



Statistical Summary of Commercial Jet Airplane Accidents

Worldwide Operations | 1959-2023



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Leadership Message



Elisabeth Martin

Vice President, Enterprise Safety and Mission Assurance
Product and Services Safety

In 2023, there were no recorded fatalities among the airplane operations that Boeing tracks for this Statistical Summary of Commercial Jet Airplane Accidents – a first since we started collecting data in 1959.

This report – our 55th annual – shows that accident rates continue to decline to historic lows, despite air traffic nearly returning to pre-pandemic levels. Total accident numbers are also declining, in addition to accident rates. For example, over the last two decades, we've seen total accidents drop by about 30%; hull losses drop by nearly 50%; and fatal accidents drop by 60%.

2023 was one of the safest years on record. But when it comes to the safety of air travel, we know – as an industry and as a company – that we can never be complacent.

That stark reminder happened in January 2024, when a door plug departed the left side of a 737-9. Thankfully, the skilled pilots and cabin crew brought the airplane and everyone on board safely back to the ground.

Boeing took immediate containment actions to ensure the safety and quality of our 737-9s. We then developed and have been implementing a comprehensive plan to strengthen our safety management, quality assurance and safety culture, based on extensive feedback from our regulator, employees, customers and independent experts.

By listening and learning, we've made improvements, including better training for our employees, broader use of our Safety Management System, and stronger encouragement for employee reporting of product safety and quality hazards.

While we remain focused on these efforts and more, we are also continuing our engagement with customers, regulators and other stakeholders around the globe. The demand for air travel continues to grow, as do our industry efforts to ensure it remains the safest form of transportation.

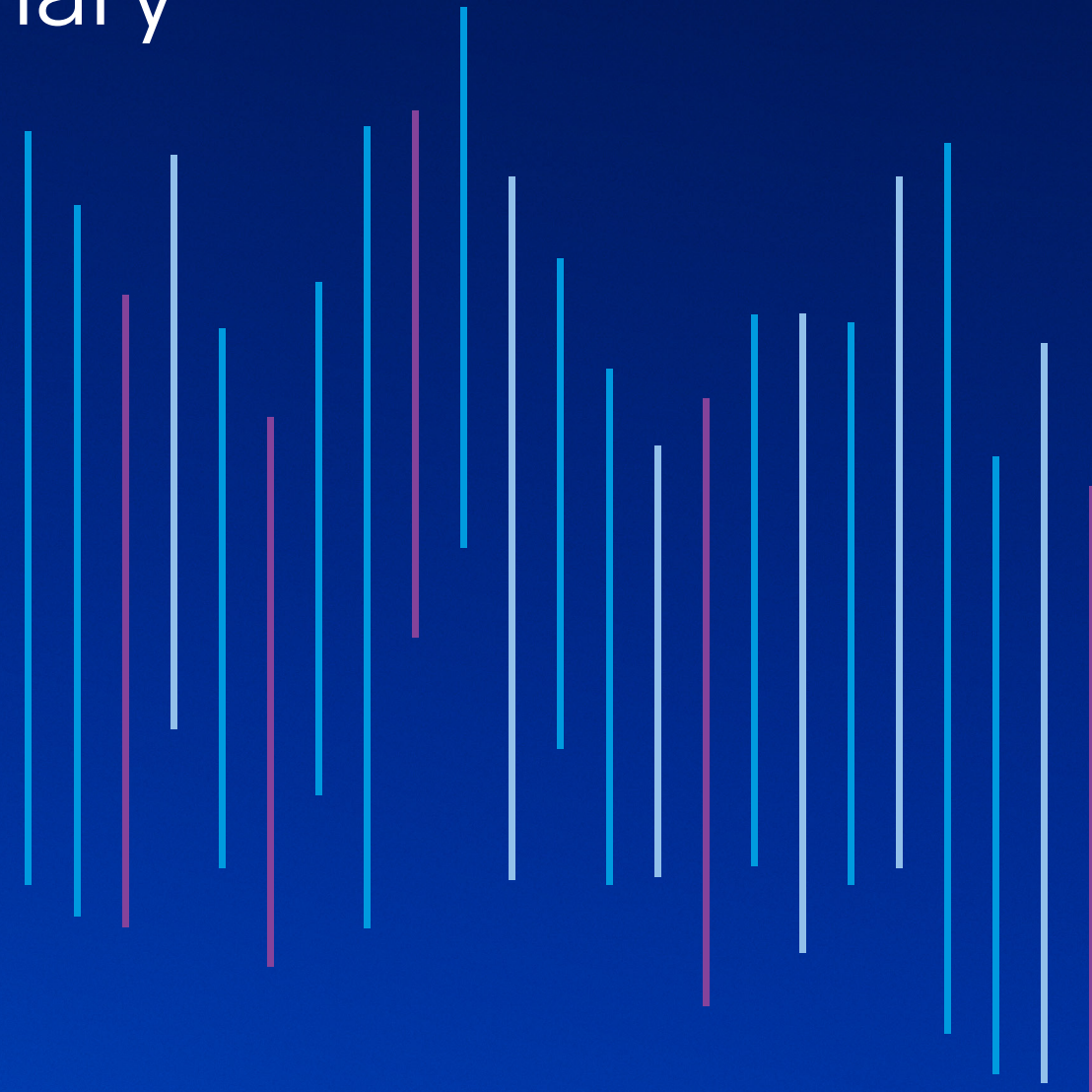
Boeing teams have engaged more than 200 airline operators in supporting, developing and implementing solutions that further strengthen the safety of the global air transportation system. We're also taking in operational data from the fleet to evaluate the assumptions made during initial aircraft design, address any risks associated with outdated assumptions and inform future designs.

It takes transparency, collaboration and humility in our never-ending drive to prevent aviation accidents. At Boeing, we remain committed to doing our part along this journey.

2023 Statistical Summary

This is the 55th edition of the Boeing Statistical Summary of Commercial Jet Airplane Accidents, which has been published by the company every year since 1969. The annual report provides data and statistical analysis to yield key insights into the safety of commercial air travel worldwide.

The information contained in this report can be used by the aviation industry to identify global trends and opportunities to advance safety. The findings underscore the importance of the industry's continuous pursuit of new levels of safety in order to prevent accidents, injury or loss of life.



2023 Airplane Accidents

Worldwide Commercial Jet Fleet

Event Date	Airline	Model (Age in Years)	Type of Operation	Accident Location	Phase of Flight	Event Description	Damage Category	Hull Loss	Injury Category	Onboard Fatalities/ Occupants (External Fatalities)	Major Accident
1/25/23	All Nippon Airways	767-300F (21)	Sched Cargo	Tokyo, Japan	Taxi	During taxi, the airplane contacted a cargo loading vehicle while turning. The fuselage was damaged. There were no injuries.	Substantial		None		
1/29/23	FlyCAA	A320 (14)	Sched Pax	Mbuji-Mayi, Democratic Republic of Congo	Initial Climb	A portion of the left-hand elevator departed the airplane after takeoff. There were no injuries.	Substantial		None		
3/22/23	United Airlines	A320 (17)	Sched Pax	Houston, United States	Landing	The airplane sustained a tail strike during landing and received substantial damage. The airplane rolled out without any further incident and taxied to the apron. There were no injuries.	Substantial		None		
3/24/23	USA Jet Airlines	MD-88 (32)	Sched Cargo	Saltillo, Mexico	Landing	The airplane sustained substantial damage after a hard landing. There were no injuries.	Substantial		None		
6/28/23	Delta Air Lines	717 (23)	Sched Pax	Charlotte, United States	Landing	The airplane sustained substantial damage when the nose landing gear did not extend before landing. There were no injuries.	Substantial		None		
7/29/23	United Airlines	767-300 (32)	Sched Pax	Houston, United States	Landing	The airplane sustained substantial damage to the upper fuselage skin while landing. There were no injuries.	Substantial		None		
8/3/23	United Airlines	767-300 (22)	Sched Pax	Washington, D.C., United States	Landing	After takeoff, a landing gear disagree indication occurred. The airplane landed safely after performing an air turnback. Postflight inspection discovered substantial damage. There were no injuries.	Substantial		None		
8/20/23	Alaska Airlines	737-800 (15)	Sched Pax	Santa Ana, United States	Landing	The airplane sustained damage when the left main landing gear collapsed after landing on the runway. There were no injuries.	Substantial		None		
9/18/23	DHL International Aviation ME	767-300 (24)	Sched Cargo	Beirut, Lebanon	Landing	The airplane suffered substantial damage during a hard landing that caused the fuselage skin to wrinkle. There were no injuries.	Substantial		None		
10/4/23	Ryanair	737-800 (13)	Sched Pax	Stansted, United Kingdom	Taxi	The airplane received substantial damage to the leading edge of the wing after impacting a catering truck while taxiing. There were no injuries.	Substantial		None		
10/4/23	FedEx	757-200 (36)	Sched Cargo	Chattanooga, United States	Landing	The airplane returned to land after the failure of its left hydraulic system. The landing gear failed to extend and airplane sustained substantial damage during the emergency landing. There were no injuries.	Substantial		None		
11	Total Accidents							0			0

Accident Rate and Departure Trends by Decade

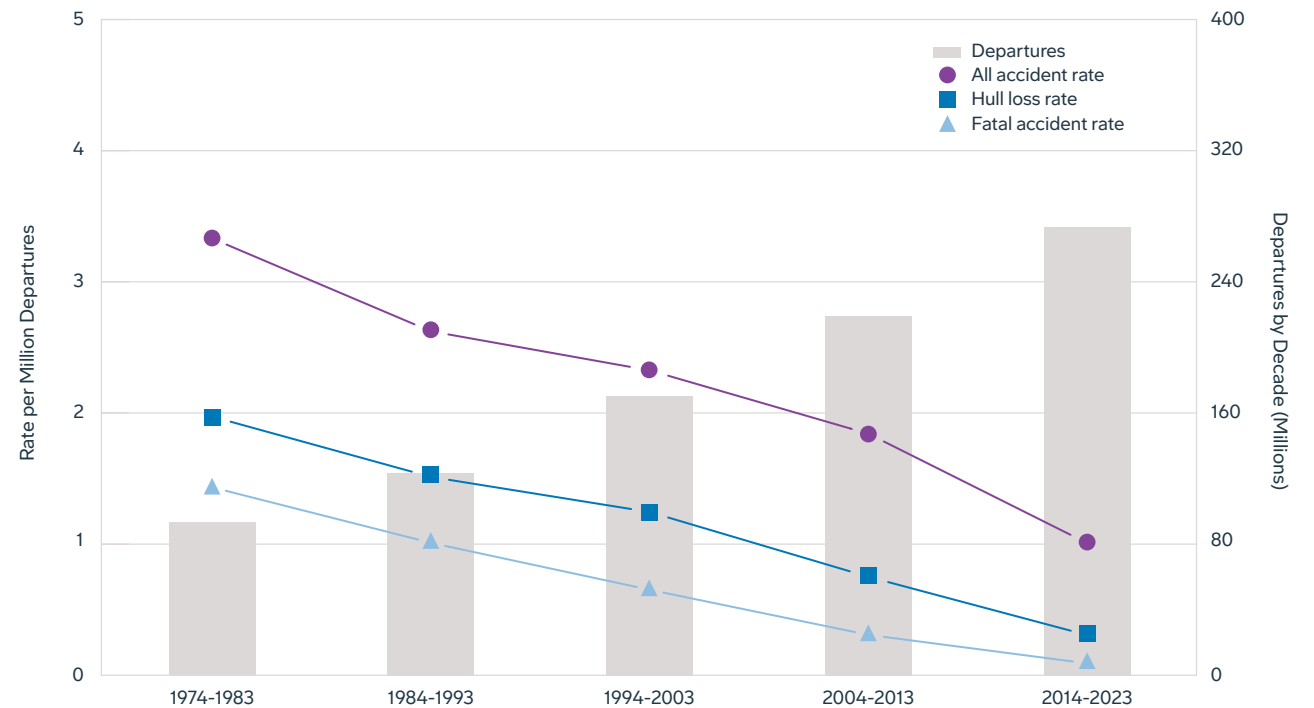
Worldwide Commercial Jet Fleet 1974-2023

Over the past five decades, statistics show that accident rates continue to decline even though air travel continues to grow worldwide. Between the last two decades, data shows the following trends:

- **Accident rate:** 45% decline
- **Hull loss rate:** 58% decline
- **Fatal accident rate:** 68% decline
- **Departures:** 25% increase

Total accident numbers are also declining, in addition to accident rates. For example, between the last two decades, total accidents dropped by about 30%; hull losses dropped by nearly 50%; and fatal accidents dropped by 60%.

