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1/23

State of Safety Report

State of Safety at a Glance



1833

Operational occurrences
and **8 643** security-
related incidents



69

fatalities and **55** injuries
as a result of persons
struck by train occurrences

10 746

negative events were
reported to the RSR
during the 2022/23
reporting period



175

injuries and **92**
fatalities as a result
of operational
occurrences





20 injuries and zero fatalities as a result of 34 PTI occurrences



Theft of assets contributed

77,65 of the security-related incidents



6 fatalities and **42** injuries as a result of level crossing occurrences



79% of all security-related incidents were reported as theft and vandalism



13 fatalities and 58 injuries as a result of security-related incidents

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List of Abbreviations/Acronyms

A	Act	National Railway Safety Regulator Act No 16 of 2002 (as amended)
	ASoSR	Annual State of Safety Report
B		
	BOC	Bombela Operating Company
D	DoEL	Department of Employment and Labour
	DoT	Department of Transport
F		
	FWI	Fatalities and Weighted Injuries (10 injuries are equivalent to 1 fatality)
G		
	GMA	Gautrain Management Agency
N		
	NIMS	National Information Monitoring System
P	PRASA	Passenger Rail Agency of South Africa
	PSBT	People struck by trains occurrences
	PTI	Platform-train interchange (alternatively interface) occurrences
R	RONO	Regulation On Notifiable Occurrences referring to the 2022. Gazetted “Regulations regarding the category and type of all notifiable occurrences” to be reported to the Chief Executive Officer of the Railway Safety Regulator, 2022.
	RRP	Rapid Rail Police
	RSR	Railway Safety Regulator
	RTMC	Road Traffic Management Corporation
S	SANS	South African National Standard
	SAPS	South African Police Service
	SPAD	Signal Passed at Danger
	SOC	State Owned Company
	SRM	Safety Risk Model
T	TCO	Train Control Officer
	TFR	Transnet Freight Rail

Preface

The Railway Safety Regulator, hereafter referred to as the RSR, has the responsibility of overseeing railway safety within South Africa. With the goal of promoting rail as the preferred mode of transportation, the RSR is dedicated to ensuring that all participants in the rail sector fulfill their respective roles to establish a secure and dependable rail industry.

According to Section 20 (1) of the National Railway Safety Regulator Act, Act 16 of 2002 (as amended), the Regulator is obliged to create and present an annual report to the Minister of Transport. This report focuses on the safety of workers, the public, and the environment in connection with railway operations. Thus, the Annual State of Safety Report (ASoSR) stands as a legally required document. It encompasses a range of safety-related data intended for railway operators, the general public, and the broader railway industry. The aim is to aid in the management of railway safety.

The report covers various forms of harm, including fatalities and injuries among employees, contractors, the general public, and train passengers. To assess collective risks, injuries of varying degrees of severity are amalgamated into a composite measure known as 'Fatalities and Weighted Injuries' (FWI). The FWI is calculated using the formula $[\text{number of fatalities}] + 0.1 \times [\text{number of injuries}]$. This approach highlights priority areas and contributes to an understanding of the overall railway risk profile, thereby enhancing safety management.

The ASoSR incorporates reported data on safety-related operational incidents, security-related events, and harm. These are gathered from the RSR's National Information

Monitoring System (NIMS), the South African Police Services (SAPS), the RSR's Contact Centre, and direct reports from railway operators. The term "occurrence" refers to events linked to operational incidents, while "incident" pertains to security-related events.

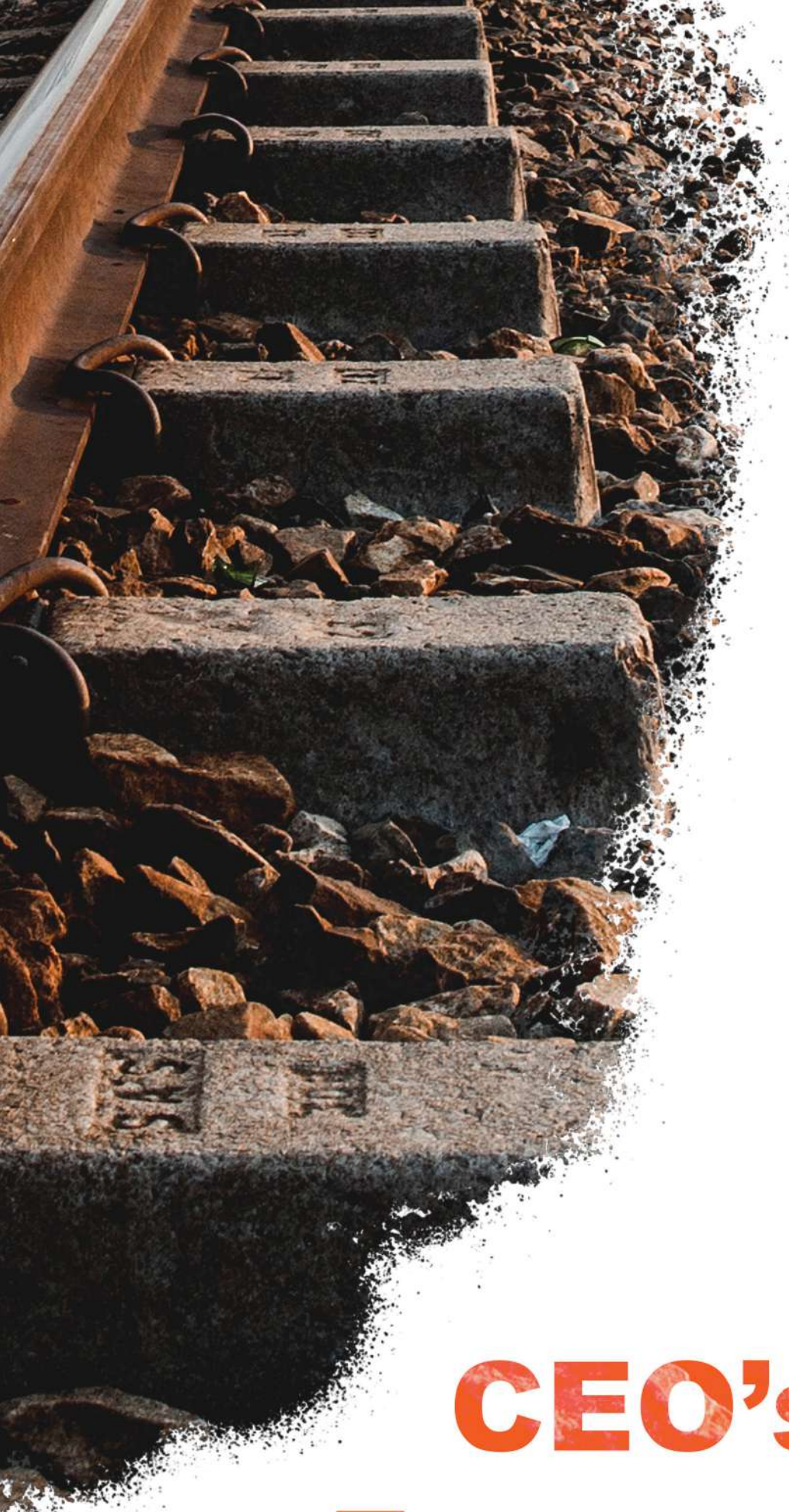
Over the reporting period spanning from 2018/19 to 2022/23, the RSR documented a total of 56,835 negative event entries. These encompass 13,299 safety-related operational incidents and 43,536 security-related events.

The ASoSR for 2022/23 begins by providing an overview of railway safety performance to establish the overall context. This overview involves analyzing data on railway occurrences and consequences (fatalities and injuries) to pinpoint and comprehend key safety risks in the railway transportation sector.

It's important for the reader to consider this ASoSR within the framework of productivity at the two largest operators, Transnet Freight Rail (TFR) and the Passenger Rail Agency of South Africa (PRASA), as well as to a lesser extent, the Bombela Operating Company (BOC) trading as Gautrain, and other smaller private operators.

Additionally, the reader should note that on 02 March 2023, the Minister of Transport issued Regulations Regarding the Category and Type of Notifiable Railway Occurrences. Clause 16 of these regulations designates them as Regulations On Notifiable Railway Occurrences, 2022 (RONO). However, for the current report, only the South African National Standards (SANS – 3000) categories were utilized. The RONO categories will be incorporated in subsequent reports.





CEO's Foreword

CEO's Foreword

In this dynamic age, as we engage in vital discussions about how railways can embrace the digital revolution, address climate challenges, and contribute to economic rejuvenation, it is disheartening to acknowledge the impediments that have hindered the growth of South African rail. The Annual State of Safety Report (ASoSR) has laid bare a disturbing truth: a staggering 97% of security-related incidents are attributed to theft and vandalism. This statistic paints a distressing picture of a situation spinning out of control.

The taxi strikes in the Western Cape in early August left commuters grappling for alternatives, revealing the potential of trains as a viable option. However, the afflictions of this system, from malfunctioning signalling equipment to compromised infrastructure security and ravaged telecommunication cables, have crippled its effectiveness. Acknowledging this, the Railway Safety Regulator (RSR) has adopted a resolute stance, devising robust solutions to counteract these issues.

Substantial investments are being infused into revitalizing rolling stock, fortifying signalling systems, and reinforcing infrastructure. These endeavours are not only poised to modernize the sector but are inherently geared towards elevating railway safety. Furthermore, during the 2022/23 reporting period, the RSR's

regional offices meticulously conducted 249 Safety Management System (SMS) audits and an impressive 483 inspections across all operational areas. The outcomes of these interventions have culminated in the issuance of directives to various operators, ensuring that safety remains paramount.

This year's ASoSR has unveiled an increase in security-related incidents across all operators, when compared to the preceding reporting cycle. The essence of commuter security cannot be overemphasized, and the means to restore faith lie in our collective dedication. By uniting with rail stakeholders and operators, we can tackle the daunting task of refining our railways. Our goal of achieving safer railways remains tangible if we persist in this collaborative spirit. Thus, I implore operators to continue working hand-in-hand with the Regulator, adhering to guidance. I also urge commuters, motorists, and pedestrians to embrace rail safety rules as a sign of respect, ensuring a harmonious coexistence with our railways.

Mr Mmuso Selaledi
ACTING CHIEF EXECUTIVE OFFICER







Executive **Summary**

Executive Summary

In the 2022/23 reporting period a total of 10 476 negative events were recorded. This consists of 1 833 safety-related operational occurrences and 8 643 security-related incidents recorded between 01 April 2022 and 31 March 2023. The RSR recorded a total of 56 835 negative events entries between the 2018/19 and 2022/23 reporting period. These 56 835 negative events consist of 13 299 safety-related operational occurrences and 43 536 security-related incidents. These entries have been recorded to calculate the overall railways' risk profile, the individual key focal occurrence categories (i.e. collisions, derailments, level crossings, people struck by trains and platform-train interchange occurrences), as well as injuries, fatalities and FWI.

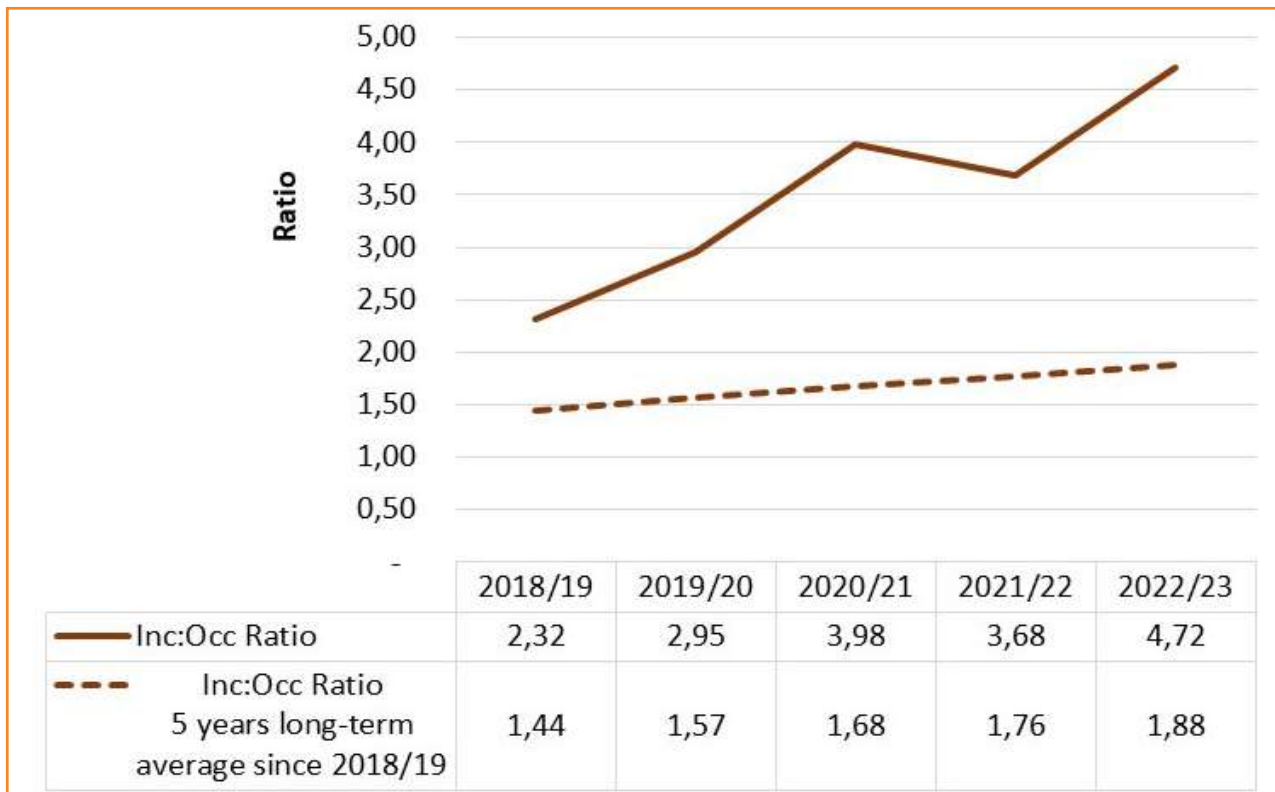
Important to note here for the reader is that during the 2019/20 and 2020/2 reporting periods, there were various COVID-19 pandemic National Security Alert Levels. This imposed disruptions by the COVID-19 pandemic severely impacted railway operations in South Africa as well as the occurrence entries recorded. The events started easing over time up to 22 March 2022 when Alert Level 1 commenced. Consequently, the recorded train km, tonne km, and passenger-km were lower than in historical pre-COVID-19 pandemic reporting periods.

Since the COVID-19 pandemic lockdown, TFR (Transnet Freight Rail), an operating division of Transnet SOC Ltd, an SOE and PRASA (Passenger Rail Agency of South Africa, an "SOE" operated far below capacity.

Important to note is that the Regulations Regarding the Category and Type of all notifiable railway occurrences to be reported to the Chief Executive Officer of the Railway Safety Regulator was published on 02 March 2022. Clause 16 of the Regulations stipulates that these regulations are called Regulations On Notifiable Railway Occurrences, 2022 (RONO). Prior the implementation of the RONO, there were challenges identified in some parts of the document which warranted changes. The identified challenges took time to rectify hence the delayed full implementation of the RONO. Therefore, in this report, the SANS 3000-1 series was dominantly used to analyse and interpret the data.

Headlines for 2022/23 include:

Throughout the 2022/23 reporting period traffic levels remained low while rampant theft and vandalism dominated operational occurrences as illustrated in the below graph.



Note "Incident – Occurrence Ratio" means the ratio determined by dividing the number of security-related incidents by the number of safety-related operational occurrences.

