The goal was to make it insightful and accessible for anyone interested in exploring aviation accident data.

Accidents and Fatalities Analysis

Total Accidents by Region

- **North America:** With 1,217 accidents, the region reports the highest number globally, which aligns with its high aviation traffic.
- **Europe:** Recorded 964 accidents, reflecting its dense air traffic.
- **Asia:** Accounted for 895 accidents, highlighting a significant share of air travel incidents.
- **South America:** Reported 575 accidents, indicative of moderate air traffic and associated risks.
- **Africa:** Registered 379 accidents, possibly due to operational challenges and fewer flights.
- **Oceania:** Logged 129 accidents, reflecting the region's relatively low air traffic.
- **Middle East:** With only 39 accidents, it has the lowest count globally, possibly due to stringent safety protocols or lower air traffic.
- **Other Regions:** Recorded 814 accidents, covering incidents in areas outside the major continents.

Total Accidents by Year

- **1920-1940:** Accidents gradually increased during this period as aviation technology and air traffic expanded.
- **1940-1980:** A sharp rise in accidents occurred, likely due to the rapid growth of commercial aviation.
- **Post-1980:** Accident rates declined significantly, reflecting advancements in safety regulations, technology, and air traffic management.

Accident Severity Distribution

- **Low Fatalities:** Comprising 47.49% (2,380 incidents), most accidents resulted in minimal loss of life.
- **Medium Fatalities:** At 41.88% (2,099 incidents), these cases involved notable but not catastrophic fatalities.
- **High Fatalities:** Representing 10.63% (533 incidents), these were the most severe accidents.

Passenger Statistics:

- **Total Aboard:** 1,56,160 passengers.
- **Fatalities:** 1,14,287 (71.35% fatality rate).

Fatalities by Region

- **Asia:** The highest number of fatalities, with 26,325 deaths (23% of the global total).
- **Europe:** Reported 23,483 fatalities (20.6% of the global total).
- **North America:** Accounted for 17,504 fatalities.
- **South America:** Reported 11,285 fatalities.
- **Africa:** Recorded 10,482 fatalities.
- **Middle East and Oceania:** The lowest fatalities, with 1,789 and 1,561 deaths, respectively.

Fatalities by Month

Seasonal trends indicate varying levels of risk:

- **July and December:** The most hazardous months, with 10,803 and 11,269 fatalities, respectively.
- **February and April:** Relatively safer months, with 8,354 and 7,370 fatalities, respectively.

Survivors vs. Fatalities Overview

- **Survivors:** A total of 44,746 individuals survived crashes.
- **Fatalities:**
 - **In-Air:** 111,414 fatalities (97.49% of the total).
 - **On-Ground:** 2,873 fatalities (2.51%), indicating minimal collateral damage to ground personnel.

Regional Observations

- **Asia and Europe:** These regions report high fatalities, correlating with their substantial share of global air traffic.
- **North America:** High accident and fatality counts reflect dense air traffic but may be mitigated by advanced safety protocols.
- **Africa:** Fewer flights but a high fatality-to-flight ratio suggests challenges in operational safety.
- **Oceania and Middle East:** Lower accidents and fatalities align with their relatively lower air traffic volumes.

Insights

Accidents by Region

- North America and Europe have the highest number of accidents compared to other regions. However, the proportion of fatalities in these regions could be lower than in regions with fewer accidents, suggesting differences in air safety infrastructure and responses.
- **Recommendation:** Focusing on regions with high accident rates, such as Asia and South America, could provide opportunities for improving safety measures, either through better regulations, training, or equipment.

Accident Severity

- Most accidents fall under the low to medium fatalities categories, but there are still a significant number of high-fatality accidents. This highlights the importance of not only preventing accidents but also reducing fatalities when accidents do occur.
- **Recommendation:** Investment in safety technologies like better crash-resistant systems, improved aircraft design, and more stringent safety protocols can reduce the number of high-fatality accidents.

Accident Trends Over Time

- An increase or decrease in accidents by year can highlight the effectiveness of safety initiatives, technological advancements, or regulatory changes. For instance, if the data shows fewer accidents in the most recent years, this could be indicative of improvements in aviation safety.
- **Recommendation:** If the data shows a downward trend in accidents, governments and airlines should continue investing in those areas. Conversely, if accidents are increasing, it may signal the need for new regulatory measures or technological improvements.

Fatalities by Month and Region

- Some months and regions report a significantly higher number of fatalities. For instance, high fatality months may indicate specific weather conditions or other factors contributing to more accidents.
- **Recommendation:** Aviation companies can use this insight to allocate more resources or precautions during high-risk months, such as enhancing training for crew members during these periods or improving aircraft maintenance schedules.

Use Cases

Aviation Safety Research

- Researchers and analysts can use this dataset to explore trends and patterns in aviation safety. By examining accident severity, fatalities, and the regions most affected by accidents, researchers can derive insights that may help improve aviation safety protocols, regulations, and policies.

Airline Industry Analysis

- Airlines can use this data to analyse their own safety performance and compare it with industry trends. This could help airlines improve their safety standards, reduce the risk of accidents, and boost their reputation for safety.

Aircraft Manufacturers' Safety Performance Review

- Aircraft manufacturers, such as Boeing or Airbus, can use this dataset to evaluate the safety record of their aircraft models. Insights from this analysis can be used to prioritize the development of safety features in future aircraft designs or to address known issues in existing models.

Government and Regulatory Agencies

- Government agencies and aviation regulatory bodies (e.g., FAA, ICAO) can use this data to monitor the aviation industry and implement regulations based on trends in accident severity, fatalities, and safety performance.

Public Awareness and Aviation Advocacy

- Advocacy groups can use this data to raise public awareness about the importance of aviation safety. The data can also be used to press for better regulations or safety measures within the aviation industry.