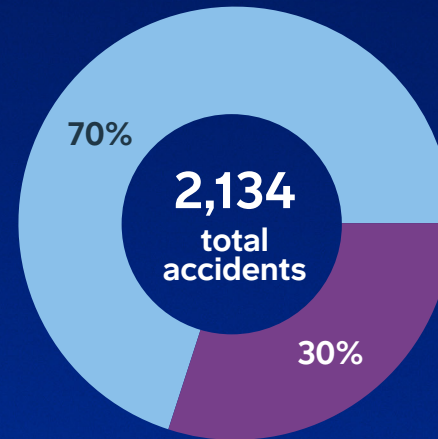
Accident Rates per One Million Departures and Total Departures, Decade View



Accident Summary by Injury and Damage

Worldwide Commercial Jet Fleet
1959-2023

1959-2023



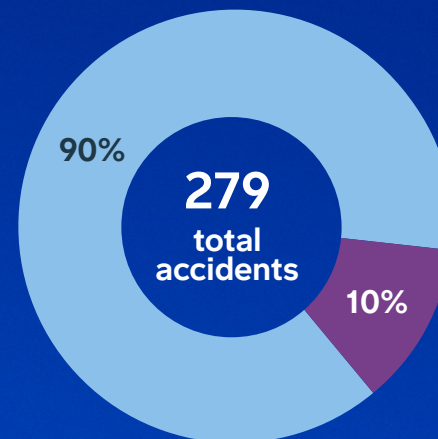
1,499 Nonfatal accidents

515 with hull loss
897 with substantial damage
87 without substantial damage

635 Fatal accidents

513 with hull loss
28 with substantial damage
94 without substantial damage

2014-2023



251 Nonfatal accidents

67 with hull loss
161 with substantial damage
23 without substantial damage

28 Fatal accidents

20 with hull loss
1 with substantial damage
7 without substantial damage

Note: "Hull loss" and the terms here refer to the severity of damage an airplane incurs from an accident.

Departures, Flight-Hours and Jet Airplanes in Service*

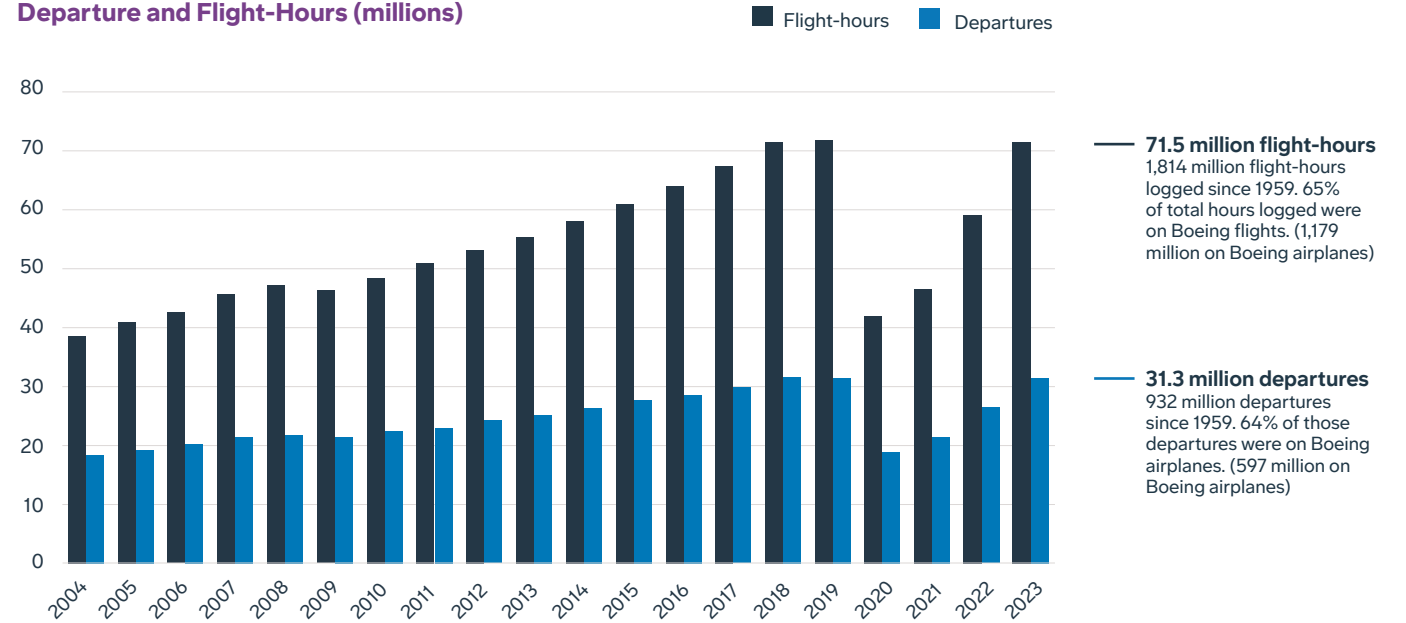
Worldwide Commercial Jet Fleet 2004-2023

Over the past 20 years, the statistics show a growing trend in the gap between total number of departures and total flight-hours. In 2023, passenger traffic continued to rebound worldwide and nearly returned to pre-pandemic numbers. The worldwide airplane fleet and commercial air traffic are expected to continue to grow over the next two decades.

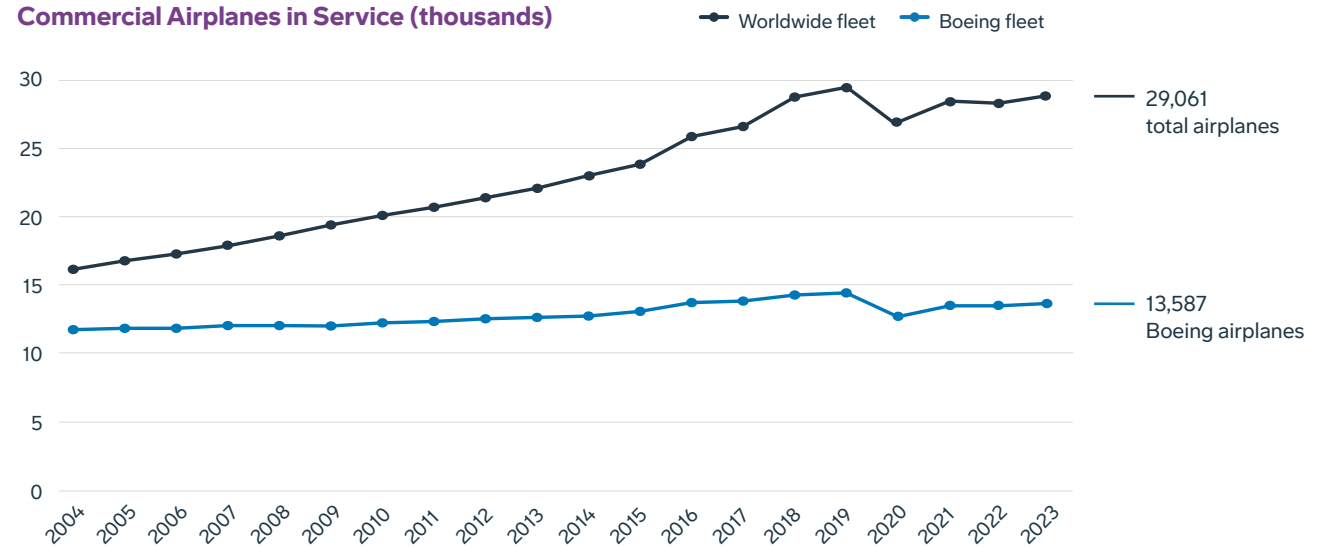
Sources: 2003-2019, Jet Information Services Inc.
2020-2023, Cirium.

*Certified jet airplanes greater than 60,000 pounds (27,216 kilograms) maximum gross weight, including those in temporary nonflying status and those in use by non-airline operators. Excluded are commercial airplanes operated in military service and CIS/USSR/PRC-manufactured airplanes.

Departure and Flight-Hours (millions)



Commercial Airplanes in Service (thousands)



Accident Summary by Type of Operation

Worldwide Commercial Jet Fleet 1959-2023

Type of Operation	All Accidents		Fatal Accidents		Onboard Fatalities (External Fatalities)*		Hull Loss Accidents	
	1959-2023	2014-2023	1959-2023	2014-2023	1959-2023	2014-2023	1959-2023	2014-2023
Passenger	1,704	230	510	24	29,643 (810)	1,066 (19)	757	63
– Scheduled	1,580	226	463	23	25,446 (806)	995 (19)	686	62
– Charter	124	4	47	1	4,197 (4)	71 (0)	71	1
Cargo	308	47	83	4	285 (385)	12 (43)	197	22
Maintenance test ferry, positioning, training and demonstration	122	2	42	0	190 (66)	0 (0)	74	2
Totals	2,134	279	635	28	30,118 (1,261)	1,078 (62)	1,028	87