Operator productivity

Operator productivity refers to train km produced by all operators. The operator productivity is associated with the passenger km produced by passenger operators PRASA and Gautrain as well as tonne km produced by freight operator TFR. Gautrain is a rapid rail service concession operated by the private Bombela Operating Company under the Gautrain Management Agency. During the 2022/23 reporting period the operator production can be depicted as follow:

- TFR produced 25,9 million train km (12% fewer than in the 2021/22 reporting period) and 108 billion tonne km (28% fewer than in the 2021/22 reporting period). The reduction in km was primarily because of the unavailability of rolling stock, the impact of floods in the KwaZulu-Natal province as well as theft and vandalism of railway infrastructure components.
- Gautrain produced 7,14 million train km (156% more than in the 2021/22 reporting period) and 101 million passenger km (136% more than in the 2021/22 reporting period).

- In the 2022/23 reporting period, PRASA's train production dropped significantly, with 9.24 million train km produced (a 74% decrease compared to 2021/22) and 45 million passenger km (a 73% decrease compared to 2021/22). PRASA attributes this reduction to a sharp decline in MLPS services, which almost ceased entirely. Due to their nature, these services contributed significantly to PRASA's mileage. PRASA faced challenges similar to TFR, including service disruptions from floods and the July 2022 riots in the KwaZulu-Natal province. In addition, the Western Cape province reduced services due to ongoing vandalism on the TFR network.
- The combined traffic levels of TFR, PRASA and Gautrain declined by 14,5% (down from 41,4 to 35,4 million train km) since the 2021/22 reporting period and 42% since the 2018/19 reporting period.

Operator capacity utilisation

In the 2022/23 reporting period, TFR averaged 4 171 tonnes per train (tpt), compared to 3 982 tpt in the 2018/19 reporting period. Note that TFR can handle various train configurations: 34 800 tpt for iron ore exports, 16 800 tpt for coal exports, 6 500 tpt to 22 000 tpt for manganese exports, and 2 700 tpt to 3 150 tpt for general freight depending on the commodity types. TFR now prefers longer, heavier trains for moving coal, iron ore, and manganese. This benefits their control over these materials' transport, making it more reliable and profitable. These heavy trains run on dedicated routes designed for them, while the regular freight network, meant for lighter loads, faces competition from trucks on the roads.

In the 2022/23 reporting period, PRASA averaged only 19 passengers per train, significantly fewer than the 285 passengers per train in 2018/19 reporting period. Gautrain averaged 34 passengers per train, compared to the historical high of 115 in the 2018/19 reporting period.

Safety-related operational occurrences for all operators

In the 2022/23 reporting period, there were 1 833 (5 per day) operational occurrences for all operators, compared to 2 060 in the 2021/22 reporting period and 3 990 in the 2018/19 reporting period. Except for categories I "People related occurrences: station infrastructure" and K "Spillage/leakage, explosion or loss of dangerous goods", worsening by 150% and 22%, respectively, all other categories showed an improvement over the 2021/22 reporting period.

Security-related Incidents for all operators

In the 2022/23 reporting period, there were 8 643 (24 per day) security-related incidents recorded by all operators, compared to 7 577 in the 2021/22 reporting period and 9 268 in the 2018/19 reporting period. Categories 1 "Theft of assets impacting on operational safety", 2 "Malicious damage/vandalism impacting on operational safety", 3 "Threats of operational safety", 5 "Crowd-related incidents", and 6 "Industrial action" worsened during the 2022/23 reporting period.

Harm to persons

Between the 2018/19 reporting period to the 2022/23 reporting period, the harmful consequences of operator risk profiles resulted in 1 526,3 FWI (or 10 FWIs every 12 days). In the 2022/23 reporting period, 109,5 FWIs (92 fatalities and 175 injuries) resulted from safety-related operational occurrences and 18,8 FWIs (13 fatalities and 58 injuries) from security-related incidents. The FWIs in the 2022/23 reporting period were 30% lower than in the 2021/22 reporting period and 83% lower than in the 2018/19 reporting period.

The safety risks related to "Category A Collisions during movement of rolling stock" headlines for the 2022/23 reporting period include:

- Zero fatalities and 24 injuries from collisions recorded in the 2022/23 reporting period.
- 90% of the 3 636 collisions between the 2018/19 and 2022/23 reporting periods were reported in subcategory A-b "A collision of rolling stock with an obstruction on a running line (including road vehicles that collide with rolling stock)".
- Train operators completed 14,5% fewer train km in the 2022/23 reporting period and 42% fewer train km than in the 2018/19 reporting period.
- Between the 2018/19 and 2022/23 reporting periods, Transnet Freight Rail (TFR) reported three times more collisions than derailments, and PRASA reported 4,4 times more derailments than collisions.
- The Gauteng province was responsible for 94% of all train collision harm since the 2018/19 reporting period.

The safety concerns in the 2022/23 report involve the risk of train derailments when moving rolling stock classified as SANS Category B. The subcategories hereof are derailments during movement of rolling stock on a running line (sub-category B-a), derailments of rolling stock on a line other than a running line (sub-category B-b) and derailments during tippler activities (subcategory B-c). The headlines include:

- 6% decrease in total train derailments compared to the 2021/22 reporting period.
- 11% increase in total train derailments per million train km compared to the 2021/22 reporting period.
- 28% increase in derailments per million train km since the 2018/19 reporting period.
- Derailments of rolling stock on a running line [B-a] account for only 33% of all the recorded derailments but resulted in 78% of FWIs (25% of all fatalities and 94% of injuries) since the 2018/19 reporting period.
- The KwaZulu-Natal (46%), Mpumalanga (15%), Northern Cape (15%), Western Cape (15%), and Gauteng (8%) provinces account for all FWI harm to persons.

The risks arising from train accidents at level crossings was analysed and included examining the relationships between occurrence sub-categories and their respective consequences. Distinctions were made between train passengers, pedestrians and road vehicle users (i.e. the general public), plus workforce (train drivers and assistants) for the 2022/23 reporting period to understand the risks of different road-rail user groups. Headlines for the 2022/23 reporting period include:

- North West (30%), KwaZulu-Natal (18%), Mpumalanga (18%), and the Western Cape province (11%) accounted for 77% of all level-crossing occurrences.
- 5% decrease in level crossing occurrences from the 2021/22 to 2022/23 reporting period.
- Level crossing occurrences per million train km decreased by 6% overall since the 2018/19 reporting period.
- The 5-year average annual number of level-crossing occurrences is 94.
- The 2019/20 reporting period recorded the lowest level crossing occurrences per million train km of 1,8. This is 10% less than in the 2022/23 reporting period. In the 2022/23 reporting period, the total number of level crossing occurrences per million train km decreased by 1% year-on-year.
- During the 2022/23 reporting period, six fatalities and 42 injuries were recorded because of level-crossings occurrences.
- Since the 2018/19 reporting period, there were 470 level-crossing occurrences resulting in 79 deaths, 250 injuries, and 104,0 FWIs.

- The overall level of harm at level crossings recorded in the 2022/23 reporting period was 10,2 FWIs compared to 15,4 FWI harm for the 2021/22 reporting period and 5 years long-term average harm of 20,8 FWI's since the 2018/19 reporting period.
- In the past, most level crossing occurrences remained attributable to road user behaviour at level crossings, motorists who underestimate the speed of trains as well as those who attempt to cross the railway line when the booms are being lowered. There is a developing trend of unattended vegetation which now contributes to this type of occurrences.

The examined safety risks related to people struck by trains excluded pedestrian level crossing occurrences, where these are accounted for in the level crossings analysis. Covered in these risks were members of the general public, railway employees and railway contractors. Headlines for the 2022/23 reporting period include:

- The number of people struck by trains decreased by 31,9% between the 2021/22 and 2022/23 reporting period. The calculated FWI count decreased by 75,7% between the 2018/19 and 2022/23 reporting periods.
- People struck by trains occurrences are lethal in nature, with one death occurring on average every 2,3 days since the 2018/19 reporting period. Since the 2018/19 reporting period, 54,7% of all people struck by trains occurrences were fatal. Hence, the FWIs on average, are only 8% higher than actual fatalities.
- Gauteng (24%), KwaZulu-Natal (30%), and Western Cape (17%) provinces recorded 71% of the people struck by trains during movement of rolling stock occurrence category in the 2022/23 reporting period, lower than the long-term trend of 82% since the 2018/19 reporting period.
- All people struck by trains occurrences per million train km decreased by 15% in the 2022/23 reporting period, and by 55% since the 2018/19 reporting period. Note that since most people struck by trains occurrences occur on the PRASA network, the impact of a 74% reduction in PRASA train km in the 2022/23 reporting period distorts the statistics favourably. The long-term harm average is 3,74 FWI per million train km.

The platform-train interchange (PTI) risks focused on those occurrences that occurred at the station or on the platform as passengers and workforce entrain and detrain stationary or moving trains. Headlines for the 2022/23 reporting period include:

- 34 PTI occurrences contributed to 2% of the overall recorded safety-operational occurrences in the 2022/23 reporting period.
- The 2022/23 reporting period PTI occurrences decreased by 56% compared to a 77% increase during the 2021/22 reporting period.
- PTI occurrences have decreased by 95% since the 2018/19 reporting period.
- Since 2018/19 reporting period, PTI occurrences, on average, resulted in 3,8 fatalities annually, and 90,1% of PTIs resulted in injuries.
- The traditional trend suggested PTI occurrences to be a weekday (97% in the 2022/23 reporting period), peak-hour (53% during 06:00-8:00 and 26% during 14:00-16:00 in the 2022/23) phenomenon which is earlier than the traditional 16:00-20:00 peak observed from 13 years ago to the 2020/21 reporting period.

- Since the 2018/19 reporting period, 44,9% of PTI occurrences were recorded in Gauteng, followed by 30,2% in KwaZulu-Natal and 23,3% in the Western Cape. The three large metropolitan areas represented 98,3% of 2022/23 reporting period PTI occurrences.
- Since the 2018/19 reporting period, PTI per million train km reduced by 91% and for the 2022/23 reporting period, it reduced by 49%. This is largely due to the reduced PRASA service.

The railway security-related incidents reported to the RSR by railway operators as well as the SAPS and RRP division is the focus of this section. The section further examined the most prevalent security concerns and provided a geographical overview of the overall harm arising from security-related incidents. Due to the nature and format of reporting security-related incidents, neither risk analysis per rail user group nor risk profiles were calculated. Highlights for the RRP 2022/23 reporting period data include:

- 1 890 incidents of theft (cable theft = 1 254, theft of infrastructure = 304 and theft other which are theft incidents which are not classified in the SAPS classifications of crime = 332).
- 332 incidents of malicious damage to property during the 2022/23 reporting period.
- 28,57% increase in illegally crossing of railway lines incidents as per the SAPS data, during the 2022/23 reporting period data.

RSR interventions are based on the RSRs mandate which includes overseeing safety of railway transport and ensuring compliance with the RSR Act. In order to fulfill its mandate, among others, the RSR issues safety permits, conducts inspections and audits, investigates railway accidents, and develops regulations and safety standards. These activities are being conducted through the head office and three regional offices. The regional offices are the Central Region comprising of Gauteng, North West, Mpumalanga, Limpopo, Free State and part of KwaZulu-Natal provinces; Coastal Region comprising of the Western Cape, Eastern Cape, Northern Cape, and part of Free State provinces; and Eastern Region comprising of KwaZulu-Natal, Free State and Mpumalanga provinces.

During the 2022/23 reporting period, the RSR regional offices conducted 249 SMS audits and 483 inspections across all its operational geographical areas as part of its interventions. Consequently, directives were issued to various operators to ensure compliance to safety. At the same time, the RSR continued to issue Safety Permits to those operators who applied as either new or renewing their safety permits. A number of research studies were conducted and approved by the RSR.

The RSR also expended substantial effort to ensure that education and awareness serve as essential safeguards for rail interactions. This all-encompassing strategy aimed to impart knowledge about rail hazards, enabling well-informed decisions. Crucially, rail safety promotions engage diverse audiences, etching enduring safety consciousness. Collaborations with PRASA, TFR, Gautrain, and others propel transformative rail safety endeavors, targeting critical sectors. The 2022/23 period marked a significant stride, executing 30 nationwide initiatives. From level crossing campaigns to community outreach and school involvement, the RSR's unwavering dedication is evident.





Introduction

Introduction

Section 20(1) of the Act, Act 16 of 2002, as amended, stipulates that the Regulator must produce and submit to the Minister of Transport, an annual report on the safety of workers, the public and the environment associated with railway operations. Therefore, the Annual State of Safety Report (ASoSR) is a legislative requirement that provides a range of safety-related information for railway operators, the general public and members of the broader railway industry to assist in managing railway safety. It is compiled through the RSR's mandate, which is to oversee the safety of railway transport, to promote improved safety performance to promote the use of rail and to monitor and ensure compliance with the Act.

The information contained in the report is of use and interest to others, such as the academics, media, public bodies involved in the industry's funding and oversight, as well as those who use the railway, or who are employed within the rail industry.

The 2022/23 reporting period for the ASoSR focuses on harm to persons (including the general public, passengers and workforce) when analysing safety risk profiles to obtain a more holistic picture of the railway's safety performance. This harm is expressed as Fatalities and Weighted Injuries (FWI). The overall FWI for the 2022/23 reporting period for operational occurrences was 109,5. The overall FWI for security-related incidents has been calculated to 18,8 during the 2022/23 reporting period. The detail hereof will be explained under the relevant sections.

The ASoSR incorporates data from the RSR's National Information Monitoring System (NIMS) and the South African Police Service (SAPS). It includes occurrences, incidents and harm reports by passengers and members of the general public via the RSR's Contact Centre. In addition to this is the occurrence and incident data received directly from railway operators.

The ASoSR aims to support the rail industry in its mission to reduce the risks associated with railway operations that may impact the safety to levels as low as is reasonably practicable. This impact may be extended to persons and property transported by railway and the environment. It does this by providing insight into the state of railway safety by analysing the number, frequency of operational occurrences and security-related incidents as well as their associated consequences and causes (where possible).

It is important to note here that the RSR is the main source of railway safety statistics in South Africa while the SAPS remains the custodian and main source of the South African security-related incidents statistics. However, detail on the latter is combined as it relates to the railway environment to present the impact thereof on safe railway operations.

Scope of the report

The scope of this report is predominantly focused on operational occurrences and security-related incidents related to the railway operations which have been reported to the RSR using the SANS 3000 – 1 series. It has been extended to include fatalities and injuries (commonly referred to as harm) to employees, contractors, the general public and train passengers. The introduction and implementation of the Regulations Regarding the Category and Type of all Notifiable Railway Occurrences to be Reported to the Chief Executive Officer of the Railway Safety Regulator, 2022 shortly called Regulations on Notifiable Railway Occurrences, (RONO), 2022 was delayed. Therefore, a full analysis of the data using the RONO revised categories will be implemented in the subsequent reports.

Origin of the data

A significant proportion of the analyses in the ASoSR are based on the operational occurrences and security-

related incidents reported by the railway operators to the RSR. Data from SAPS – Rapid Rail Police, the general public and media reports are used to supplement the report where appropriate.

The analysis in this report is based on occurrence and incidents data for a 5-year reporting period from 1 April 2018 to 31 March 2023.

How safety and security are analysed

Since the 2018/19 to 2022/23 reporting period, the RSR collected and recorded 56 835 events. This comprised 13 299 (23%) operational safety-related occurrences and 43 536 (77%) security-related incidents. During the 2022/23 reporting period, the RSR collected and recorded 10 476 events. The breakdown hereof indicates that operators reported 1 833 (17%) operational occurrences and 8 643 (83%) security-related incidents to the RSR during the 2022/23 reporting period.

Each occurrence or incident reported contains temporal and location information, the SANS compliant reporting category, consequences (i.e. injuries and fatalities), short descriptions, and the network and train operators involved in these occurrences. This allows for detailed analysis to be carried out by examining trends and where possible, identifying the causes of occurrences and their respective consequences.

Similar to the 2021/22 ASoSR, when analysing collective risks, injuries of differing levels of seriousness must be combined into one composite measure. For the purpose of the present safety analysis, an approach has been used which is based on an established standard in risk analysis of transport modes. The composite measure is termed 'Fatalities and Weighted Injuries' or FWI, abbreviated. It is calculated using the following formula: [number of fatalities] + 0.1 x [number of injuries].

