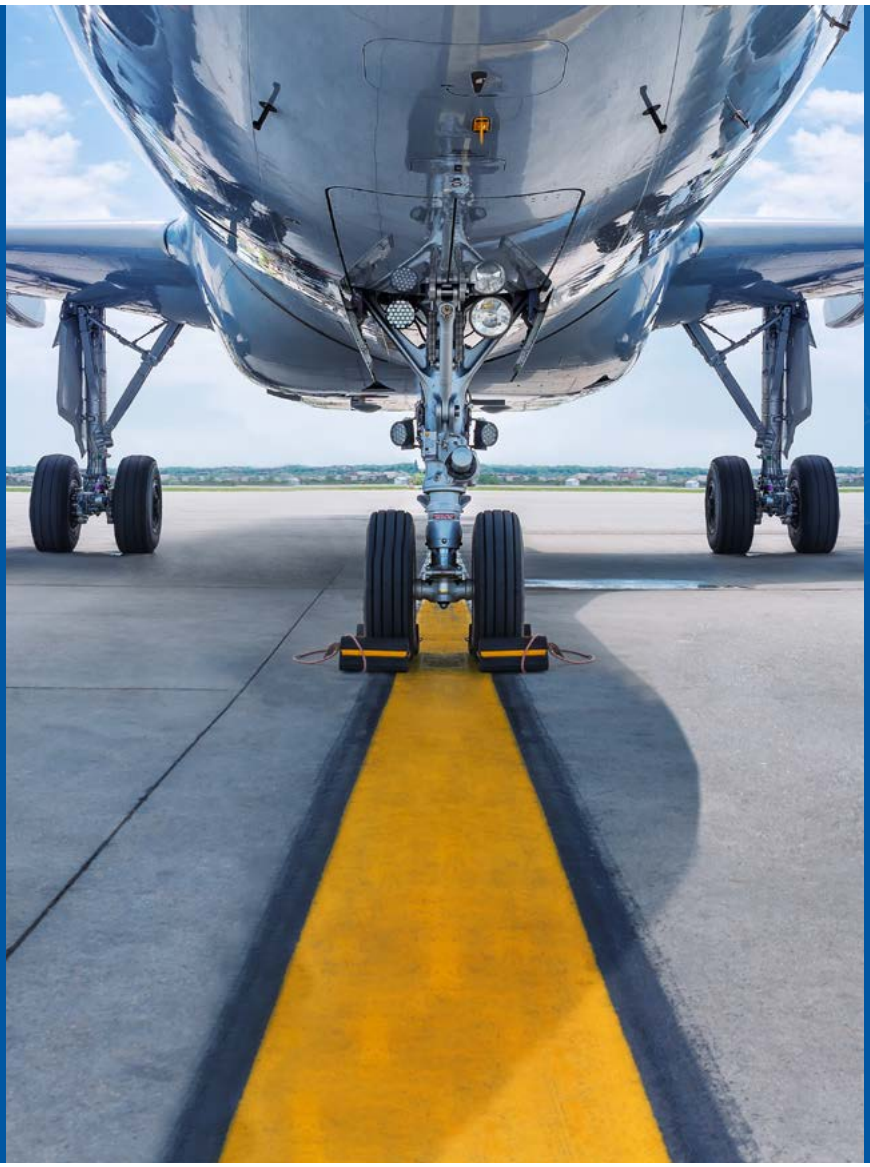

Annual Safety Report

2022

ASIA PACIFIC REGION

Disclaimer:

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Acknowledgement to contributors

RASG-APAC thanks the members of the RASG-APAC Annual Safety Reporting and Programme Working Group that contributed to the elaboration of this 2022 RASG-APAC Annual Safety Report:

- International Civil Aviation Organization (ICAO)
- International Air Transport Association (IATA)
- Commercial Aviation Safety Team (CAST)

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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 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 programme. The objectives of the APRAST include recommending enhancement initiatives to the RASG-APAC which will reduce aviation risks. To do so, APRAST will:

- review, for application within the Asia Pacific region, existing safety enhancement initiatives (SEIs) 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 SEIs. 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.

Supporting the work of the APRAST, are three Working Groups:

a. Safety Enhancement Initiative Working Group (SEI WG)
b. Safety Reporting Programme Working Group (SRP WG); and
c. Ad-hoc Working Group for Regional Aviation Safety Plan (RASP)

Asia Pacific – Accident Investigation Working Group (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 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.

Safety Enhancement Initiative Working Group (SEI WG)

The role of the SEI WG is to assist 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, based on ICAO initiatives or the initiatives of other relevant organisations or regions or based on the risks and issues identified through the USOAP CMA process. The identified SEIs should be prioritised to ensure that those that have the greatest potential for reducing safety risk are examined first.

To accomplish the objectives, the SEI WG will:

i. Assist APRAST in the identification and development of 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
ii. Assist APRAST in the provision of generic implementation guidance related to the SEIs to guide members through the SEI implementation process

iii. Assist APRAST in the identification of assistance programmes such as, but not limited to, workshops and seminars to improve the level of implementation of developed SEIs, with the support of the Secretariat.

iv. Develop and conduct a process to review existing SEIs and provide recommendations to improve the effectiveness and level of implementation.

Safety Reporting Programme Working Group (SRP WG)

The SRP WG's role is to 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:

i. Reactive information

ii. 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.

An Ad-hoc Working Group was formed to formulate the first Regional Aviation Safety Plan (RASP) for 2020–22, with the States will be adopting the GASP 2020–22 to align themselves in developing a National Aviation Safety Plan (NASP) taking reference from the GASP and the region's Regional Aviation Safety Plan (RASP), which was approved by RASG-APAC/9, in November 2019. This working group is also developing the RASP for the next triennium, being 2023-25.

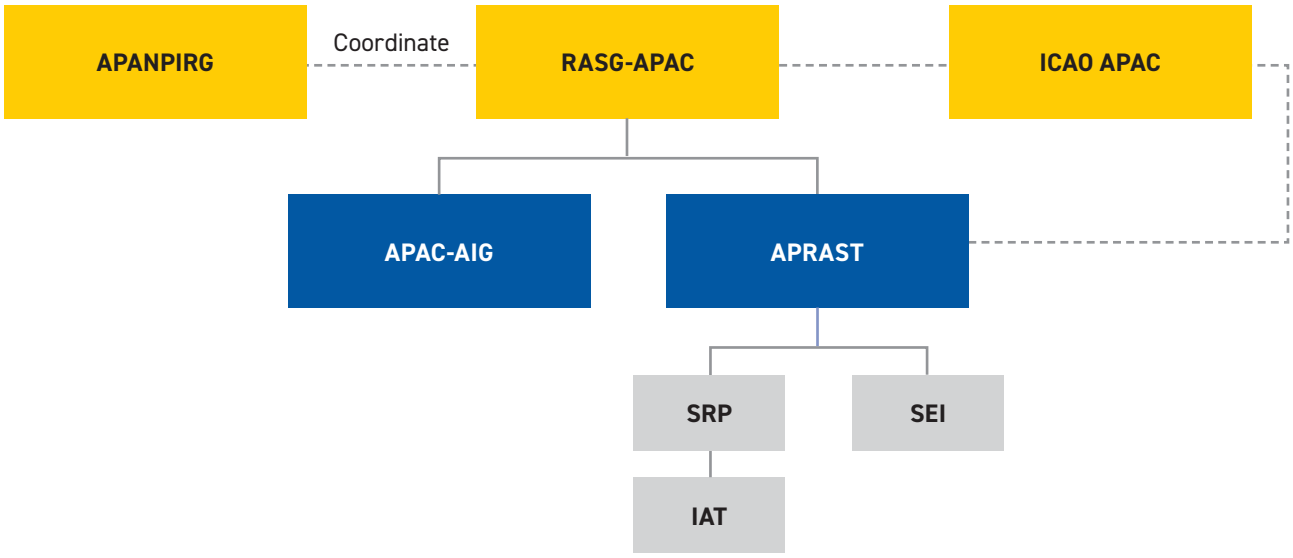
The organisational structure of the RASG-APAC and its subsidiary bodies is shown in Figure 1.1. The International Civil Aviation Organization (ICAO) Asia Pacific regional office in Bangkok provides the secretariat support necessary for the RASG-APAC to function.

The 2022 Annual Safety Report, developed by the SRP WG and published by RASG-APAC, is the 10h edition of exclusive safety report for the Asia Pacific region based on data provided by ICAO, the US Commercial Aviation Safety Team (CAST) and the 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, IATA, 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 2010–2016, with data for 2017–2019 being sourced from ICAO's Safety Indicator Study Group (SISG). In subsequent APAC Annual Safety Reports, SISG data will replace all iSTARS data beyond 2017 when SISG data was made available.

This 10th 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 Continuous Monitoring Approach (CMA).

In this report, the most frequent accident categories, in accordance with the **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, are identified.

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

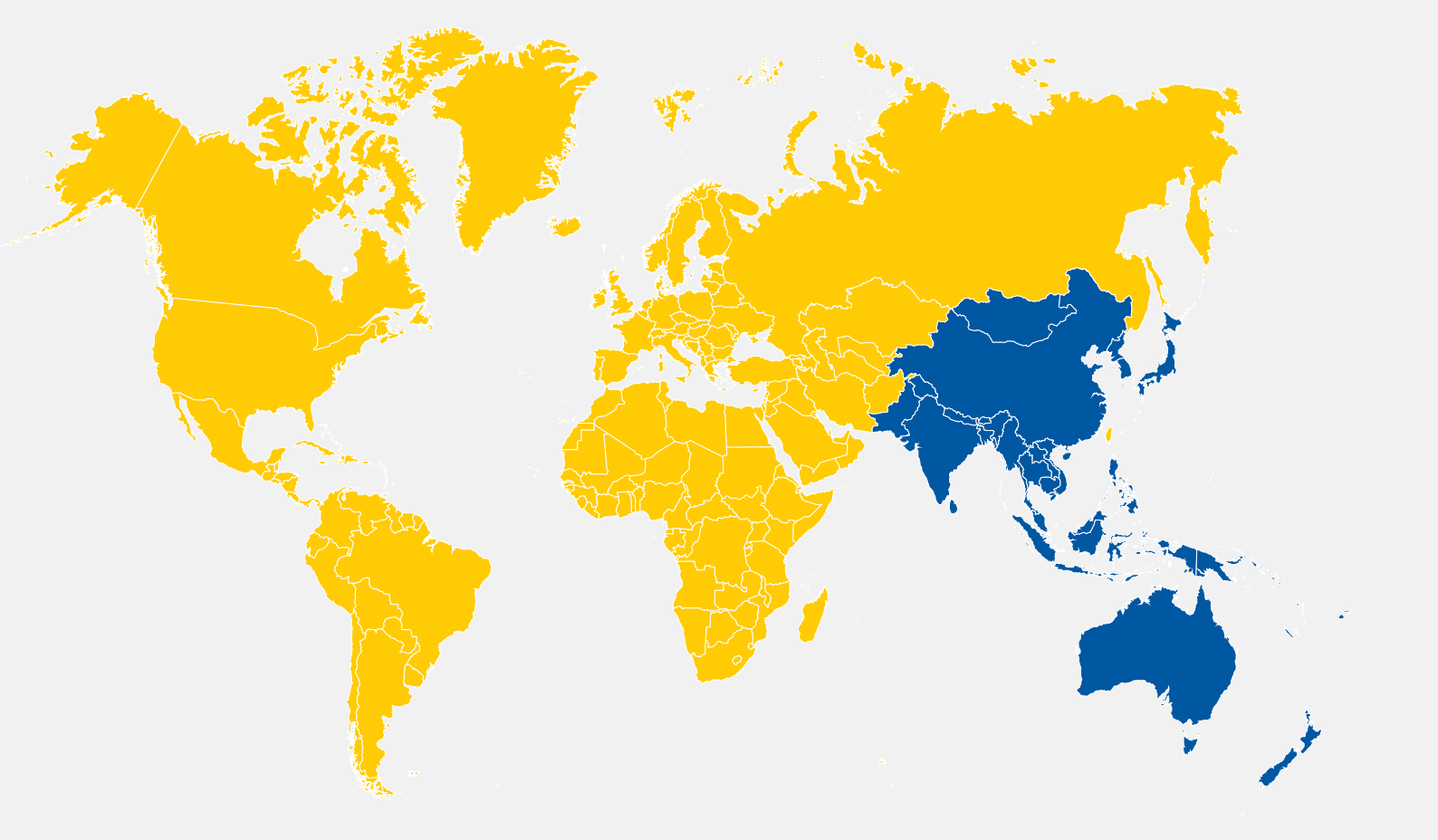


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Table 2.1 Member States/Administration accredited with the ICAO Asia Pacific Office

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

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 IAT on aviation accidents in the APAC region. The safety information was collected from ICAO, IATA and CAST.