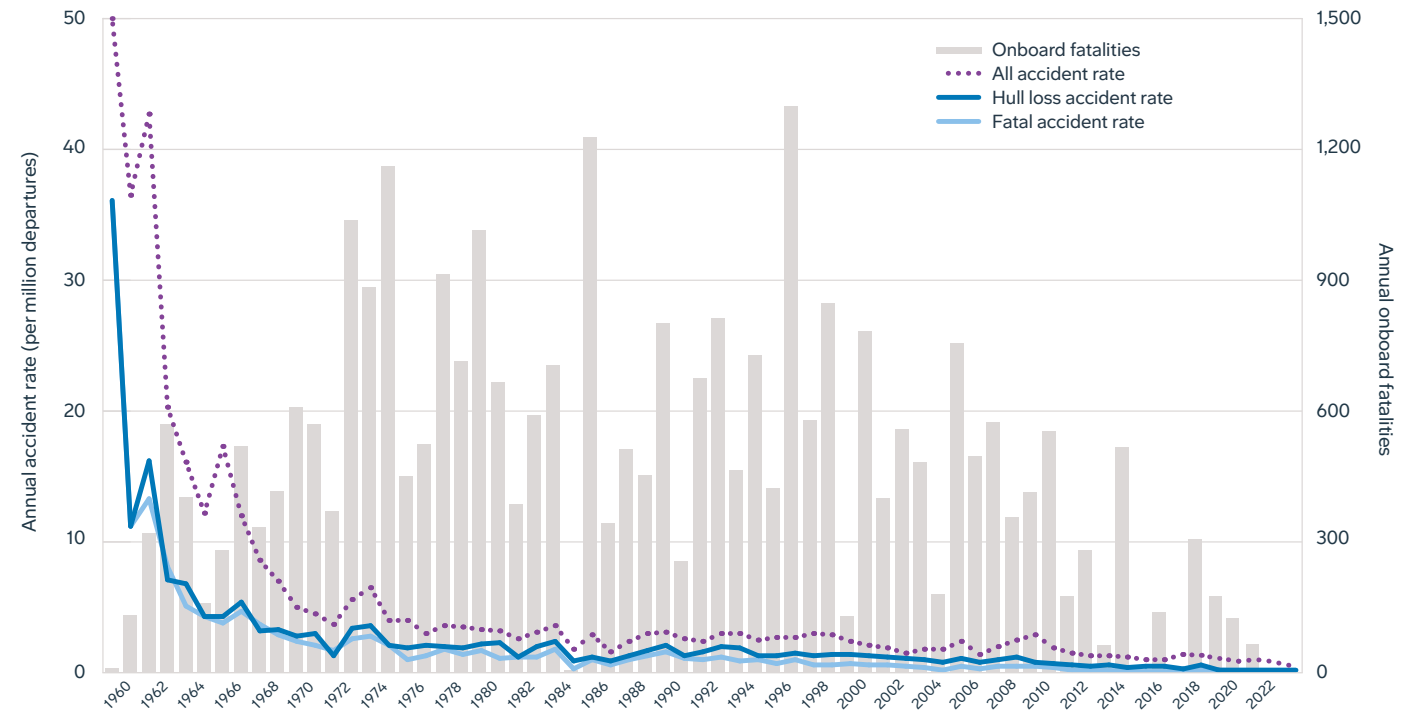
*External fatalities include on-ground fatalities as well as fatalities on other aircraft involved.

Accident Rates and Onboard Fatalities by Year

Worldwide Commercial Jet Fleet 1959-2023

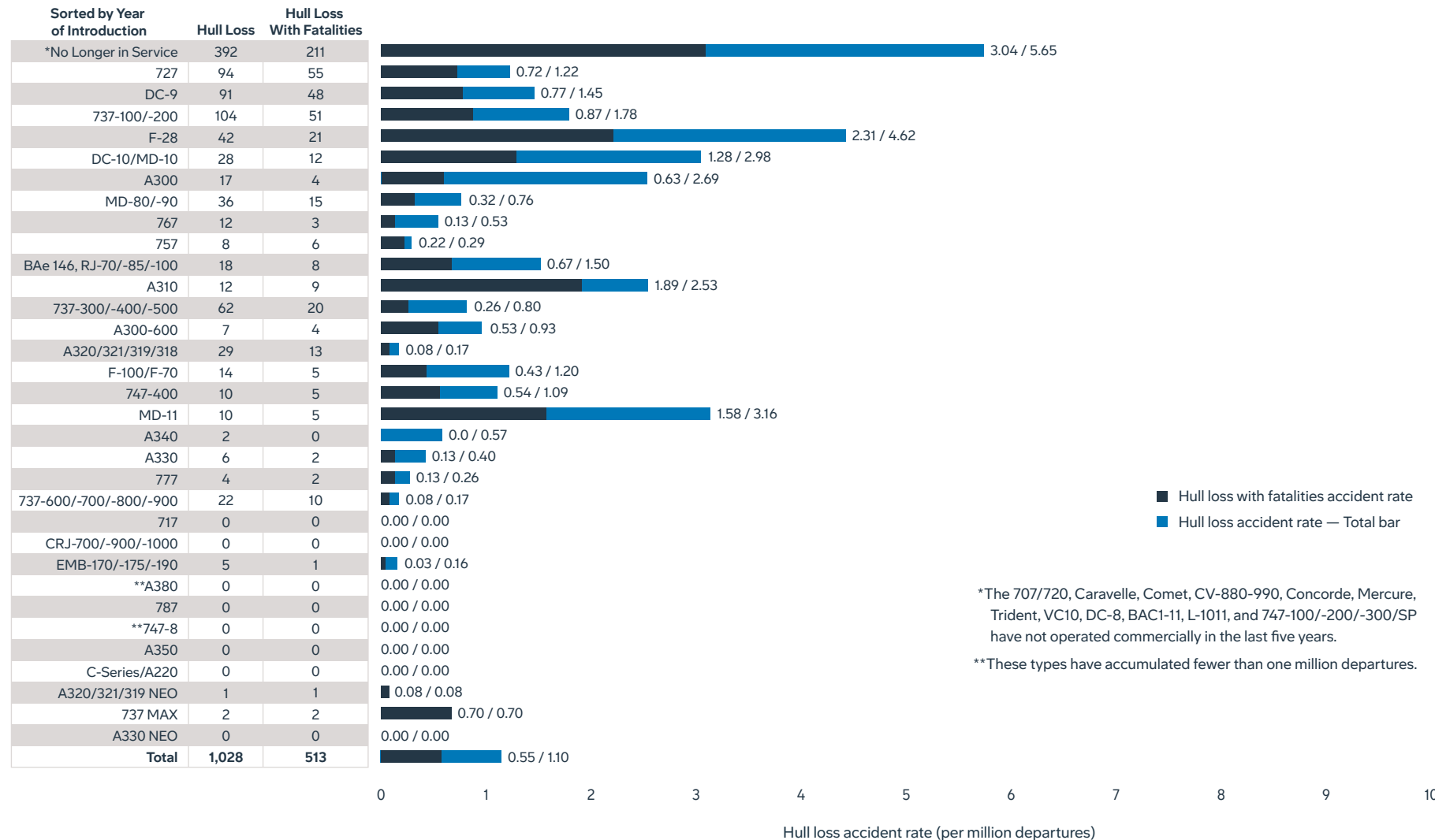
The first decade of the jet age saw dramatic improvements in fatal accident rates. Since then, safety advancements across the industry have helped continue the downward trend. In fact, there were zero fatal accidents in 2023 – the first year without a fatal accident since data collection began in 1959.

Accident Rates and Onboard Fatalities per One Million Departures



Accident Rates by Airplane Type

Hull Loss Accidents | Worldwide Commercial Jet Fleet | 1959-2023



CAST/ICAO Common Taxonomy Team Aviation Occurrence Categories

The International Civil Aviation Organization (ICAO) and the Commercial Aviation Safety Team (CAST), which includes government officials and aviation industry leaders, have jointly chartered the CAST/ICAO Common Taxonomy Team (CICTT). CICTT includes experts from several air carriers; aircraft manufacturers; engine manufacturers; pilot associations; regulatory authorities; transportation safety boards; ICAO; and members from Canada, the European Union, France, Italy, the Netherlands, the United Kingdom, and the United States. CICTT is co-chaired by one representative each from ICAO and CAST.

The team is charged with developing common taxonomies and definitions for aviation accident and incident reporting systems. Common taxonomies and definitions establish a standard industry language, thereby improving the quality of information and communication. With this common language, the aviation community's capacity to focus on common safety issues is greatly enhanced.

The CICTT Aviation Occurrence Taxonomy is designed to permit an assignment of multiple categories as necessary to describe the accident or incident. Since 2001, the Occurrence Validation Study Group (OVSG), formerly Safety Indicator Steering Group (SISG), has met annually to assign CICTT occurrence categories to the prior year's accidents.

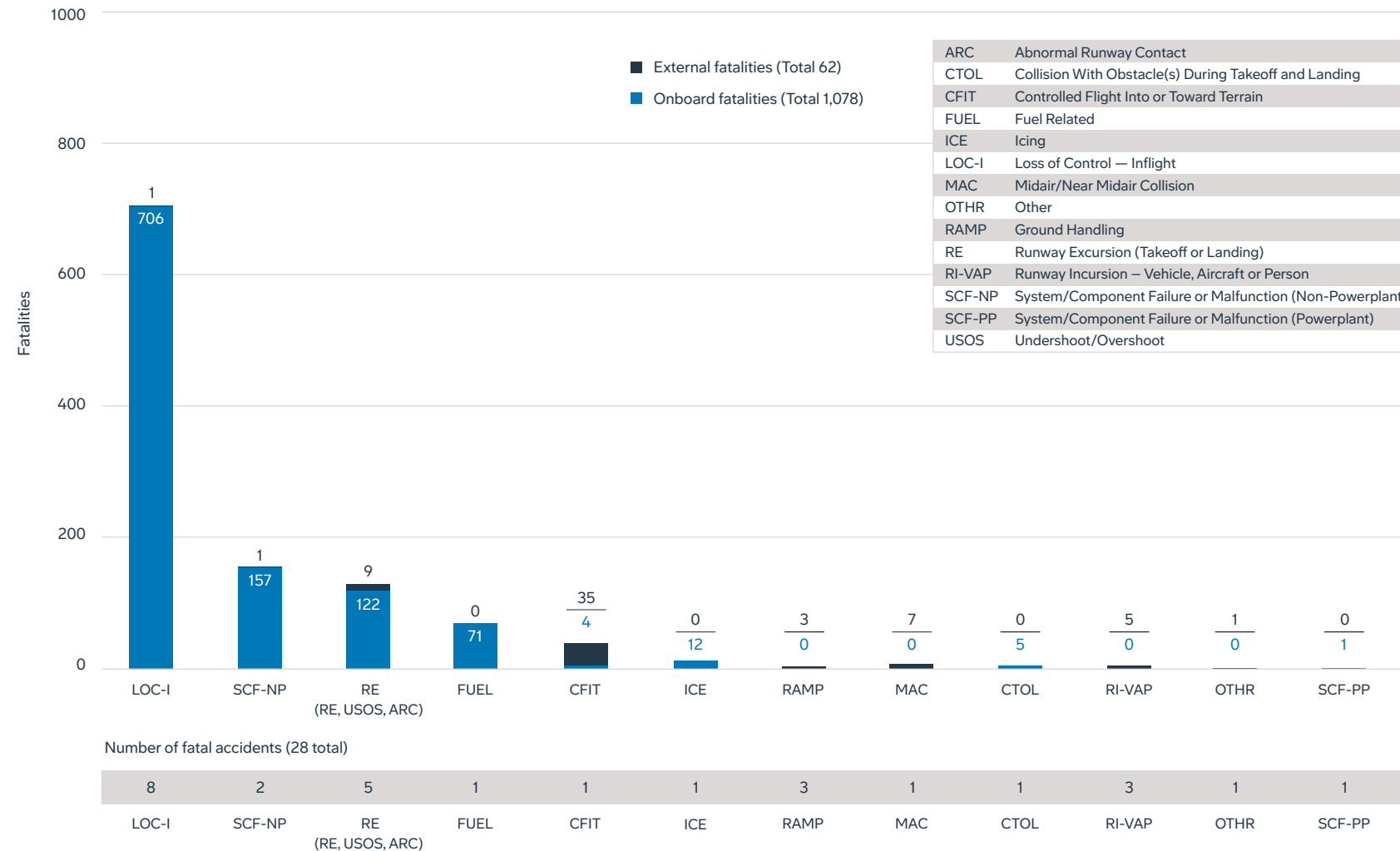
In a separate activity, the CAST assigned each fatal accident to a single principal category. Those accident assignments and a brief description of the categories are reported in the following chart.

