Annual Safety Report

2019

Asia Pacific Region

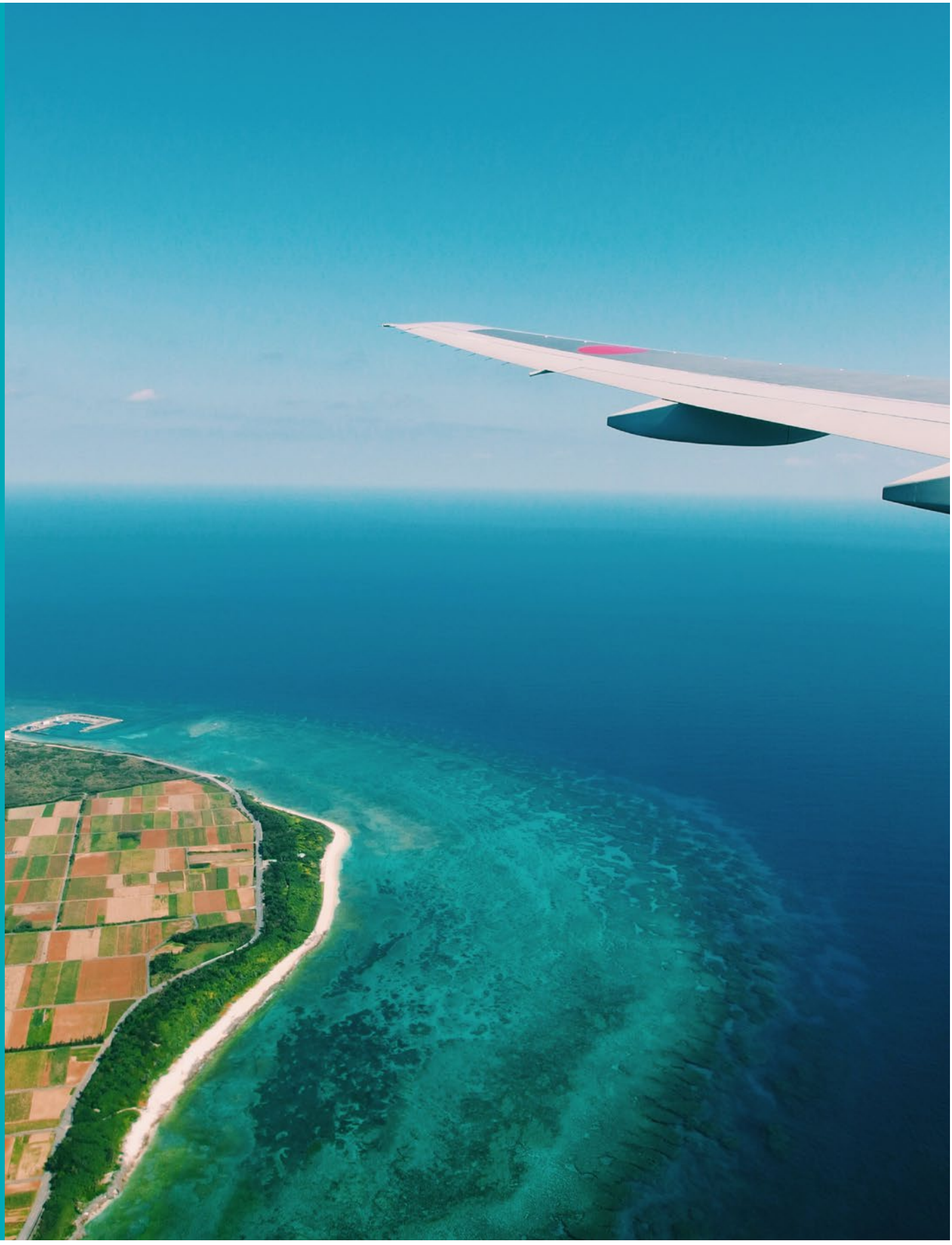
Acknowledgement to contributors

RASG-APAC thanks the members of the RASG-APAC Safety Reporting Programme Working Group that contributed to the compilation of this 2019 RASG-APAC Annual Safety Report:

- ICAO
- IATA
- CAST

Cover image: © iStockphoto.com | oversnap
1908.2991

Contents



© unsplash | yu-kato

01 Foreword

Regional Aviation Safety Group – Asia Pacific (RASG-APAC) background

The establishment of the Regional Aviation Safety Group – Asia Pacific (RASG-APAC) was endorsed at the 47th DGCA conference as a focal point to ensure harmonisation and coordination of efforts aimed at reducing aviation safety risks for the Asia Pacific (APAC) region.

RASG-APAC supports implementation of the ICAO Global Aviation Safety Plan (GASP) and the Global Aviation Safety Roadmap (GASR).

RASG-APAC membership includes representatives from the 41 States/Administrations associated with the ICAO Asia Pacific Regional Office.

RASG-APAC has established the Asia Pacific Regional Aviation Safety Team (APRAST) to implement its work program. The objectives of the APRAST include recommending interventions to the RASG-APAC which will reduce aviation risks. To do so, APRAST will:

- review, for application within the Asia Pacific region, existing safety interventions which have already been developed through the efforts of well-established, multinational safety initiatives
- review, for application within the Asia Pacific region, the best practices and metrics defined in the GASP/GASR
- review regional accidents, significant incident trends and other areas of local concern to determine unique issues that may warrant locally developed interventions. The focus and priority for APRAST will be to introduce, support and develop actions that have the potential to effectively and economically reduce regional aviation risks.

Asia Pacific – Accident Investigation Working Group (APAC–AIG) is now placed under RASG directly and, supporting the work of the APRAST, are three Working Groups:

a. Safety Enhancement Initiative Working Group (SEI WG)
b. Safety Reporting Program Working Group (SRP WG)
c. Ad hoc Working Group for the Regional Aviation Safety Plan (RASP).

APAC-AIG

As the APAC-AIG is now placed directly under RASG, the APAC-AIG will review the Global Aviation Safety Plan/Roadmap (GASP/R) GSI 3/Focus Area 3, 'Impediments to Reporting of Errors and Incidents', and GSI 4/Focus Area 4, 'Ineffective Incident and Accident Investigation' and propose the necessary recommendations to address these two focus areas. The APAC-AIG will:

- review, for application within the Asia Pacific region, existing policies and procedures relating to accident investigation and the reporting of errors and incidents that have already been developed
- review, for application within the Asia Pacific region, the best practices and metrics defined in Global Safety Initiative/ Focus Areas 3 and 4 of the GASP/GASR
- review regional accidents and significant incident trends and other areas of local concern to determine unique issues that may warrant locally developed policies and procedures to effectively capture information for study and for the development of recommendations. The focus and priority for AIG WG will be to introduce, support and develop actions that have the potential to effectively and economically reduce the regional aviation accident risk.

SEI WG

The SEI WG assists APRAST in the development, implementation and review of SEIs to reduce aviation risks. These SEIs could be established based on the analysis of regional data, ICAO initiatives or the initiatives of other relevant organisations or regions or based on the risks and issues identified through the Universal safety oversight audit program (USOAP) Continuous Monitoring Approach (CMA) process. The identified SEIs should be prioritised to ensure those that have the greatest potential for reducing safety risk are examined first.

To accomplish the objectives, the SEI WG will:

- Assist APRAST in the identification and development of SEIs, for application within the Asia Pacific regions, which are aligned with the regional priorities and targets. The focus of these SEIs is to effectively and economically mitigate regional safety risks identified by the SRP-WG
- Assist APRAST in the provision of generic implementation guidance related to the SEIs to guide members through the SEI implementation process

- Assist APRAST in the identification of assistance programs such as, but not limited to, workshops and seminars to improve the level of implementation of developed SEIs, with the support of the secretariat
- Develop and conduct a process to review existing SEIs and provide recommendations to improve the effectiveness and level of implementation.

SRP WG

The SRP WG will gather safety information from various sources to determine the main aviation safety risks in the Asia Pacific region. To be included in the Annual Safety Report are:

- Reactive information
- Proactive information.

The information analysis team (IAT) formed within the SRP WG will analyse the available safety information to identify risk areas. Recommendations for safety enhancement initiatives will be made by the SRP WG to the RASG-APAC, through APRAST, based on the identified risk areas.

The ad-hoc working group is formed to formulate the Regional Aviation Safety Pan (RASP) as the States will be adopting GASP 2020–22 to align themselves in developing the National Aviation Safety Plan (NASP).

Taking reference from GASP and the regions; the Regional Aviation Safety Plan (RASP) is planned to be approved at APAC-RASG/9 by the end of 2019.

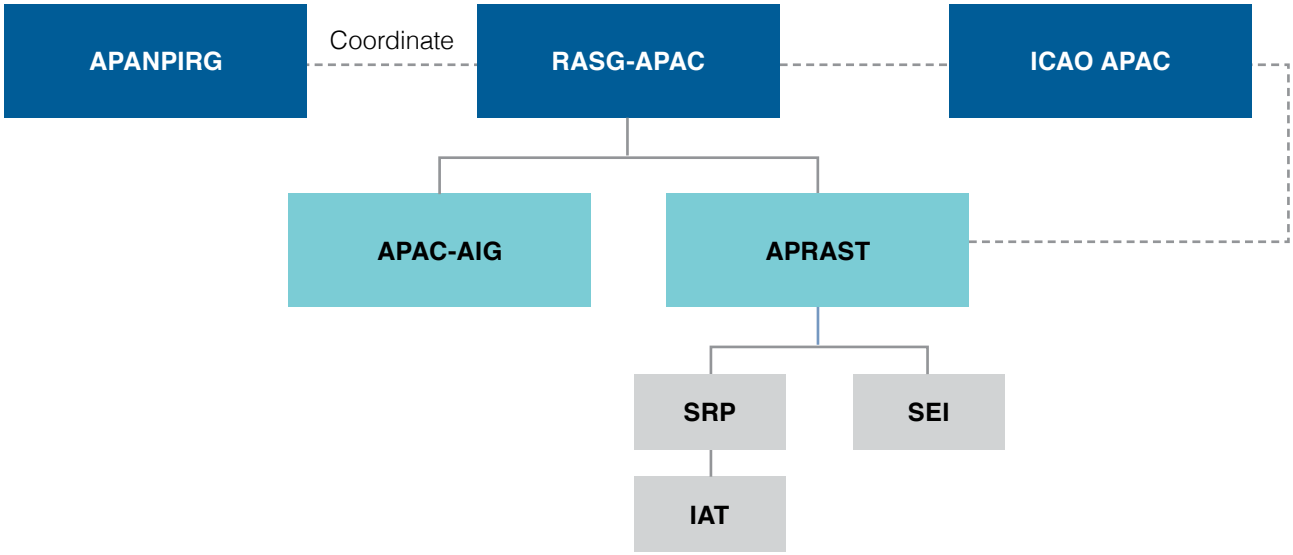
The organisational structure of the RASG-APAC and its subsidiary bodies is shown in Figure 1.1. The International Civil Aviation Organization (ICAO) regional office in Bangkok provides the secretariat support necessary for the RASG-APAC to function.

The 2019 Annual Safety Report, developed by the SRP WG and published by RASG-APAC, is the 7th edition of the safety report for the Asia Pacific region based on data provided by ICAO, Commercial Aviation Safety Team (CAST) and International Air Transport Association (IATA). Analysis of this aviation safety data was completed with the in-kind contributions of aviation safety personnel from RASG-APAC member States/administrations and industry partners. This report is envisioned to be an annual publication, providing appropriately updated aviation safety information.

Copies of this report can be downloaded from: https://www.icao.int/APAC/RASG/Pages/APAC-Safety-Report.aspx

For clarification or additional information please email: apac@icao.int

Figure 1.1 RASG-APAC Organisation



02 Introduction

The objectives of this RASG-APAC Annual Safety Report are to gather safety information from various stakeholders, analyse the main aviation safety risks in the Asia Pacific region and identify possible actions for enhancing aviation safety in a coordinated manner.

The safety information presented in this report is based on the compilation and analysis of data provided by ICAO, the IATA, the US CAST and data from the Official Aviation Guide, checked and verified by ICAO.