Reactive information Analysis

In recent years, the global accident rate saw a gradual rise followed by a sharp downtrend, decreasing from 2.41 accidents per million departures in 2017 to 1.93 per million departures in 2021. On the other hand, RASG-APAC rate has maintained a steady decline from 1.64 per million departures to 0.82 per million departures over the same period. The RASG-APAC's accident rate has remained lower than the global accident rate over the past decade. Overall, the five-year moving average accident rate, globally and for RASG-APAC, has shown a consistent downward trend.

The number of accidents attributable to States/ Administrations in the RASG-APAC region in 2021 reduced to 7 from 9 in 2020. In terms of fatalities, there was one fatal accident in 2021, down from 2 in 2020.

With both the global and APAC accident results, consideration must be given for the reduced activity levels resulting from the COVID-19 pandemic.

Proactive information analysis

The RASG-APAC region had an overall USOAP Effective Implementation (EI) score of 66.35 per cent in 2022, higher than its performance of 63.91 per cent in 2021. This result remains lower than the global level of 69.32 per cent.

In terms of Critical Elements (CE), the RASG-APAC region had lower EI scores for all categories as compared with the global average. Critical Element 4 (Personnel Qualifications and Training), Critical Element 1 (Primary Aviation Legislation) and Critical Element 5 (Technical Guidance) were the areas where APAC had the largest variances in critical element score to the global average. The APAC region was closest to the global EI scores for critical elements 6 (*Licencing and Certification*) and critical element 7 (*Surveillance Obligations*). *Resolution of safety concerns* continued to have the lowest EI scores within RASG-APAC at 50.9 percent.

By area, *Accident and Incident Investigation* (AIG) retained the lowest EI score for RASG-APAC. In comparison, other EI areas in RASG-APAC achieved an effective implementation score over 65.

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. Identified hazards and their associated risk can then be prioritised and appropriate mitigation actions taken.

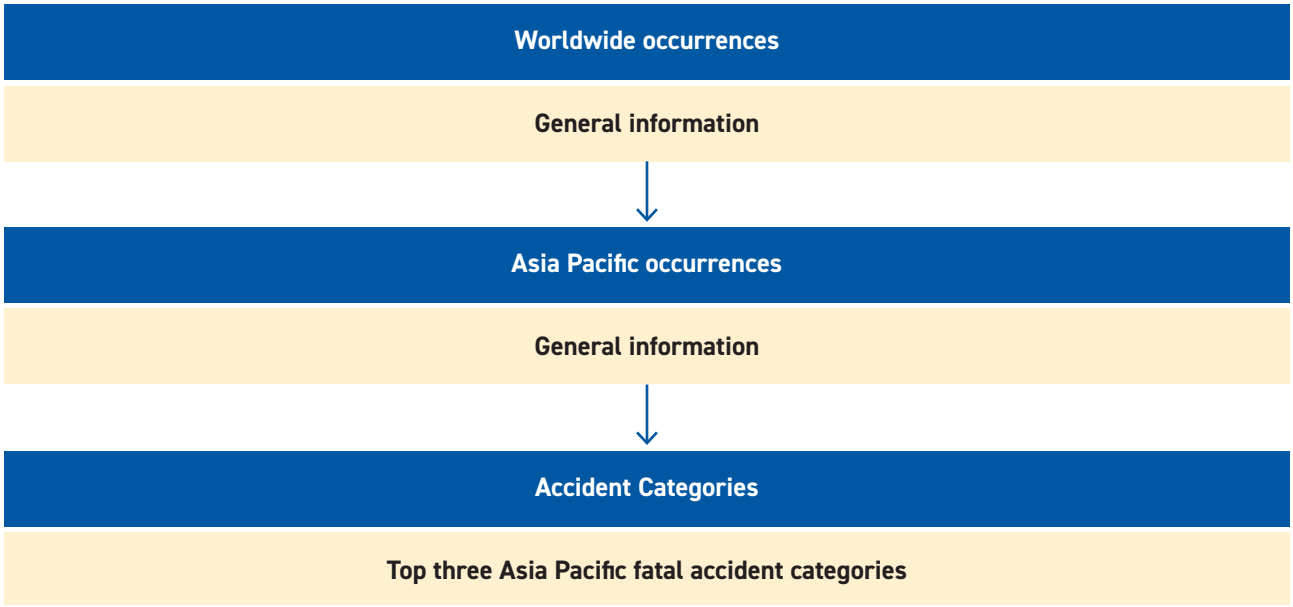
RASG-APAC can be viewed as a regional safety management process or a regional safety program (RSP) in the same way that a State Safety Program (SSP) is a national safety management process and a Safety Management System is a service provider's safety management program. Using safety information provided 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 MTOW greater than 5700kg operated by (or registered with) the members 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 firstly be based on their membership with the respective Cooperative Development of Operational Safety and Continuing Airworthiness Programme (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 programmes. 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.

06 RASG APAC 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

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 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.
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 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 ACTG criteria (commercial operation, jet or turboprop and MTOW > 5,700Kg) 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
  - 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

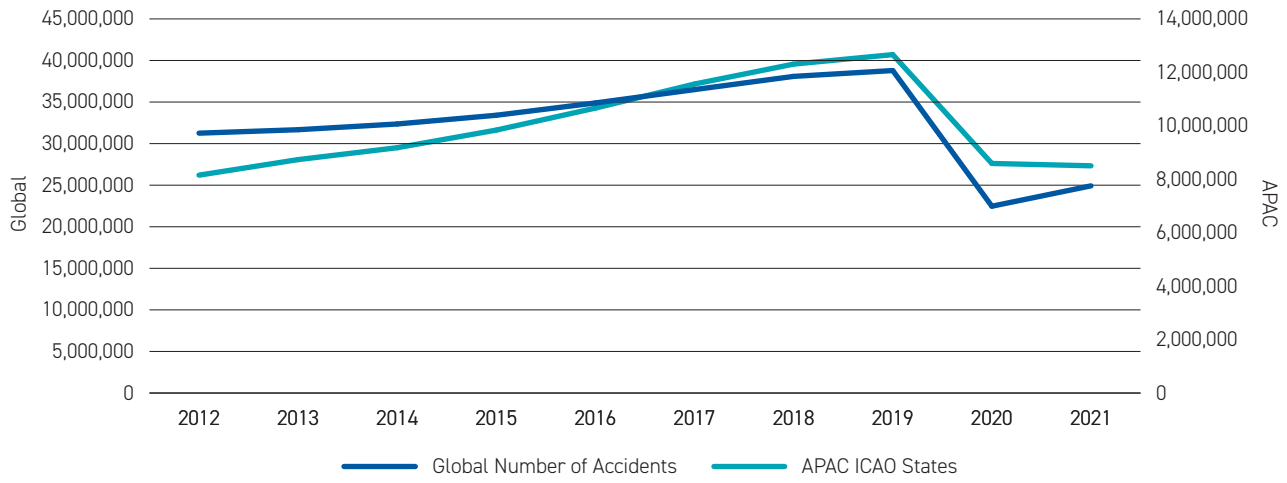
7.1 Global and APAC Accident Rates

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.

Air travel volume in 2021 continued to be greatly affected by the global pandemic caused by the COVID-19 virus, which has severely affected the aviation sector since 2020. Global air traffic rebounded slightly in 2021 to 24.9 million departures from 22.5 million departures in 2020, representing 64 % of pre-pandemic levels in 2019. However, the volume of departures in RASG-APAC remained similar to traffic levels in 2020 of around 8.5 million departures.

The reduction in traffic numbers has severely impacted global aviation. However, the impact of pandemic operations on safety trends is difficult to determine. Therefore, a combination of numbers, yearly rates, and multi-year aggregate data will be used to present an understanding of the safety context in the APAC region.

Chart 7.1.1 Departures by Region (2012 to 2021)



The accident rate in the APAC region has declined significantly over the last decade from 2.82 (2012) to 0.82 (2021) per million departures. This compares favourably with the global accident rates where the rate of decline has been less over the same period, from 3.14 (2012) to 1.93 (2021) accidents per million departures.

The 5-year moving average does highlight that the medium-term trend remains positive with accident rates continuing to ease both globally and within APAC since 2014. The average 5-year accident rate within APAC has reduced to 1.34 per million departures from 2.67 (2014). Similarly, the global 5-year accident rate has also reduced to 2.47 in 2021, from 3.44 in 2014.

Comparing the accident rates between 2020 and 2021, the reduction in accident rate within APAC can be attributed to the fewer number of accidents in 2021 (7) as compared to 2020 (9). Globally, there were 48 accidents in 2021, unchanged from 2020.

Accident rates according to the IATA dataset are shown in Charts 7.1.3. The accident rate according to IATA in 2021 is 0.68 and 2.23 accidents per million departures for APAC and the World respectively. There was a decrease in accident rates both globally and within APAC for 2021. Looking at the long-term changes in accident rates, the data shows that there is a decreasing trend in accident rates since 2012.

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 ICAO iSTARS, SISG and OAG: Global accident rate versus APAC accident rate, including five-year Sliding Average (2012–2021)

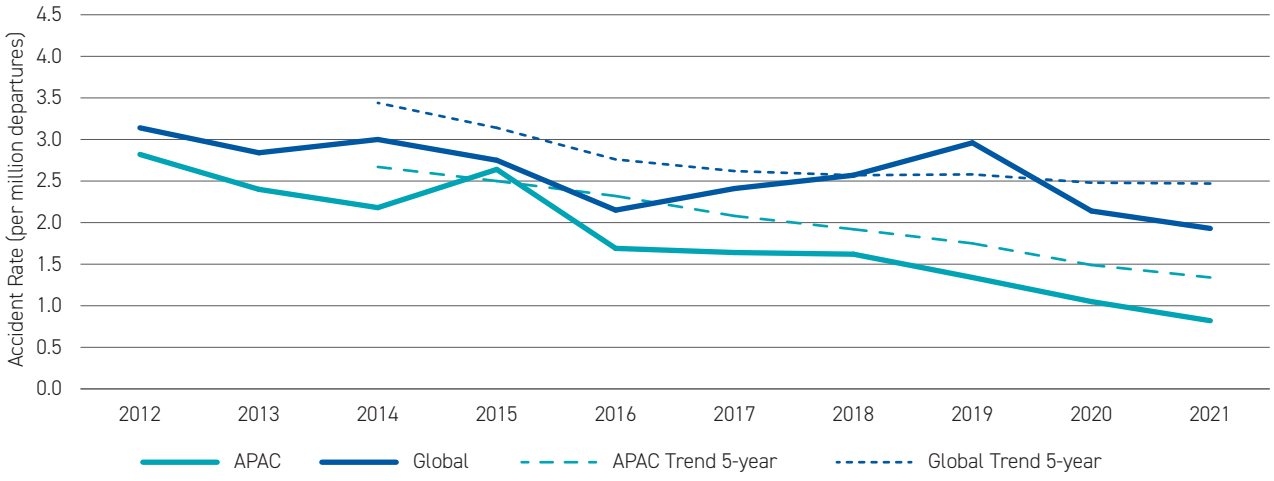


Chart 7.1.3 IATA: APAC region's Accident Rate (2012 to 2021)