The CAST's use of principal categories has been instrumental in focusing industry and government efforts and resources on accident prevention. Charts using principal categories are used by the CAST to identify changes to historical risk and to help to determine if the safety enhancements put in place are effective.

For a complete description of the categories, go to www.intlaviationstandards.org.

Fatalities by CICTT Aviation Occurrence Categories

Fatal Accidents | Worldwide Commercial Jet Fleet | 2014-2023



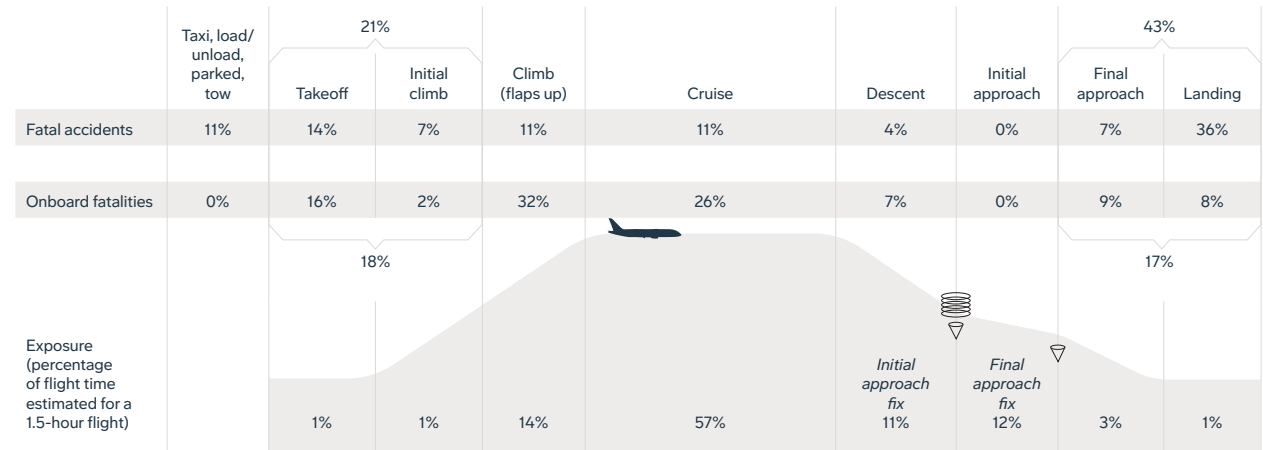
Note: Principal categories as assigned by CAST. See ["Definitions and Terms"](#) for included and excluded event details. For a complete description of CAST/ICAO Common Taxonomy Team (CICTT) Aviation Occurrence Categories, go to www.intlaviationstandards.org.

Fatal Accidents and Fatalities by Phase of Flight

Worldwide Commercial Jet Fleet 2014-2023

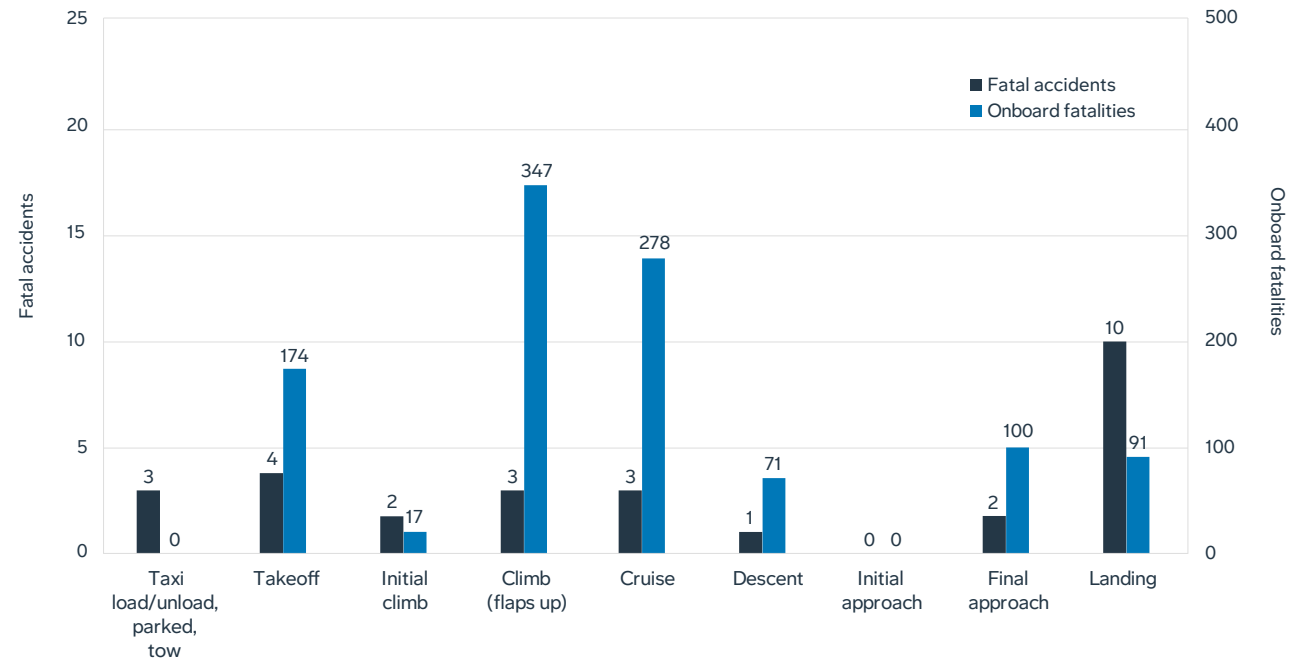
While cruising at altitude makes up the majority of time in the air, this phase of flight accounts for 11% of all fatal accidents. Conversely, the landing phase accounts for only 1% of flight time, but 36% of all fatal accidents. Most safety-related improvements over the past few decades have focused on the taxi, climb, approach and landing phases.

Percentage of Fatal Accidents and Onboard Fatalities | 2014-2023



Note: Percentages may not sum to 100% because of numerical rounding.

Distribution of Fatal Accidents and Onboard Fatalities | 2014-2023



Regional Statistics

**North America,
Central America
and Caribbean
(NACC)**

**Europe and
North Atlantic
(EUR/NAT)**

**Asia and Pacific
(APAC)**

**Middle East
(MID)**

**Western
and Central
Africa
(WACAF)**

**South
America
(SAM)**

**Eastern and
Southern Africa
(ESAF)**

This section organizes accident data into seven regions aligned with the [ICAO's annual Safety Report](#). Each region is different in terms of air travel growth rates, operational profiles and other important factors, and the data is reflected with those factors in mind. However, all regions share one common trend – the continued decline in accident rates across recent decades.

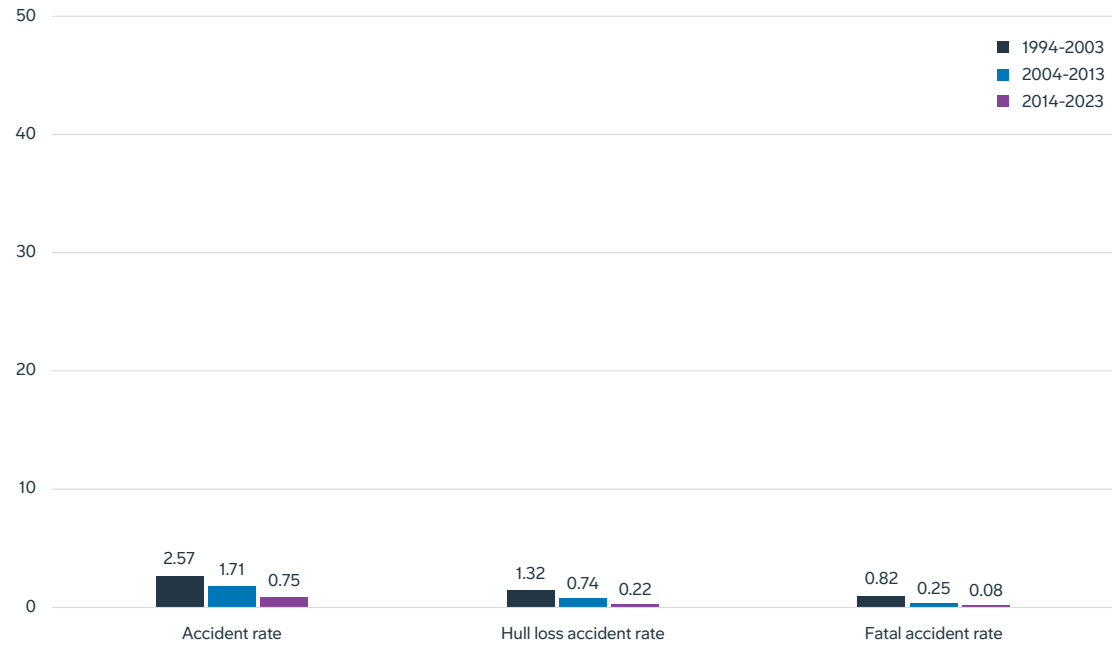
Accident statistics are aligned with operators and their home state of operation. This regional data perspective provides additional safety data for ICAO members as they develop and implement their global, regional and national aviation safety plans.