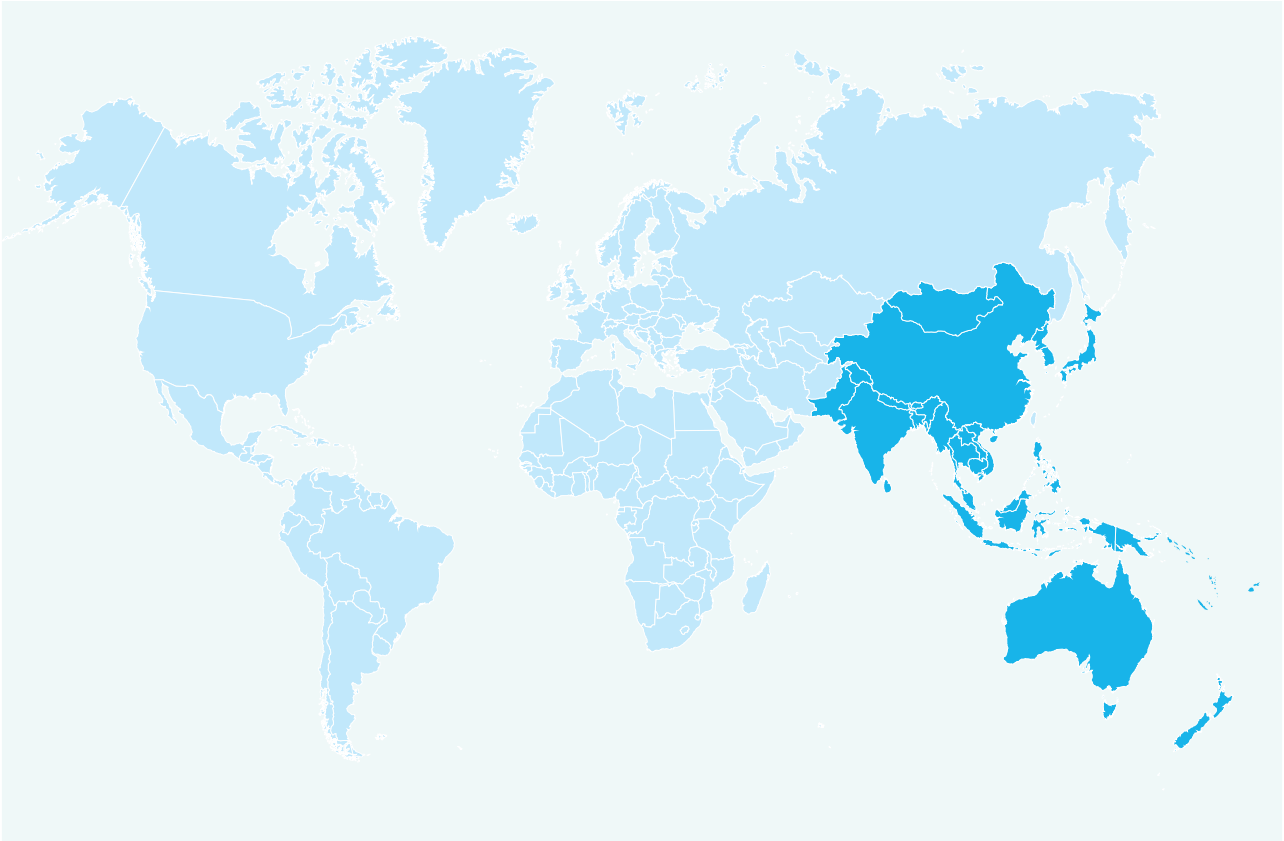
Accident and fatal accident occurrence data was sourced from ICAO iSTARS for the reference period 2009–2016, with data for 2017–2018 being sourced from ICAO's Safety Indicator Study Group (SISG). In subsequent APAC Annual Safety Reports, SISG data will replace all iSTARS data.

This seventh edition of the RASG-APAC Annual Safety Report focuses on reactive information relating to hull loss and fatal accidents (both on the ground and in-flight) involving commercial aeroplanes operated by (or registered with) the member States/administrations of the RASG-APAC, i.e. States/administrations associated with the ICAO Asia Pacific Regional Office. It will also include proactive information for the Asia Pacific region based on USOAP CMA.

In future, the Annual Safety Report will also include the compilation and analysis of predictive information so that effective mitigation measures can be developed and implemented to reduce/prevent accidents.

In this report the most frequent accident categories are identified, in accordance with CAST/ICAO Common Taxonomy Team which is also used by IATA, relating to fatality risk, as well as other significant emerging risk categories in the Asia Pacific region.

Figure 2.1 Asia Pacific region – countries associated with the ICAO Asia Pacifc Regional Office



© Adobe stock

Table 2.1 Member states/administration associated with the ICAO Asia Pacific Office

Member states/administration			
Afghanistan	Fiji	Myanmar	Solomon Islands
Australia	India	Nauru	Sri Lanka
Bangladesh	Indonesia	Nepal	Thailand
Bhutan	Japan	New Zealand	Timor Leste
Brunei Darussalam	Kiribati	Pakistan	Tuvalu
Cambodia	Lao People's Democratic Republic	Palau	Tonga
China	Malaysia	Papua New Guinea	Vanuatu
Hong Kong, China	Maldives	Philippines	Vietnam
Macao, China	Marshall Islands	Republic of Korea	
Cook Islands	Micronesia (Federated States of)	Samoa	
Democratic People's Republic of Korea	Mongolia	Singapore	

03 Executive summary

This edition of the RASG-APAC Annual Safety Report collates and presents the results of analysis carried out by members of the information analysis team on aviation accidents in the APAC region. The safety information was collected from ICAO, IATA and CAST.

Reactive information analysis[1]

Overall, the five-year moving average accident rate, globally and for RASG-APAC, has shown a consistent downward trend to 2018. However, on an annual basis, an increase in the accident rate did occur in 2012 and 2015. The RASG-APAC's accident rate has remained lower than the global accident rate over the past decade.

The number of accidents attributable to States/ Administrations in the RASG-APAC region in 2018 was 20, up from 19 in 2017. In terms of fatalities, there were three fatal accidents in 2018, up from one in 2017. The fatal accidents resulted in 241 fatalities, up from two in 2017.

For 2018, the RASG-APAC's five-year moving average accident rate of 1.90 per million departures remains lower than the global average rate of 2.57 per million departures. The marginal increase in the number of accidents, accompanied by APAC's growing air traffic volume (from 11.6 to 12.3 million departures) kept RASG-APAC region's accident rate virtually stable in 2018 (1.62 accidents per million departures compared to 1.64 in 2017).

The most frequent accidents for the RASG-APAC region in 2018 related to runway safety, which includes runway excursion, abnormal runway contact (hard landings and tail-strikes on landing) and runway undershoot/overshoot.

In terms of fatality risk, the three fatal accidents in 2018 were attributed to loss of control in flight, runway excursion and runway overshoot/undershoot.

Proactive information analysis

The RASG-APAC region had an overall USOAP effective implementation (EI) score of 64.18 per cent in 2019, up from 61.96 per cent in 2018. However, this result remains lower than the global level of 68.53 per cent.

In terms of critical elements (CE), the APAC region had lower EI scores for all categories as compared to the global average. By CE, CE-4 on Technical personnel qualifications and training and CE-8 on Resolution of safety concerns (CE-8) had the lowest EI scores within RASG-APAC, at 54.98 and 49.53 per cent respectively. By area, accident and incident investigation (AIG) and aerodrome and ground aids (AGA) had the lowest EI scores of 49.00 per cent and 59.41 per cent respectively.

1 The safety information related to accidents is based on 2018 data. This is due to the length of time taken for investigative reports to be completed and the publication schedule of the ASR.

© Adobe stock

04 Safety information

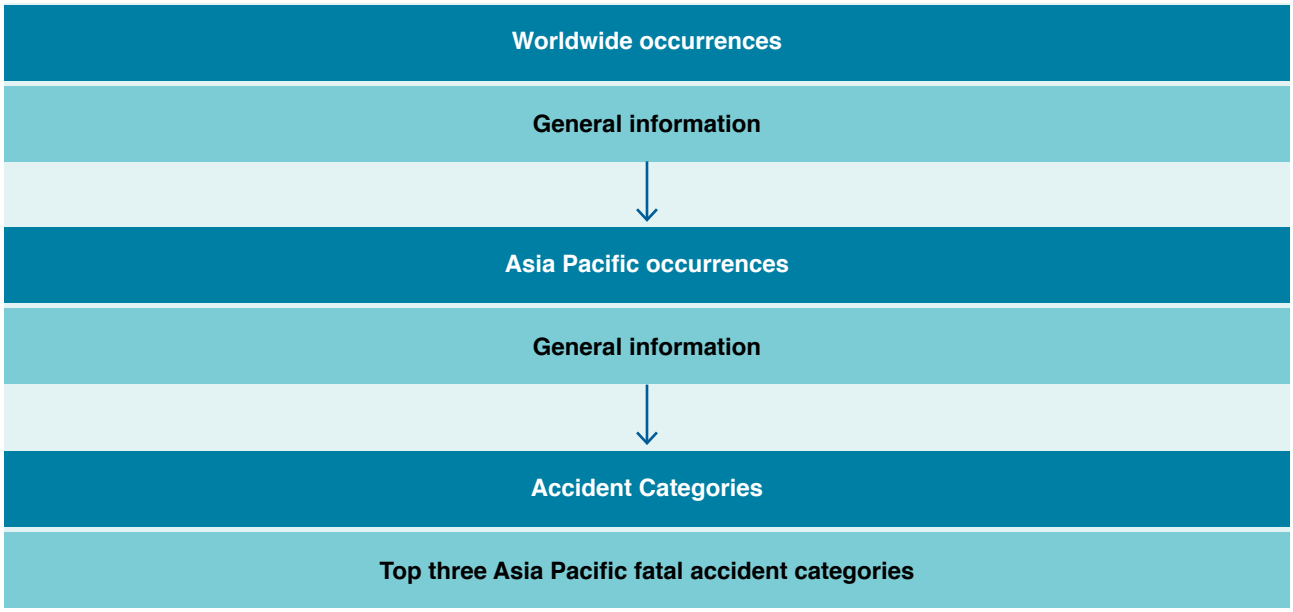
Safety information is an important input for any safety management process. With adequate and accurate safety information, hazards can be identified through robust processing and critical analysis of this safety information. Identified hazards and their associated risk can be prioritised and appropriate mitigation actions taken.

RASG-APAC can be viewed as a regional safety management process or a regional safety program (RSP) in the same way that a state safety program (SSP) is a national safety management process and a safety management system is a service provider's safety management program. Using safety information provided by ICAO, IATA and CAST helps the region to identify the areas of greater safety concerns and therefore be able to collectively focus on addressing these areas.

05 Approach for analysis

Our approach for the analysis is to process the accident information provided by ICAO, IATA and CAST involving commercial aircraft of Maximum take off weight (MTOW) greater than 5700kg operated by (or registered with) the member States/administrations of RASG-APAC. All reported information is for aircraft involved in scheduled commercial activities which are either validated or under validation. The analysis initially focuses on accident rates, numbers and categories from a global versus APAC perspective, then on the sub regions of North Asia, South Asia, South East Asia and the Pacific.
The process is illustrated in Figure 5.1.

Figure 5.1 Approach for analysis



The grouping of States/administrations into the four APAC sub-regions will be based on their membership with the respective cooperative development of operational safety and continuing airworthiness program (COSCAP) or, if there is no affiliated membership with any sub-regional body, on geographical association. The results of the analysis for each of the sub-regions can therefore be used by the various COSCAP or sub-regional groupings to identify work programs. Moreover, each of the COSCAPs will be able to provide assistance in implementation and training in areas that are more relevant to their sub-regions.

The grouping of the States/administrations in the four RASG-APAC sub-regions is as follows:

North Asia (NA) region

States/administrations that are members of COSCAP-NA:

- China (including Chinese Taipei)
- Hong Kong, China
- Macao, China
- Democratic People's Republic of Korea
- Japan
- Mongolia
- Republic of Korea

South Asia (SA) region

States/administrations that are members of COSCAP-SA:

- Afghanistan
- Bangladesh
- Bhutan
- India
- Maldives
- Nepal
- Pakistan
- Sri Lanka

South-East Asia (SEA) region

States/administrations that are members of COSCAP-SEA:

- Brunei Darussalam
- Cambodia
- Indonesia
- Lao People's Democratic Republic
- Malaysia
- Myanmar
- Philippines
- Singapore
- Thailand
- Timor-Leste
- Vietnam

Pacific region

States/administrations that are members of the Pacific Aviation Safety Office (PASO):

- Australia (Including Norfolk Island and Christmas Island)
- Cook Islands
- Fiji
- Kiribati
- Marshall Islands
- Micronesia (Federated States of)
- Nauru
- New Zealand
- Palau
- Papua New Guinea
- Samoa
- Solomon Islands
- Tonga
- Tuvalu
- Vanuatu

06 Reporting culture and accidents in the Asia Pacific region

This report does not focus on any analysis of the reporting culture of the RASG-APAC region, but this may be included in future editions.

07 Reactive safety information

Background

As defined in the fourth edition (2.5.2) of the ICAO Document 9859, a reactive analysis method responds to events (such as incidents and accidents) that have already happened and about which information has been collected. In the context of this report, all the reactive safety information analysed relates to accidents involving aircraft operated by (or registered with) the member States/administration within the RASG-APAC region.

Data sources

The reactive safety information analysed in this report has been obtained from ICAO, IATA and CAST, and the organisation of this information will take these sources into account. It is important to note that the definition of an accident differs between ICAO and IATA and this should be considered when comparing trends from these data providers.