Understanding the overall profile of railway risk assists with its management, by enabling focus to be given to identified priority areas. When calculating the overall railways' risk profile as well as that for the individual key

focal occurrence categories (i.e. collisions, derailments, level crossings, people struck by trains and platform-train interchange occurrences), injuries and fatalities data for the 2018/19 - 2022/23 reporting period were used to ensure a long-term perspective. This is especially important for those categories of occurrences with low frequencies and high consequences.

Recorded harm

Given the Regulator's mandate and the public's requirement for safe rail transport, it is important to understand the limitations of recorded harm. When comparing data from one reporting period to another, which is known as year-on-year analysis, it's important to consider the long-term trends in harm reporting. This helps to determine whether railway safety is getting better or not.

Data cut-off

The data used in the 2022/23 ASoSR is based on the latest and most accurate and verified information available at the time of production. Therefore, the data cut-off date for this report was 31 March 2023.

South African largest railway operators

In order to avoid any confusion with regards to the naming of operators in this report, it is important to remember the following:

- Transnet Freight Rail (TFR) refers to the state-owned entity administered under Transnet State Owned Company (SOC) Ltd.
- Passenger Rail Agency of South Africa (PRASA) was formerly called Metrorail or South African Rail Commuter Cooperation (SARCC). The analysis herein includes the occurrences and incidents recorded by PRASA Rail and Main Line Passenger Services (MLPS). In this report, PRASA refers to the PRASA Rail division.
- Bombela Operating Company (BOC) is the railway operator trading as Gautrain under concession management of the Gautrain Management Agency (GMA).





Railway Safety and Security Overview

Railway Safety and Security Overview

This section presents the overall context by analysing the railway incidents and consequence (fatalities and injuries) data to identify and understand the safety performance in the railway transport industry. It makes use of time series analyses of railway incidents and consequences to provide an overview of the high-level trends and risk profiles in passenger, public and workforce safety performance. The analysis includes tables and graphs with descriptions and a narrative.

During the 2022/23 reporting period (1 April 2022 to 31 March 2023), railway operations were severely curtailed by ongoing service disruptions. These disruptions were caused by the under-maintenance of railway assets, procurement corruption, rampant theft and vandalism of railway assets, the electricity crisis and the sluggish economy following the -COVID-19 pandemic. Consequently, the recorded train km, tonne-km, and passenger-km remain low compared to historical data.

Nationally per million train km for the 2022/23 reporting period, operators reported 4% more safety-related operational occurrences and 33% more security-related incidents. As a result of this risk profile, there were 157.3 FWI incidents in the 2022/23 period, which is a 30% decrease compared to 2021/22 and 83% fewer compared to 2018/19 between 2018/19 and 2022/23 there were 1 541,8 FWI resulting from safety-related operational occurrences.

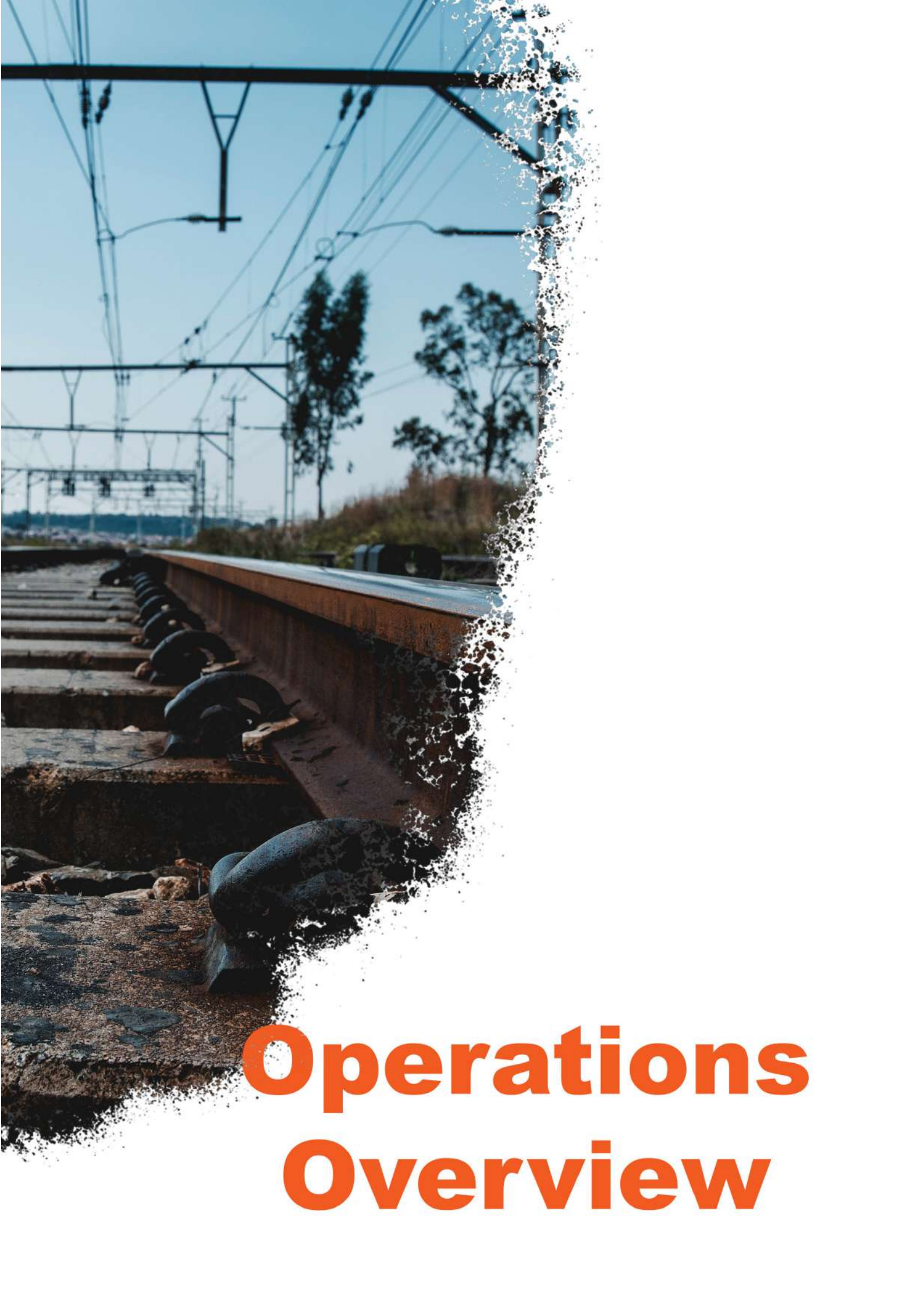
The 2022/23 overall headlines

- Except the Gautrain concession with a 156% increase in train km and a 153% increase in passenger km, for the 2022/23 reporting period, the other two SOE operators, TFR (with a 12% decrease in train km and a 28% decrease in tonne-km) and PRASA (with a 74% decrease in train km and a 73% decrease in passenger-km) are in operational decline.
- Due to the decrease in operations, the count of safety-related operational incidents has also fallen by 11%, from 2,060 in the 2021/22 reporting period to 1,833 in the 2022/23 period. However, there has been a 14% rise in the number of security-related incidents, increasing from 7,577 in the 2021/22 period to 8,643 in the 2022/23 period. This trend of increasing security

incidents has been ongoing since the 2018/19 reporting period.

- TFR experienced 90% of the recorded security-related incidents during the 2022/23 reporting period and PRASA 10%.
- The reduced traffic levels have distorted the historical occurrence category distribution of 13 299 safety occurrences for the reporting period since 2018/19 reporting period. In 2022/23 reporting period, people-related occurrences displaced the traditional dominance of collisions, derailments, and platform-train inter-changes.
- In the 2022/23 reporting period, there were 109,5 FWIs caused by safety-related operational occurrences, down from 27 actual recorded index in the 2021/22 reporting period. Similarly, in the 2022/23 reporting period, there were 18,8 FWIs caused by security-related incidents, down from 26,9 recorded index in the 2021/22 reporting period, all reported on a rounded-up basis.
- 86,6% of Passengers were harm-free during operational safety occurrences.
- The public was harm free in only 20% of operational safety occurrences.
- One FWI occurred in 36% of harmful operational safety occurrences and 2 FWI in 55% of the same.
- Although there was a 74% reduction in public FWI during the 2022/23 reporting period, the public was harm-free in only 20% of these operational safety occurrences.
- There was a 68% overall increase in harmful security-related incidents between the 2021/22 and 2022/23 reporting periods.

The RSR also expended substantial effort to ensure that education and awareness serve as essential safeguards for rail interactions. This all-encompassing strategy aimed to impart knowledge about rail hazards, enabling well-informed decisions. Crucially, rail safety promotions engage diverse audiences, etching enduring safety consciousness. Collaborations with PRASA, TFR, Gautrain, and others propel transformative rail safety endeavors, targeting critical sectors. The 2022/23 period marked a significant stride, executing 30 nationwide initiatives. From level crossing campaigns to community outreach and school involvement, the RSR's unwavering dedication is evident.



Operations Overview

Operations Overview

Table 1 lists the traffic volumes and productivity for the 2018/19 - 2022/23 reporting periods, as submitted to the RSR by the three major operators TFR, PRASA Rail and BOC (Gautrain). When examining the annual train km per operator from the 2018/19 reporting period to the 2022/23 reporting period, interesting trends for each of the operators are revealed.

Table 1: TFR, PRASA Rail and Gautrain traffic volumes and productivity for 2018/19 to 2022/23 reporting period

Reporting period	Transnet Freight Rail (TFR)		Passenger Rail Agency of South Africa (PRASA), based on fare paying commuters (i.e. excludes fare evasions)		Bombela Operating Company (BOC / Gautrain)	
	Million train km	Billion tonne km	Million train km	Million passenger km	Million train km	Million passenger km
2018/19	37,0	146,0	20,1	5 720,0	3,95	453,7
2019/20	32,7	145,8	17,9	2 996,1	4,93	449,1
2020/21	29,7	125,9	1,9	81,7	2,68	83,4
2021/22	29,4	150,9	9,2	167	2,8	101
2022/23	25,9	108,0	2,4	44,6	7,14	238,2

Table 1 and Figure 1 indicate that TFR, South Africa's major freight operator, had a 30% decrease in train km since the 2018/19 reporting period. This is from 37 million train km to 25,9 million train km recorded during the 2022/23 reporting period. A year-on-year comparison of TFR tonnes per train productivity indicates a 19% decrease from 5 132 recorded during the 2021/22 reporting period to 4 171 in the 2022/23 reporting period. For the 5-year period under review, TFR tonnes per train productivity increased by 5% from 3 982 in the 2018/19 reporting period.

TFR attributes the decrease in train km to the impact of floods in the KwaZulu-Natal province, reduction of fleet by 30% as well as theft and vandalism of railway infrastructure components. PRASA attributes the reduction to the significant decline on the Main Line Passenger Service (MLPS). Similar to TFR, PRASA experienced floods that halted the services and the riots in the KwaZulu-Natal province around July 2022. The Western Cape reduced their services due to continuous vandalism on the TFR network. Gauteng might have shown an increase but certain lines were closed for a rebuilding programme to finalize the work carried out.

The 2018/19 to 2022/23 reporting period fluctuations in the recorded km by the three major railway operators is presented in Figure 1, 2 and 3 respectively.

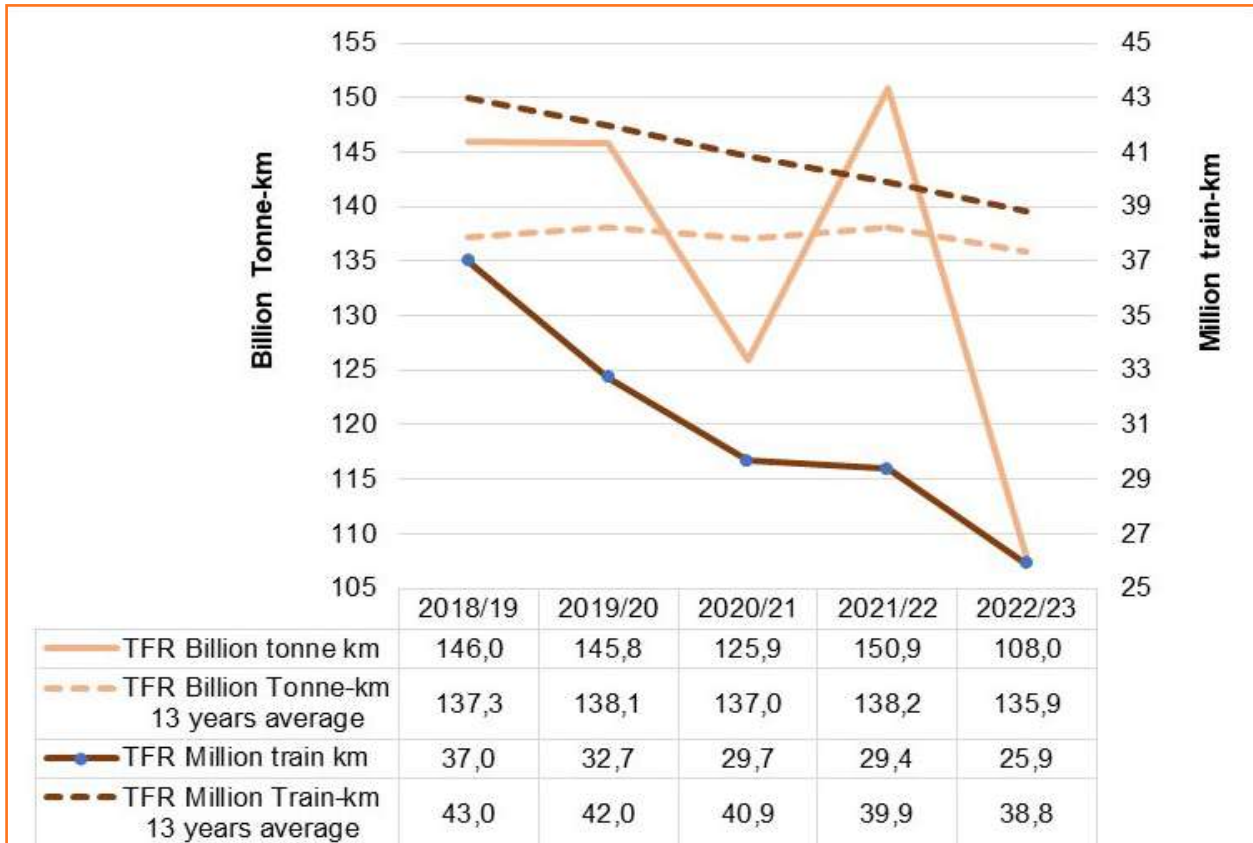


Figure 1: TFR operations data from 2018/19 to 2022/23 reporting period

Figure 2 shows that since the 2018/19 reporting period, PRASA Rail had a 74% decrease in train km and a 73% decrease in passenger km. In the 2022/23 reporting period, PRASA once again averaged 19 passengers per train productivity, which is 93% fewer than in 2018/19 reporting period.