Asia and Pacific (APAC)

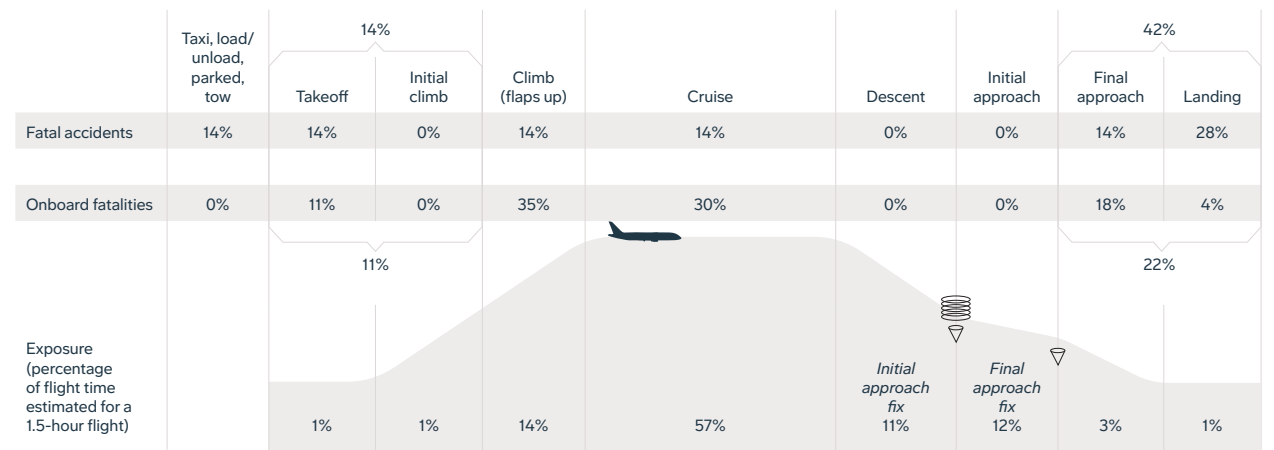
Regional Accident Counts		
APAC	1959-2023	2014-2023
All Accidents	399	67
Fatal Accidents	128	7
Onboard Fatalities	7,197	532
External Fatalities	271	2
Hull Loss Accidents	195	20

Fatal Accidents	
CICTT Category	2014-2023
CFIT	0
CTOL	0
FUEL	0
ICE	0
LOC-I	3
MAC	0
OTHR	0
RAMP	1
RE (RE, USOS, ARC)	3
RI-VAP	0
SCF-NP	0
SCF-PP	0

Accident Rates per One Million Departures



Percentage of Fatal Accidents and Onboard Fatalities | 2014-2023

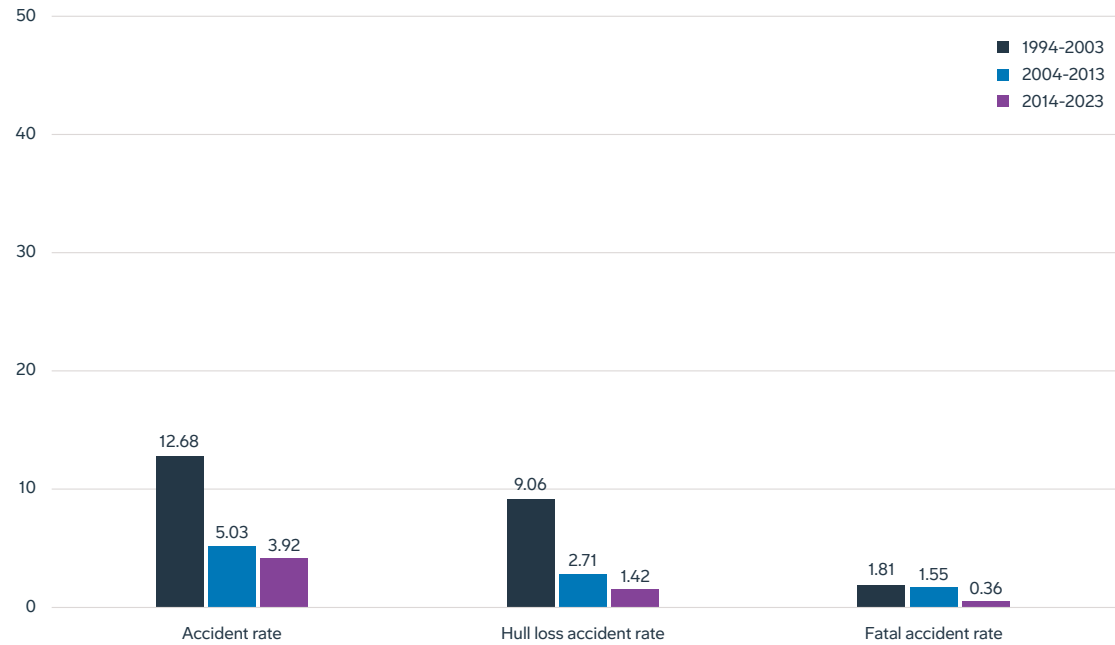


Eastern and Southern Africa (ESAF)

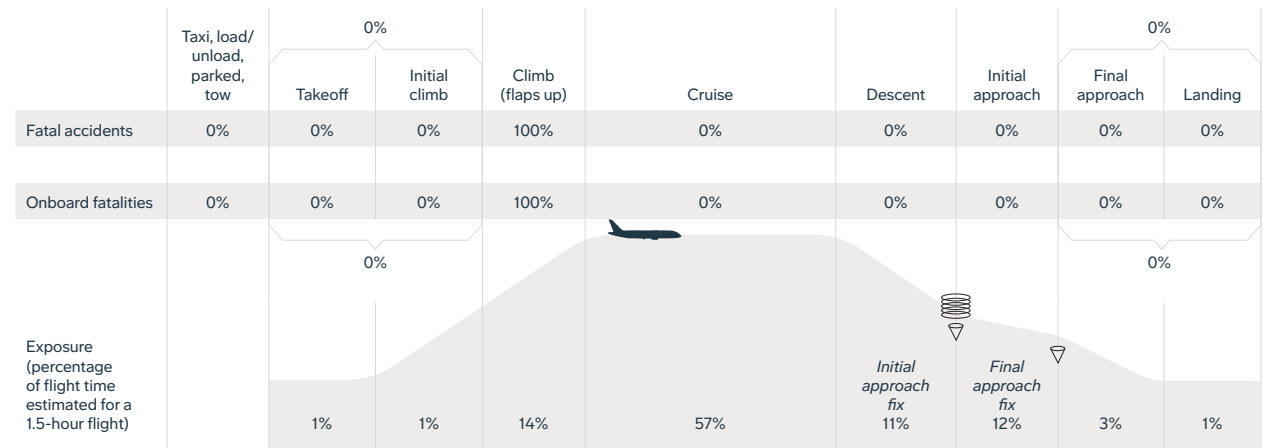
Regional Accident Counts		
ESAF	1959-2023	2014-2023
All Accidents	72	11
Fatal Accidents	16	1
Onboard Fatalities	1,064	157
External Fatalities	10	0
Hull Loss Accidents	44	4

Fatal Accidents	
CICTT Category	2014-2023
CFIT	0
CTOL	0
FUEL	0
ICE	0
LOC-I	0
MAC	0
OTHR	0
RAMP	0
RE (RE, USOS, ARC)	0
RI-VAP	0
SCF-NP	1
SCF-PP	0

Accident Rates per One Million Departures



Percentage of Fatal Accidents and Onboard Fatalities | 2014-2023



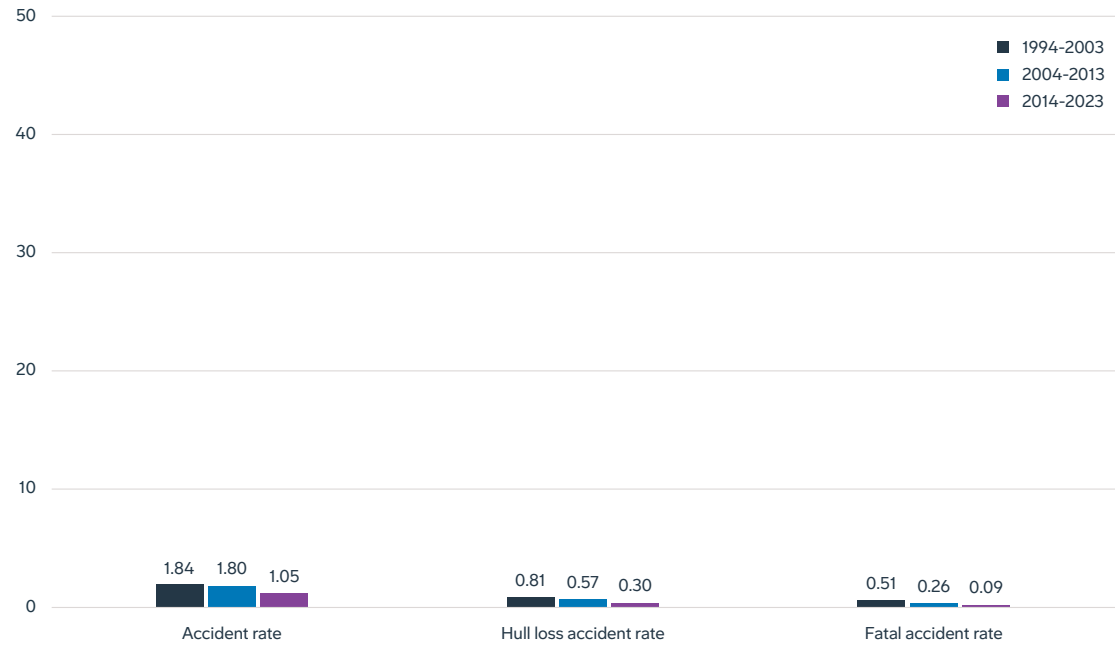
Note: Percentages may not sum to 100% because of numerical rounding.

Europe and North Atlantic (EUR/NAT)

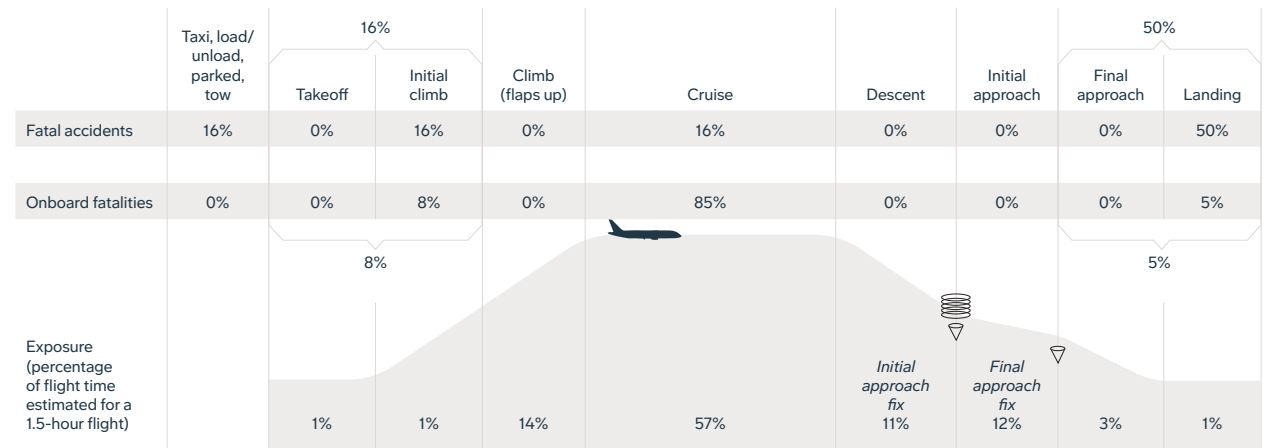
Regional Accident Counts		
EUR/NAT	1959-2023	2014-2023
All Accidents	508	74
Fatal Accidents	142	6
Onboard Fatalities	8,069	135
External Fatalities	146	38
Hull Loss Accidents	217	21

Fatal Accidents	
CICTT Category	2014-2023
CFIT	1
CTOL	0
FUEL	0
ICE	1
LOC-I	1
MAC	0
OTHR	0
RAMP	1
RE (RE, USOS, ARC)	1
RI-VAP	1
SCF-NP	0
SCF-PP	0