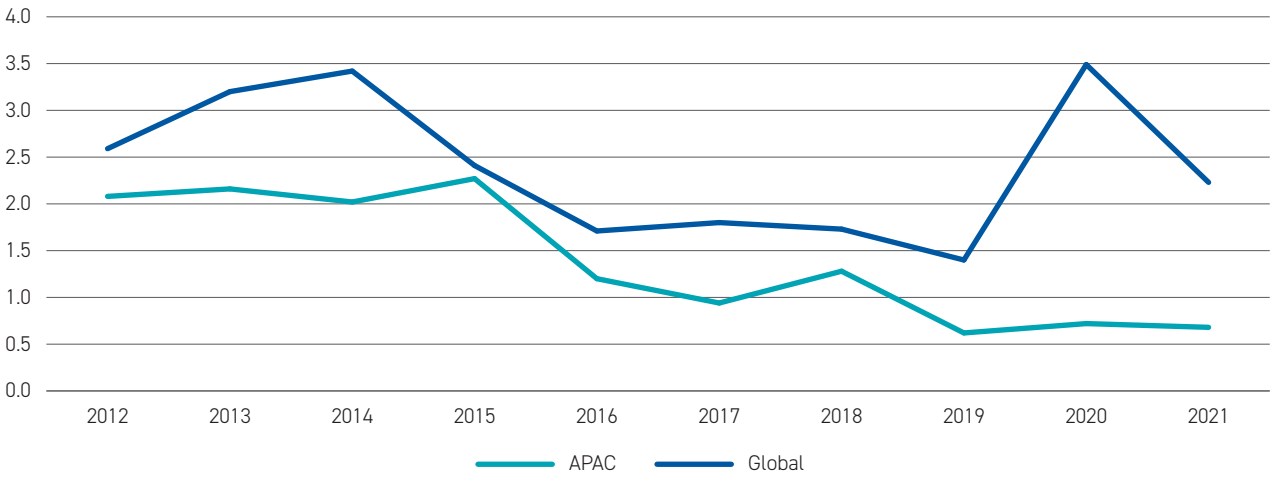


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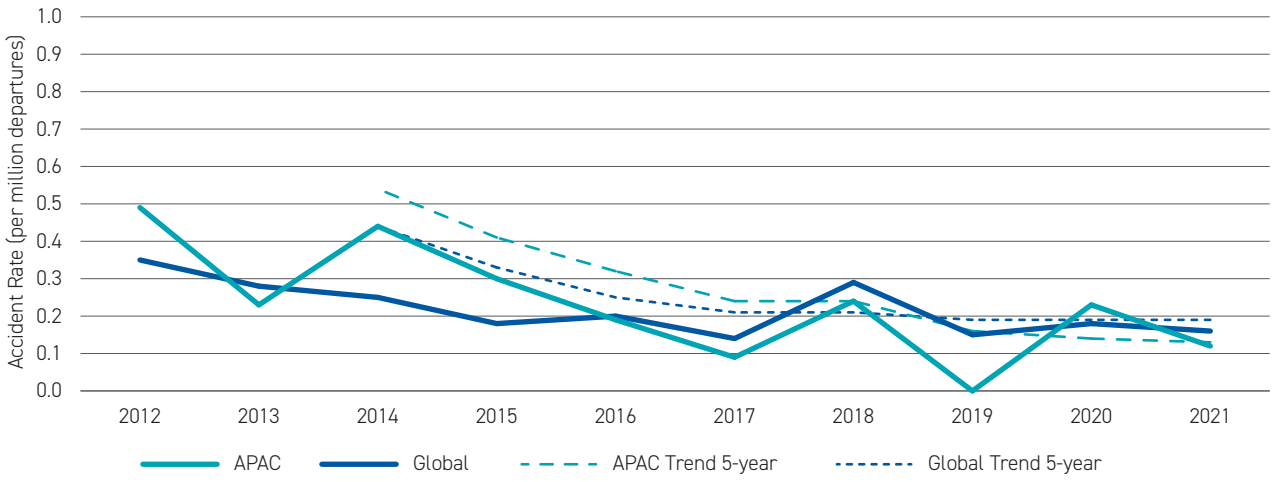
Chart 7.1.4 shows the fatal accident rate from 2012 to 2021 in both the APAC region and the world. The number of fatal accidents has remained stable in 2021, with 4 events globally, including one fatal accident recorded in the APAC region. For comparison, there were two fatal accidents in 2020 in the APAC Region. Overall, the rates of fatal accidents globally and within APAC continue to decrease, and in 2021 remained slightly below the 5-year average, at 0.16 and 0.12 accidents per million departures respectively. The 5-year trend for fatal accident rate in APAC continues to be positive, having dropped below the global fatal accident rate since 2019.

Chart 7.1.4 Global vs. RASG_APAC Fatal accident rate (2012–2021)



7.2 Global and APAC Accident Numbers

It is important to recognize 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.

The large reduction in traffic volume in 2021, due to the global pandemic, continued to contribute to the decrease in total accident numbers. In the APAC region in 2021, a total of 7 accidents were recorded, with 1 being a fatal accident. This represented a decrease from 9 accidents in 2020, and 17 accidents in 2019. A summary of the accident numbers over the past 10 years is shown in Chart 7.2.1.

Comparing the long term-trend in accident numbers shows a significant decrease of non-fatal and fatal accidents in 2021. Prior to 2021, the average number of accidents and fatal accidents in the previous five years was 16.6 and 1.6, respectively.

Chart 7.2.1 ICAO iSTARS, SISG and OAG: Number of accidents – RASG-APAC (2012–2021)

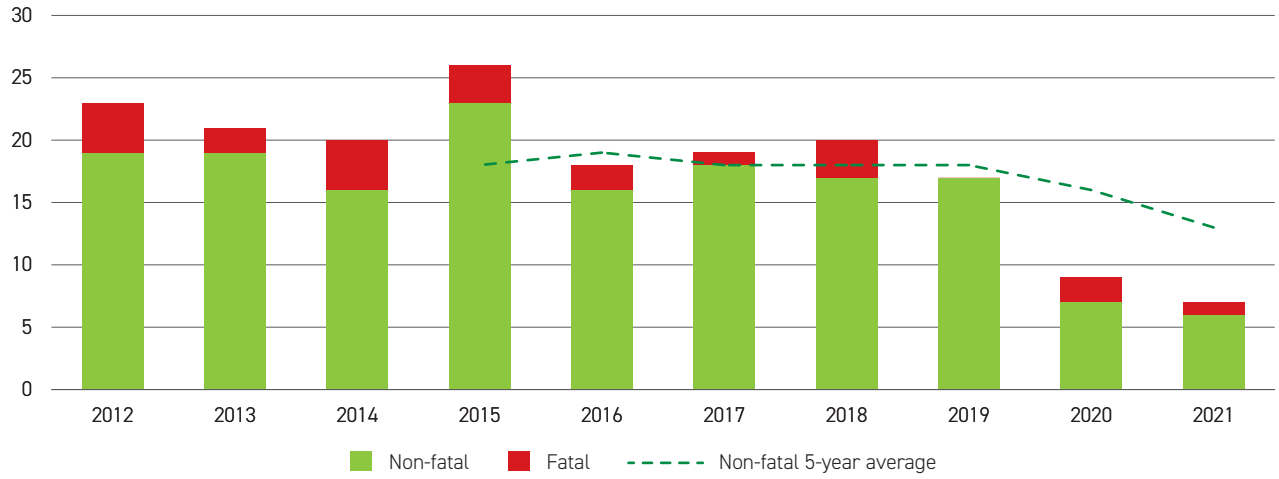


Table 7.2.1 IATA: Accident Count from 2017 to 2021 (Region of Occurrence vs Region of Operator)

	2017	2018	2019	2020	2021	Total
APAC Operators Accidents	12	18	9	6	6	**51**
Accidents occurring in APAC	12	17	9	7	3	**48**
APAC Operators Accidents in APAC	12	16	9	7	3	**46**
Non-APAC Operators Accidents in APAC	0	1	0	1	0	**5**

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 APAC region (APAC and non-APAC operator).

Not surprisingly, most APAC operator accidents occur within the APAC region, while non-APAC operator incidents are very seldom in the APAC region. The number of accidents occurring in APAC, and number of total APAC operator accidents declined further in 2021, based on IATA data. These numbers were the lowest seen over the past five years, with these results likely impacted by the decline in activity post-onset of COVID-19.

Chart 7.2.2 IATA: APAC Operator Accidents

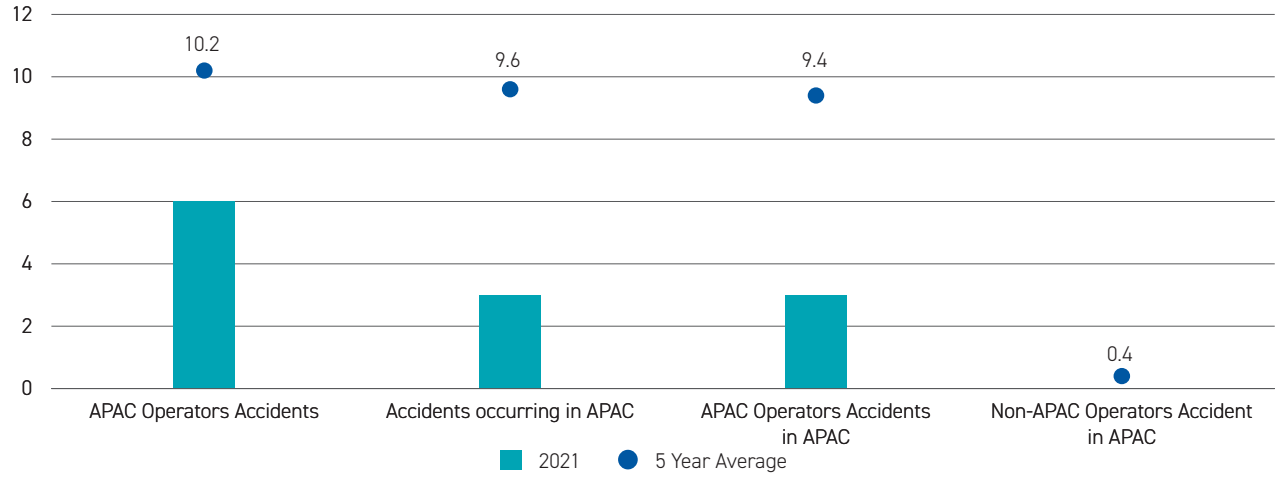


Chart 7.2.2 shows us the APAC operator incidents in 2021, as compared to the 5-year average. There is a large decrease in accident numbers across all divisions. However, as above, we note that this is likely due to the large decreases in traffic volume in 2021 (8.5 million) compared to the average traffic over the last 5 years (10.7 million).

Accident Trends (Hull Loss / Substantial Damage / Fatality Risk)

Data from 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 2021. There was one accident in this category in 2021, which is significantly lower than the previous average over the past 10 years of 5.3 events yearly. While the accident numbers fluctuate considerably on a yearly basis, the 10-year moving average also shows that there has been a decline in hull losses and fatal accidents over the past five years from 7.6 to 5.3 accidents per year.

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

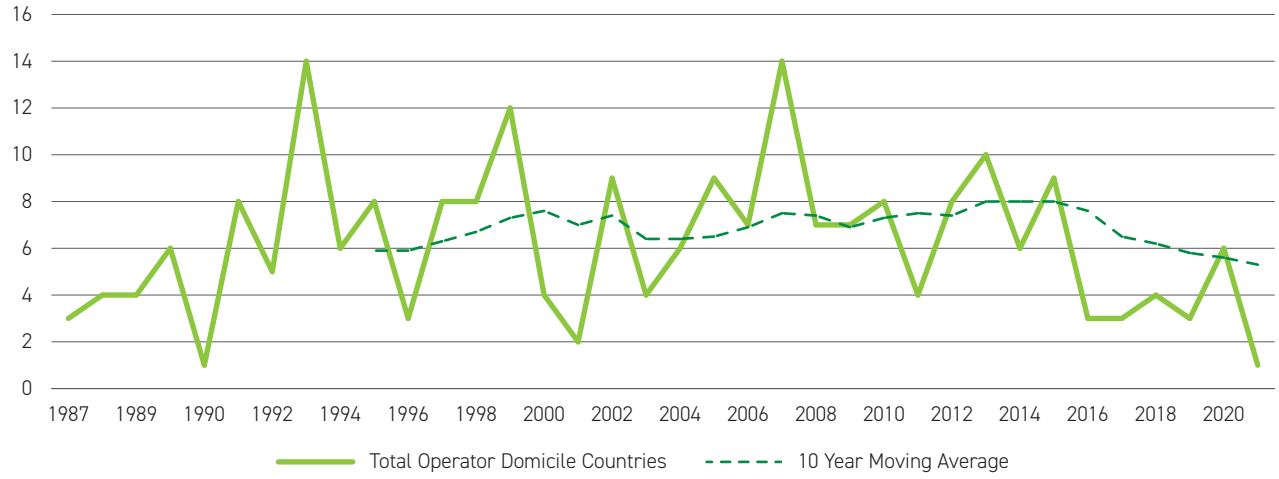


Chart 7.2.4 shows the fatality risk for both APAC and the world from 2012–2021, using data . A single fatal accident occurred in the APAC region in 2021, resulting in a fatal accident risk of 0.11 per million sectors, in comparison with the global rate at 0.63.