Please note:

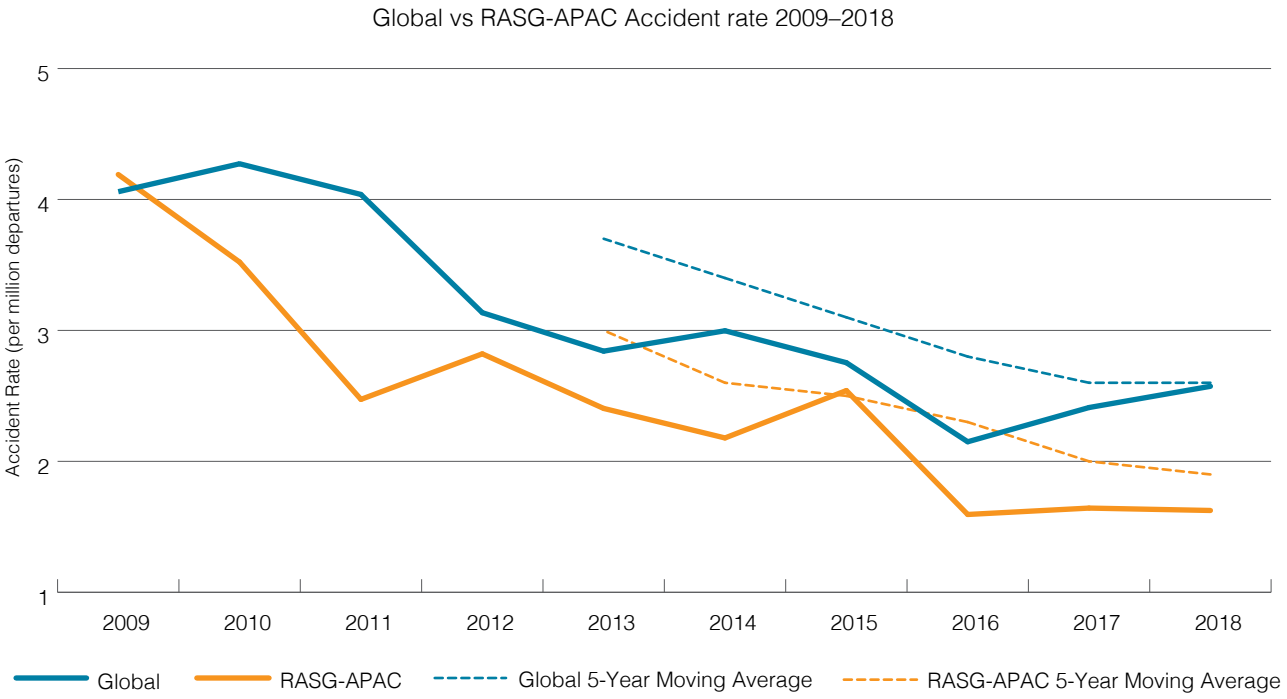
1. ICAO's reactive safety information is derived from Accident / Incident Data Reporting (ADREP) reports, validated by the Safety Indicator Study Group (SISG). The SISG reviews and validates aviation safety occurrence information supplied by member States' investigative bodies. The definition of 'accident' is based on ICAO Annex 13. SISG data used for 2017 and 2018 with ICAO iStars data used for 2009–2016
2. IATA's reactive safety information relates to accidents that result in hull loss, fatalities and substantial damage to aircraft. It contains statistics on accidents classified by the Accident Classification Technical Group (ACTG) and uses the same definitions for the IATA Annual Safety Report. All regional rates are based on the operator's State of registry and rates are always based on per million sectors (flights).
   - 'All accident rate' contains all accidents (hull loss and substantial damage) for the type of analysis being performed. For example, 'all accident rate' in the general context means all accidents, of all aircraft types that meet the IATA ACTG criteria (commercial operation, jet or turboprop and MTOW >5700 kg) and of all accident categories; 'all accident rate' in the context of jet/hard landing means all jet accidents (hull loss and substantial damage) that had a hard landing.
   - Only accidents of the following categories are part of the database:
     - Controlled flight-into-terrain (CFIT)
     - Loss of control in-flight (LOC-I)
     - Runway collision
     - Mid-air collision
     - Runway/Taxiway excursion
     - In-flight damage
     - Ground damage
     - Undershoot
     - Hard landing
     - Gear-up landing/Gear collapse
     - Tailstrike
     - Off-airport landing/Ditching
     - Other end state
   - IATA defines 'sector' as the operation of an aircraft between take-off at one location and landing at another location (other than a diversion).
   - IATA's North Asia (NASIA) and Asia Pacific (ASPAC) regions are equivalent to ICAO's APAC region.

Global and Asia Pacific safety trends

7.1 Global and APAC accident rates

Global accident rates, APAC accident rates and the accident rates for the four RASG-APAC sub-regions were compiled based on information provided by ICAO, including accident data from iSTARS and the SISG and departures data from the Official Aviation Guide (OAG), with data cleansing and verification conducted by ICAO. All information presented is dependent on accurate information being supplied by member States.

Chart 7.1.1 ICAO iSTARS, SISG and OAG: Global accident rate versus APAC accident rate, including five-year sliding average (2009–2018)



The accident rate in the APAC region has declined significantly over the last decade from 4.2 (2009) to 1.6 (2018) accidents per million departures. This compared favourably with global trends where the rate of decline has not been as substantial, with accident rates declining to 2.6 accidents per million departures in 2018, down from 4.1 in 2009.

Despite accident rates declining for the Asia Pacific region and globally for much of the last decade, in 2017 and 2018 different trends emerged. Accident rates in the APAC region reached a plateau of 1.6 accidents per million departures in 2017 and 2018, while global results showed an increased accident rate over the same period.

The stabilisation in accident rates for APAC was driven by an increase in the fatal accident rate which was countered by a decrease in the non-fatal accident rate. ICAO's data for APAC showed fatal accident rates per million departures rising to 0.24 from 0.09 per million departures in 2017. Notably, the 2017 fatal accident rate was a record low for the APAC region.

The five-year moving average does highlight that the medium-term trend remains positive with accident rates continuing to ease since 2013, both globally and within the APAC region.

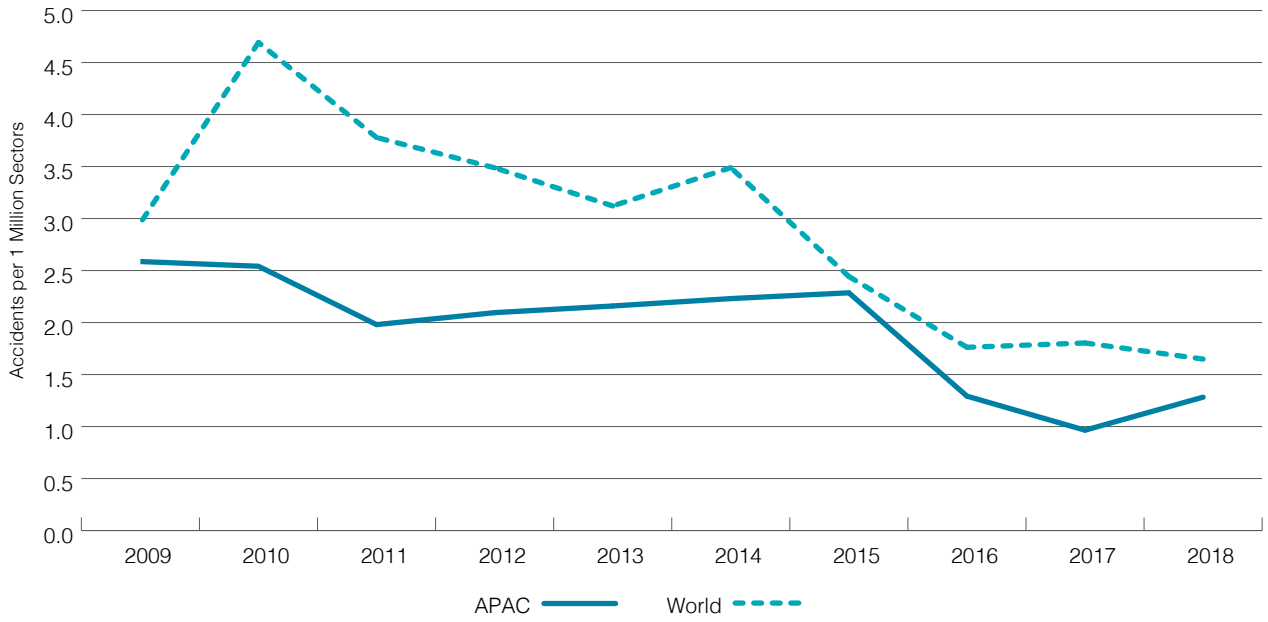
Despite the increased fatal accident rate, the overall accident rate remained stable in the APAC region with the rate of non-fatal accidents being at a record low in 2018.

Global accident rates and also those for APAC have been supported by significant growth in departure numbers, rising by 33 per cent globally in the decade to 2018 and 91 per cent in the APAC region.

As with ICAO data, IATA also shows that the steady downward trend seen in accident rates since 2010, with 2014 an exception, has stabilised, with accident rates in 2016 and 2018 being comparable. A similar pattern is also evident in APAC with accident rates almost identical in 2016 and 2018.

Although there is a degree of consistency between ICAO and IATA data, there are some variations in trends exhibited. This may in part be due to the different accident definition used, i.e. hull loss, fatalities and substantial damage, relative to the definition used by ICAO iSTARS which extends to accidents involving serious injuries and accidents where aircraft damage may not have resulted in hull loss.

Chart 7.1.2 IATA: APAC region's accident rate (2009–2018)



7.2 Global and APAC accident numbers

It is important to recognise the inherent variability of accident numbers over time. To alleviate such variability, consideration of longer-term trends provides a more realistic perspective of safety performance.

As could be expected, ICAO accident statistics also show trends that are not completely dissimilar to accident rates, with both non-fatal and fatal accidents globally increasing in 2018 relative to the previous year.

The number of fatal accidents that occurred globally in 2018 was 11, above the five-year moving average of seven.

Results were more favourable in APAC, with non-fatal accidents declining to 17 in 2018, slightly below the five-year average. As with global results, the APAC region also had an increase in fatal accidents to three in 2019; however, this was comparable to both the five and 10-year trend.

Chart 7.2.1 ICAO iSTARS, SISG and OAG: Number of accidents – RASG-APAC (2009–2018)

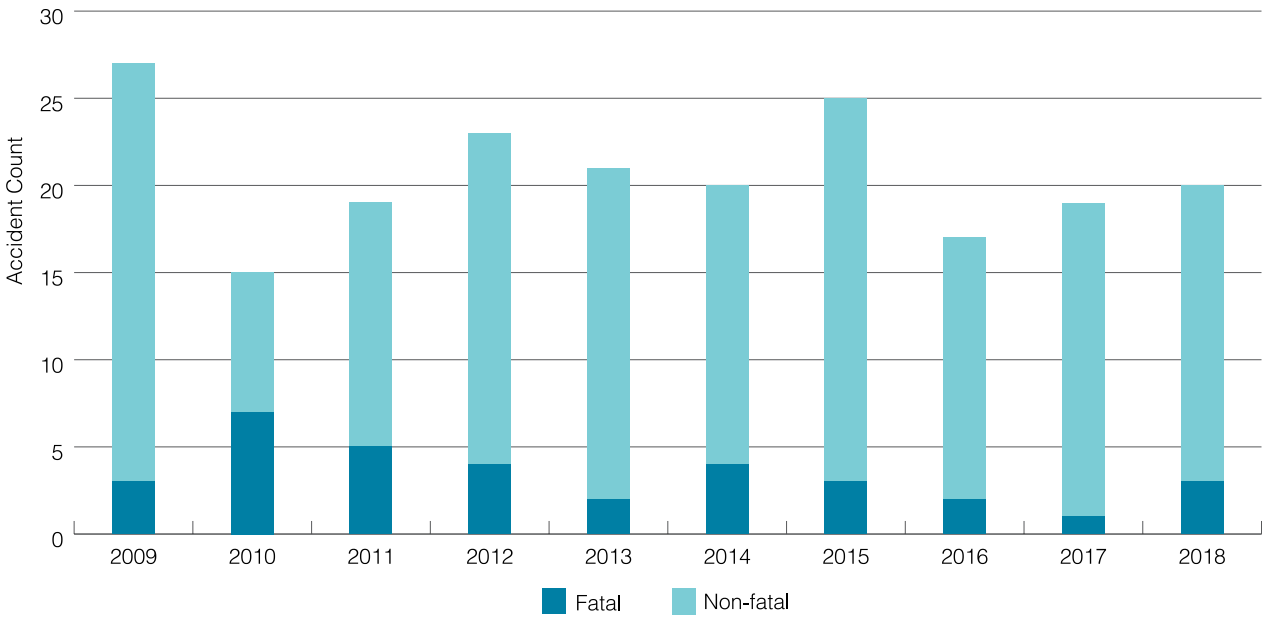


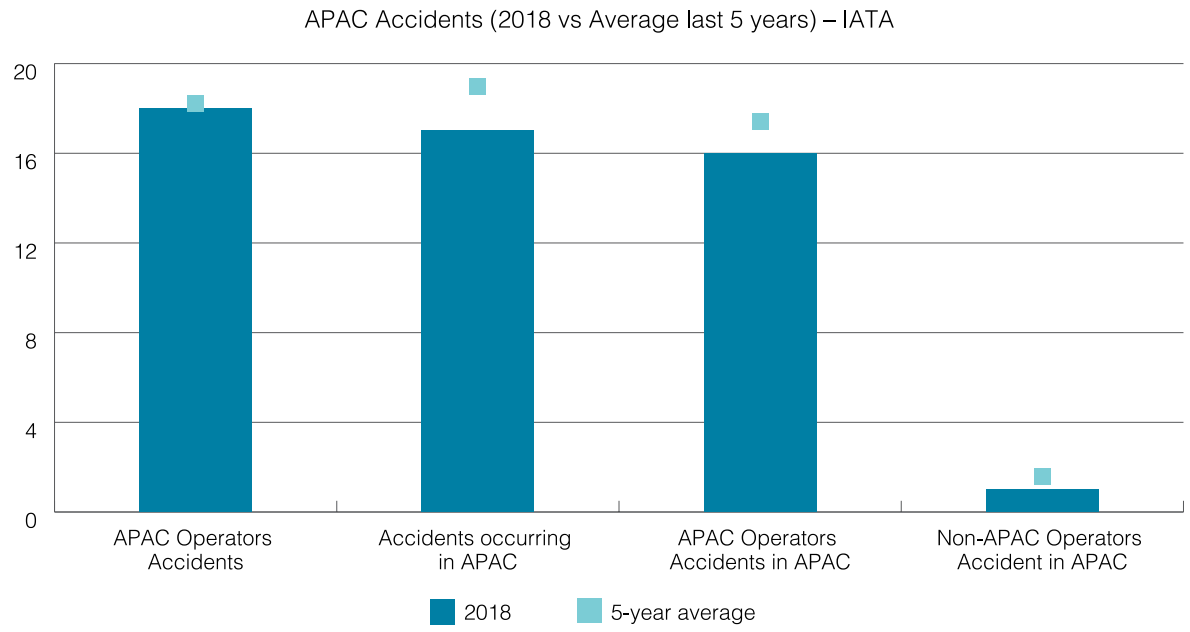
Table 7.2.1 IATA: Accident count from 2014–2018 (Region of occurrence vs region of operator)

	2014	2015	2016	2017	2018	Total
APAC operators accidents	22	24	15	12	18	**91**
Accidents occurring in APAC	22	27	17	12	17	**95**
APAC operators accidents in APAC	20	24	15	12	16	**87**
Non-APAC operators accidents in APAC	2	3	2	0	1	**8**

Table 7.2.1 provides an IATA breakdown of accident counts of APAC operators by region of occurrence (worldwide and in APAC region), and a breakdown by region of operator in the APAC region (APAC and non-APAC operator). Not surprisingly, most APAC operator accidents occur within the APAC region while non-APAC operator accidents are very seldom in the APAC region.