Accident Rates per One Million Departures



Percentage of Fatal Accidents and Onboard Fatalities | 2014-2023



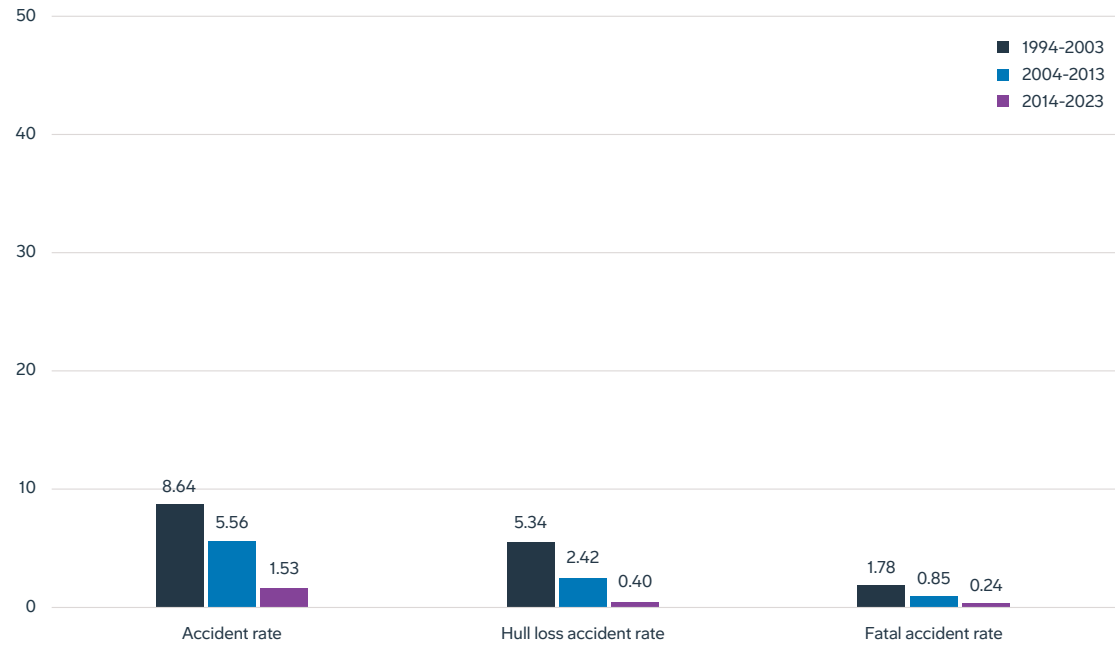
Note: Percentages may not sum to 100% because of numerical rounding.

Middle East (MID)

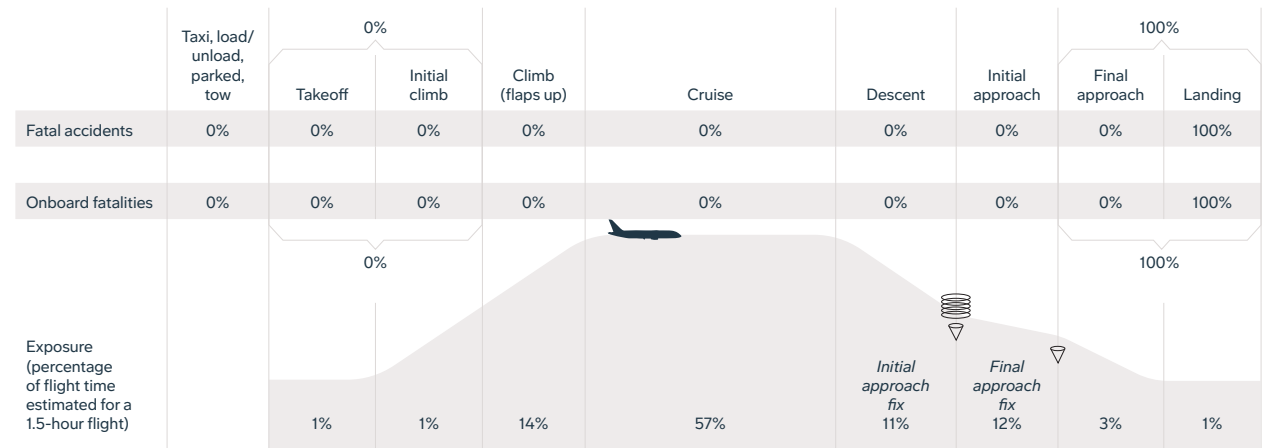
Regional Accident Counts		
MID	1959-2023	2014-2023
All Accidents	148	19
Fatal Accidents	41	3
Onboard Fatalities	2,353	62
External Fatalities	128	2
Hull Loss Accidents	76	5

Fatal Accidents	
CICTT Category	2014-2023
CFIT	0
CTOL	0
FUEL	0
ICE	0
LOC-I	2
MAC	0
OTHR	0
RAMP	0
RE (RE, USOS, ARC)	0
RI-VAP	1
SCF-NP	0
SCF-PP	0

Accident Rates per One Million Departures



Percentage of Fatal Accidents and Onboard Fatalities | 2014-2023



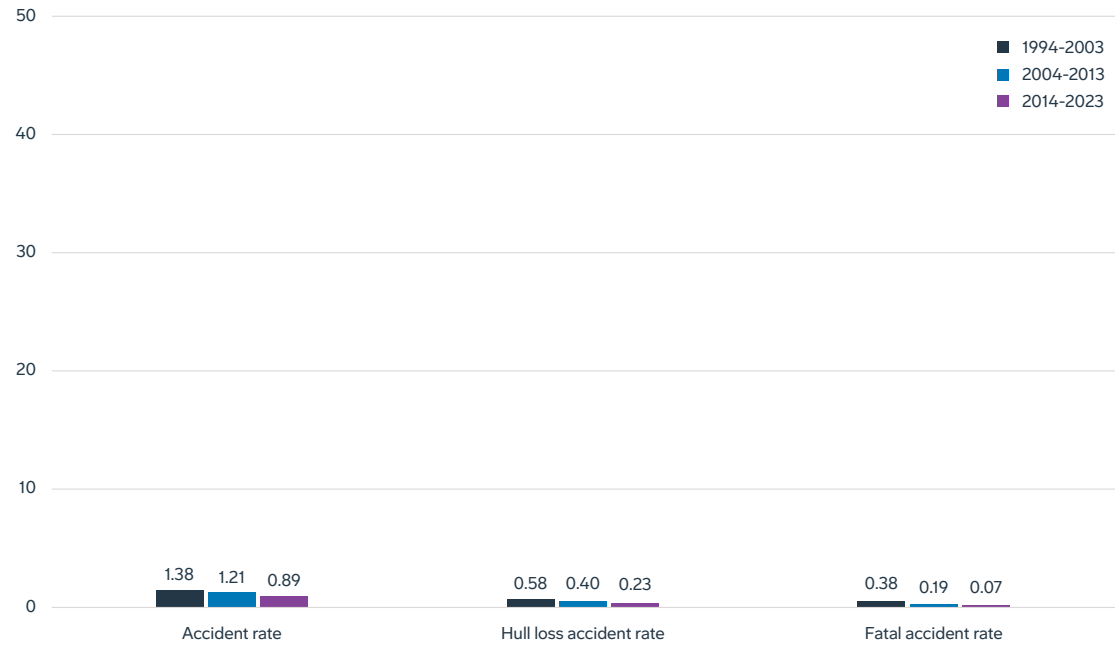
Note: Percentages may not sum to 100% because of numerical rounding.

North America, Central America and Caribbean (NACC)

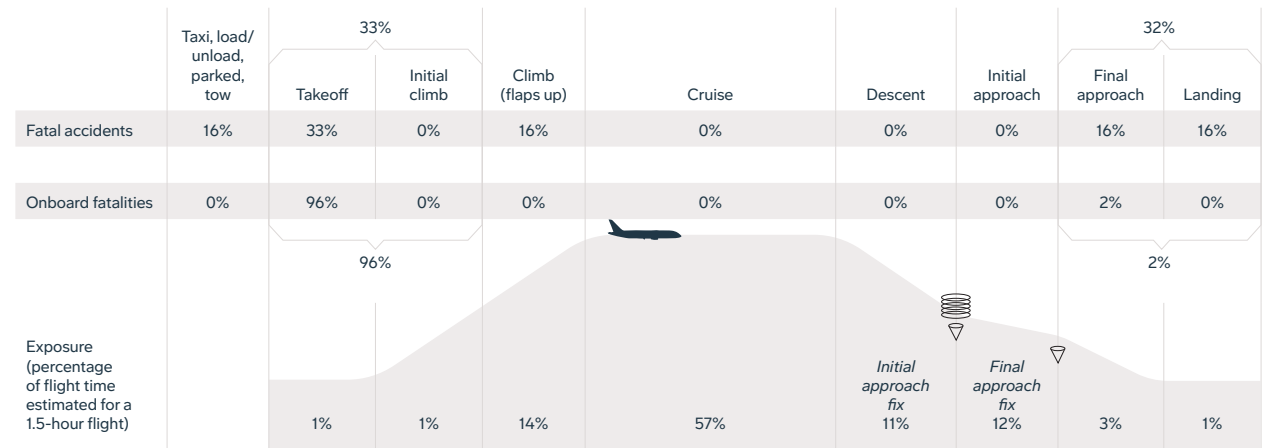
Regional Accident Counts		
NACC	1959-2023	2014-2023
All Accidents	702	75
Fatal Accidents	210	6
Onboard Fatalities	7,228	116
External Fatalities	416	3
Hull Loss Accidents	281	19

Fatal Accidents	
CICTT Category	2014-2023
CFIT	0
CTOL	0
FUEL	0
ICE	0
LOC-I	2
MAC	0
OTHR	1
RAMP	1
RE (RE, USOS, ARC)	0
RI-VAP	0
SCF-NP	1
SCF-PP	1

Accident Rates per One Million Departures



Percentage of Fatal Accidents and Onboard Fatalities | 2014-2023



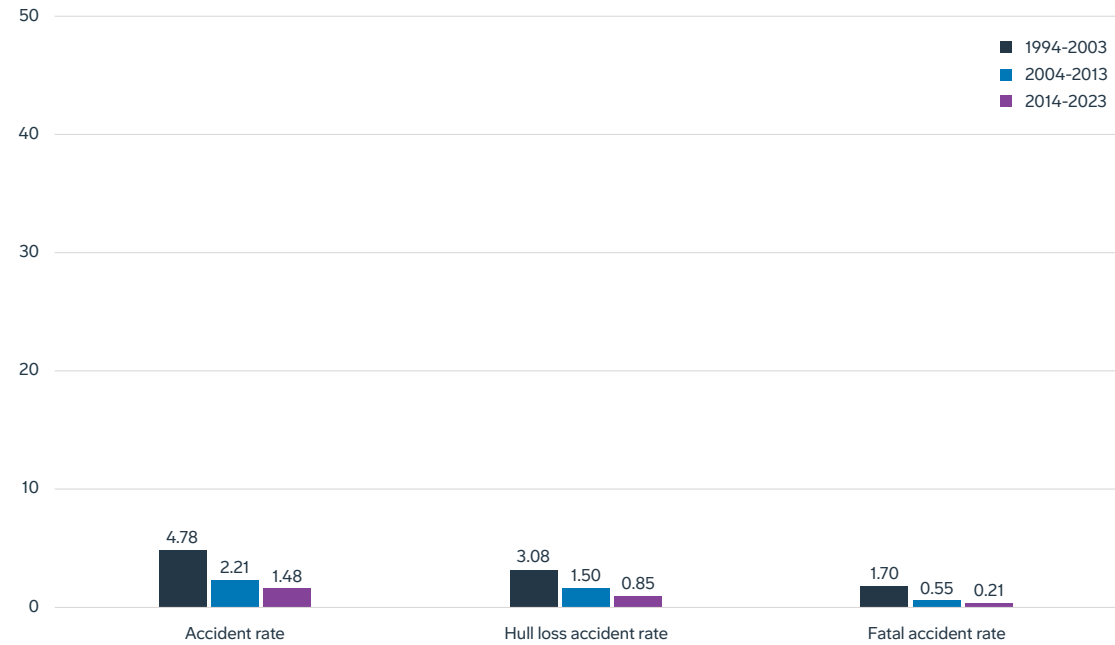
Note: Percentages may not sum to 100% because of numerical rounding.