Chart 7.2.5 shows the hull loss rate for both APAC and the world from 2012–2021. Over the last 10 years, the APAC region's yearly hull loss occurrence rate has consistently trended lower than the global rate. APAC's accident rate resulting in hull losses has decreased from 0.24 accidents per million sectors in 2020 to 0.11 accidents per million sectors in 2021. This is significantly lower than the global rate at 0.92.

Chart 7.2.4 IATA: Fatality Risk (2012 to *2021*)

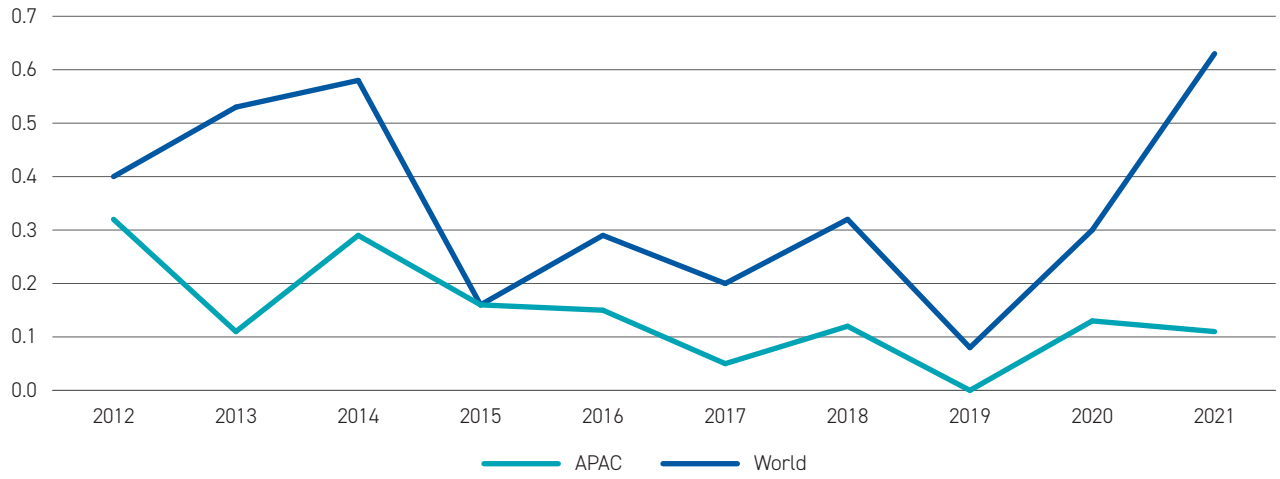
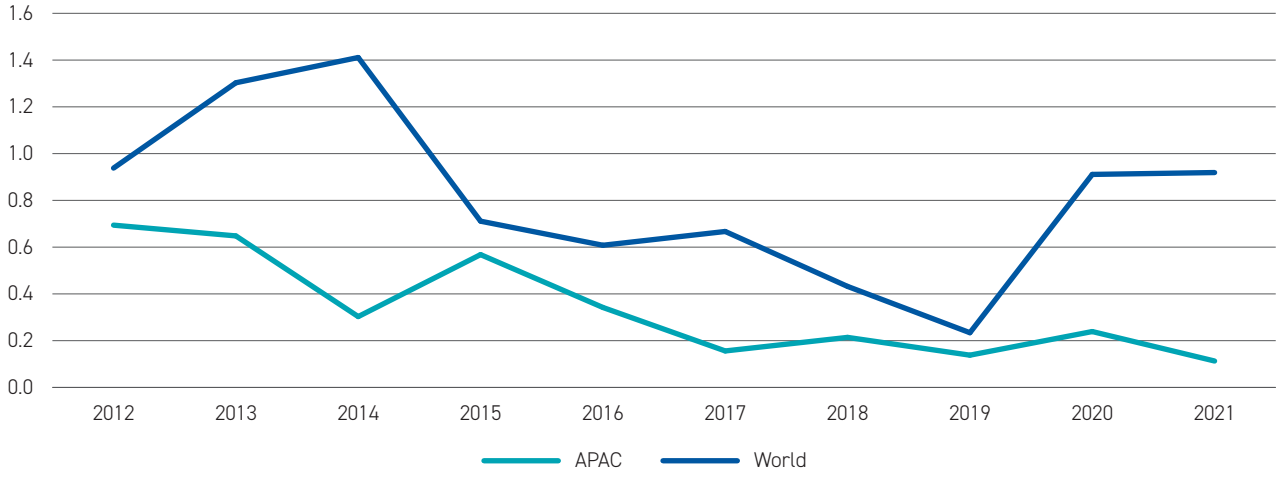
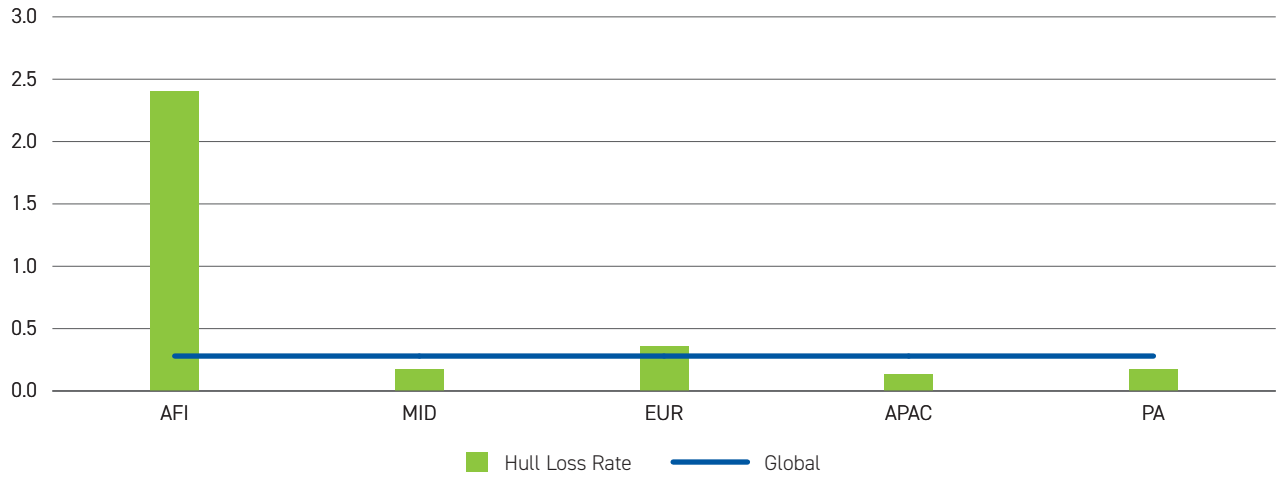


Chart 7.2.5 IATA: Hull losses (2012 to *2021*)



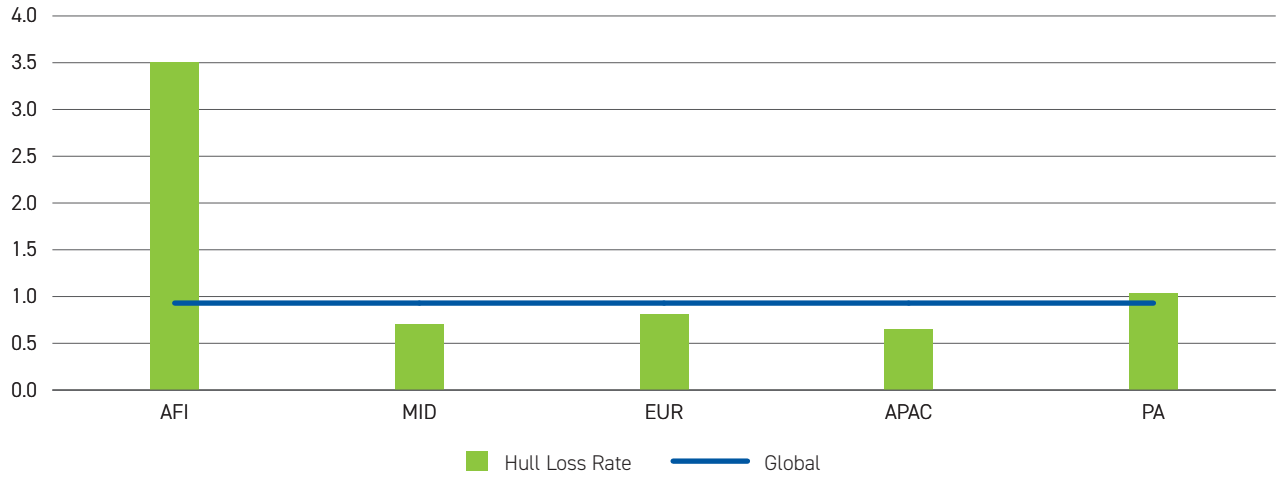
Over the past 5 years, APAC has continued to compare favourably with global trends in hulll loss rates. In 2021, the APAC region had a hull loss rate of less than 0.2 per million sectors, compared with global results where the rate exceeded 0.9 per million sectors.

Chart 7.2.6 IATA: Hull Loss Rates (2017 to 2021) per million sectors



The APAC region also fared better than the global average for 5-year substantial damage rates, at 0.65 per million sectors flown (global average 0.9 per million sectors flown).

Chart 7.2.7 IATA: Substantial Damage Rates (2017 to 2021) per million sectors



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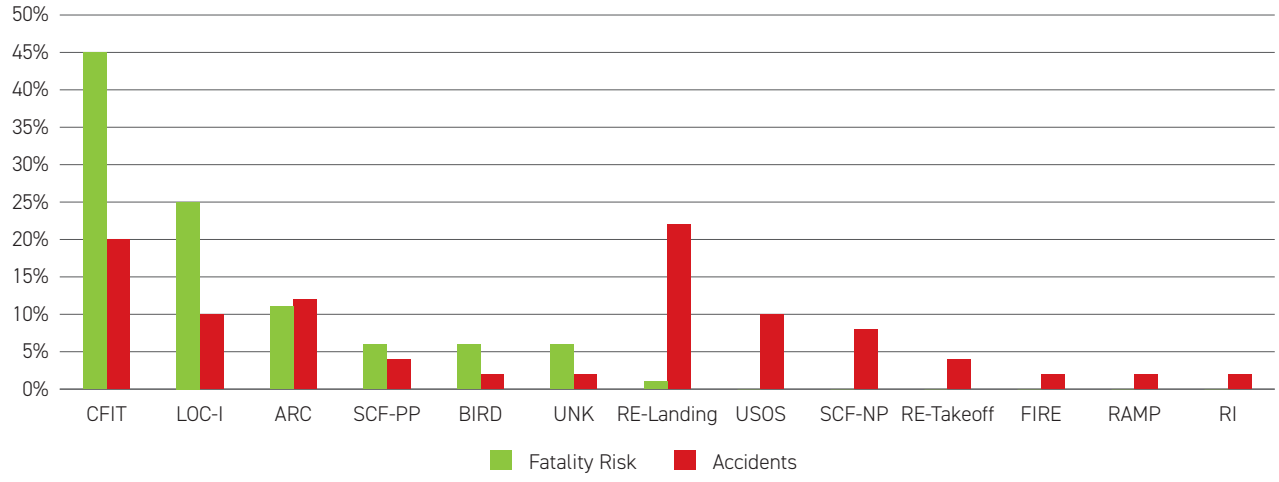
7.3 Global and APAC Accident Categories

Data from CAST, as shown in Chart 7.3.1, identified Controlled Flight into Terrain (CFIT) and Loss of Control In-Flight (LOC-I) as the leading causes for fatality risk for APAC operator domicile countries, while CFIT and Runway Excursion (RE) on landing have been the leading causes for hull losses in the last ten years.

Chart 7.3.1 CAST: Fatality and Accident Risks for High-Risk Accident Categories in APAC



CFIT, 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 ten years.

- The accident rate attributable to CFIT was zero* in 2021, continuing a trend over the past 4 years for APAC. *for airlines that are part of IATA's IOSA program
- Accidents in APAC attributable to LOC-I increased in 2021 to 0.11 accidents per million sectors. This is above the 3-year moving average of 0.04 per million sectors. LOC-I accidents also increased globally to 0.12 accidents per million sectors.

There were no accidents attributable to Runway/Taxiway Excursion in 2021 across the globe.