Based on IATA data, the number of APAC operators (within and outside APAC) and Non-APAC operators accidents increased in 2018. Despite such an increase, 2018 accident numbers by APAC operators remained consistent with the average of the results seen over the past five years.

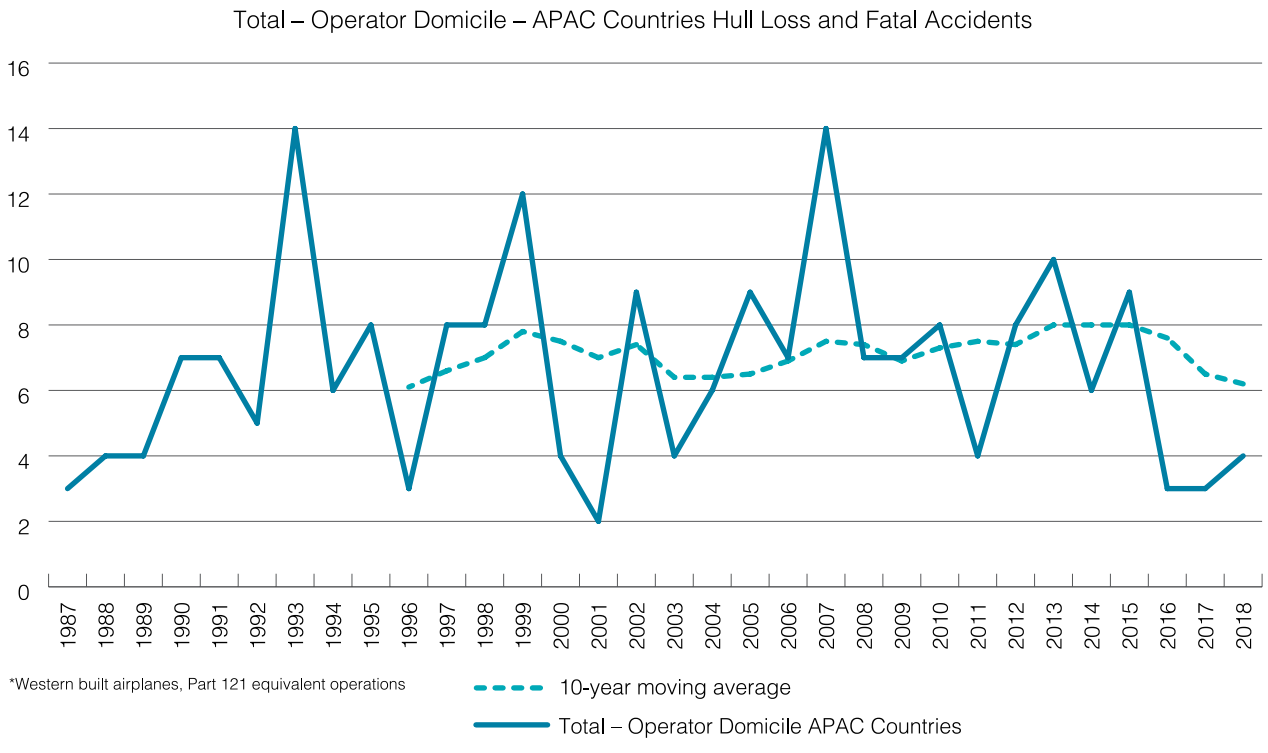
Chart 7.2.2 IATA: APAC operator accidents



Accident trends (Hull loss/ substantial damage/fatality risk)

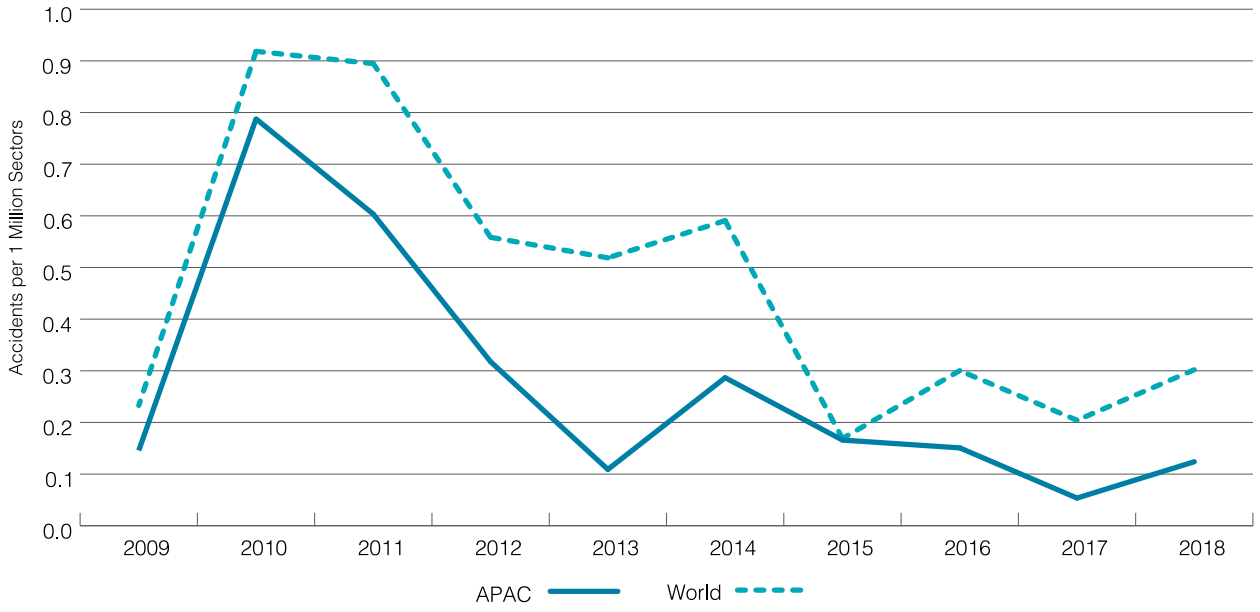
Data from the Commercial Aviation Safety Team (CAST) shown in Chart 7.2.3 shows the number of accidents of western-built airplanes flown by operators based in APAC countries which resulted in hull loss or fatalities from 1987 to 2018. The number of accidents increased slightly from three in 2017 to four in 2018. While the accident numbers fluctuate considerably on a yearly basis, the 10-year moving average shows that there has been a decline in hull losses and fatal accidents, from eight to six over the past five years.

Chart 7.2.3 CAST: Number of hull loss or fatal accidents for operators based in APAC



There were three fatal accidents in the APAC region in 2018, which resulted in 241 fatalities. As shown in Chart 7.2.4, APAC's fatal accident risk of 0.05 per million sectors in 2017 increased to 0.12 per million sectors in 2018, but this was still lower than the global rate at 0.30 per million sectors.

Chart 7.2.4 IATA: Fatality risk (2009–2018)



Over the last 10 years, the APAC region's yearly hull loss occurrence rate has also been lower than the global rate. The APAC's accident rate resulting in hull losses has increased from 0.16 per million sectors in 2017 to 0.21 per million sectors in 2018.

Chart 7.2.5 IATA: Hull losses (2009–2018)

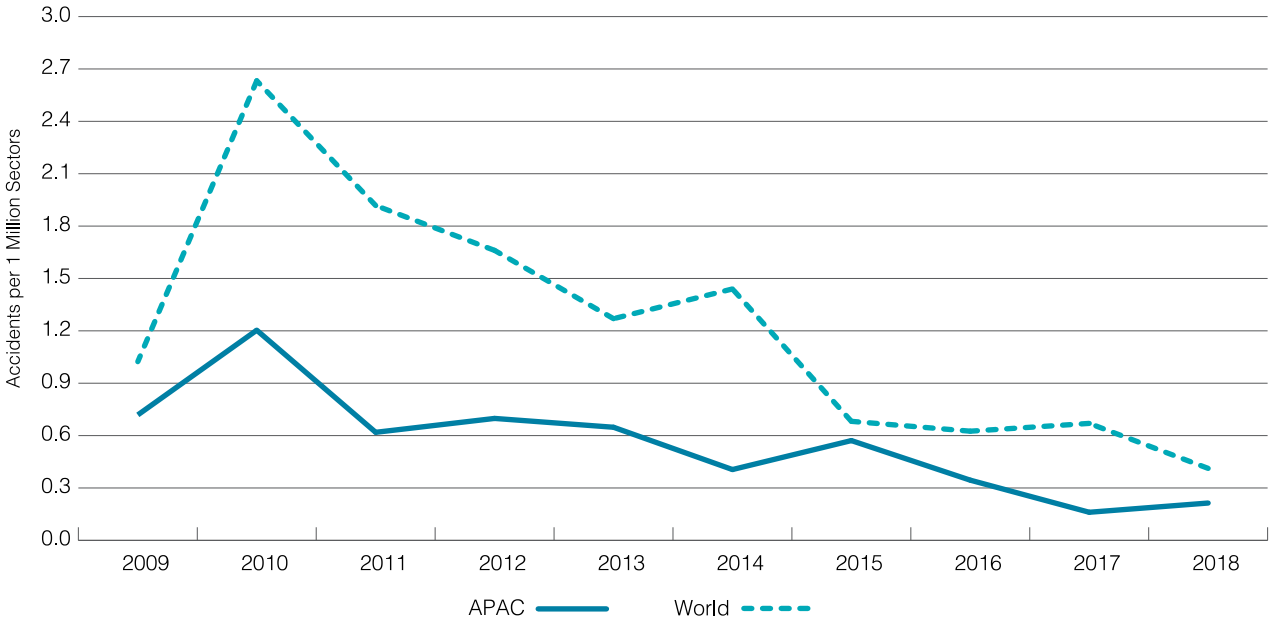


Table 7.2.2 IATA: APAC compared with other regions – accident type from 2014 to 2018

	World	AFI	MID	EUR	APAC	PA
Hull Loss	**88**	16	8	22	19	23
Substantial Damage	**227**	18	14	56	72	67
Sector Count (Millions)	**197.8**	6.7	8.5	51.5	58.4	72.7

Chart 7.2.6 IATA: Hull loss rates (2009–2018) per million sectors

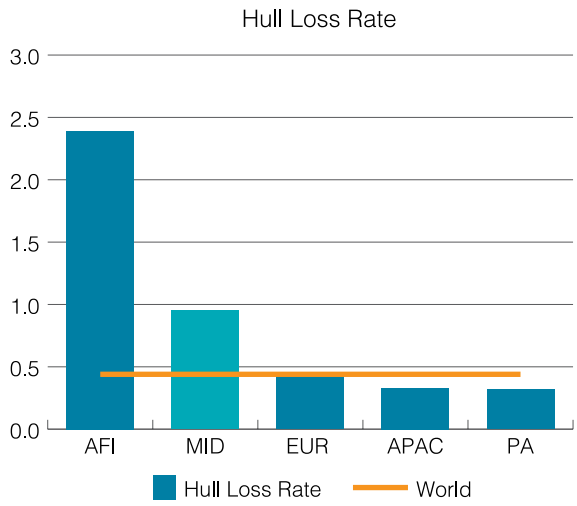
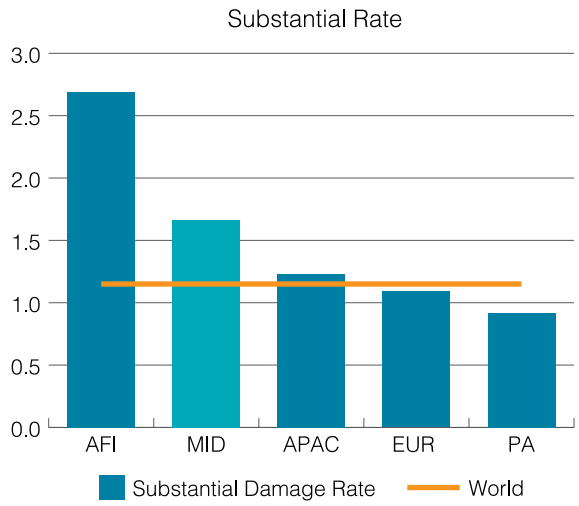


Chart 7.2.7 IATA: Substantial damage rates (2009–2018) per million sectors

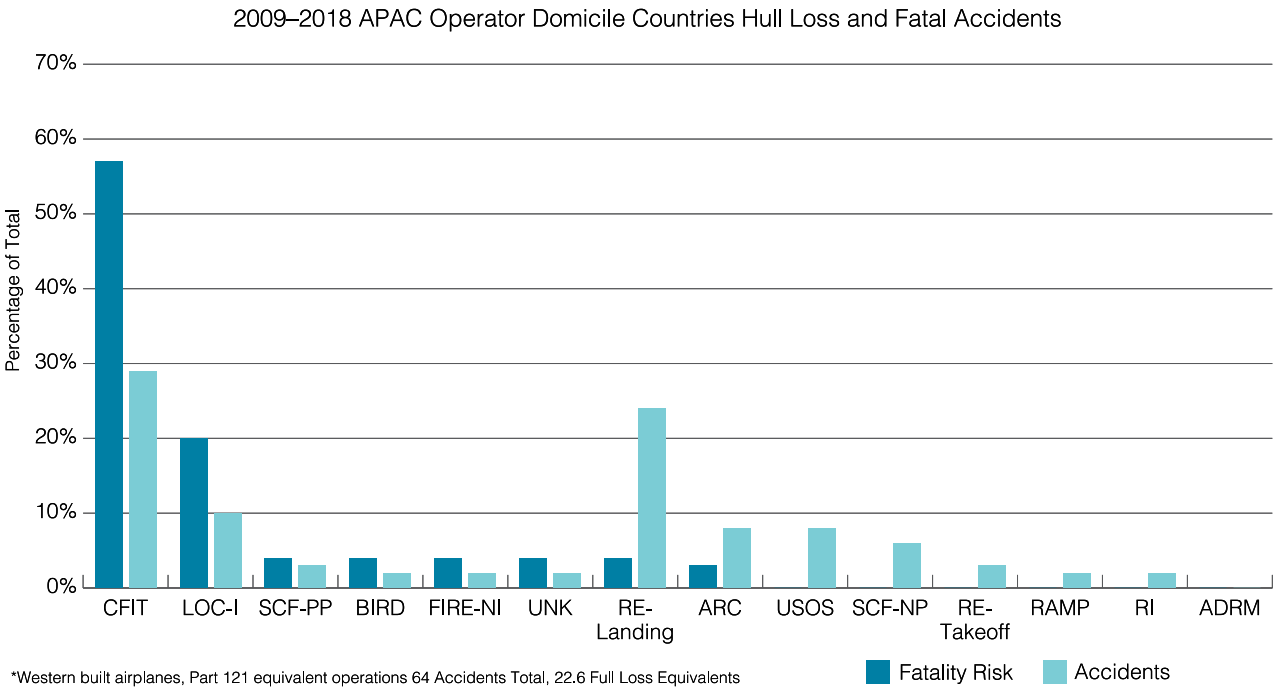


The APAC region also fared better than the global average with a five-year average hull loss rate of 0.33 per million sectors. However, in terms of substantial damage, the APAC region's five-year average rate of 1.23 per million sectors was comparable to the global average.