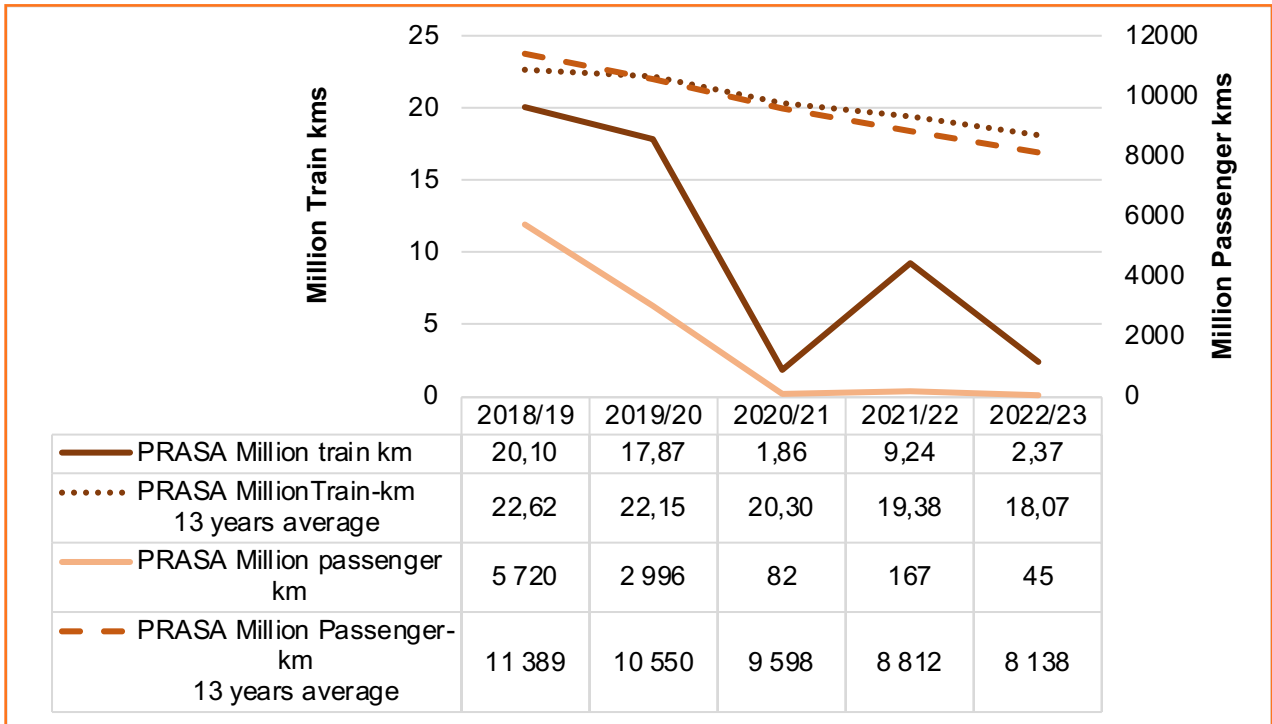


Figure 2: PRASA Rail operations data from 2018/19 to 2022/23 reporting period

Figure 3 shows Bombela Operating Company trading as Gautrain produced 156% more train km and 136% more passenger km from the first full year of operations in the 2022/23 reporting period. Passengers-per-train productivity decreased by 8% from 37 to 34 in the 2020/23 reporting period, which is 70% fewer that the 2018/19 reporting period.

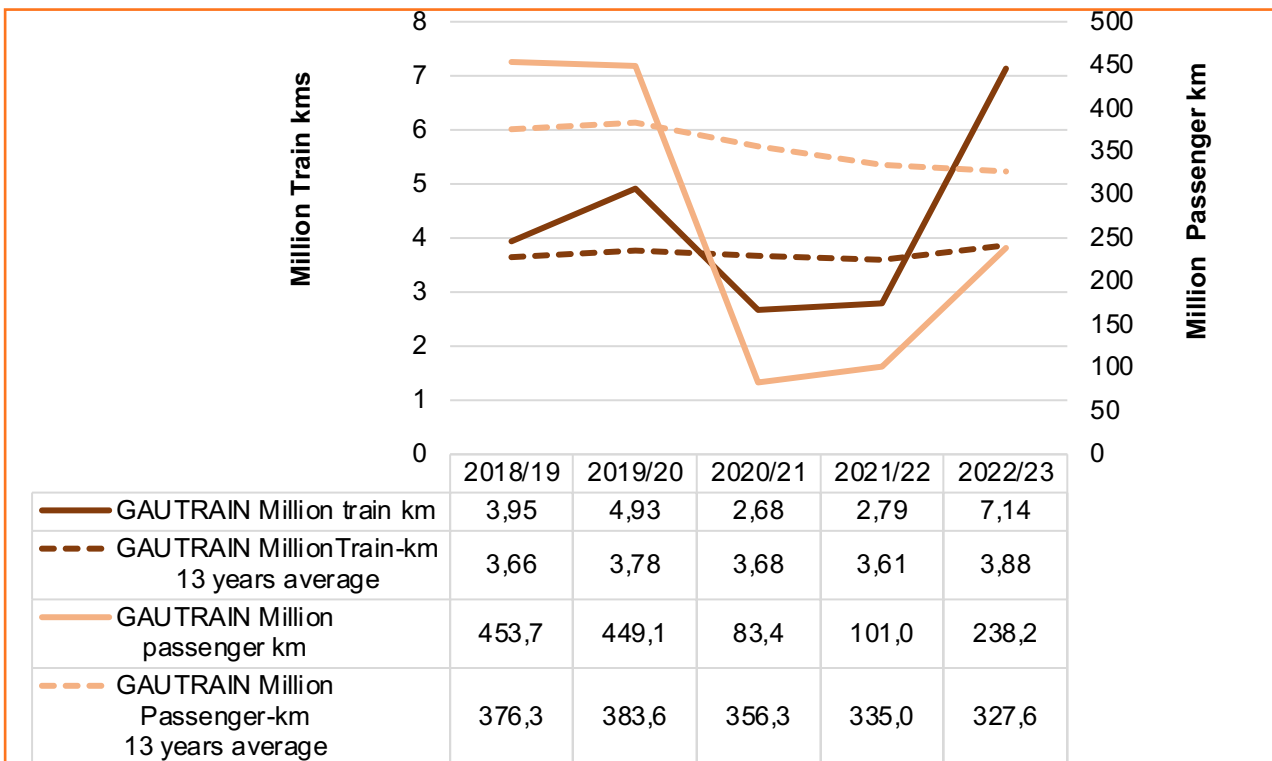


Figure 3: Gautrain operations data from 2018/19 to 2022/23 reporting period



Safety Performance Overview

Safety Performance Overview

Railway occurrence data is classified into two broad categories: safety-related operational occurrences and security-related incidents, as contained in both the SANS and Regulations On Notifiable Occurrences (RONO), 2022. The Act, Act 16 of 2002 as amended, indicates that operational occurrences fall within the ambit of the RSR's oversight activities. The Act also instructs the RSR to support and advocate for security-related incidents. In this regard, the RSR monitors and supports the efforts of other organs of state, such as the SAPS and the Department of Employment and Labour (DoEL), that share concurrent jurisdiction and mutual interests in addressing railway safety.

The SANS 3000-1 and RONO stipulates the minimum requirements for the reporting of operational occurrences and security-related incidents to the RSR. Both the SANS and RONO defines and classifies occurrences into categories and subcategories to be used by railway operators in their reporting to the RSR. These categories and subcategories are used for a more detailed data analysis. Operational occurrences are captured into 12 in the SANS [A – L] and into 15 [A-O] in the RONO as major categories. The security-related incidents are categorised into nine [1-9] in the SANS and into ten categories in the RONO. Therefore, in this report, the SANS categories were used. Table 2 provides an overview of the operational occurrences and security-related incidents recorded by the RSR during the 2022/23 reporting period as per the SANS. The RONO, 2022 categories are presented as Table 3. A detailed listing hereof is presented in Appendix B; it can also be found in the SANS 3001 – 2016 and RONO, 2022.



Table 2: SANS 3000-1 description for operational occurrences and security-related incidents

CATEGORY	DESCRIPTION
OPERATIONAL OCCURRENCES	
A	Collisions during movement of rolling stock
B	Derailments during movement of rolling stock
C	Unauthorised movements including rolling stock movements exceeding limit of authority
D	Level crossing occurrences
E	People struck by trains during movement of rolling stock
F	People-related occurrences: trains outside station platform areas or in section
G	Passenger-related occurrences: travelling outside designated area of train
H	People-related occurrences: platform-train interchange (colloquially known as PTIs or Platform-train interface)
I	People-related occurrences: station infrastructure
J	Electric shock
K	Spillage/leakage, explosion or loss of dangerous goods
L	Fires
SECURITY-RELATED INCIDENTS	
1	Theft of assets (impacting on operational safety)
2	Malicious damage (vandalism) to property
3	Threats (to operational safety)
4	Hijacking of trains
5	Crowd-related occurrences
6	Industrial action
7	Personal safety on trains
8	Personal safety at stations
9	Personal safety in sections, yards and depots

Table 3: RONO, 2022 description for operational occurrences and security-related incidents

CATEGORY	DESCRIPTION
OPERATIONAL OCCURRENCES	
A	Collisions during movement of rolling stock
B	Derailments during movement of rolling stock
C	Unauthorised movements (Rolling stock movements exceeding limit of authority in respect of position)
D	Level crossing occurrences
E	Persons struck by trains during movement of rolling stock
F	People-related occurrences: trains outside station platform areas (In section)
G	Passenger-related occurrences: Travelling outside designated passenger area
H	People-related occurrences: platform-train interchange
I	People-related occurrences: station infrastructure
J	Electric shock occurrences
K	Spillage, leakage, or release of dangerous goods
L	Fires and explosions
M	Procedural irregularities (And near misses)
N	Pantograph hook-ups
O	On-board passenger related occurrences
SECURITY-RELATED INCIDENTS	
1	Theft of assets impacting on operational safety
2	Malicious damage (vandalism) of assets impacting on operational safety
3	Threats (to operational safety)
4	Hijacking of trains
5	Crowd-related occurrences
6	Industrial action
7	Personal safety on trains
8	Personal safety at stations
9	Personal safety outside station platform area (In sections, between stations, including sidings, yards and depots)
10	Human bodies found within the railway reserve

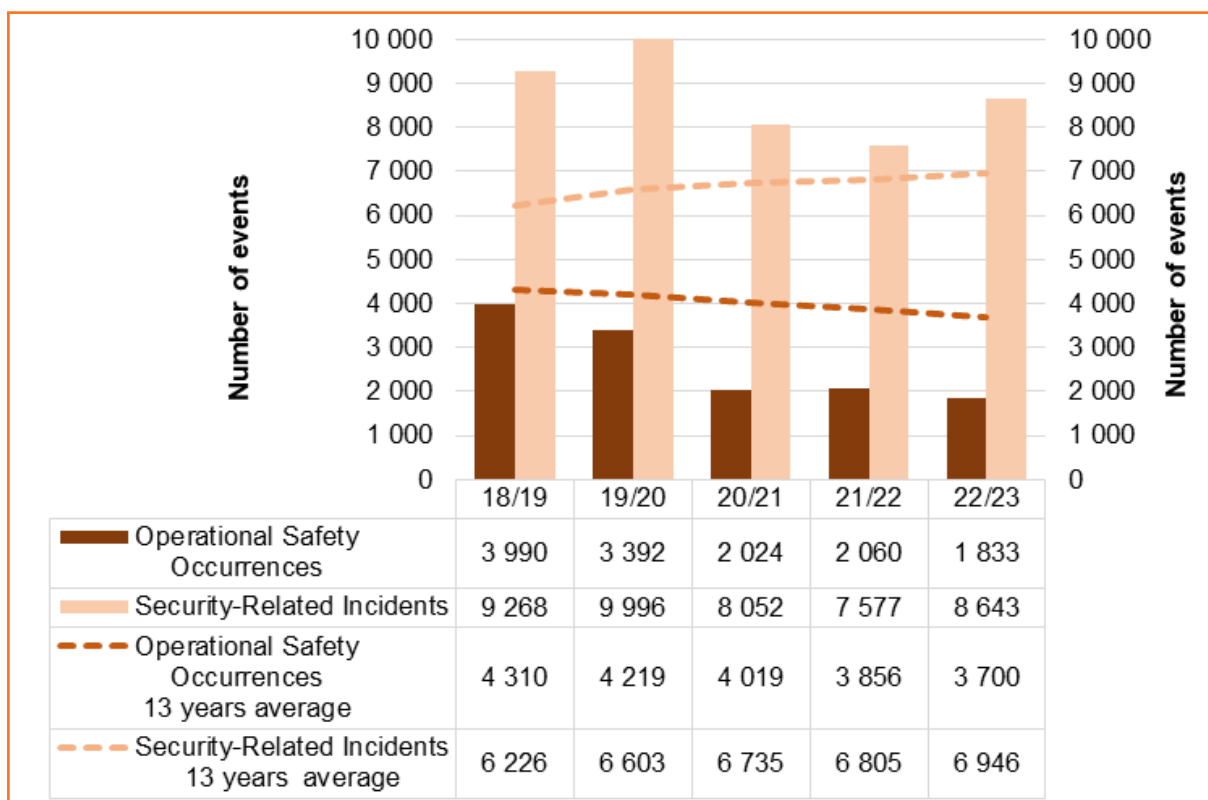


Figure 4: Operational and security-related incidents actual number of entries from the 2018/19 to 2022/23 reporting period with long term averages

Table 3 shows the number of operational occurrences and security-related incidents for the 2018/19 to 2022/23 reporting period as per the SANS with the actual number of entries as well as the long-term average trend presented in Figure 4. Since the 2018/19 operational period, the number of operational occurrences reduced by 54% and security-related incidents increased by 7%. The year-on-year comparison on the actual (absolute) number of recorded negative events between the 2021/22 and 2022/23 reporting periods indicates that operational occurrences reduced by 11% but the security-related incidents increased by 14%.

Table 4: All operators summary total operational occurrences and security-related incidents recorded from 2018/19 to 2022/23

Reporting period/ totals	2018/19	2019/20	2020/21	2021/22	2022/23
Operational occurrences	3 990	3 392	2 024	2 060	1 833
Security-related incidents	9 268	9 996	8 052	7 577	8 643

There was a 4% increase in operational occurrences per million train km during the 2022/23 reporting period. Security-related incidents per million train km increased by 33% during the same reporting period.

Figure 5 shows that the number of operational occurrences remained fairly constant while security-related incidents continue to grow. TFR and PRASA Rail are the dominant railway operators in South Africa. These operators consistently record the highest number of occurrences annually.

PRASA experienced an annus horribilis during 2020/21 as trains were halted for three months under the COVID-19 pandemic emergency lock down provisions. Therefore, during 2020/21 reporting period, the number of security-related incidents at PRASA reduced from 4 658 down to 2 005 on a year-on-year comparison, but the train km plummeted from 17,9 million down to 1,9 million year on year. Consequently, the security-related incidents per million train km increased more than fourfold year-on-year during the 2020/21 reporting and returned to a somewhat normal trend during the 2021/22 reporting period. The 2022/23 reporting period trend further suggest an almost similar trend when compared to 2018/19, 2019/20 and 2021/22 reporting periods.