Table 7.3.1 APAC fatal accident categories (2012–2021)

Year	TURB	F-NI	UNK	OTH	SCF	RS	LOC-I	CFIT	RE	ARC	ADRM	USOS
2012	0	0	1	0	1	0	0	2	0	0	0	0
2013	0	0	0	0	0	1	1	0	0	0	0	0
2014	0	0	1	1	0	0	1	1	0	0	0	0
2015	1	0	0	0	0	1	0	0	0	0	0	1
2016	0	0	0	0	1	0	1	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	1
2018	0	0	0	0	0	0	1	0	1	0	0	1
2019	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	1	1	0	0
2021	0	0	0	0	0	0	1	0	0	0	0	0
Total	**1**	**0**	**2**	**1**	**2**	**2**	**4**	**3**	**2**	**1**	**0**	**3**

Table 7.3.2 APAC accident categories (2017–2021)

Year	TURB	F-NI	RE	GS	OTH	RS	LOC-I	CFIT	ADRM	ARC	RAMP	GCOL
2017	6	0	4	1	1	7	0	0	0	0	0	0
2018	3	0	6	0	2	8	1	0	0	0	0	0
2019	7	1	4	0	0	0	0	0	0	4	1	0
2020	3	1	0	0	0	0	0	0	0	3	0	0
2021	2	0	0	0	0	0	1	0	0	3	0	0
Total	**21**	**2**	**14**	**1**	**3**	**15**	**2**	**0**	**0**	**10**	**1**	**0**

Table 7.3.1 shows the breakdown of fatal accident categories in the APAC region from 2012 to 2021. Over the past decade, fatal accidents in APAC were most likely the result of (i) Loss of Control in Flight, (ii) Controlled Flight into Terrain, or (iii) Runway Safety or related events. In 2021, the one fatal accident that occurred in APAC was attributed to LOC-I.

Table 7.3.2 shows the breakdown of accident categories in the APAC region from 2017 to 2021. The three most common accident categories in 2021 and in the past five years were: (i) Runway Safety or related events including Runway Excursion, Abnormal runway contact (ARC); and (ii) Turbulence (TURB); and (iii) Abnormal runway contact (ARC).

As can be seen in Chart 7.3.3, data from IATA shows that over the last 5 years (from 2017 to 2021), runway excursion, hard landing and in-flight damage were in the top three accident categories in the region. For fatal accidents, presented in Chart 7.3.6, the top two accident categories from 2017 to 2021 were Runway/taxiway excursion and LOC-I. In the same period, the data shows, in Chart 7.3.7, that the most non-fatal accidents occur during the landing phase while the highest number of fatal accidents took place during the approach phase.

**IOSA refers to the IATA Operational Safety Audit (IOSA) Programme, an international evaluation system designed to assess the operational management and control systems of an airline.*

Chart 7.3.2 IATA: APAC accident category distribution (2017–2021)

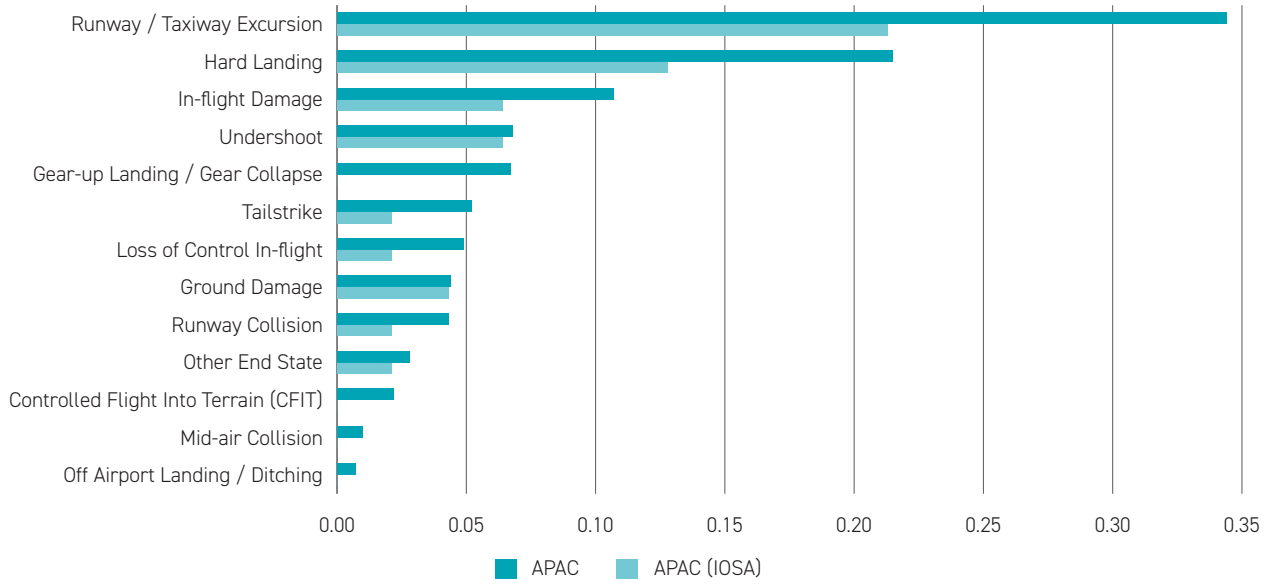


Chart 7.3.3 IATA: APAC fatal accident category distribution (2017–2021)

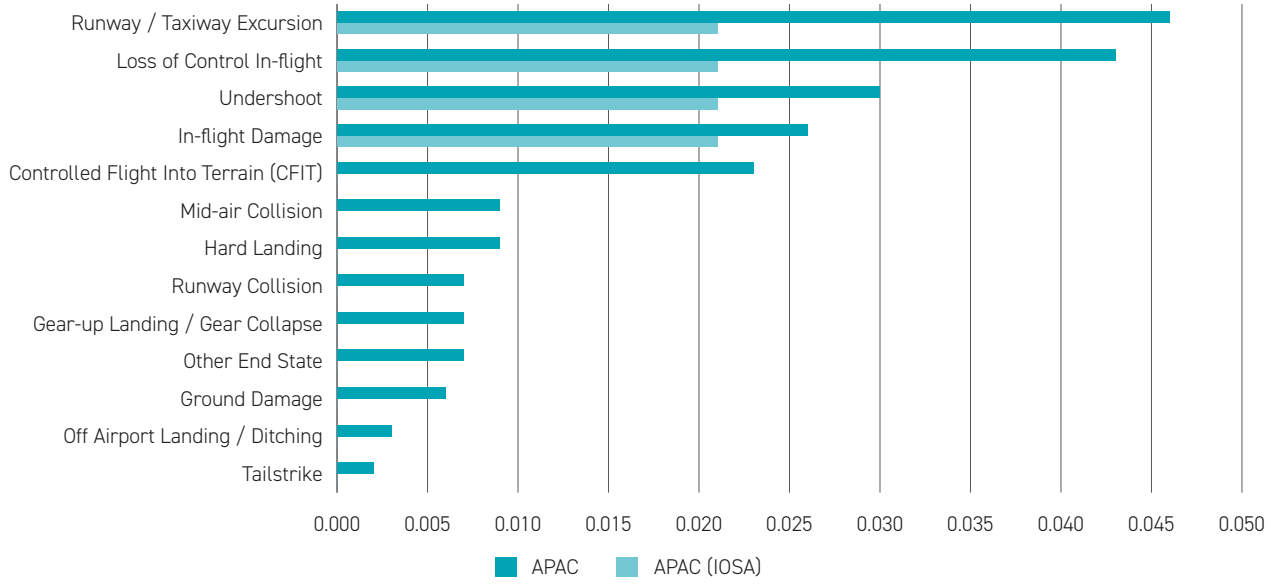
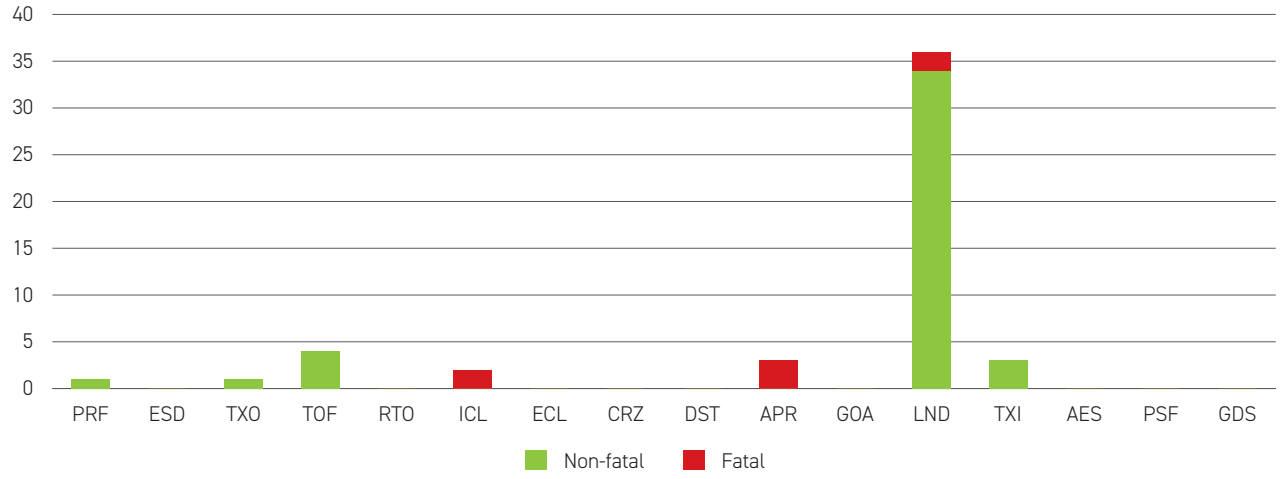


Chart 7.3.4 IATA: APAC accidents by flight phase (2017–2021)



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7.4 Top Contributing Factors to Accidents within Asia Pacific – IATA

IATA's Top Contributing Factors to Accidents within Asia Pacific are shown in Table 7.4.1. The top contributing categories, which is defined as the categories with contributing factors with the highest scores, are (i) Flight Crew Errors (ii) Environmental Threats and (iii) Undesired Aircraft States.

The specific elements related to these top contributing categories are outlined below:

- Flight Crew Errors – Manual Handling / Flight Controls;
- Environmental Threats – Meteorology and Thunderstorms;
- Undesired Aircraft States – Long/floated/bounced/firm/off-centre/crabbed land

Table 7.4.1 Top Contributing Factors to Accidents within Asia Pacific (2017–2021)

Contributing Factors	% of All Accidents (involving Hull Loss or Substantial Damage)	Contributing Factors	% of Accidents (involving Hull Loss or Substantial Damage) IOSA Certified Airlines Only
Latent Conditions			
Regulatory Oversight	56%	Regulatory Oversight	44%
Safety Management	50%	Safety Management	38%
Flight Ops: Training Systems	25%	Flight Ops: Training Systems	19%
Environmental Threats			
Meteorology	69%	Thunderstorms	38%
Thunderstorms	63%	Thunderstorms	38%
Airport Facilities	50%	Ground-based nav aid malfunction	38%
Airline Threats			
Aircraft Malfunction	13%	Aircraft Malfunction	6%
Operational Pressure	13%	Maintenance Events	6%
Maintenance Events	6%	Regulatory Oversight	6%
Flight Crew Errors			
Manual Handling / Flight Controls	63%	Manual Handling / Flight Controls	38%
SOP Adherence / SOP Cross-verification	38%	SOP Adherence / SOP Cross-verification	25%
Callouts	31%	Callouts	13%
Undesired Aircraft States			
Long/floated/bounced/firm/ off-centre/crabbed land	56%	Long/floated/bounced/firm/ off-centre/crabbed land	38%
Vertical / Lateral / Speed Deviation	44%	Unnecessary weather penetration	31%
Unstable Approach	44%	Vertical / Lateral / Speed Deviation	31%
Countermeasures			
Overall Crew Performance	56%	Overall Crew Performance	31%
Taxiway/Runway Management	38%	Captain should show Leadership	19%
Captain should show Leadership	31%	Leadership	19%

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 (2012–2021)

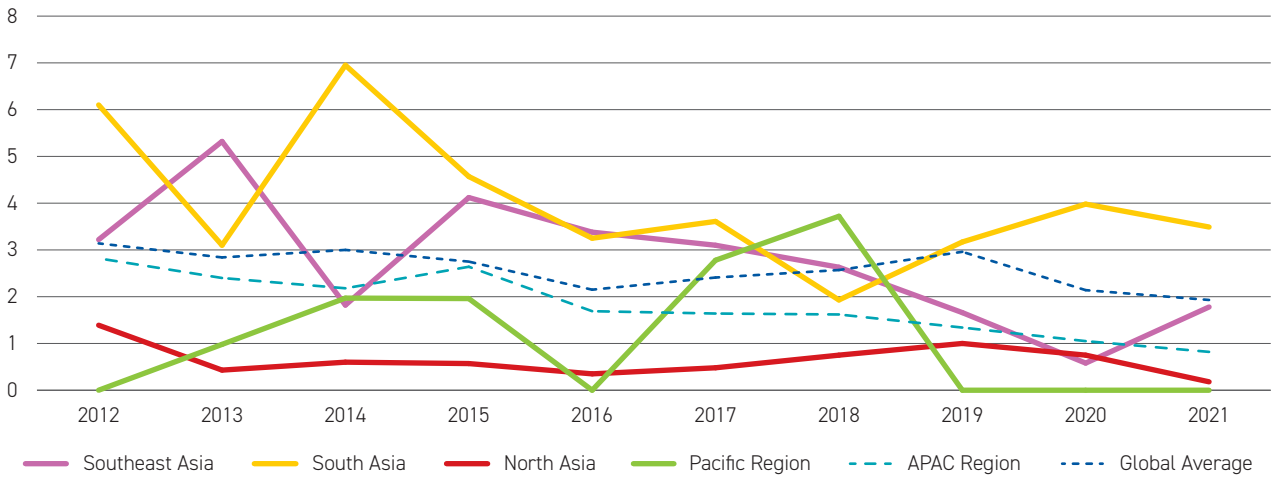


Chart 7.5.1 provides an illustration of the accident rates within APAC by sub-region. In line with the regional downtrend, most regions have seen an improvement in their accident rates over the past decade.