7.3 Global and APAC accident categories

Data from CAST, as shown in Chart 7.3.1, identified CFIT and LOC-I as the leading causes for fatality risk for APAC operator domiciled countries, while runway excursion on landing has been the leading cause for hull losses in the last 10 years.

Chart 7.3.1 CAST: High-risk accident categories



*Western built airplanes, Part 121 equivalent operations 64 Accidents Total, 22.6 Full Loss Equivalents

Controlled flight into terrain (CFIT), loss of control in-flight (LOC-I) and runway/taxiway excursion have also been identified by IATA as the high-risk accident categories globally. Charts 7.3.2, 7.3.3 and 7.3.4 show the performance of each of these categories in the APAC region for the last 10 years:

- There were no accidents attributable to CFIT in 2018, continuing a trend over the past three years for APAC.
- Accidents attributable to LOC-I also recorded a decrease in 2018 as compared with 2017. The rate of occurrences in 2018 was 0.07 accidents per million sectors, down from 0.08 accidents per million sectors in 2017.
- Runway/taxiway excursion recorded a slight increase in 2018 as compared with 2017. In 2018, there were 0.43 accidents per million sectors, up from 0.42 accidents per million sectors in 2017.

Chart 7.3.2 IATA: Annual controlled flight into terrain (CFIT) accident rate (APAC vs. world)

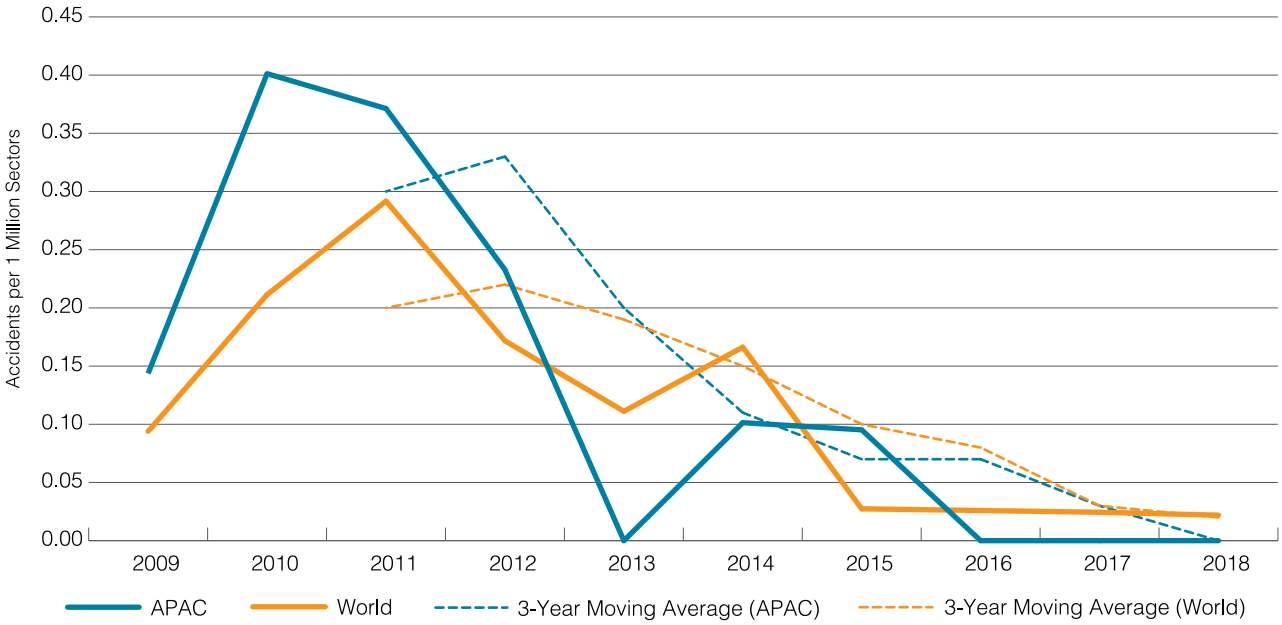
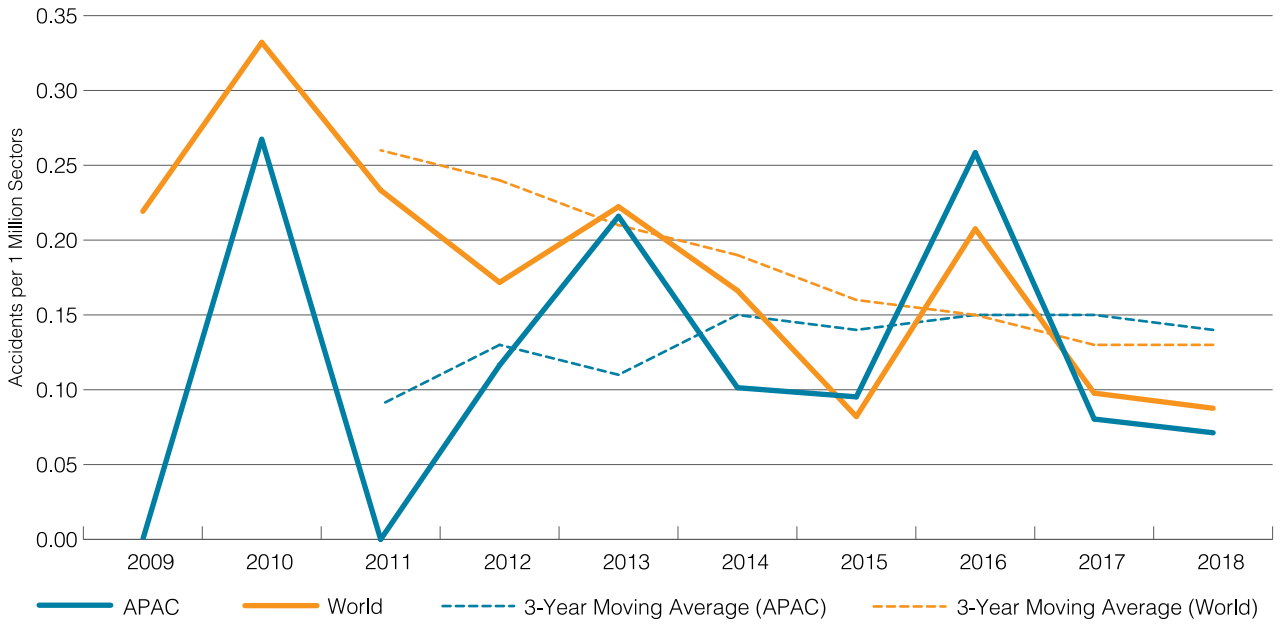


Chart 7.3.3 IATA: Annual loss of control in-flight accident rate (APAC vs. world)



© Adobe stock

Chart 7.3.4 IATA: Annual runway/taxiway excursion accident rate (APAC vs. world)

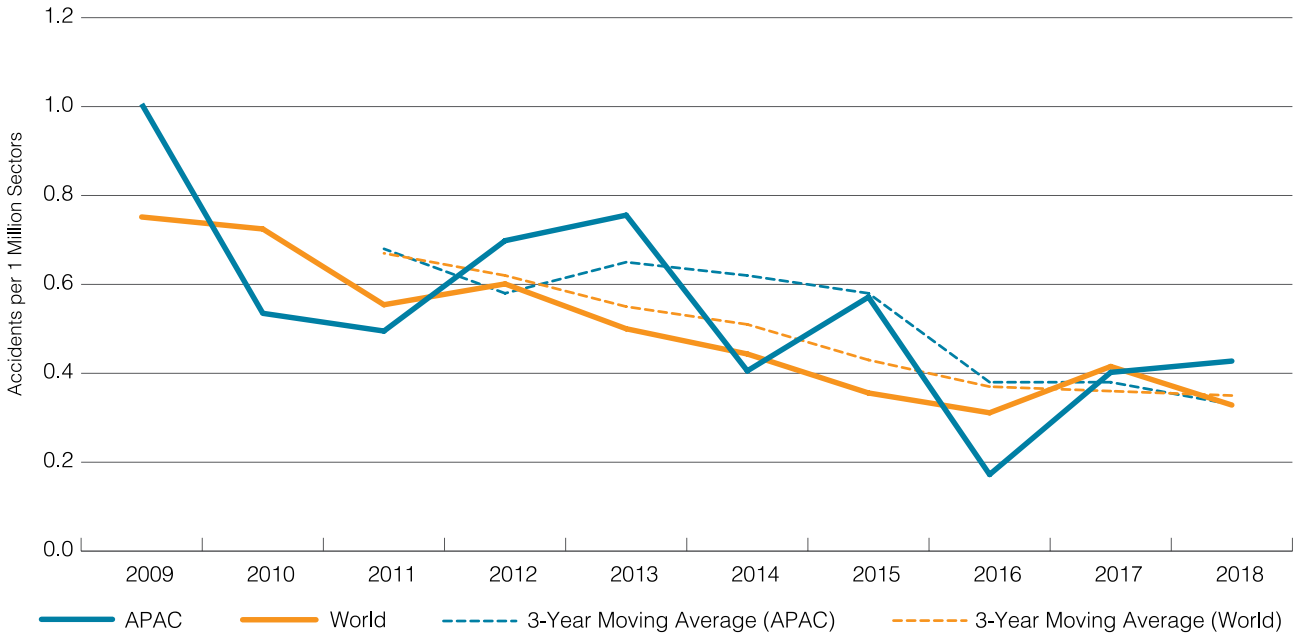


Table 7.3.1 APAC fatal accident categories (2009–2018)

Year	TURB	F-NI	UNK	OTH	SCF	RS	LOC-I	CFIT	RE	USOS	Total
2009	0	0	1	0	0	1	0	1	0	0	3
2010	0	1	2	0	0	1	1	2	0	0	7
2011	0	1	1	0	0	1	1	1	0	0	5
2012	0	0	1	0	1	0	0	2	0	0	4
2013	0	0	0	0	0	1	1	0	0	0	2
2014	0	0	1	1	0	0	1	1	0	0	4
2015	1	0	0	0	0	1	0	0	0	1	3
2016	0	0	0	0	1	0	1	0	0	0	2
2017	0	0	0	0	0	1	0	0	0	0	1
2018	0	0	0	0	0	1	1	0	1	0	3
Total	**1**	**2**	**6**	**1**	**2**	**7**	**6**	**7**	**1**	**1**	**34**

Table 7.3.2 iSTARS and SISG: APAC accident categories (2016–2018)

Year	TURB	F-NI	UNK	MED	RE	GS	OTH	SCF	RS	LOC-I	CFIT	Total
2016	1	0	0	0	0	0	0	4	11	1	0	17
2017	6	0	0	0	4	1	1	0	7	0	0	19
2018	3	0	0	0	6	0	2	0	8	1	0	20
Total	**10**	**0**	**0**	**0**	**10**	**1**	**3**	**4**	**26**	**2**	**0**	**56**

More recently, the three most common accident categories for APAC region in 2018 were runway safety (RS), runway excursion (RE) and turbulence. RS-related accidents, which include runway incursions/excursions, tailstrikes and hard landings, were the most frequently occurring accident category in the APAC region over the last three years (2016–2018), as indicated in Table 7.3.2. This is followed by the turbulence accident category which recorded 10 occurrences, and four occurrences for the system component failure (SCF) category over the same timeframe.

As can be seen in Chart 7.3.5, over the last five years (2014–2018), runway excursion, hard landing and in-flight damage were among the top three accident categories in the region. For fatal accidents, the top three categories from 2014 to 2018 were LOC-I, CFIT and other end-state respectively. In the same period, Chart 7.3.7 shows that the most non-fatal accidents occurred during the landing phase while the highest number of fatal accidents took place during the cruise phase.