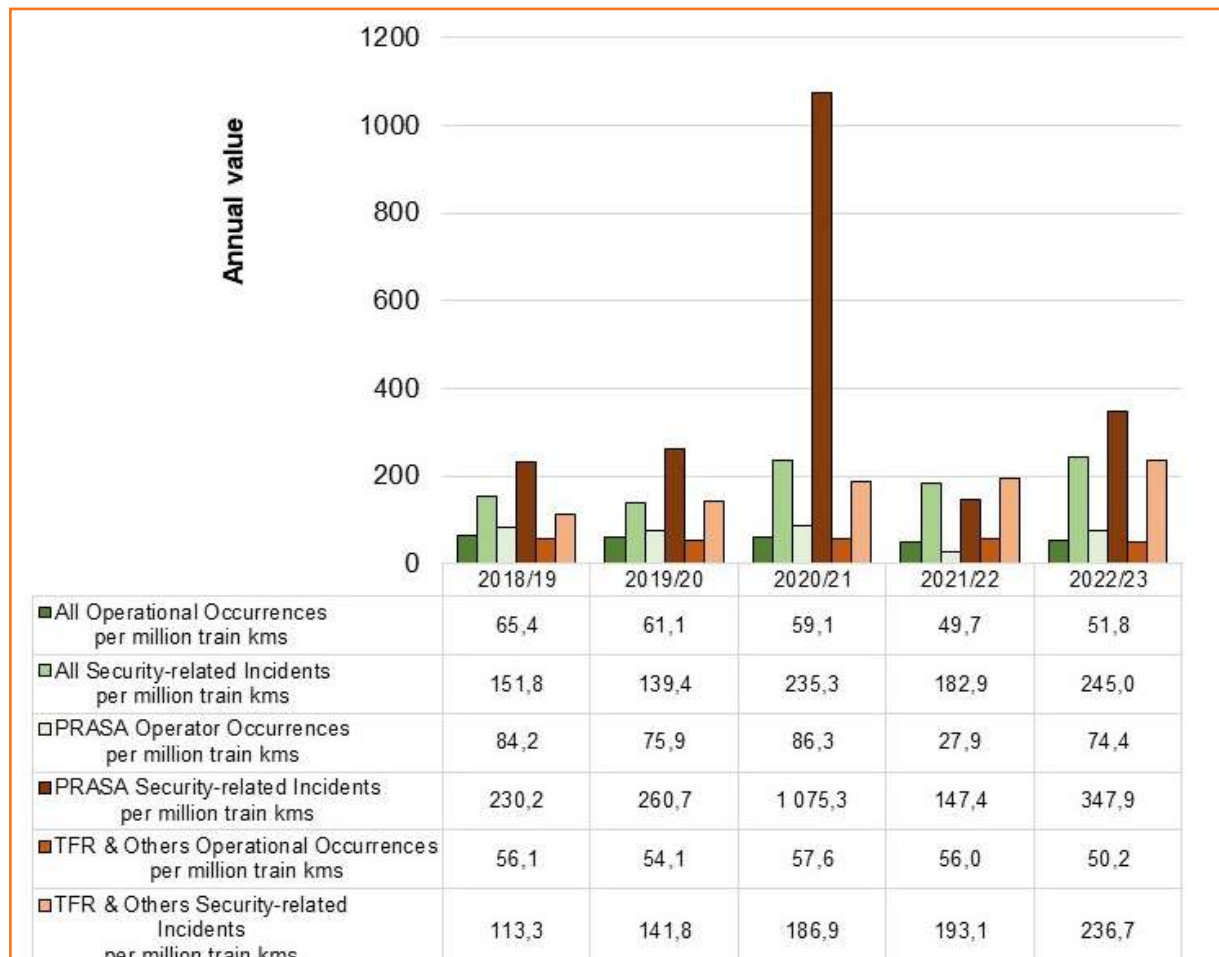


Figure 5: Occurrences and incidents per million train km for the 2018/19 to 2022/23 reporting period

Figure 6 shows the SANS category breakdown of the cumulative 13 299 safety occurrences entries reported between the 2018/19 and 2022/23 reporting period.

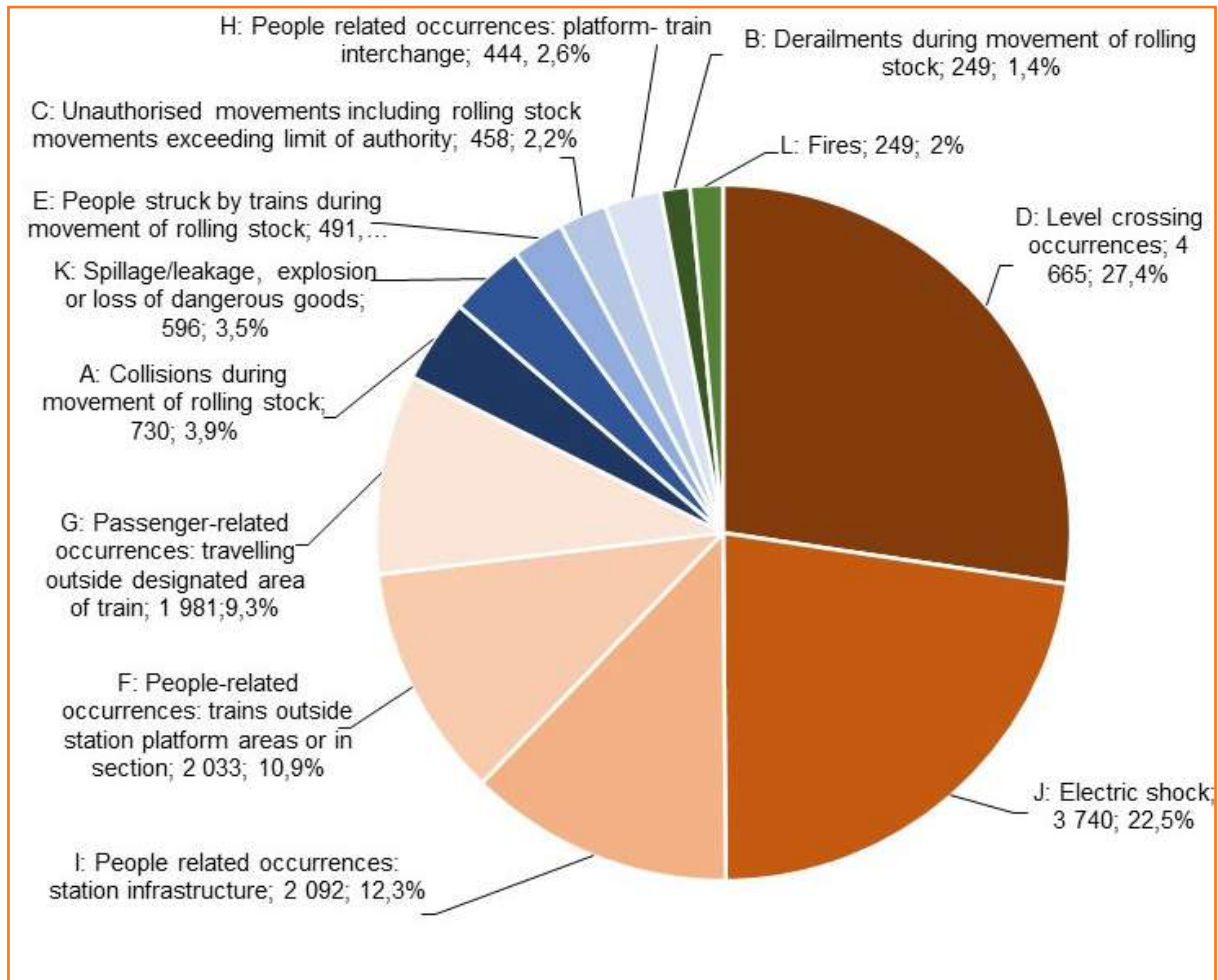


Figure 6: Distribution of 13 299 safety occurrences for the 2018/19 to 2022/23 reporting period

Historically, railway operational occurrences by province were dominated by the three large PRASA Metrorail networks in Gauteng, KwaZulu-Natal and the Western Cape provinces. However, with the collapse of the PRASA service since 2021/22, the KwaZulu-Natal (32,6%), Mpumalanga (12,8%) and Northern Cape (10,7%) provinces collectively reported 56,1% of the operational safety occurrences as presented in Figure 7.

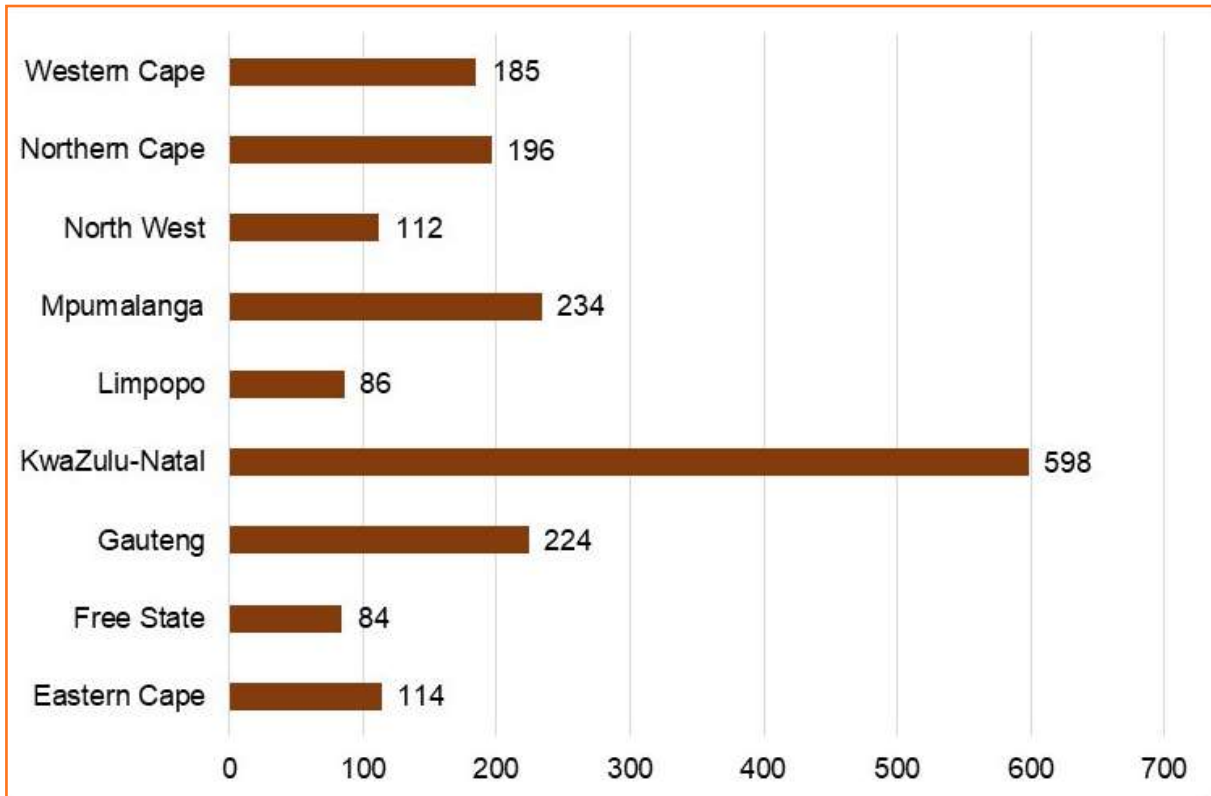


Figure 7: Recorded safety operational occurrences by province in 2022/23 reporting period

Table 5 shows improvements in all other SANS categories when comparing the 2021/22 reporting period to 2022/23 reporting period actual number of entries. In addition, a five-year window period indicates that operators reported 11% fewer safety operational occurrences year-on-year during the 2022/23 reporting period.



Table 5: Five-year overview of operational occurrences and safety-related incidents

Reporting Year	2018/19	2019/20	2020/21	2021/22	2022/23				
	All	All	All	All	TFR	PRASA	Other	All	Var 21/22
A: Collisions during movement of rolling stock	873	847	665	652	562	18	21	601	-8%
B: Derailments during movement of rolling stock	370	382	325	290	187	20	68	275	-5%
C: Unauthorised movements including rolling stock movements exceeding limit of authority	127	84	40	51	23	10	14	47	-8%
D: Level crossing occurrences	133	104	73	86	63	3	8	74	-14%
E: People struck by trains during movement of rolling stock	519	490	125	185	75	46	5	126	-32%
F: People-related occurrences: trains outside station platform areas or in section	165	132	4	16	1	4	0	5	-69%
G: Passenger-related occurrences: travelling outside designated area of train	169	116	7	5	0	1	0	1	-80%
H: People related occurrences: platform- train interchange	625	456	44	78	0	34	0	34	-56%
I: People related occurrences: station infrastructure	110	65	0	2	0	5	0	5	150%
J: Electric shock	45	66	37	29	20	6	0	26	-10%
K: Spillage/leakage, explosion or loss of dangerous goods	154	13	79	68	82	0	1	83	22%
L: Fires	70	516	625	598	526	29	1	556	-7%
TOTAL	3 990	3 392	2 024	2 060	1 539	176	118	1 833	-9%

Figure 8 presents the safety occurrences recorded during the 2022/23 reporting period. The Top 5 SANS categories A, L, B, E and K made up 89,5% of all safety operational occurrences in the 2022/23 reporting period.

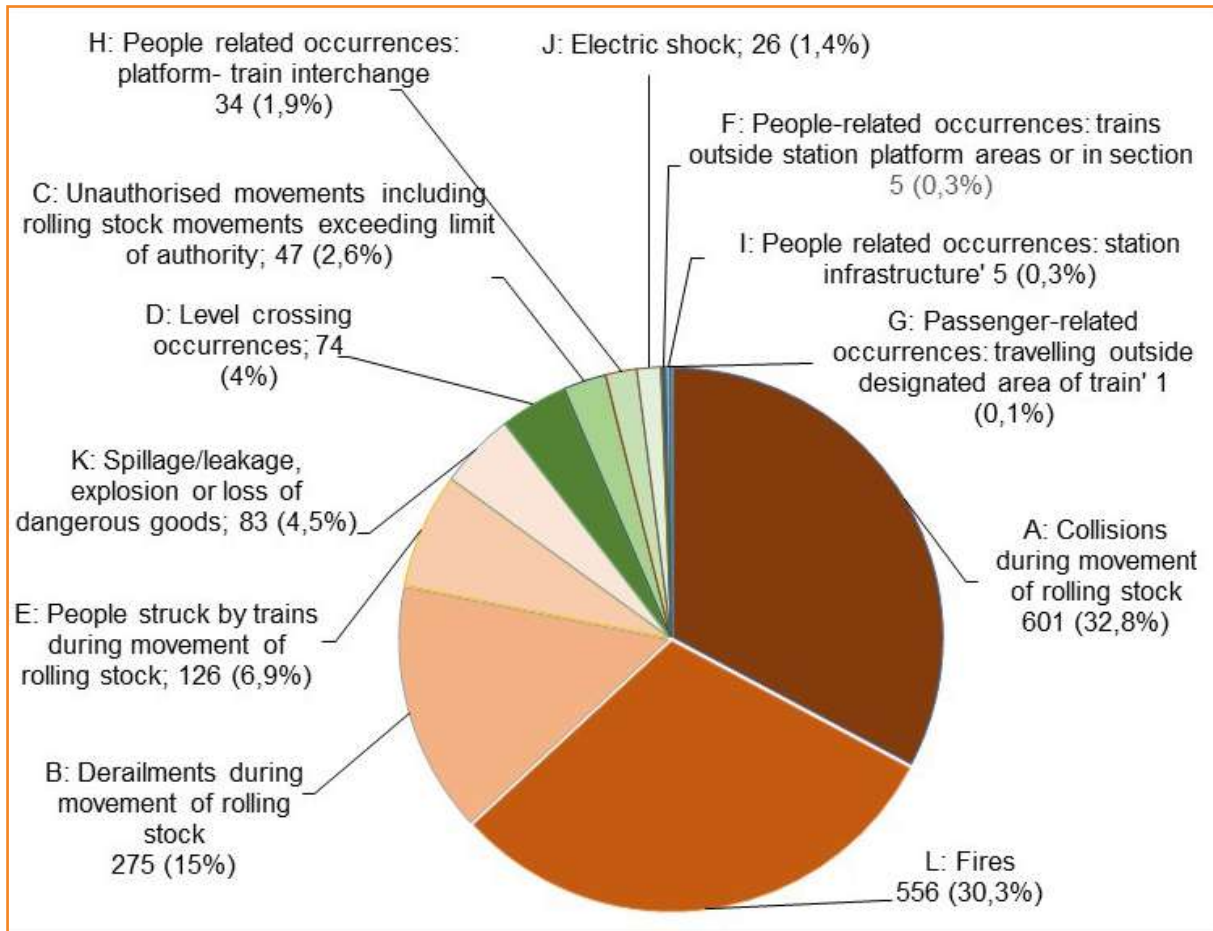


Figure 8: Operational occurrences categories distribution for 2022/23 reporting period

RSRs Top five strategic focus areas

The RSR has been focusing on the identified five strategic focus areas to positively impact the levels of safety in the rail industry. These focus areas have formed the basis of the RSR's strategic objectives and interventions since 2013/14 when the RSR redirected itself towards risk reduction rather than compliance and enforcement. The selected areas are based on operational occurrences. They are in line with international best practices of assessing the risk profile of operators within the railway industry. The focus areas are the following operational occurrence categories, as defined in SANS 3000 – 1 and RONO, 2022:

- Category A-a: Mainline collisions between rolling stock;
- Category B-a: Mainline derailments of rolling stock;
- Category D-a: Level crossing occurrences at authorised level crossings;
- Category E-a: People struck by trains on a mainline; and
- Category H-a and H-b: Platform train interface occurrences.