More recently, the Pacific Region has achieved a zero accident rate over the past 3 years. North Asia has also achieved a near zero accident rate for much of the last decade.

Chart 7.5.2 ICAO iSTARS, SISG and OAG: APAC sub-regional fatal accident rate (2012–2021)

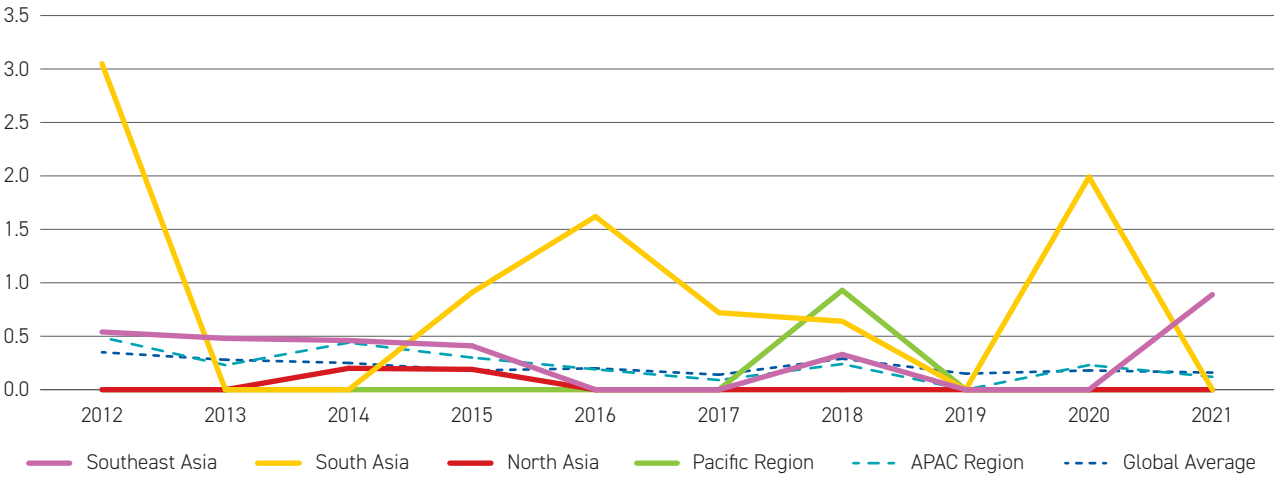


Chart 7.5.2 depicts the trend in the fatal accident rate by APAC sub-region. Most APAC sub-regions saw a fatal accident rate in 2021 of less than 0.5 accidents per million departures.

Chart 7.5.3 ICAO iSTARS, SISG and OAG: APAC sub-regional accident rate 5 Year Moving Average (2017–2021)

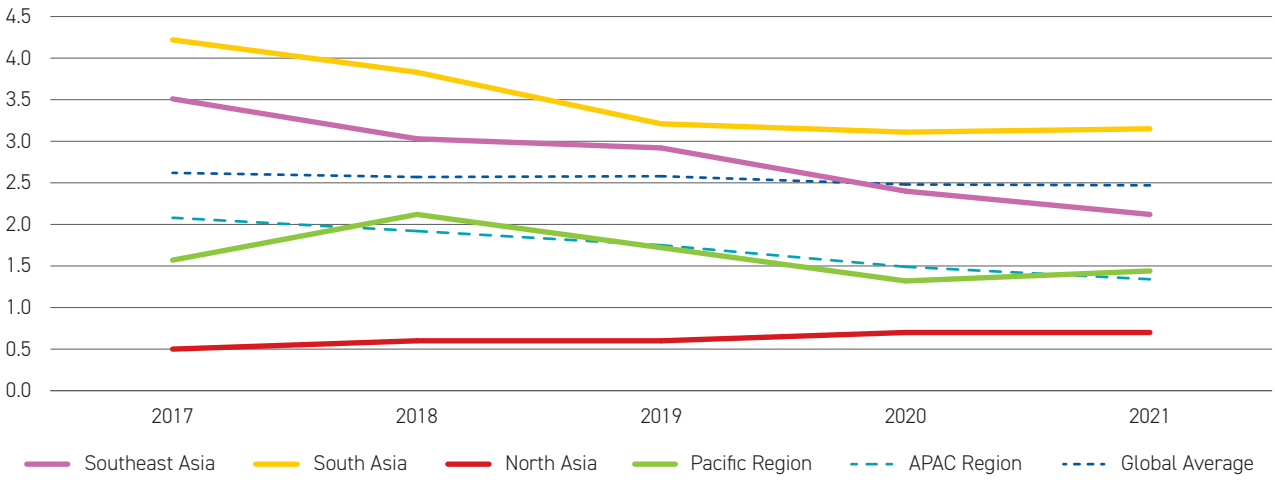


Chart 7.5.3 shows the 5-year moving average for accident rates in APAC's sub-regions. The data shows a reduction in the accident rate trend since 2017 for South Asia and South East Asia.

North Asia maintains the lowest 5-year average accident rate of between 0.5 and 0.7 accidents per million hours flown.

Accident rates in the Pacific region have mirrored much of those seen by the APAC region overall.

Chart 7.5.4 ICAO iSTARS, SISG and OAG: APAC sub-regional fatal accident rate 5 Year Moving Average (2017–2021)

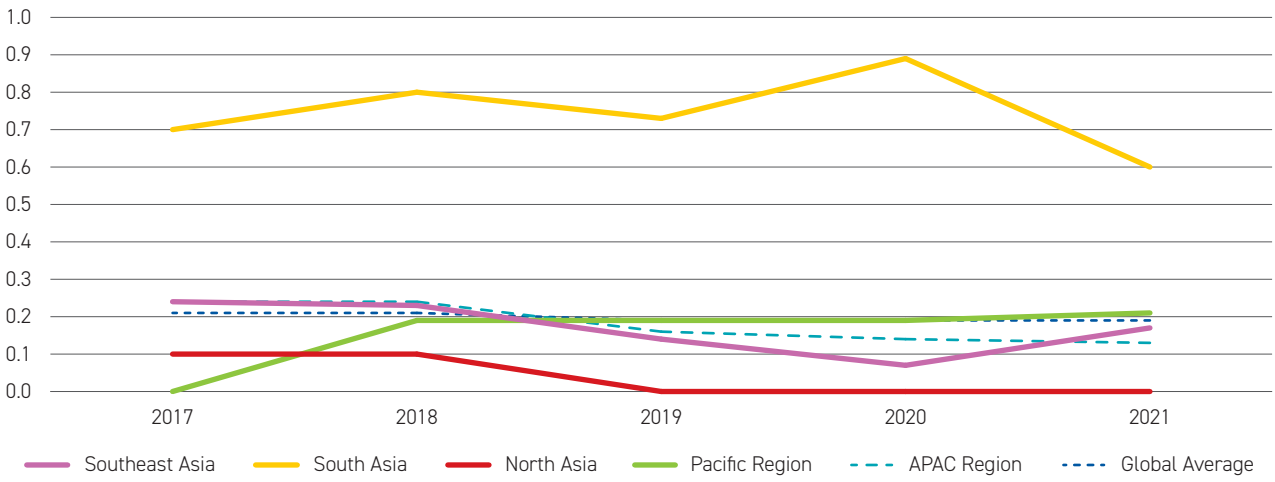


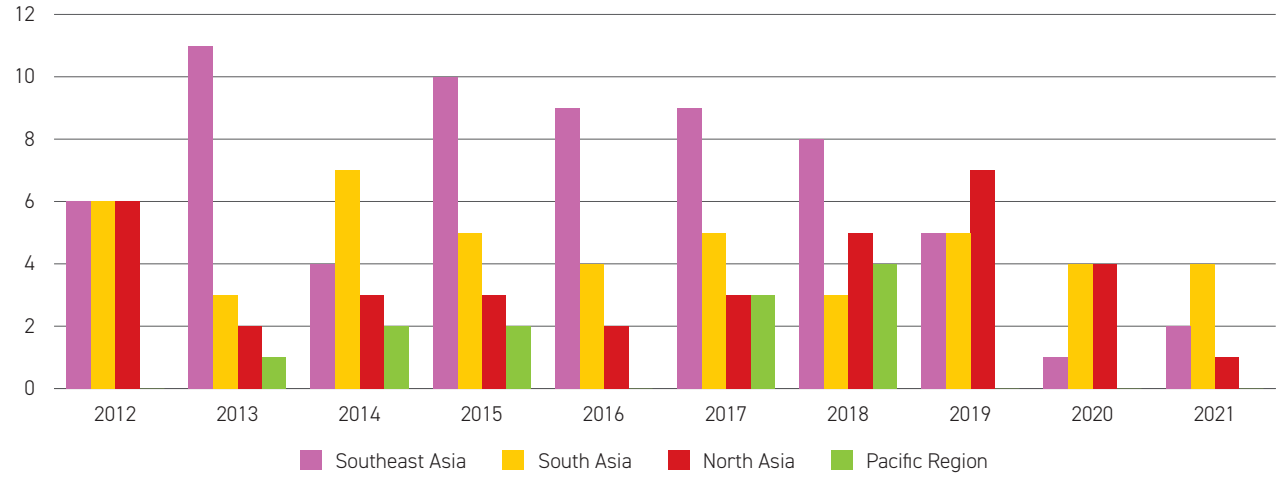
Chart 7.5.4 provides an illustration of the fatal accident rates within APAC by sub-region.

Despite the South Asia region having the highest fatal accident rate trend per milion departures in the APAC region it did see a decline in this rate in the 5 years to 2021.

Fatal accident rates on a 5-year trend basis for the Pacific and South East Asia regions have remained relatively stable since 2018 and comparable to the APAC average.

North Asia achieved a zero fatal accident rate on a 5-year trend basis.

Chart 7.5.5 iSTARS, SISG and OAG: APAC sub-regions accident numbers (2012–2021)



The distribution of accidents as depicted in Chart 7.5.5 indicates that the South-east Asia region had the highest total number of accidents (65) over the last 10 years. In comparison, South Asia and North Asia had 46 and 36 accidents over the past decade, respectively.

There was a total of fourteen accidents in the Pacific Region in the same time period.

South-east Asia saw a single fatal accident in 2021 with other regions not seeing any such events.