Chart 7.3.5 IATA: APAC accident category distribution (2014–2018)

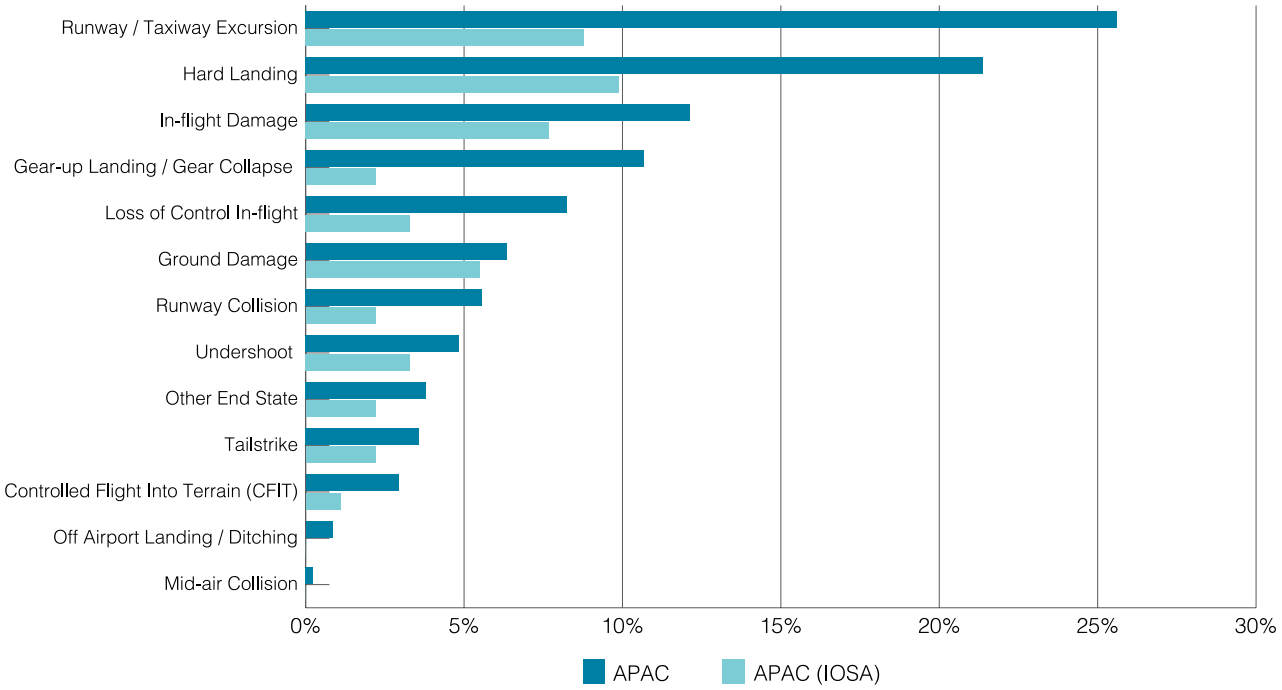
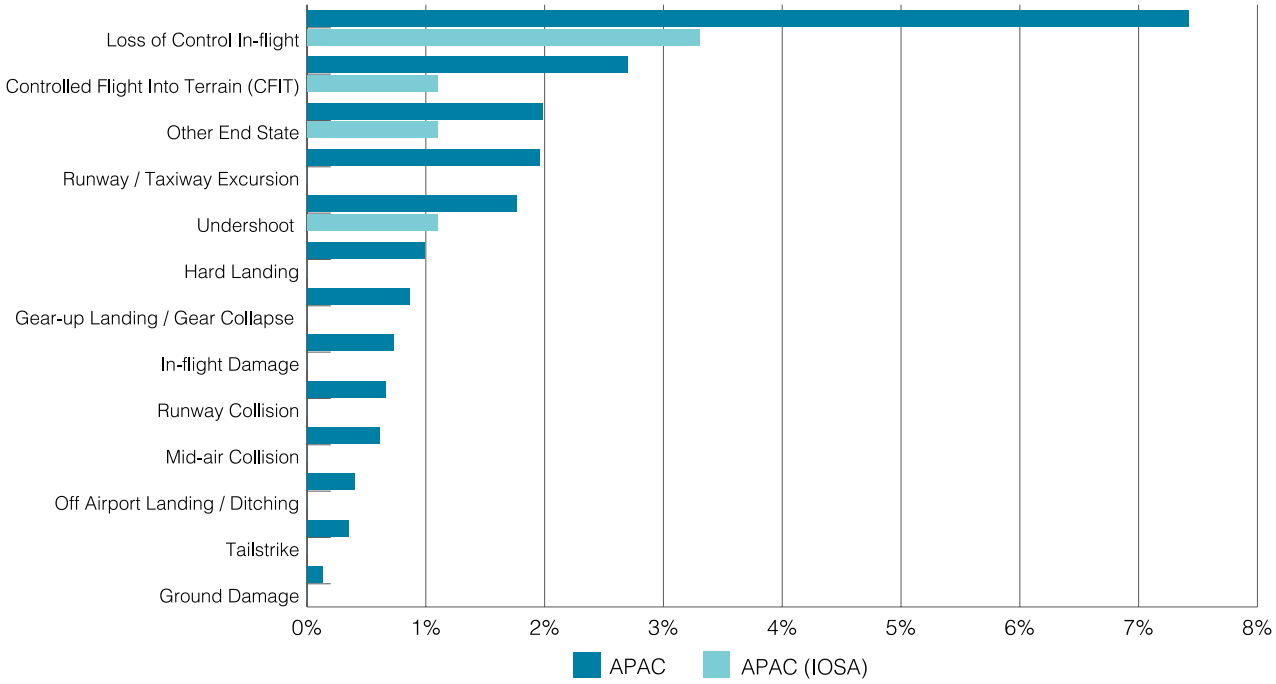


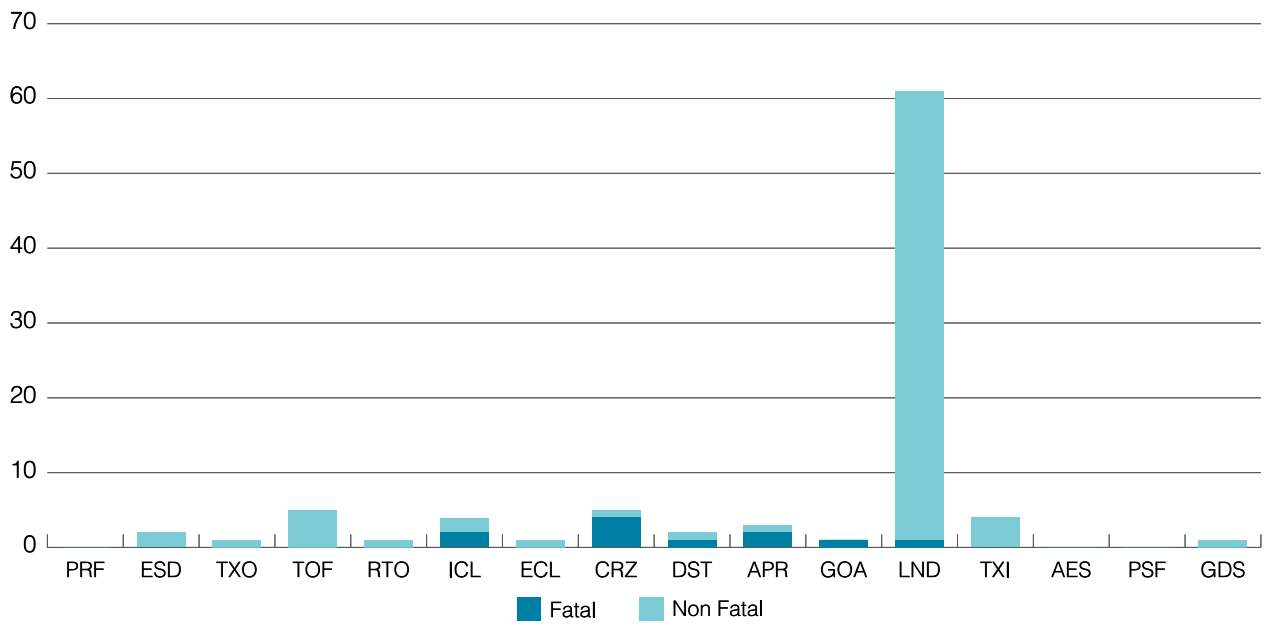
Chart 7.3.6 IATA: APAC fatal accident category distribution (2014–2018)



**IOSA refers to the IATA operational safety audit (IOSA) program, an international evaluation system designed to assess the operational management and control systems of an airline.*

© iStock.com | Necip Yanmaz

Chart 7.3.7 IATA: APAC accidents by flight phase (2014–2018)



7.4 Top Contributing factors to accidents within Asia Pacific – IATA

Based on IATA's top contributing factors to accidents within Asia Pacific (Table 7.4.1), flight crew errors accounted for a higher proportion of contributing factors for APAC accidents than almost any other factor. Similarly, undesired aircraft states accounted for a high proportion of contributing factors. Both flight crew errors and undesired aircraft states have likely played a role in the rate of runway/taxiway excursions being higher than other high-risk accident categories.

Regulatory oversight, meteorology, aircraft malfunction, manual handling/flight controls, undesired aircraft state (including long/floated/bounced/firm/off-center/crabbed land) and overall crew performance were the top contributing factors in their respective categories, for accidents within the APAC region.

Table 7.4.1 Top contributing factors to accidents within Asia Pacific (2014–2018)

Contributing factors	% of all accidents (involving hull loss or substantial damage)		% of accidents (involving hull loss or substantial damage) IOSA registered airlines only
Latent conditions			
Regulatory oversight	46%	Regulatory oversight	34%
Safety management	34%	Safety management	27%
Flight ops: training systems	24%	Flight ops: training systems	27%
Environmental threats			
Meteorology	35%	Meteorology	29%
Airport facilities	18%	Wind/Windshear/Gusty wind	17%
Poor visibility/IMC	16%	Poor visibility/IMC	15%
Airline threats			
Aircraft malfunction	19%	Aircraft malfunction	24%
Maintenance events	10%	Maintenance events	12%
Flight crew errors			
Manual handling/flight controls	49%	Manual handling/flight controls	46%
SOP adherence/SOP cross-verification	41%	SOP adherence/SOP cross-verification	41%
Pilot-to-pilot communication	17%	Pilot-to-pilot communication	27%
Undesired aircraft states			
Long/floated/bounced/firm/off-center/crabbed land	30%	Vertical/lateral/speed deviation	32%
Vertical/lateral/speed deviation	29%	Long/floated/bounced/firm/off-centre/crabbed land	24%
Unstable approach	28%	Unstable approach	20%
Countermeasures			
Overall crew performance	33%	Overall crew performance	27%
Monitor/Cross-check	27%	Monitor/Cross-check	22%
Leadership	18%	Leadership	20%

Asia Pacific sub-regional safety trends

7.5 Sub-regional accident rates, numbers and categories

Chart 7.5.1 ICAO iSTARS, SISG and OAG: APAC sub-regional accident rate (2009–2018)

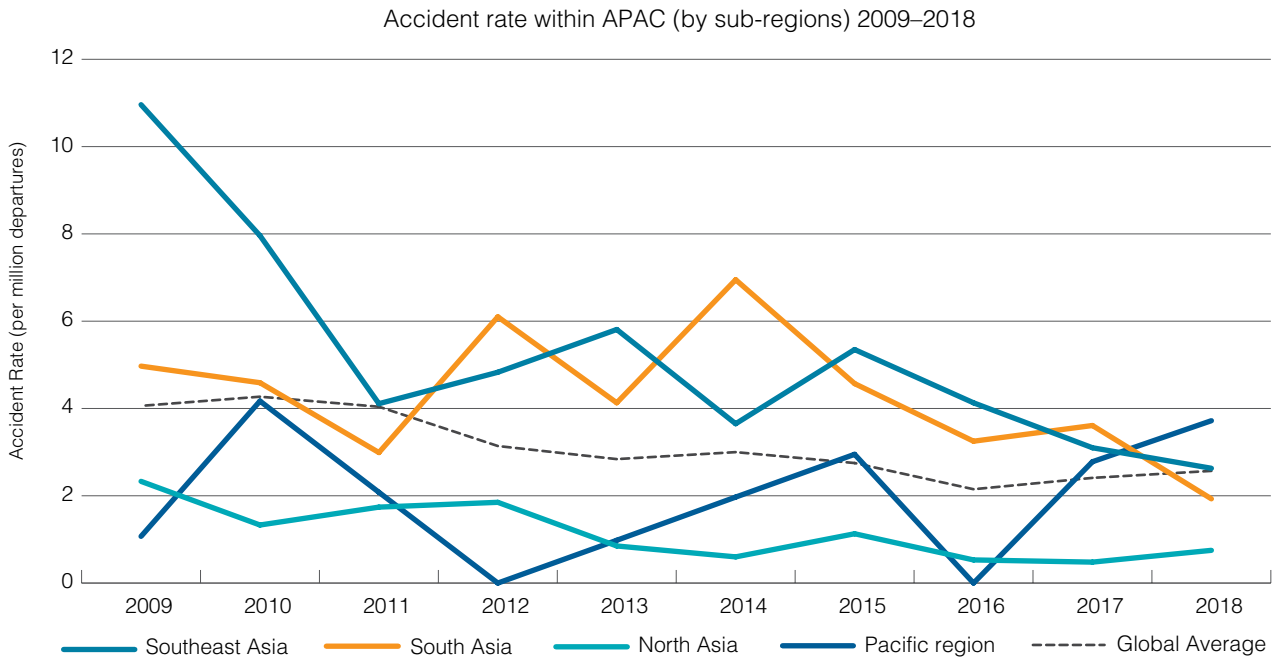
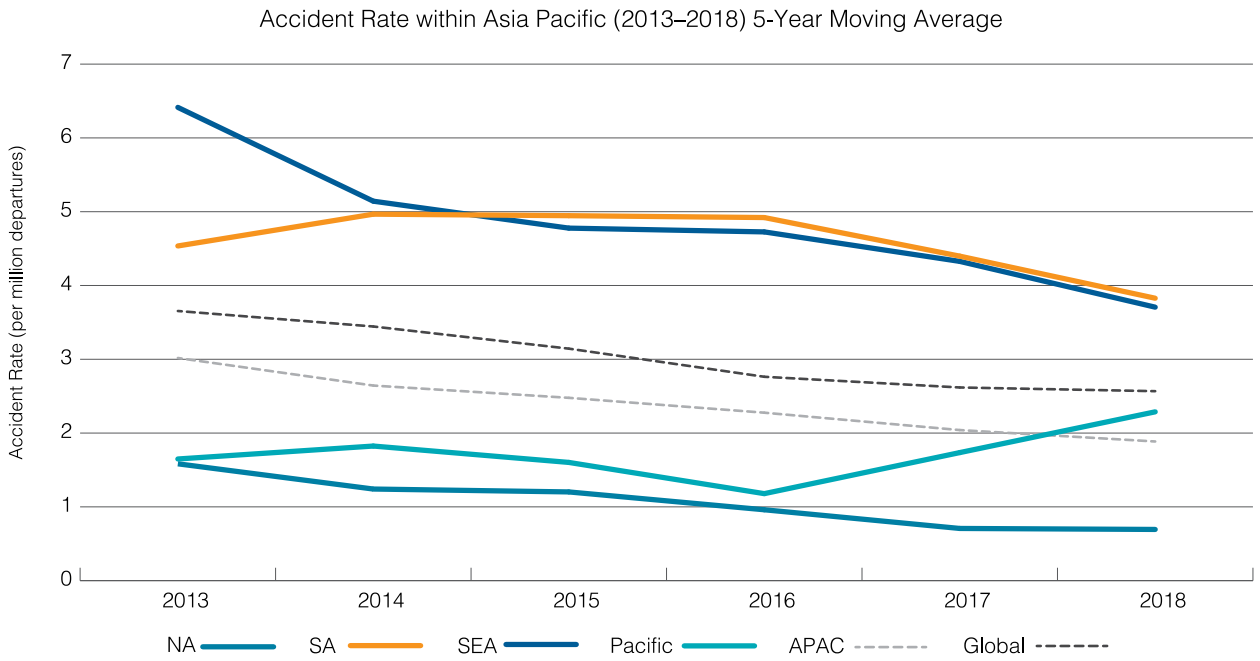


Chart 7.5.1 provides an illustration of the accident rates within the APAC by sub-region. In line with the global trend, sub-regional accident rates have trended down since 2014, except for the Pacific sub-region where the accident rate increased from 0 per million departures in 2016 to 3.7 per million departures in 2018, which was above the global average rate.