When these five categories of operational occurrences manifest, there is a large-scale financial impact. This can be in terms of direct costs incurred for damage to rolling stock due to derailments and collisions. There may be indirect costs due to closure of lines for recovery purposes. There may be also costs incurred due to the possible large-scale human impact in terms of fatalities and injuries during passenger train collisions, level crossings and people-related occurrences such as people struck by trains and platform train interface occurrences. Table 5 shows the data since the 2018/19 reporting period, while Figure 9 presents these figures graphically.

Table 6: RSR’s 5 Strategic areas of operational occurrence focus

SANS Subcategory/RP	18/19	19/20	20/21	21/22	22/23
A-a (Collision on running line)	12	6	9	14	8
B-a (Derailment on running line)	112	123	88	102	120
D-a (Level crossings)	117	96	61	78	70
E-a (People struck by trains)	514	482	122	177	117
H-a & H-b (Platform train interface)	623	455	43	78	34



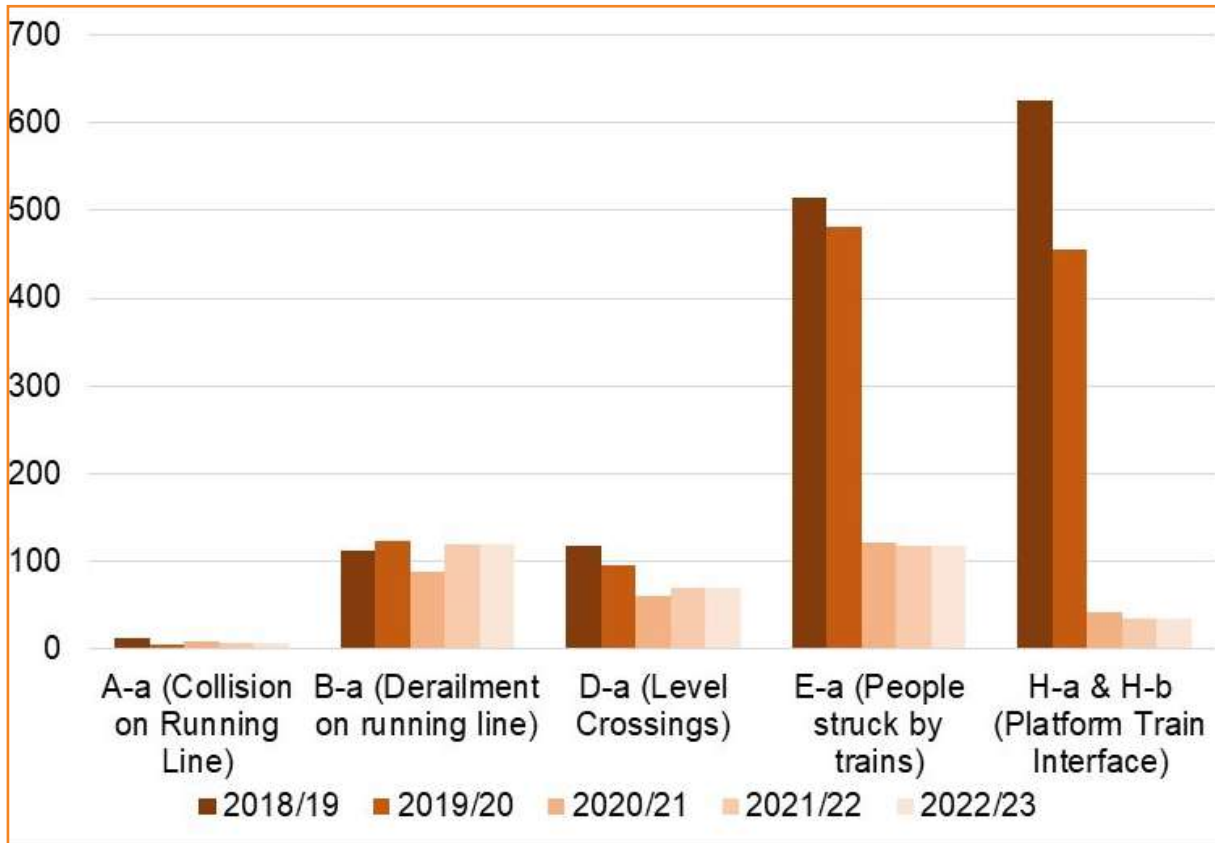


Figure 9: Number of safety occurrences as per the RSR Top 5 strategic areas of focus

With the theft and vandalism security-related incidents categories contaminating these top five focus areas, a summary of the two security-related high-frequency entries is listed in Table 7.

Table 7: Theft and vandalism

SANS Category	2018/19	2019/20	2020/21	2021/22	2022/23
Theft of assets	6 291	7 180	6 390	6 040	6 782
Malicious damage (vandalism)	1 810	1 884	1 462	1 320	1 343

Table 8 presents the recorded operational fatalities and injuries from the 2018/19 reporting period to the 2022/23 reporting period. The 2022/23 reporting period indicates that the year-on-year number of fatalities decreased by 32% and injuries by 22%.

Table 8: The 2018/19 - 2022/23 recorded operational fatalities and injuries

Operational occurrences: recorded fatalities					
SANS CAT/ RP	2018/19	2019/20	2021/22	2021/22	2022/23
A	4	4	0	0	0
B	1	0	0	3	0
C	0	0	0	0	0
D	25	18	20	10	6
E	284	264	70	103	69
F	6	9	0	2	1
G	18	20	0	1	0
H	9	10	0	0	0
I	1	0	0	0	0
J	26	44	24	16	16
K	1	0	0	0	0
L	0	0	0	0	0
Total	375	369	114	135	92
Operational occurrences: recorded fatalities					
SANS CAT/ RP	2018/19	2019/20	2021/22	2021/22	2022/23
A	1 266	85	25	9	24
B	29	72	5	10	13
C	0	1	0	0	0
D	75	59	20	54	42
E	223	206	55	82	55
F	164	127	2	13	4
G	156	96	6	1	1
H	605	431	21	38	20
I	107	65	0	2	5
J	21	24	10	12	11
K	0	0	0	1	0
L	14	44	1	1	0
Total	2 660	1 210	145	233	175

Table 9 and Figure 10 show the actual FWI index for all occurrence categories since the 2018/19 reporting period. Since the 2018/19 reporting period, the actual FWI reduced by 82% and year-on-year while the 2022/23 reporting period data reflect a 30% reduction in FWI.

Table 9: Fatality and Weighted Injury (FWI) index for all safety occurrence categories 2018/19 to 2022/23 reporting period (actual numbers)

Occurrence Category/FWI	2018/19	2019/20	2021/22	2021/22	2022/23	Total
A	131	13	3	0,9	2,4	151,3
B	4	8	1	4,0	1,3	18,3
C	0	1	0	0,0	0,0	1,0
D	33	24	22	15,4	10,2	104,6
E	307	285	76	111,2	74,5	853,7
F	23	22	1	3,3	1,4	50,7
G	34	30	1	1,1	0,1	66,2
H	70	54	3	3,8	2,0	132,8
I	12	7	0	0,2	0,5	19,7
J	29	47	25	17,2	17,1	135,3
K	1	0	0	0,1	0,0	1,1
L	2	5	1	0,1	0,0	8,1
TOTAL FWI	646	496	133	157,3	109,5	1 541,8





Figure 10: Relative contribution to FWI of operational safety as per the SANS occurrence categories

Figure 11 shows the FWI breakdown for the 2022/23 reporting period. The annual average since the 2018/19 reporting period is 308,4 actual and equivalent deaths resulted from operational occurrences. Category E, People struck by trains during movement of rolling stock accounted for 65% of all FWI in the 2022/23 reporting period.

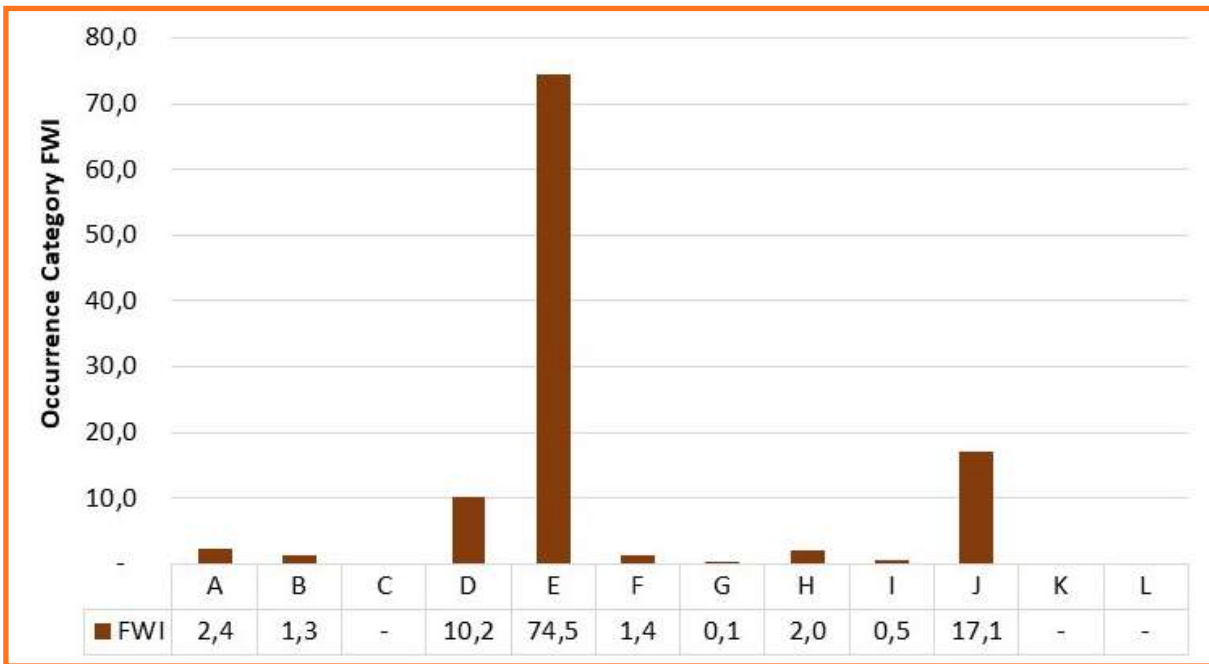


Figure 11: FWI for each SANS Category for 2022/23 reporting period

Figure 12 illustrates how the FWIs for all the operational safety SANS occurrence categories vary per geographical location. The long-term trend shows the three large metropolitan cities in Gauteng, KwaZulu-Natal and Western Cape provinces, with the higher commuter traffic volumes, recorded 83% of the FWIs.

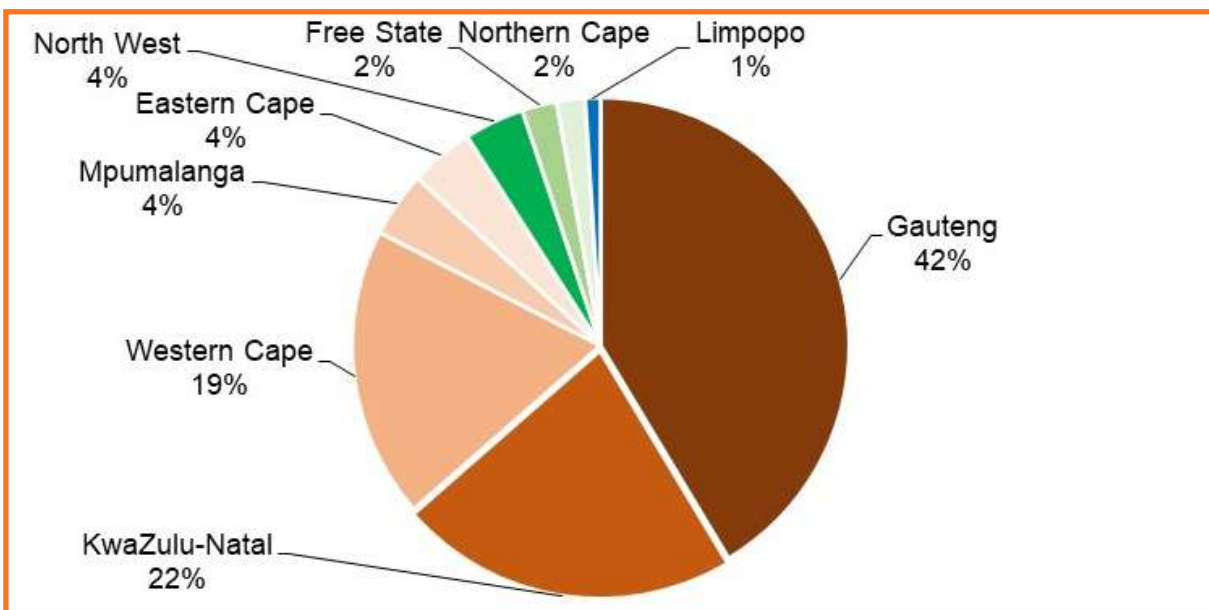


Figure 12: FWI for all safety occurrence categories per province in the 2018/19 – 2022/23 reporting period

Persons affected by operational occurrences

Figure 13 shows the FWI trend for the 2018/19 to 2022/23 reporting periods. Analysis of the historical data shows a high number of injuries resulting from occurrence Categories A (Collisions during movement of rolling stock), E (People struck by trains during movement of rolling stock), F (People-related occurrences: trains outside station platform areas or in section), and H (People related occurrences: platform- train interchange). The collapse of the PRASA Metrorail service since 2021/22 has prevented the human concentration that drive these harmful occurrences from the historical long-run FWI trend. The reader is therefore cautioned not to interpret the trend as a true reflection of less harmful operations.

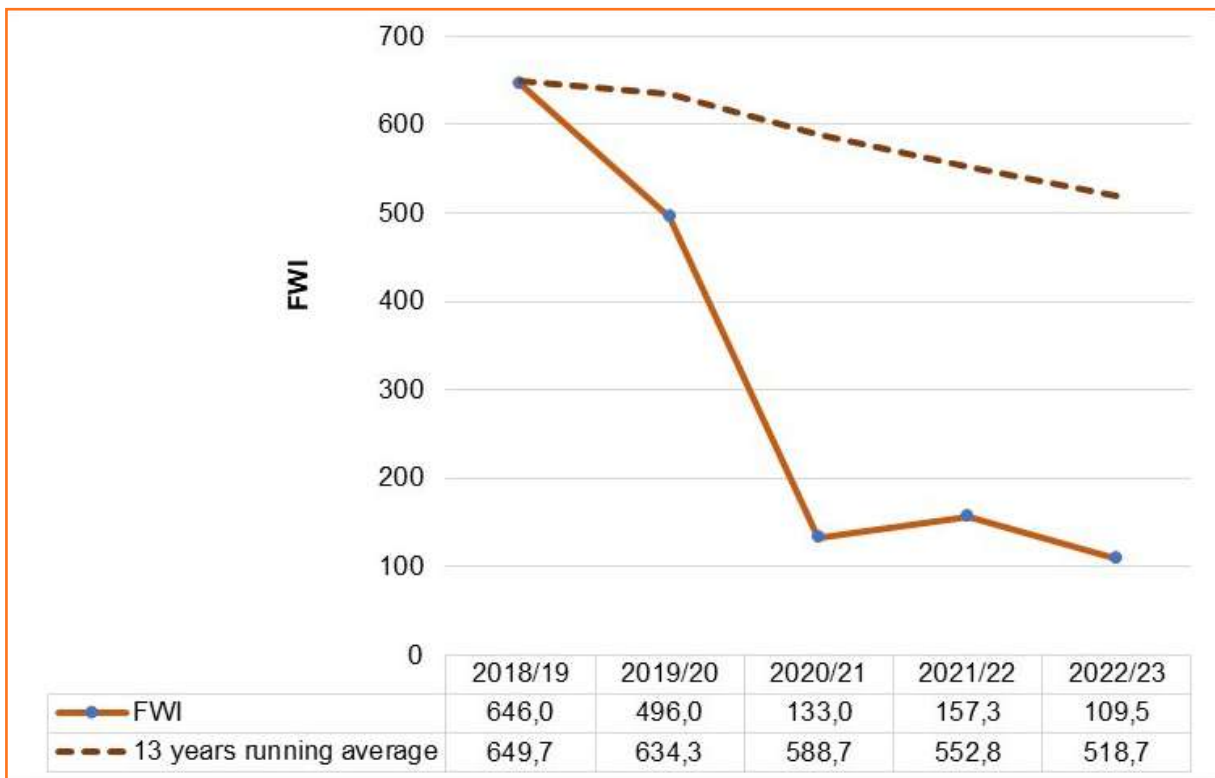


Figure 13: FWI from 2018/19 to 2022/23 reporting period.