Chart 7.5.6 iSTARS, SISG and OAG: APAC sub-regions fatal accident numbers (2012–2021)

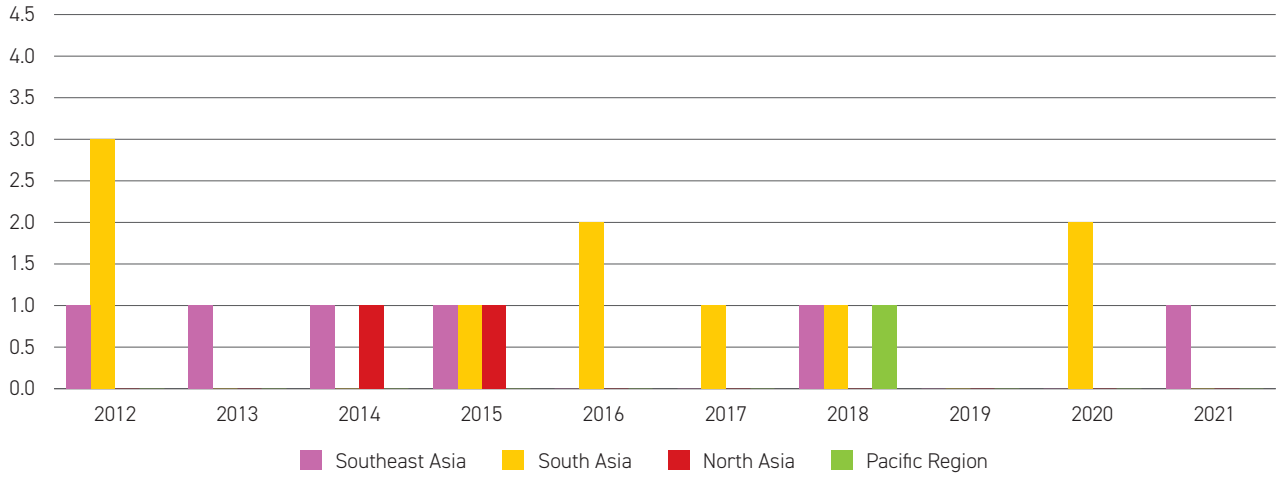


Table 7.5.1 iSTARS, SISG: APAC sub-regions top three fatal accident categories (2012–2021)

	SEA Region				SA Region				NA Region			
Year	RS	LOC-I	CFIT	Total	RS	LOC-I	CFIT	Total	RS	LOC-I	CFIT	Total
2012	0	0	1	1	0	0	1	1	0	0	0	0
2013	0	1	0	1	0	0	0	0	1	0	0	1
2014	0	1	0	1	0	0	0	0	0	0	1	1
2015	0	0	0	0	1	0	0	1	0	0	0	0
2016	0	0	0	0	0	1	0	1	0	0	0	0
2017	0	0	0	0	1	0	0	1	0	0	0	0
2018	0	1	0	1	1	0	0	1	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	3	0	0	3	0	0	0	0
2021	0	1	0	1	0	0	0	0	0	0	0	0
Total	**0**	**4**	**1**	**5**	**6**	**1**	**1**	**8**	**1**	**0**	**1**	**2**

Table 7.5.1 shows the breakdown of top three fatal accident categories by APAC sub-regions. The SEA sub-region recorded the most Loss of Control – Inflight (LOC-I) fatal accidents (four) over the last ten years while the SA region recorded the most runway safety (RS)-related fatal accidents (six) over the same time period. The SEA, SA and NA regions recorded a single CFIT fatal accident each in the past 10 years.

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Table 7.5.2 iSTARS, SISG: APAC accident categories (RS, LOC-I, CFIT) (2017–2021)

	SEA region				SA region				NA region			
Year	**RS**	**LOC-I**	**CFIT**	**Total**	**RS**	**LOC-I**	**CFIT**	**Total**	**RS**	**LOC-I**	**CFIT**	**Total**
2017	5	0	0	5	4	0	0	4	2	0	0	2
2018	4	1	0	5	3	0	0	3	4	0	0	4
2019	0	0	0	0	5	0	0	5	0	0	0	0
2020	1	0	0	1	1	0	0	1	2	0	0	2
2021i	1	1	0	2	2	0	0	2	1	0	0	1
Total	**11**	**2**	**0**	**11**	**15**	**0**	**0**	**15**	**9**	**0**	**0**	**9**

Table 7.5.2 shows that runway safety tends to be the most common category of accident (non-fatal) across all APAC sub-regions and particularly South-east Asia and South Asia over the past 5 years.

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 with its 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 programme continuous monitoring approach (USOAP CMA).

8.1 ICAO Universal Oversight Audit Programme Continuous Monitoring Approach (USOAP CMA)

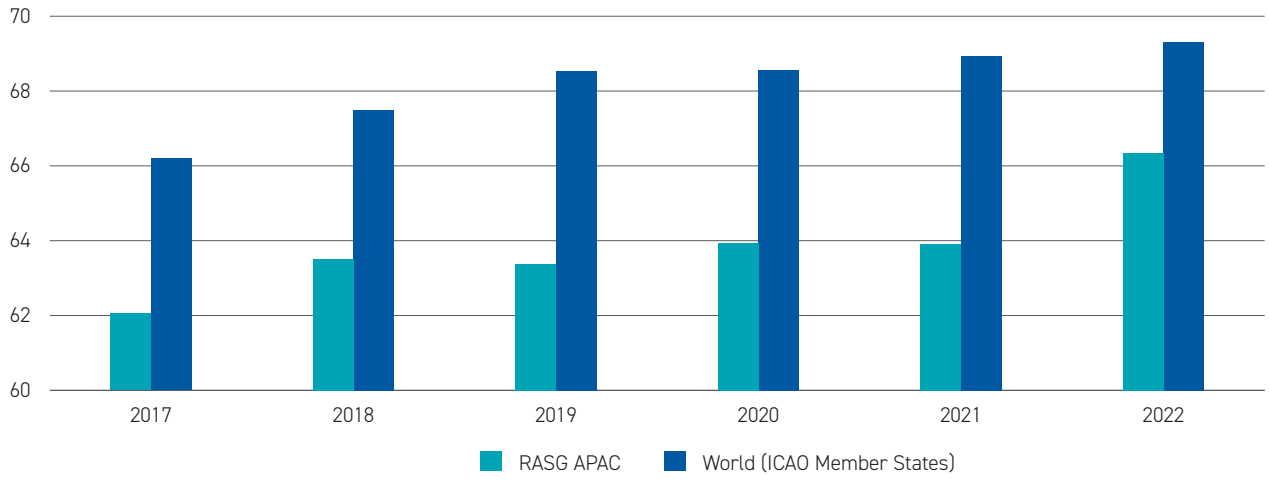
USOAP audits focus on a State's capability to provide safety oversight by assessing whether it has effectively and consistently implemented the critical elements (CE) of a safety oversight system. It also determines the State's level of implementation of ICAO's safety-related standards and recommended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

1. Primary aviation legislation
2. Specific operating regulations
3. State civil aviation system and safety oversight functions
4. Technical personnel qualifications and training
5. Technical guidance, tools and the provision of safety-critical information
6. Licensing, certification, authorisation and approval obligations
7. Surveillance obligations
8. Resolution of safety concerns

The USOAP CMA programme 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 2022 increased to 66.35 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 69.32 per cent in 2022.

Chart 8.1 RASG-APAC Overall implementation

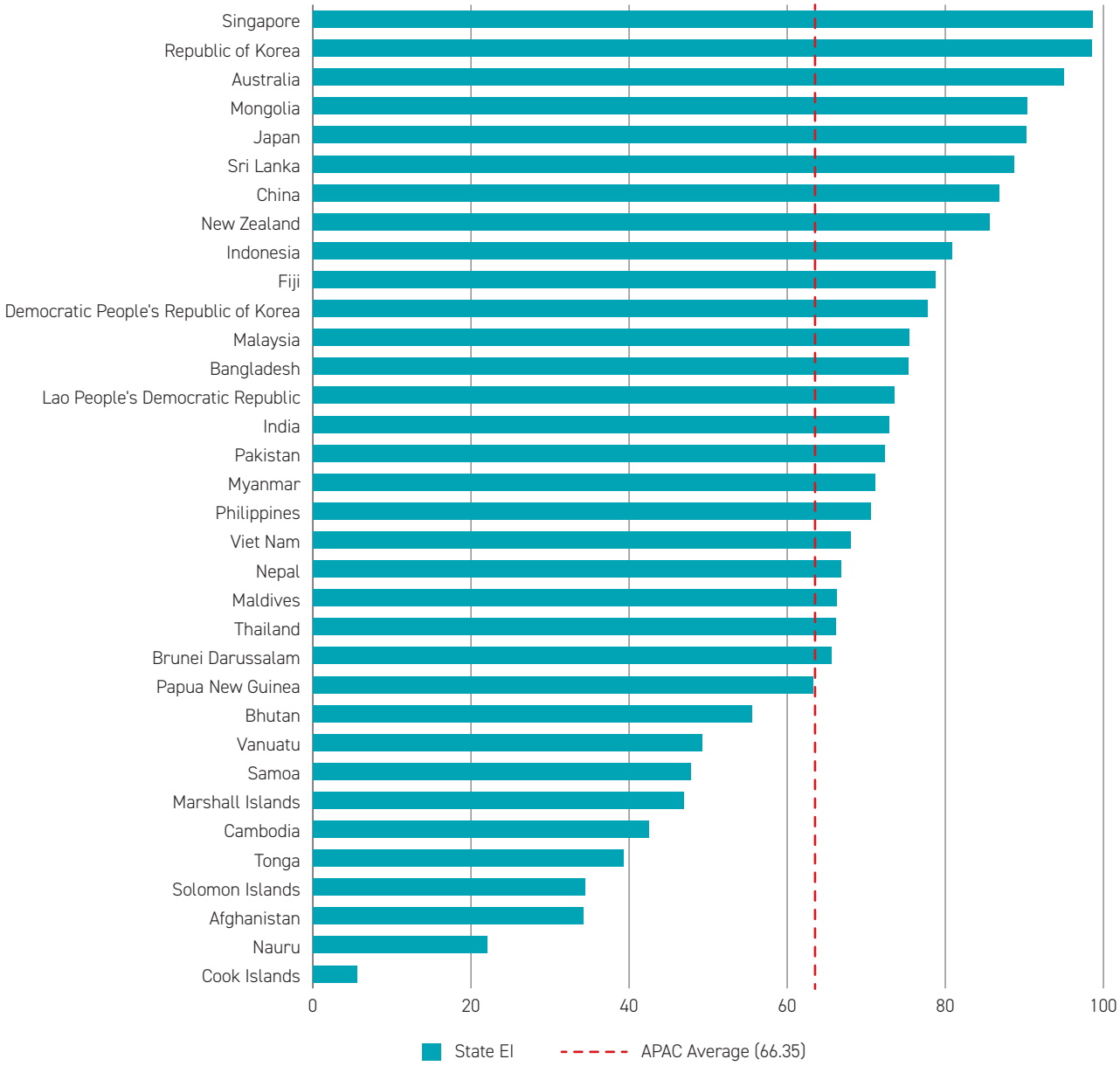


Note – Data was extracted from the iSTARS database on August 1st 2022.

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 50.9 per cent for the RASG-APAC, followed by CE4 (55.39 per cent) and CE 7 (59.85 per cent) respectively. In comparison to all ICAO member States, RASG-APAC had lower average scores for all CEs with Organisation and Safety Oversight Function (CE7) being the closest in comparison.