Notably, accident rates in the SA sub-region have decreased by more than three times, from 7.0 per million departures in 2014, to 1.9 per million departures in 2018.

From the chart, it is evident that the accident rates for the South-East Asia (SEA) and South Asia (SA) sub-regions have consistently been above global average rates; however, this changed in 2018 with accident rates in South-East Asia now aligning with the global average, and accident rates in South Asia now being below the global average. Accident rates in the North Asia (NA) sub-region remained below global average rates.

Chart 7.5.2 ICAO iSTARS, SISG and OAG: APAC sub-regional accident rate five-year moving average (2009–2018)

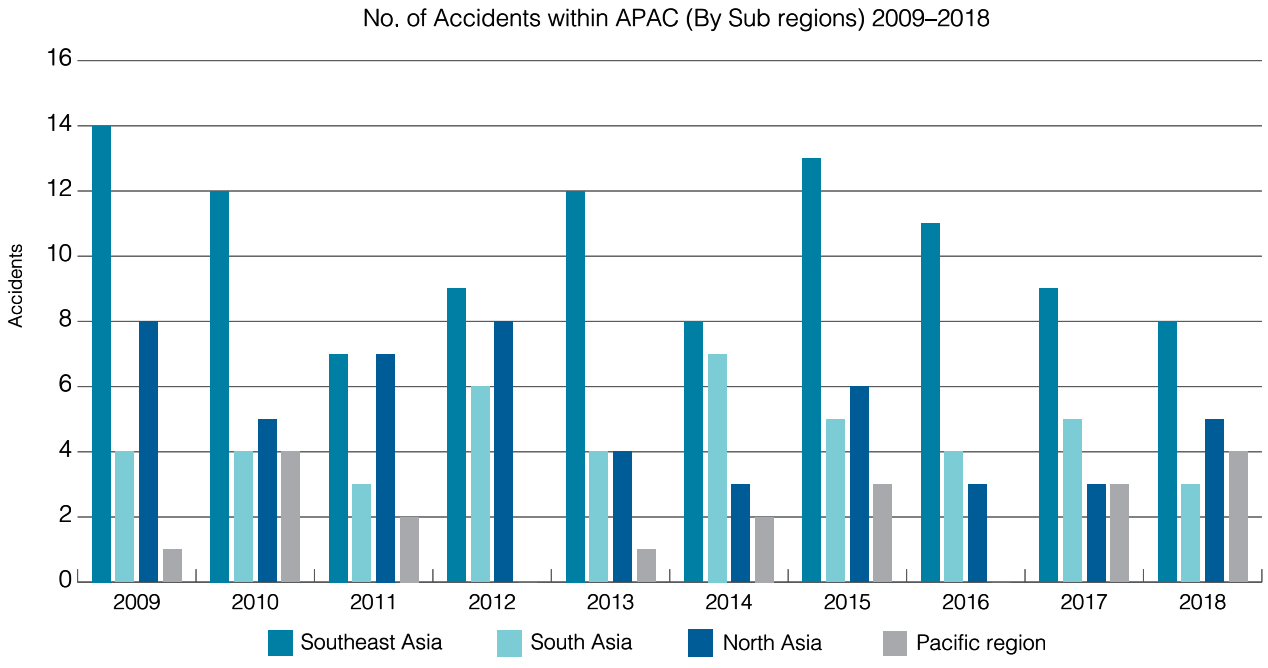


The five-year moving average shows a reduction in the accident rate trend for the South Asia and South-East Asia regions. Accident rates for these regions remain above the APAC and global average.

North Asia continued to have a five-year moving average accident rate below regional and global averages, with accidents rates averaging less than one accident per million departures.

The Pacific region had an increase in the five-year moving average accident rate in 2017 and 2018, but remained below the global average.

Chart 7.5.3 iSTARS, SISG and OAG: APAC sub-regions accident numbers (2009–2018)



The distribution of the accidents shown in Chart 7.5.3 indicates the SEA region had the highest number of accidents (103) over the last 10 years. This was also the case in 2018.

The number of accidents recorded in South Asia (three) in 2018 was equal to the lowest recorded over the past decade, whereas for the Pacific region the reverse was true, with the 2018 result being equal to the highest number of accidents over the past decade (to 2010).

In 2018, the SEA region accounted for 40 per cent of the accidents in the APAC region, with North Asia representing 25 per cent. One fatal accident which resulted in 189 fatalities, the highest for 2018, was attributed to SEA region.

Chart 7.5.4 iSTARS, SISG and OAG: APAC sub-regions fatal accident numbers (2009–2018)

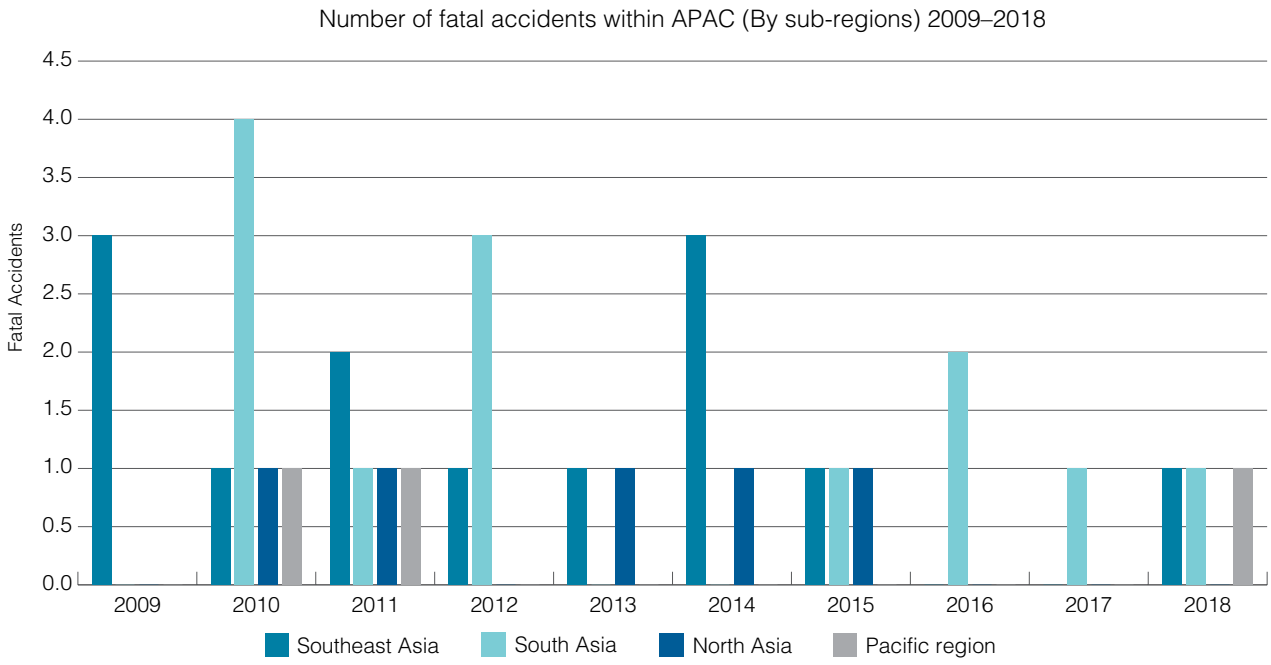


Table 7.5.1 iSTARS, SISG: APAC sub-regions top three fatal accident categories (2009–2018)

	SEA Region				SA Region				NA Region				Pacific Region			
Year	RS	LOC-I	CFIT	Total	RS	LOC-I	CFIT	Total	RS	LOC-I	CFIT	Total	RS	LOC-I	CFIT	Total
2009	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	1	0	2	3	0	1	0	1	0	0	0	0
2011	0	1	0	1	0	0	1	1	0	0	0	0	1	0	0	1
2012	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0
2013	0	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0
2014	0	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0
2015	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
2017	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
2018	0	1	0	1	1	0	0	1	0	0	0	0	1	0	0	1
Total	1	4	2	7	4	1	4	9	1	1	1	3	2	0	0	2

Table 7.5.1 shows the breakdown of the top three fatal accident categories by APAC sub-regions. The SEA sub-region recorded the most LOC-I fatal accidents (four) over the last 10 years, while the SA region recorded the most CFIT fatal accidents (four). The SA region also recorded the most runway safety-related fatal accidents (four) over the same time period.

Table 7.5.2 iSTARS, SISG: APAC accident categories (RS, LOC-I, CFIT) (2016–2018)

	SEA Region				SA Region				NA Region				Pacific Region			
Year	RS	LOC-I	CFIT	Total	RS	LOC-I	CFIT	Total	RS	LOC-I	CFIT	Total	RS	LOC-I	CFIT	Total
2016	8	0	0	8	1	1	0	2	2	0	0	2	0	0	0	0
2017	5	0	0	5	4	0	0	4	2	0	0	2	0	0	0	0
2018	4	1	0	5	3	0	0	3	4	0	0	4	3	0	0	3
Total	17	1	0	18	8	1	0	9	8	0	0	8	3	0	0	3

Table 7.5.2 shows the SEA sub-region had the highest number of accidents related to RS in 2016–2018. RS was also the top accident category for the SA, NA and Pacific regions.

08 Proactive safety information

Proactive safety information is gathered through analysis of existing or real-time situations – a primary function of the safety assurance team by audits, evaluations, employee reporting, and associated analysis and assessment processes. These involve actively seeking hazards in the existing processes (ICAO Doc 9859).

This information can be obtained from a number of sources, but this report focuses on the ICAO universal safety oversight audit program continuous monitoring approach (USOAP CMA).

8.1 ICAO universal oversight audit program continuous monitoring approach (USOAP CMA)

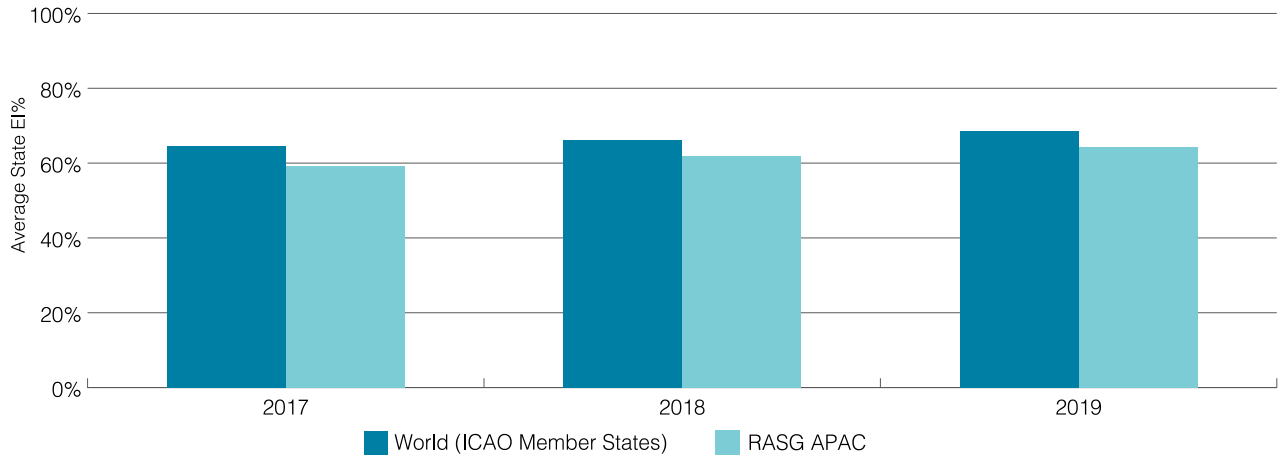
USOAP audits focus on a State's capability to provide safety oversight by assessing whether it has effectively and consistently implemented the critical elements (CE) of a safety oversight system. It also determines the State's level of implementation of ICAO's safety-related standards and recommended practices (SARPs), associated procedures and guidance material. Eight critical elements are evaluated:

- primary aviation legislation
- specific operating regulations
- state civil aviation system and safety oversight functions
- technical personnel qualifications and training
- technical guidance, tools and the provision of safety-critical information
- licensing, certification, authorisation and approval obligations
- surveillance obligations
- resolution of safety concerns.