Figure 14 shows a marked decrease in harm to passengers and reduced harm to the general public since the 2018/19 reporting period.

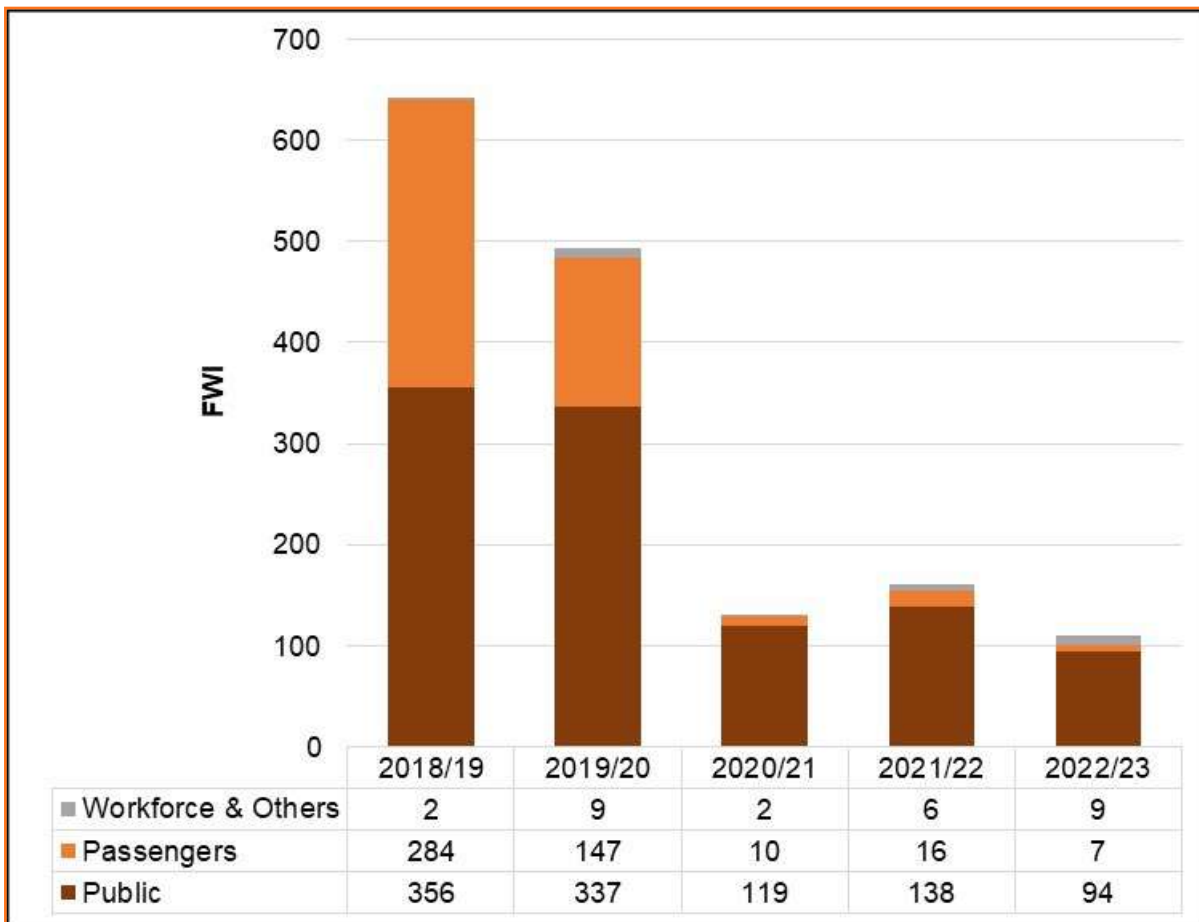


Figure 14: All persons FWI 2018/19 to 2022/23 reporting period.

Safety of passengers ¹

During the 2022/23 reporting period, seven passenger FWI were recorded compared to 5,5 in the 2021/22 reporting period and 283,7 in the 2019/18 reporting period.

Figure 15 illustrates passengers' FWIs, which account for 30% of all FWI recorded during the 2018/19 to 2022/23 reporting period. Since the COVID-19 epidemic, the passenger rail service has remained limited, hence the drastic drop in harm to passengers.

¹ The following SANS occurrence reporting categories were used to identify passenger harm: [A], [B], [F-a], [G], [H-a], [H-b], [I-b], [J-d] and [L]

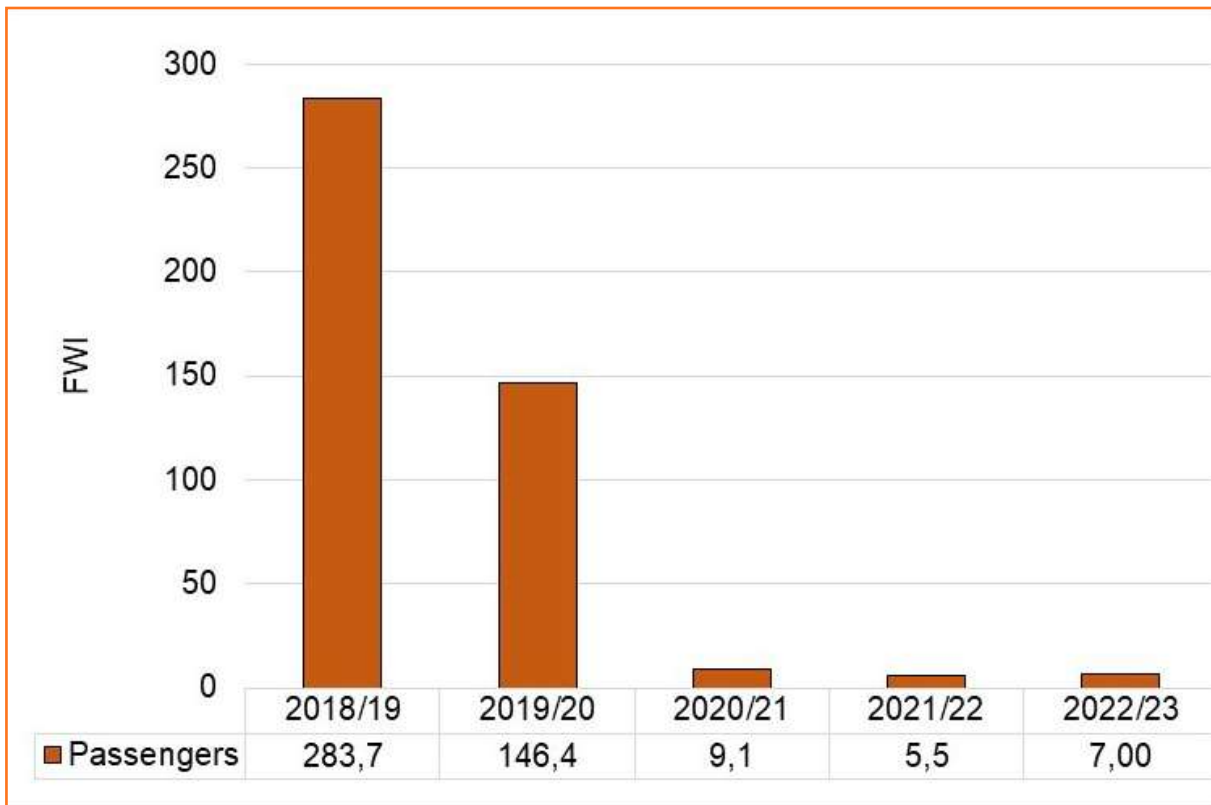


Figure 15: The 2018/19 to 2022/23 reporting period FWI for passengers

Figure 16 illustrates the risk profile for passengers for the 2018/19 to 2022/23 reporting period.

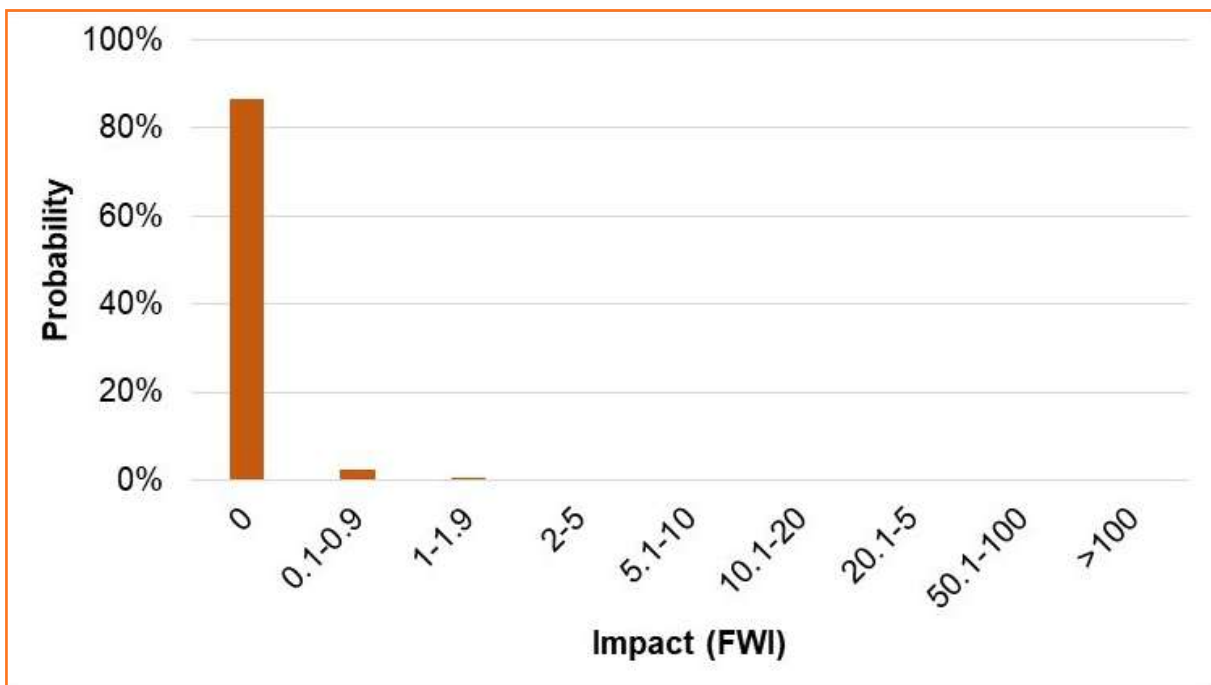


Figure 16: Risk profile for passengers (2018/19 to 2022/23)

The 2022/23 reporting period risk profile for passengers shows that once passenger-related operational occurrences happen, based on a FWI index basis:

- 86,6% of passengers were harm-free of these harmful operational safety occurrences;
- Less than one passenger FWI occurred in harmful operational safety occurrences.

Safety of the workforce²

From an operational occurrence perspective, the railway operators in South Africa ensure a safe working environment for employees and contractors. Figure 17 illustrates the calculation for workforce FWIs for the 2018/19 - 2022/23 reporting period.

The lowest FWI values for workforce harm were recorded respectively in the 2018/19 (0,9 FWI) and 2020/21 (1,2 FWI) reporting periods. Of all (109,5 FWIs) persons harmed during the 2022/23 reporting period as a result of operational safety occurrences, only 2% were suffered by employees and contractors.

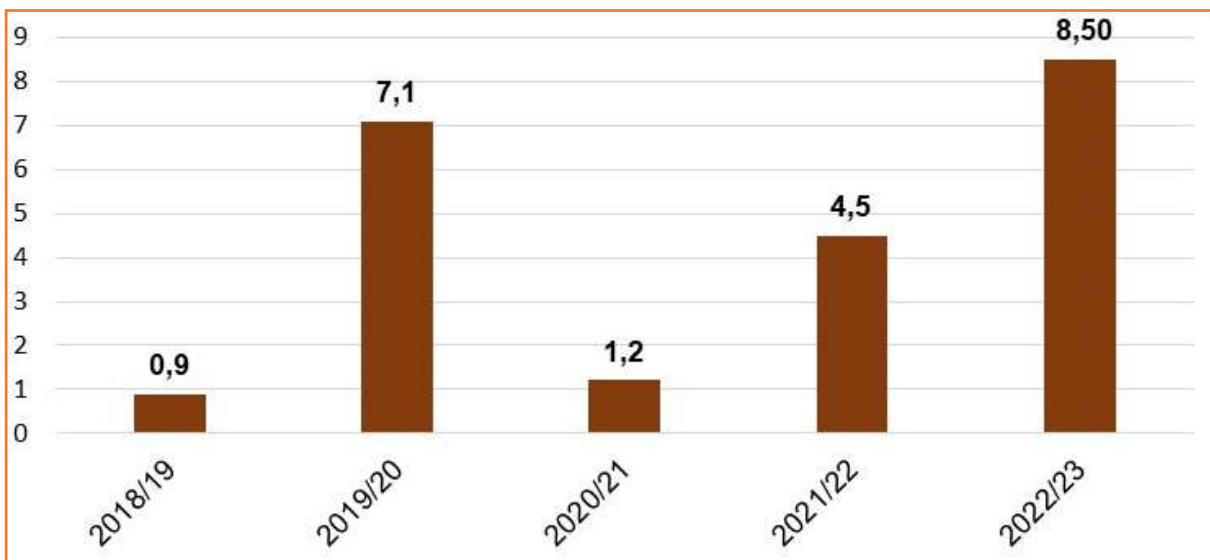


Figure 17: Workforce FWIs for 2018/19 - 2022/23

The 2022/23 reporting period risk profile for workforce (employees and contractors) in Figure 18 show that once workforce-related operational occurrences happen, based on a FWI index basis:

² The following SANS occurrence reporting categories were used to identify workforce harm: [E-b], [E-c], [E-e], [E-f], [F-b], [F-c], [H-c], [H-d], [H-e], [H-f], [I-c], [I-d], [I-e], [I-f], [J-b], [J-c], [J-e], [J-f], [J-h], [J-i], [J-k] and [J-l]

The 2022/23 reporting period risk profile for workforce (employees and contractors) in Figure 18 show that once workforce-related operational occurrences happen, based on a FWI index basis:

The workforce was not free of harmful operational occurrences in 2022/23. One FWI occurred in 36% of the cases and 2 FWI in 55% of harmful operational safety occurrences.