South America (SAM)

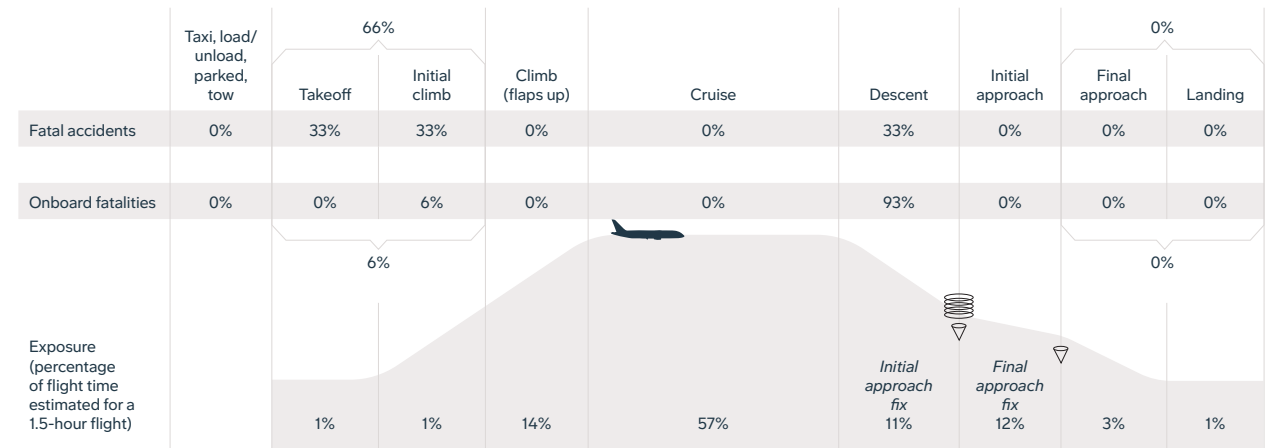
Regional Accident Counts		
SAM	1959-2023	2014-2023
All Accidents	211	21
Fatal Accidents	74	3
Onboard Fatalities	3,250	76
External Fatalities	212	2
Hull Loss Accidents	145	12

Fatal Accidents	
CICTT Category	2014-2023
CFIT	0
CTOL	1
FUEL	1
ICE	0
LOC-I	0
MAC	0
OTHR	0
RAMP	0
RE (RE, USOS, ARC)	0
RI-VAP	1
SCF-NP	0
SCF-PP	0

Accident Rates per One Million Departures



Percentage of Fatal Accidents and Onboard Fatalities | 2014-2023



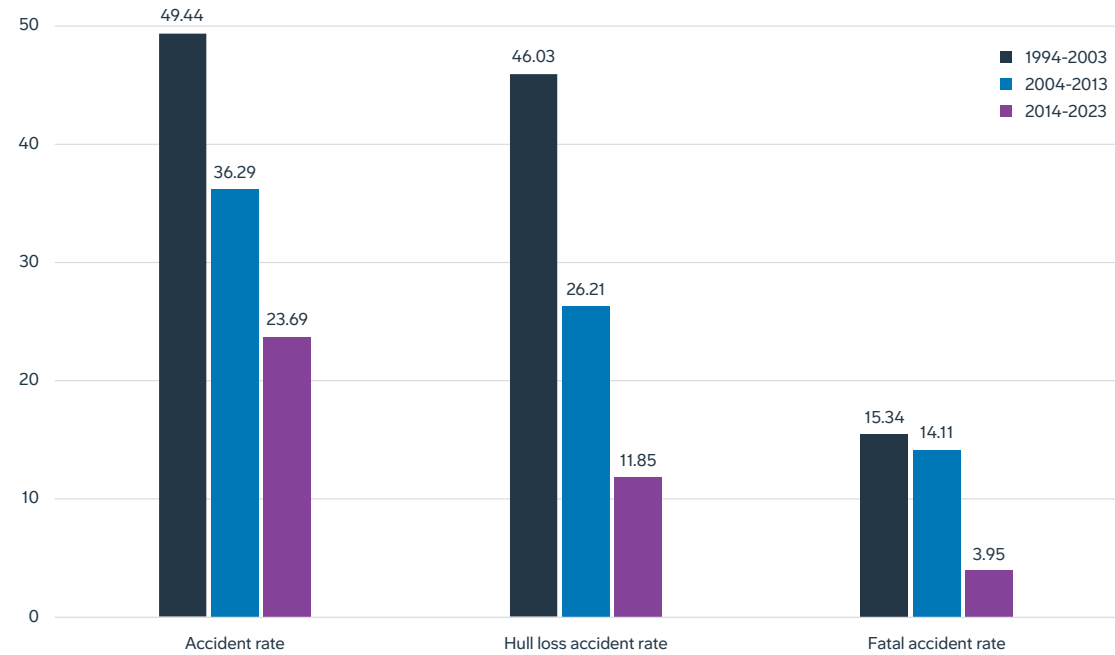
Note: Percentages may not sum to 100% because of numerical rounding.

Western and Central Africa (WACAF)

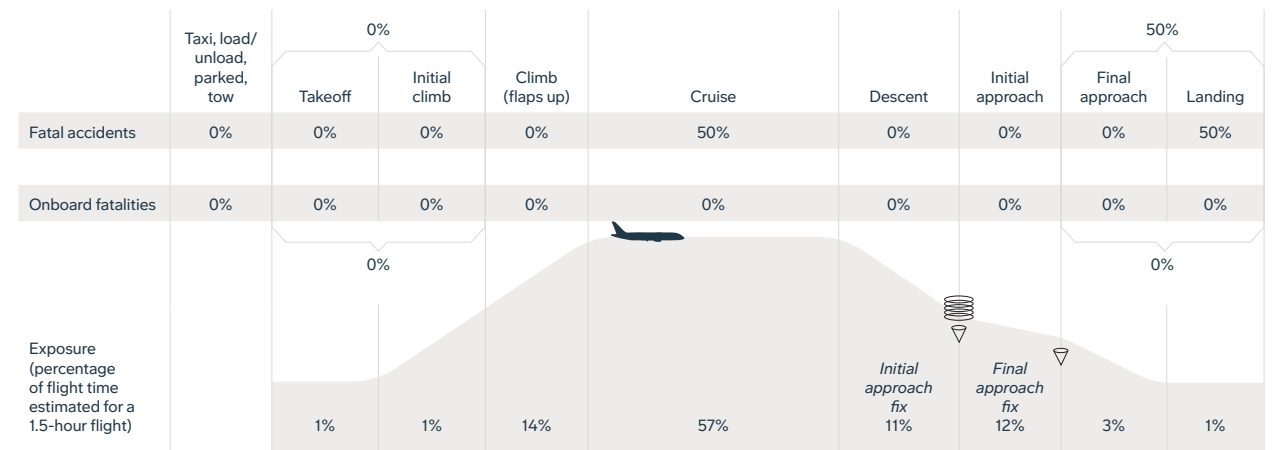
Regional Accident Counts		
WACAF	1959-2023	2014-2023
All Accidents	94	12
Fatal Accidents	24	2
Onboard Fatalities	957	0
External Fatalities	78	15
Hull Loss Accidents	70	6

Fatal Accidents	
CICTT Category	2014-2023
CFIT	0
CTOL	0
FUEL	0
ICE	0
LOC-I	0
MAC	1
OTHR	0
RAMP	0
RE (RE, USOS, ARC)	1
RI-VAP	0
SCF-NP	0
SCF-PP	0

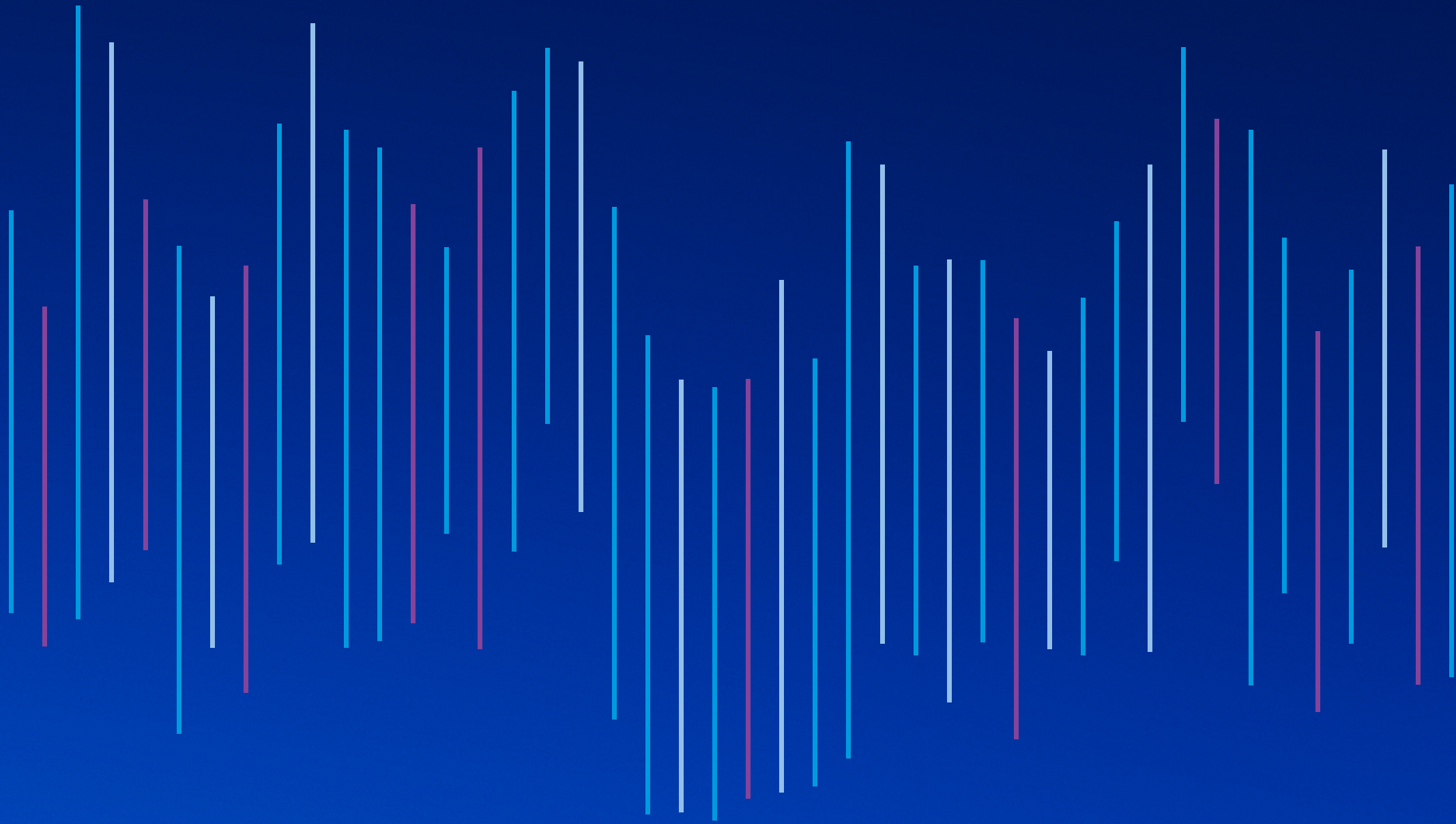
Accident Rates per One Million Departures



Percentage of Fatal Accidents and Onboard Fatalities | 2014-2023



Note: Percentages may not sum to 100% because of numerical rounding.