The USOAP CMA program was launched in January 2013. Comprehensive information relating to USOAP CMA is available on the USOAP CMA online framework at www.icao.int/usoap

The overall effective implementation (EI) for the RASG-APAC region in 2019 increased to 63.37 per cent (as shown in Chart 1). The EI score has been stable for the past few years and reasonably below the global level, which was 68.53 per cent in 2019.

Chart 8.1 RASG-APAC Overall implementation

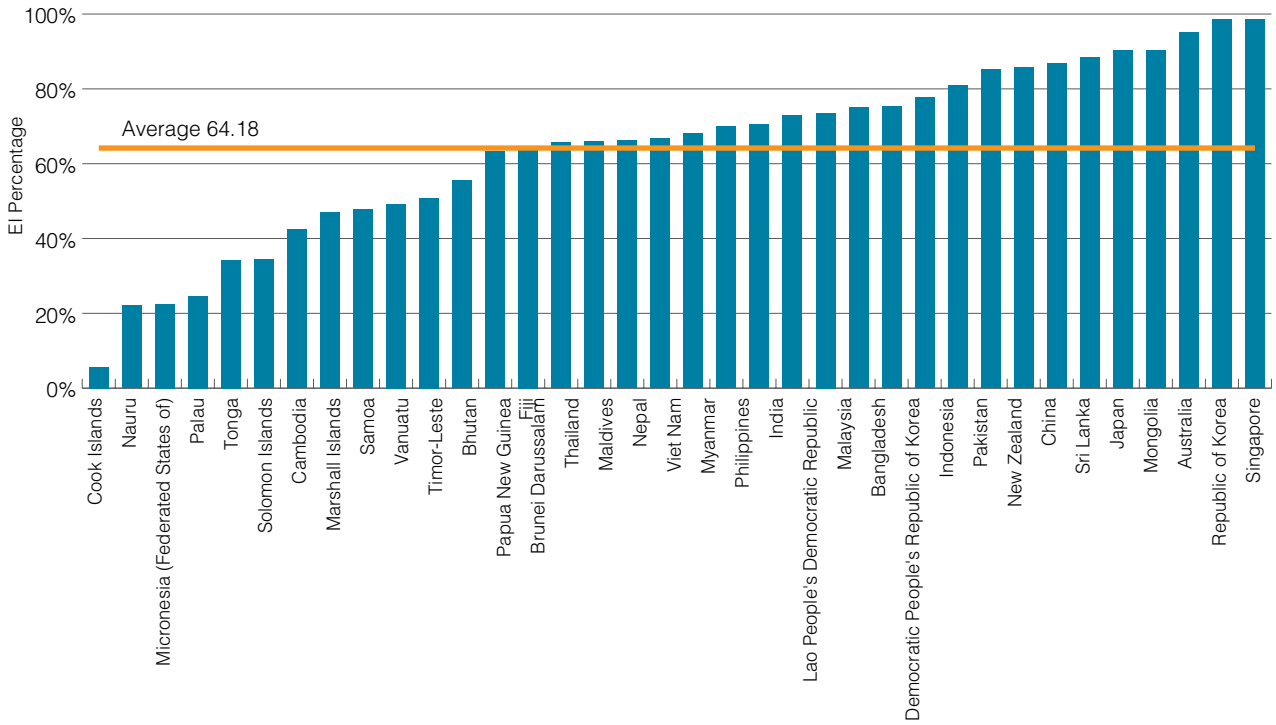


Note: Data was extracted from the iSTARS database on the 11 October 2019.

Chart 8.2 illustrates the overall EI by State. It should be noted that any changes or improvements to a State's EI can only be reflected after one of the following is conducted:

- comprehensive systems approach (CSA) audit
- ICAO coordinated validated mission
- integrated validated mission
- off-site monitoring activity
- off-site safety system concern (SSC) protocol questions management activity.

Chart 8.2 Overall EI for RASG-APAC States



The EI by critical elements (CE) in Chart 8.3 revealed that resolution of safety concerns (CE 8) had the lowest implementation score of 49.53 per cent for the RASG-APAC. In comparison to all ICAO member States, RASG-APAC had lower scores for all CEs, with Certification and Approval Obligations (CE6) being the closest in comparison.

Chart 8.3 Overall EI by critical element RASG-APAC States compared to all ICAO member States

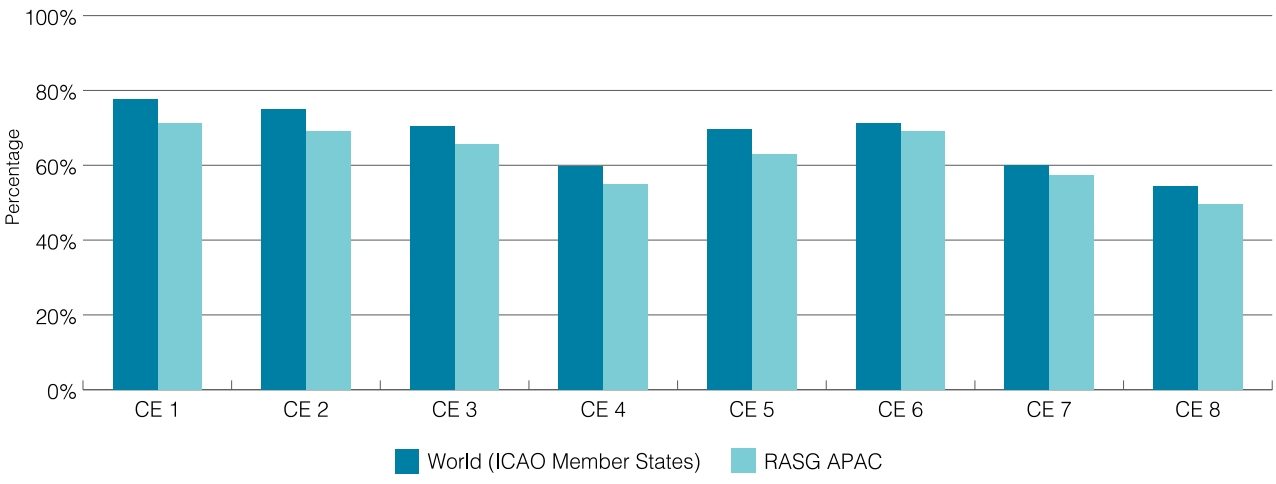
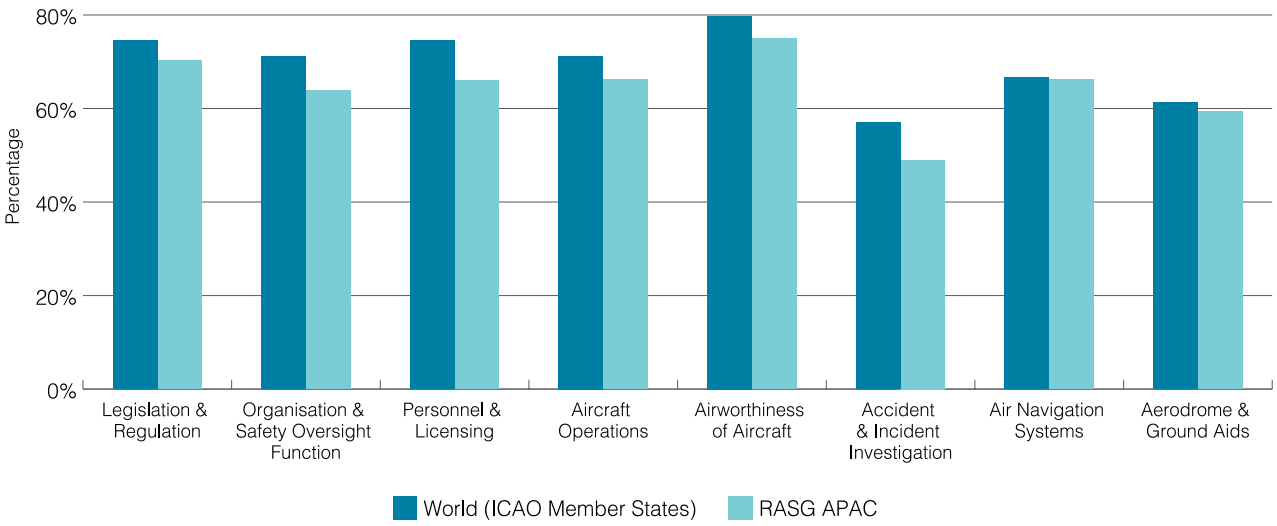


Chart 8.4 displays the overall EI by area compared to all ICAO member States. The data indicates that RASG-APAC is lower for all categories, with air navigation systems being the category with the score closest to ICAO member states.

Chart 8.4 Overall EI by area RASG-APAC States compared to all ICAO member States



© Thinkstock | mikdam

09 Conclusion

Reactive safety information

From the analysis of the reactive safety information provided by ICAO, IATA and CAST, the most common fatal accident categories in the APAC region between 2009 and 2018 were:

- loss of control in-flight (LOC-I)
- controlled flight-into-terrain (CFIT) and
- runway safety.

Safety information from IATA and CAST also revealed that CFIT and LOC-I were the accident categories with the highest fatality risks in APAC region, while runway/taxiway excursions, hard landing and in-flight damage accounted for the highest number of accidents. It should also be noted that landing-related accidents continue to be the flight phase with the greatest number of accidents. The APAC region should continue to focus its efforts on mitigating and minimising occurrences relating to these categories and flight phases.

Proactive safety information

The EI score for the RASG-APAC region increased in 2019 (64.18%), compared to 2018 (61.96%). The EI for the RASG-APAC region was lower than the global average by CE. Of these, *technical personnel qualifications and training (CE4) and Resolution of safety concerns (CE-8)* were lowest, at 54.98 and 49.53 per cent respectively. Both these critical elements also contained the lowest scores across the world (ICAO member states), suggesting that they appear to be a consistent issue across the world.

10 List of acronyms

ACAS	Airborne collision avoidance systems
ACTG	Accident Classification Technical Group
ADRM	Aerodrome
AFI	Africa (IATA Region)
AIS	Aeronautical information service
AMAN	Abrupt manoeuvre
ANSP	Air navigation service provider
AOC	Air operator certificate
APAC	Asia Pacific
APR	Approach
ARC	Abnormal runway contact
ASIA PAC	Asia/Pacific (ICAO Region)
ASPAC	Asia/Pacific (IATA Region)
ATC	Air traffic control
ATM	Air traffic management
BIRD	Birdstrike
CABIN	Cabin safety events
CAST	Commercial aviation safety team
CFIT	Controlled flight into terrain
CICTT	CAST/ICAO Common Taxonomy Team
CIS	Commonwealth of Independent States (IATA Region)
CMA	Continuous monitoring approach
CRM	Crew resource management
CRZ	Cruise
CVR	Cockpit voice recorder
DFDR	Digital flight data recorder
DGAC	Directorate general of civil aviation
DGCA	Directors-General of Civil Aviation Conference
DH	Decision height
E-GPWS	Enhanced ground proximity warning system
ETOPS	Extended range operations by turbine engine aeroplanes
EDTO	Extended diversion time operations (replaces ETOPS)
EUR	Europe (ICAO and IATA Region)
EVAC	Evacuation
FDA	Flight data analysis
FLP	Flight planning (IATA)
F-NI	Fire/smoke (none-impact)
FMS	Flight management system
FOQA	Flight operations quality assurance
F-POST	Fire/smoke (post-impact)
FUEL	Fuel related
GASP	ICAO global aviation safety plan
GCOL	Ground collision
GNSS	Global navigation satellite system
GOA	Go-around
GPWS	Ground proximity warning system
GSI	Global safety initiative
HL	Hull loss – aircraft destroyed or damaged and not repaired
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICE	Icing
ICL	Initial climb
IMC	Instrument meteorological conditions
INOP	Inoperative
IOSA	IATA operational safety audit
iSTARS	Integrated safety trend analysis and reporting system
LALT	Low-altitude operations
LATAM	Latin America and the Caribbean (IATA Region)
LEI	Lack of effective implementation
LND	Landing
LOC-G	Loss of control on ground
LOC-I	Loss of control inflight
LOSA	Line operations safety audit
MAC	AIRPROX/TCAS alert/loss of separation/ near miss collisions/mid-air collisions
MDA	Minimum descent altitude
MED	Medical
MEL	Minimum equipment list
MENA	Middle East and North Africa (IATA REGION)
NAM	North America (ICAO and IATA Region)
NASIA	North Asia (IATA Region)

NAVAIDS	Navigational aids
NOTAM	Notice to airmen
OAG	Official Aviation Guide
OTH	Other
RA	Resolution advisory
RAMP	Ground handling operations
RE	Runway excursion (departure or landing)
RE-Landing	Runway excursion – landing
Re-Take-off	Runway excursion – take-off
RI	Runway incursion
RI-A	Runway incursion – animal
RI-VAP	Runway incursion – vehicle, aircraft or person
RS	Runway safety
RTO	Rejected take-off
SAM	South America (ICAO Region)
SARPS (ICAO)	Standards and recommended practices
SCF-NP	System/component failure or malfunction – non-powerplant
SCF-PP	System/component failure or malfunction – powerplant
SD	Substantial damage
SEC	Security-related
SISG	Safety Indicator Study Group (ICAO)
SMS	Safety management system
SOP	Standard operating procedure
SRVSOP	Regional safety oversight system
SSP	State safety program
TAWS	Terrain awareness warning system
TCAS	Traffic collision and avoidance system
TCAS RA	Traffic collision and avoidance system – resolution advisory
TEM	Threat and error management
TOF	Take-off
TURB	Turbulence encounter
TXI	Taxi
UAS	Undesirable aircraft state
UNK	Unknown or undetermined
USOAP	Universal safety oversight audit program
USOS	Undershoot/overshoot