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

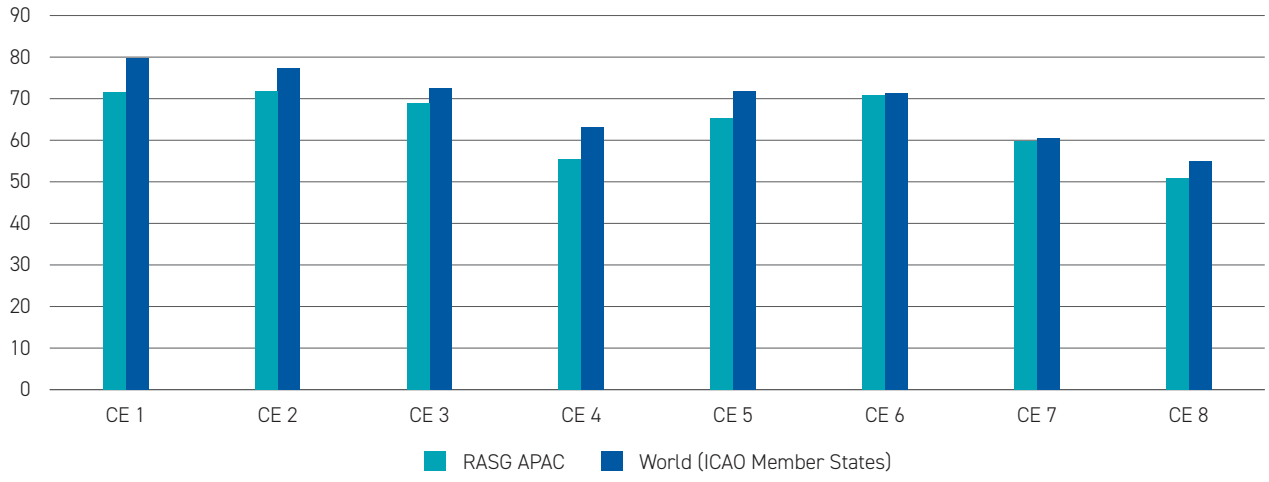
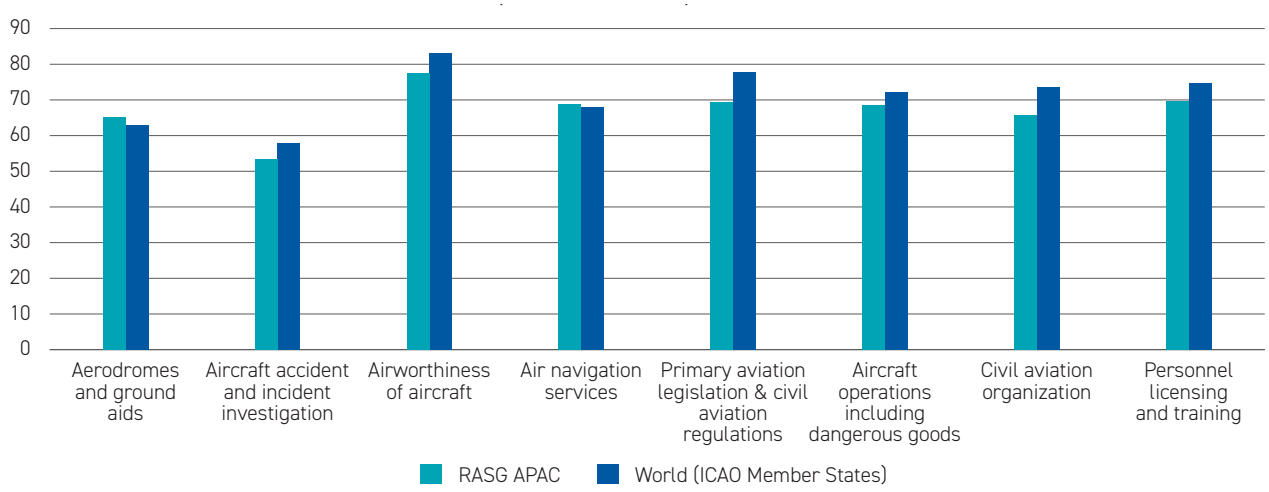


Chart 8.4 Overall EI by area RASG-APAC States compared to all ICAO member States



09 Safety risks arising from COVID-19

The COVID-19 pandemic has significantly impacted the aviation industry. In the past two years, aircraft operations have sharply declined, aircraft grounded and crew placed on furlough as the industry grapples with the economic impact. As border restrictions are being lifted and aircraft operations are ramping up, the associated air travel recovery must be done in a safe manner.

A previous COVID-19 survey was conducted on the management of safety and challenges faced by States/ Administrations during the pandemic. As there were useful insights gleaned from the survey previously, the Seventeenth Meeting of the Asia Pacific Regional Aviation Safety Team (APRAST/17) agreed to conduct a follow-up survey, given the potential prolonged impact of the pandemic on aviation safety in the APAC region. The focus of the follow-up survey this year would be on key safety risks arising as the region focuses on recovery.

A total of 11 responses were received from States, and the key findings are summarised as follows:

Chart 9.1 States' response to survey on priority areas

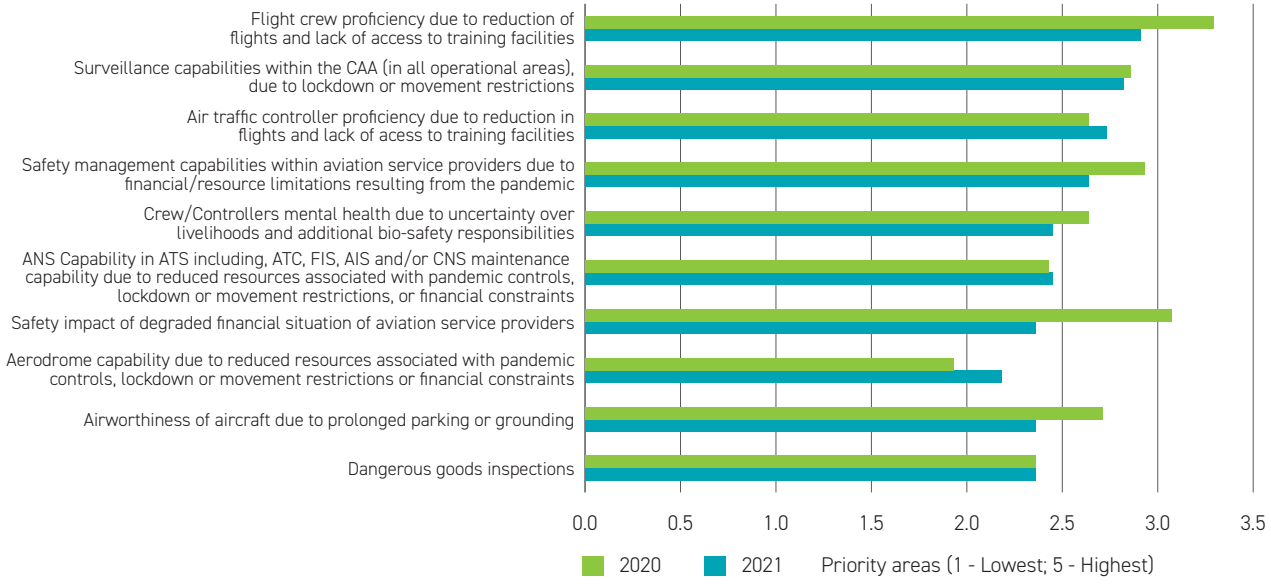
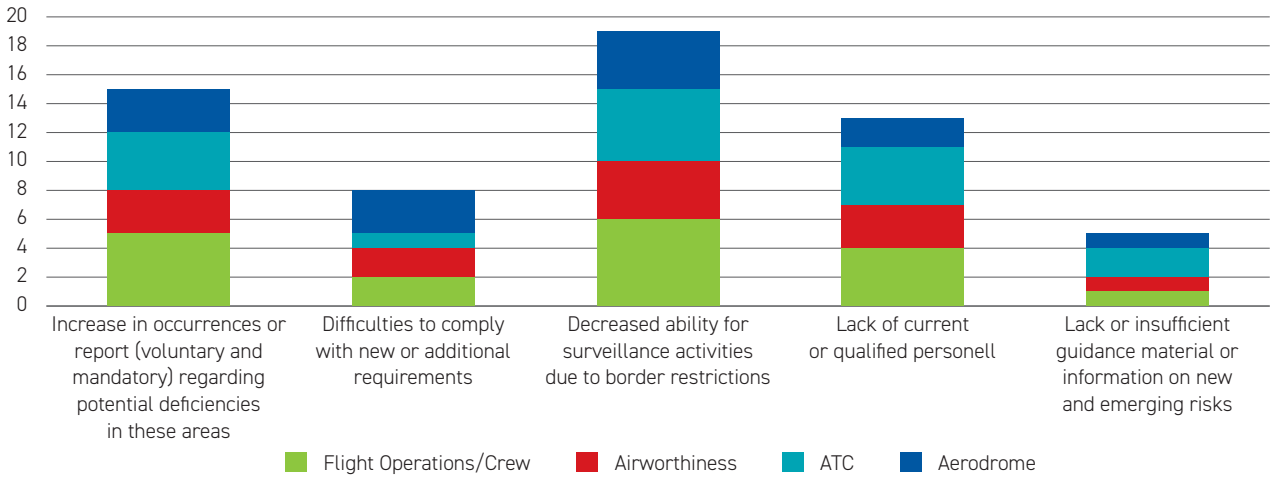


Chart 9.2 States' response to survey on key issues faced



Key safety risk areas

Key safety risks as identified by States have evolved since the start of the pandemic. Given the focus on air travel recovery and ramp-up of operations, States are prioritising on the below key safety areas:

i. flight crew proficiency
ii. surveillance capabilities within the CAA
iii. air traffic controller proficiency
iv. safety management capability within aviation service providers
v. crew/ controller's mental health

Flight crew proficiency remained a key priority for States. While it was noted that many operators still had significant financial liabilities, States have responded that safety risks due to this can be mitigated through other means such as surveillance.

The main issue faced by States during this period is the decreased ability for surveillance activities due to border restrictions. Many had to shift to conducting remote surveillance, and highlighted difficulties as some aspects still required onsite inspection. There was also an increase in occurrences or reports observed by States in the respective operational areas – for example, deviation from flight path, aircraft system malfunctions and aerodrome occurrences. A third issue identified was in the lack of current or qualified personnel. Operations in many States have been impacted by infected qualified personnel. Many are also feeling the effect of the loss of experienced personnel during the earlier stages of the pandemic, and are unable to recruit the required talent in time for the ramp-up of operations now.

i. Flight crew proficiency

States have continued to indicate flight crew proficiency as a key risk area. Some States still face to face challenges in flight crew training as training facilities were not as accessible due to Covid. Where possible, these States allowed for the conduct of online training to keep flight crew recurrent. For others, a requalification program ensured that flight crew are proficient before being released to conduct operations. Where operations were ramping up, States also continued to track the average number of hours flown by pilots, and to investigate occurrences to determine if flight crew proficiency was a contributing factor.

ii. Surveillance capabilities within the CAA

Surveillance capabilities within the CAA were greatly affected due to border restrictions and inability to conduct physical inspections. While most States have adapted well to conduct remote surveillance, challenges were highlighted such as video conference fatigue, lack of peripheral vision for inspections, time differences. It was noted on the importance of the surveillance scope and objective being made clear to involved parties. Moving forward with the opening of borders, most States were conducting surveillance via a hybrid format, tapping on the benefits of remote inspection and to allow to onsite inspection for required areas.

iii. Air traffic controller proficiency

The decline in air traffic during the COVID-19 pandemic had impacted aviation professionals such as air traffic controllers. Some States have noted the decrease in proficiency levels due to low traffic in the past two years. Some mitigating measures implemented by States include conducting simulator training sessions, with pre-COVID traffic intensity and complexities in preparation for air traffic controllers to be able to manage the increase in operations post pandemic.

iv. Safety management capability within the aviation service providers

States noted that it was important to work closely with the industry to continue oversight of service providers' Safety Management Systems (SMS), to as to maintain safety levels as the sector moved to a different phase of operational tempo – from reduced operations during the pandemic, to the ramp-up of operations as air travel recovers.

v. Crew/ Controller's mental health

Mental health and well-being of crew was identified by various States as a key risk area. This was due to interruptions to careers and layoffs during the pandemic. As operations ramp up, the increased workload was now a stressor as well due to fatigue concerns. States mitigate this by conducting seminars on the topic as awareness was an important factor and making available counselling services for the crew.

Overall, the importance of close engagement and collaboration between regulators and industry was key to maintain safety levels. It was also encouraged for the continuous exchange of safety information and best practices amongst the sector.

10 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 2012 and 2021 were:

- Loss of Control In-Flight (LOC-I);
- Controlled Flight-Into-Terrain (CFIT); and
- Runway Safety

Safety information from IATA and CAST safety information also revealed that CFIT, LOC-I and abnormal runway contact are 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 continues to be the flight phase with the highest number of accidents. The APAC region should continue to focus its efforts on mitigating and minimising occurrences relating to these categories and phases.

Proactive safety information

The effective implementation (EI) score for the RASG-APAC region increased in 2022 (66.35%) as compared to 2021 (63.91%). The EI for RASG-APAC region was lower than global average by Critical Element (CE). Of these, Personnel and Licencing (CE8) and Air Navigation Systems (CE4) were lowest at 50.90 and 55.39 per cent respectively. Both of these critical elements also contain scores among the lowest across the global averages, suggesting that they appear to be a consistent issue across the world.

11 List of acronyms

ACAS	Airborne collision avoidance systems
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-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 airman
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	Standards and recommended practices (ICAO)
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 programme
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 programme
USOS	Undershoot/overshoot