About This Document

The accident statistics presented in this summary are confined to worldwide commercial jet airplanes that are heavier than 60,000 pounds (27,216 kilograms) maximum gross weight. Within that set of airplanes, there are two groups excluded:

1. Airplanes manufactured in the Commonwealth of Independent States (CIS), the Union of Soviet Socialist Republics (USSR), or the People's Republic of China (PRC) due to lack of operational data.
2. Commercial airplanes operated in military service. (However, if a military-owned commercial jet transport is used for civilian commercial service, that data will be included in this summary.)

The following airplanes are included in the statistics:

Boeing		Airbus	BAE SYSTEMS (Avro)	BAE SYSTEMS (HS)	Embraer	Lockheed
707/720	DC-8	A300	Avro RJ70/85/100	BAe 146	E170/175	L-1011
727	DC-9	A300-600		Comet 4	E190/195	
737	DC-10/MD-10	A310	BAE SYSTEMS (BAC)	Trident		Dassault Aviation
747	MD-11	A320/321/319/318	Concorde		Fokker	Mercure
757	MD-80/-90	A330	One-Eleven	Bombardier	F28	
767		A340	VC10	CRJ700/900/1000	F70	General Dynamics
777		A350			F100	(Convair)
787		A380		Aerospatiale		CV-880/-990
717		A220/C Series		Caravelle		

Flight operations data for Boeing airplanes is developed internally from airline operator reports. Flight operations data for non-Boeing airplanes is compiled by Cirium. The source of jet airplane inventory data is Jet Information Services Inc.

Accident data is obtained, when available, from government accident reports. Otherwise, information is from operators, manufacturers, various government and private information services, and press accounts.

Readers may note that cumulative accident totals from year to year may not exactly correlate with the expected change from the previous year's accidents. This is a result of periodic audits of the entire accident history for updates to the data.

Definitions related to the development of statistics in this summary are primarily based on corresponding ICAO, U.S. National Transportation Safety Board (NTSB) and Flight Safety Foundation (FSF) terms, as explained in the next section.

Definitions

Airplane Accident

An occurrence associated with the operation of an airplane that takes place between the time any person boards the airplane with the intention of flight and such time as all such persons have disembarked, in which:

- The airplane sustains substantial damage.
- Death or serious injury results from:
 - Being in the airplane.
 - Direct contact with the airplane or anything attached thereto.
 - Direct exposure to jet blast.

Excluded Airplanes

Airplanes manufactured in the CIS, USSR or the PRC are excluded because of the lack of operational data. Commercial airplanes operated in military service are generally excluded. (If a military-owned commercial jet transport is used for civilian commercial service, that data is included in this summary.)

Excluded Events

- Fatal and nonfatal injuries from natural causes.
- Fatal and nonfatal self-inflicted injuries or injuries inflicted by other persons.
- Fatal and nonfatal injuries of stowaways hiding outside the areas normally available to the passengers and crew.
- Nonfatal injuries resulting from atmospheric turbulence, normal maneuvering, loose objects, boarding, disembarking, evacuation, and maintenance and servicing.
- Nonfatal injuries to persons not aboard the airplane.
- Occurrences classified as missing, unknown or undetermined (CICCTT occurrence category UNK) are not included in this publication until otherwise determined by the official ICAO Annex 13 investigation.

Note: The exclusion of the UNK occurrence category is in alignment with industry efforts to identify, prioritize and reduce global high-risk categories of occurrences such as those identified in ICAO's Global Aviation Safety Plan (GASP).

(See the [“CAST/ICAO Common Taxonomy Team Aviation Occurrence Categories”](#) section.)

Definitions

Excluded Events (continued)

The following occurrences are **not** considered airplane accidents:

- Those that are the result of experimental flight tests. (However, maintenance flight tests, ferry, positioning, training and demonstration flights are not excluded.)
- Those that are the result of a hostile action, including sabotage, hijacking, terrorism and military action.

Note: This is generally consistent with the ICAO and the NTSB definition of an accident. (See the [“Referenced ICAO and NTSB Definition”](#) section.)

The differences are:

1. The ICAO and NTSB references to “aircraft” were changed to “airplane” and references to propellers and rotors were eliminated.
2. This publication excludes events that result in nonfatal injuries from atmospheric turbulence, normal maneuvering, etc.; nonfatal injuries to persons not aboard the airplane; and any events that result from an experimental flight test or from hostile action, such as sabotage, hijacking, terrorism and military action.

Note: Within this publication, the term “accident” is used interchangeably with “airplane accident.”

Destroyed

The estimated or likely cost of repairs would have exceeded 50% of the new value of the airplane had it still been in production at the time of the accident.

Note: This definition is consistent with the FSF definition. NTSB defines “destroyed” as damaged due to impact, fire or in-flight failures to an extent not economically repairable.

Fatal Injury

Any injury that results in death within 30 days of the accident.

Note 1: This is consistent with both the ICAO and the NTSB definitions.

Note 2: External fatalities include on-ground fatalities as well as fatalities on other aircraft involved.

Definitions

Major Accident

An accident in which any of three conditions is met:

- The airplane was destroyed.
- There were multiple fatalities.
- There was one fatality and the airplane was substantially damaged.

Note: This definition is consistent with the NTSB definition. It also is generally consistent with FSF, except that the FSF definition specifies that fatalities include only occupants of the airplane. ICAO does not normally define the term “major accident.”

Serious Injury

An injury that is sustained by a person in an accident and that:

- Requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received.
- Results in a fracture of any bone (except simple fractures of fingers, toes or nose).
- Causes severe hemorrhage, nerve, muscle or tendon damage.
- Involves injury to any internal organ.
- Involves second- or third-degree burns or any burns affecting more than 5% of the body surface.
- Involves verified exposure to infectious substances or injurious radiation.

Note: This is generally consistent with the ICAO definition. It is also consistent with the NTSB definition except for the last bullet, which is not included in the NTSB definition.

Definitions

Substantial Damage

Damage or failure that adversely affects the structural strength, performance, or flight characteristics of the airplane, and that would normally require major repair or replacement of the affected component.

Substantial damage is not considered to be:

- Engine failure or damage limited to an engine, if only one engine fails or is damaged.
- Bent fairings or cowlings.
- Dents in the skin.
- Small puncture holes in the skin.
- Damage to wheels.
- Damage to tires.
- Damage to flaps.
- Damage to engine accessories.
- Damage to brakes.
- Damage to wingtips.

Note 1: This definition is generally consistent with the NTSB definition of substantial damage except it (1) deletes the reference to “small puncture holes in the fabric” and “ground damage to rotor or propeller blades,” and (2) deletes “damage to landing gear” from the list of items not considered to be substantial damage.

Note 2: ICAO does not define the term “substantial damage.” Still, the definition is generally consistent with the ICAO definition of damage or structural failure contained within part (B) of the ICAO accident definition.

Note 3: Boeing does not consider damage to be substantial if repairs to an event airplane enable it to be flown to a repair base within 48 hours of the event.

Boeing Terms*

Accident Rates

In general, this expression is a measure of accidents per million departures. Departures (or flight cycles) are used as the basis for calculating rates because there is a stronger statistical correlation between accidents and departures than there is between accidents and flight-hours, or between accidents and the number of airplanes in service, or between accidents and passenger miles or freight miles. Airplane departures data is continually updated and revised as new information and estimating processes become available. These form the baseline for the measure of accident rates, and, as a consequence, rates may vary between editions of this publication.

Airplane Collisions

Events involving two or more airplanes are counted as separate events, one for each airplane. For example, destruction of two airplanes in a collision is considered to be two separate accidents.

Fatal Accident

An accident that results in fatal injury.

Hull Loss

Airplane totally destroyed or damaged and not repaired. Hull loss also includes, but is not limited to, events in which:

- The airplane is missing. An aircraft is considered to be missing when the official search has been terminated and the wreckage has not been located.
- The airplane is completely inaccessible.

State of Operation

Regional data is reported based on the ICAO member state that serves as the headquarters location of the operator involved in the accident.

Referenced ICAO and NTSB Definitions

Accident

ICAO defines an “accident” as follows:

Accident. An occurrence associated with the operation of an aircraft that, in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time as it comes to rest at the end of the flight and the primary propulsion system is shut down, in which:

- A. A person is fatally or seriously injured as a result of:
- Being in the aircraft.
 - Direct contact with any part of the aircraft, including parts which have become detached from the aircraft.
 - Direct exposure to jet blast, except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew.

B. The aircraft sustains damage or structural failure which:

- Adversely affects the structural strength, performance or flight characteristics of the aircraft.
- Would normally require major repair or replacement of the affected component, except for engine failure or damage, when the damage is limited to a single engine (including its cowlings or accessories), to propellers, wingtips, antennas, probes, vanes, tires, brakes, wheels, fairings, panels, landing gear doors, windscreens, the aircraft skin (such as small dents or puncture holes), or for minor damages to main rotor blades, tail rotor blades, landing gear, and those resulting from hail or bird strike (including holes in the radome).

C. The aircraft is missing or is completely inaccessible.

NTSB defines an “aircraft accident” as follows:

Aircraft accident means an occurrence associated with the operation of an aircraft that takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage. For purposes of this part, the definition of “aircraft accident” includes “unmanned aircraft accident,” as defined in 49 CFR 830.2.

Referenced ICAO and NTSB Definitions

Safety Management System (SMS)

ICAO defines an “SMS” as follows:

An SMS is a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures. Visit www.icao.int/safety/SafetyManagement for more information.

Serious Injury

ICAO defines “serious injury” as follows:

Serious injury. An injury that is sustained by a person in an accident and which:

- A. Requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received.
- B. Results in a fracture of any bone (except simple fractures of fingers, toes or nose).
- C. Involves lacerations that cause severe hemorrhage, nerve, muscle or tendon damage.
- D. Involves injury to any internal organ.
- E. Involves second- or third-degree burns, or any burns affecting more than 5% of the body surface.
- F. Involves verified exposure to infectious substances or injurious radiation.

NTSB defines “serious injury” as follows:

Serious injury means any injury that:

1. Requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received.
2. Results in a fracture of any bone (except simple fractures of fingers, toes or nose).
3. Causes severe hemorrhages, nerve, muscle or tendon damage.
4. Involves any internal organ.
5. Involves second- or third-degree burns, or any burns affecting more than 5% of the body surface.

Substantial Damage

NTSB defines “substantial damage” as follows:

Substantial damage means damage or failure that adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowling, dented skin, small puncture holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered “substantial damage” for the purpose of this part.

ICAO does not define the term “substantial damage.”

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