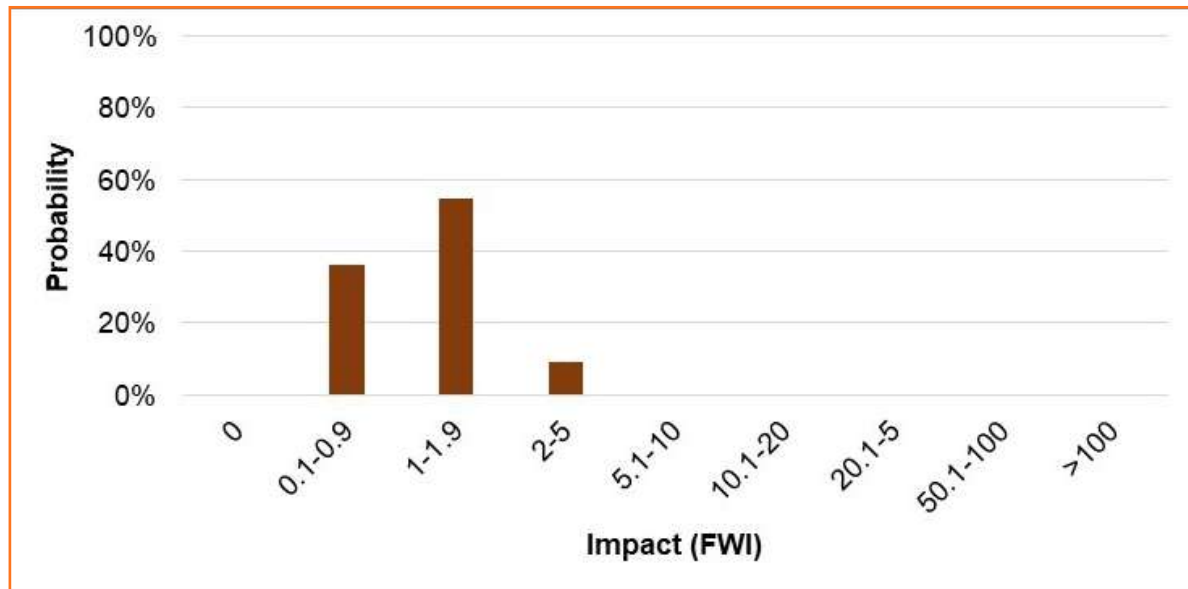


Figure 18: The 2022/23 risk profile for the workforce (employees and contractors)

Safety of the public³

In contrast to the workforce, FWI for the public remain higher, largely due to occurrence category [E] – People struck by trains during movement of rolling stock. From an operational occurrence perspective, the railway operators in South Africa do not provide a safe passenger rail environment for the public. Figure 19 illustrates the calculation for public FWIs for the 2018/19-2022/23 reporting period. Public FWIs for the 2022/23 reporting period is 74% lower than the long-standing trend since the 2018/19 reporting period.

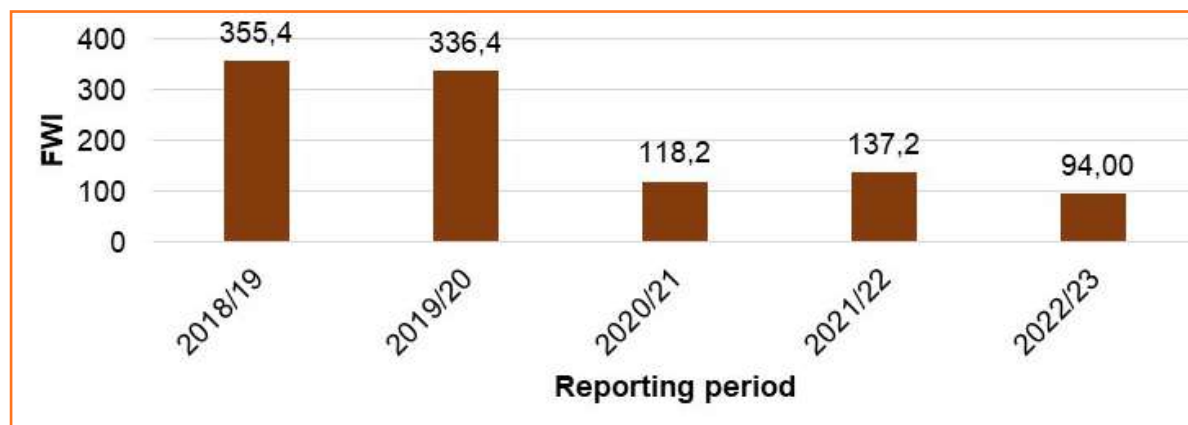


Figure 19: Public FWIs for 2018/19 to 2022/23 reporting period

³ The following SANS occurrence reporting categories were used to identify public harm: [D], [E-a], [E-d], [I-a], [J-a], [J-g] and [J-j]

A concerning issue in this analysis is that of all 109,5 (actual) persons harmed as a result of operational safety occurrences, 85% (94,0 FWIs) were suffered by the public (compared to 160 in 2021/22). This is 32% better than the 2021/22 reporting period.

The 2022/23 reporting period risk profile for the public presented in Figure 20 shows that once public-related operational occurrences happen, based on a FWI index basis:

- The public was harm free in only 20% of these operational safety occurrences.
- Less than one public FWI occurred in 25% of the operational safety occurrences.
- Operational occurrences associated with one to two public FWIs have a probability 29%.
- Operational occurrences associated with two to five public FWIs have a low probability (0,4%).

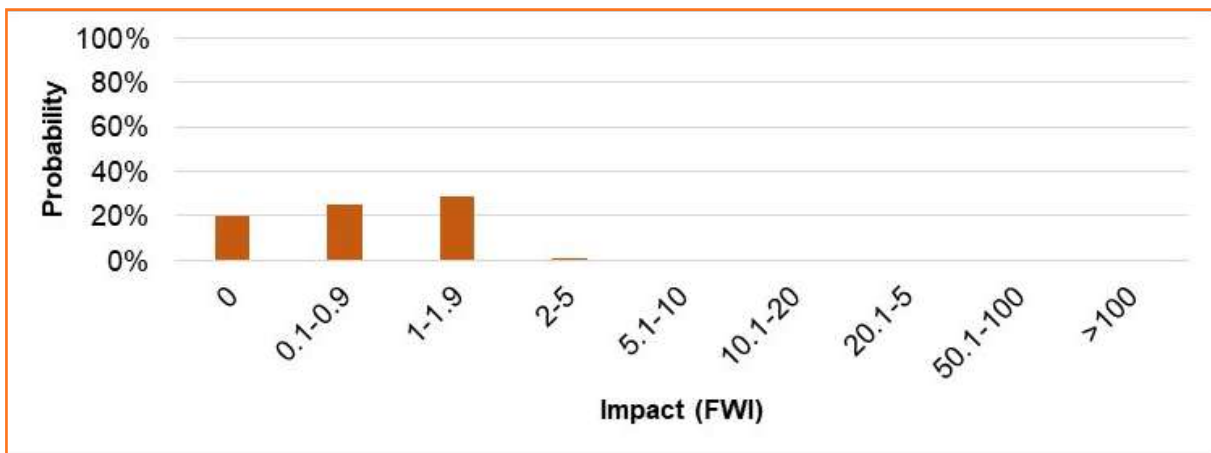


Figure 20: Risk profile for the general public (2022/23)



Security performance

The Act acknowledges that safety and security matters are interconnected amid the RSR playing a supporting role in railway security. Risk profiles and FWI values for passenger, workforce and public harm have not been calculated for this sub-section as they do not provide any further insights into the nature and severity of the security-related Incidents reported to the RSR.

Table 10-A and 10-B shows a 68% overall increase in harmful security-related incidents between 2021/22 and 2022/23 reporting periods. This is in contrast with an 80% decrease in the number of harmful security-related incidents since the 2018/19 reporting period.

Table 10-A: Security-related incidents per SANS Category

SANS CAT/ Reporting period	Security-related FATALITIES 2018/19 to 2022/23					
	2018/19	2019/20	2020/21	2021/22	2022/23	Total
1: Theft of assets	0	0	1	0	0	1
2: Malicious damage (vandalism)	1	0	1	3	0	5
3: Threats of operational safety	0	0	0	0	0	0
4: Train kidnapping or hijacking	0	0	0	0	0	0
5: Crowd-related occurrences	0	0	0	0	0	0
6: Industrial action	0	0	0	0	0	0
7: Personal safety on trains	9	3	1	0	0	13
8: Personal safety on stations	12	16	2	7	3	40
9: Personal safety outside station platform area	8	9	8	9	10	44
TOTAL	30	28	13	19	13	103

Table 10-B: Security-related incidents per SANS Category

SANS CAT / Reporting period	Security-related INJURIES 2018/19 to 2022/23					
	2018/19	2019/20	2020/21	2021/22	2022/23	Total
1: Theft of assets	2	1	1	0	0	4
2: Malicious damage (vandalism)	5	3	3	1	2	14
3: Threats of operational safety	0	0	0	0	0	0
4: Train kidnapping or hijacking	0	0	0	0	0	0
5: Crowd-related occurrences	0	0	0	0	0	0
6: Industrial action	5	0	0	0	0	5
7: Personal safety on trains	292	240	10	10	5	557
8: Personal safety on stations	210	157	24	40	28	459
9: Personal safety outside station platform area	70	57	23	28	23	201
TOTAL	584	458	61	79	58	1 240

Table 11 shows all of the SANS-3000 categorised security-related incidents reported by operators to the RSR since the 2018/19 reporting period.

Table 11: Security-related incidents per SANS Category

Reporting year	2018/19	2019/20	2020/21	2021/22	2022/23					
SANS Category	All	All	All	All	All	TFR	PRASA	Other	Var 2018/19	Var 2022/23
1: Theft of assets	6291	7180	6390	6033	6782	6307	468	7	7%	6%
2: Malicious damage (vandalism)	1810	1884	1462	1318	1653	1343	236	74	-9%	13%
3: Threats of operational safety	66	64	30	4	11	10	1	0	-83%	-63%
4: Train kidnapping or hijacking	Train kidnapping or hijacking' has been recorded as category 3 'Threats of operational safety', as the descriptions of the incidents pertained to threats to operational safety and not the SANS definition of 'kidnapping' and/or 'hijacking'.									
5: Crowd-related occurrences	35	11	8	7	9	9	0	0	-74%	13%
6: Industrial action	35	28	12	9	16	16	0	0	194%	33%
7: Personal safety on trains	461	389	22	27	17	6	11	0	-96%	-23%
8: Personal safety on stations	429	312	60	94	81	23	57	1	-81%	35%
9: Personal safety outside station platform area	141	128	68	76	74	23	50	1	-48%	9%
TOTAL	9268	9996	8052	7568	8643	7737	823	83	-6%	7%

All categories show an overall 14% year-on-year worsening since the 2021/22 reporting period and an 18% improvement since the 2018/19 reporting period.

Figure 21 indicates that TFR experienced 89.5% of the security-related incidents during the 2022/23 reporting period, PRASA 9.5%, and the other operators 1%.

Figure 21 also shows the alarming trend of a steadily increasing number of security-related incidents reported by operators. Security-related incidents decreased by 18% between the 2018/19 reporting period and the 2022/23 reporting period but increased by 14% since the 2021/22 reporting period.

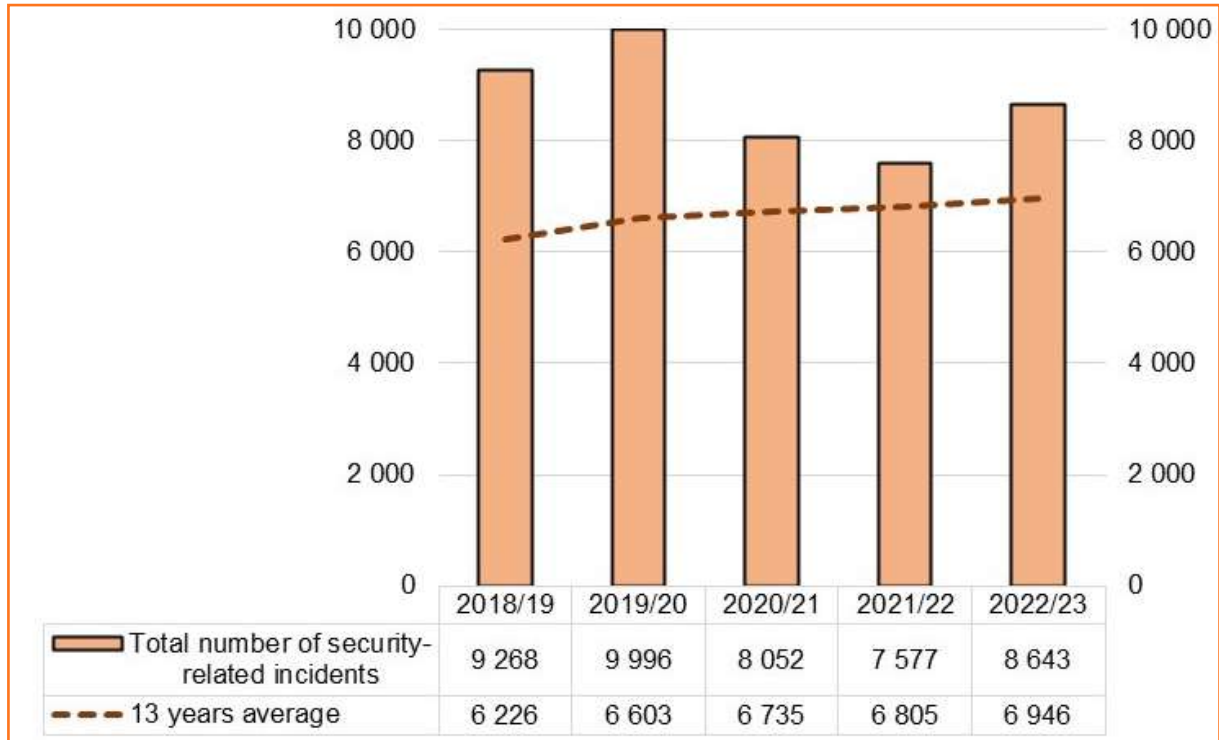


Figure 21: Total number of security-related incidents reported by all operators since 2018/19 reporting period.

Figure 22 presents the breakdown of security-related incidents at PRASA since the 2018/19 reporting period. The area of the pie chart is scaled to the number of security-related incidents for a specific reporting period. In the 2022/23 period, incidents dropped by 82% from 2018/19 and 40% from 2021/22. However, when adjusted for a million train km, incidents in 2022/23 rose by 51% from 2018/19 and 136% from 2021/22. This trend is alarming given that over 5 years PRASA produced 88% fewer train km since the 2018/19 reporting period and 74% fewer train km on a year-on-year when comparing the 2021/22 reporting period km to the 2022/23 reporting period recorded km.

PRASA security-related Incidents	2018/19	2019/20	2020/21	2021/22	2022/23	2022/23 vs 2018/19	2022/23 vs 2021/22
Number of security-related Incidents	4 627	4 658	2 005	1 361	823	-82%	-40%
Number of security-related Incidents per million train km	230	261	1 075	147	348	51%	136%

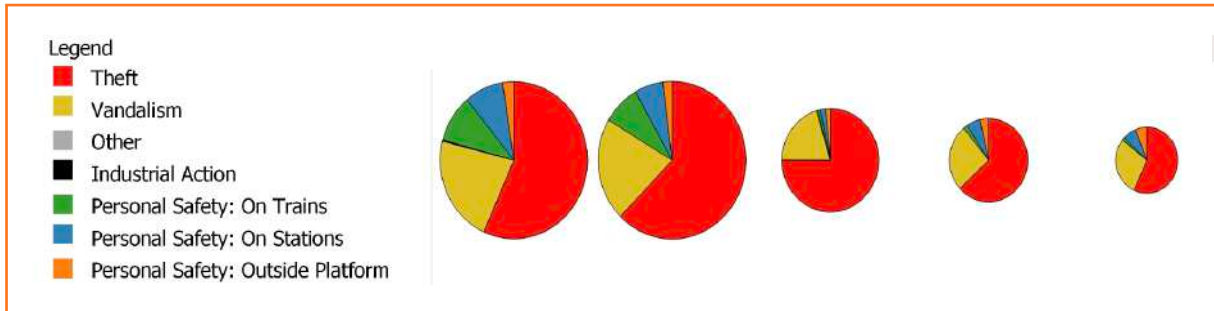


Figure 22: Breakdown of PRASA-reported security-related incidents since the 2018/19 reporting period

In the 2018/19 reporting period, theft represented 68% of all security-related and malicious damage to property (vandalism) 20%. These figures for the 2022/23 reporting period were 79% and 19% respectively.

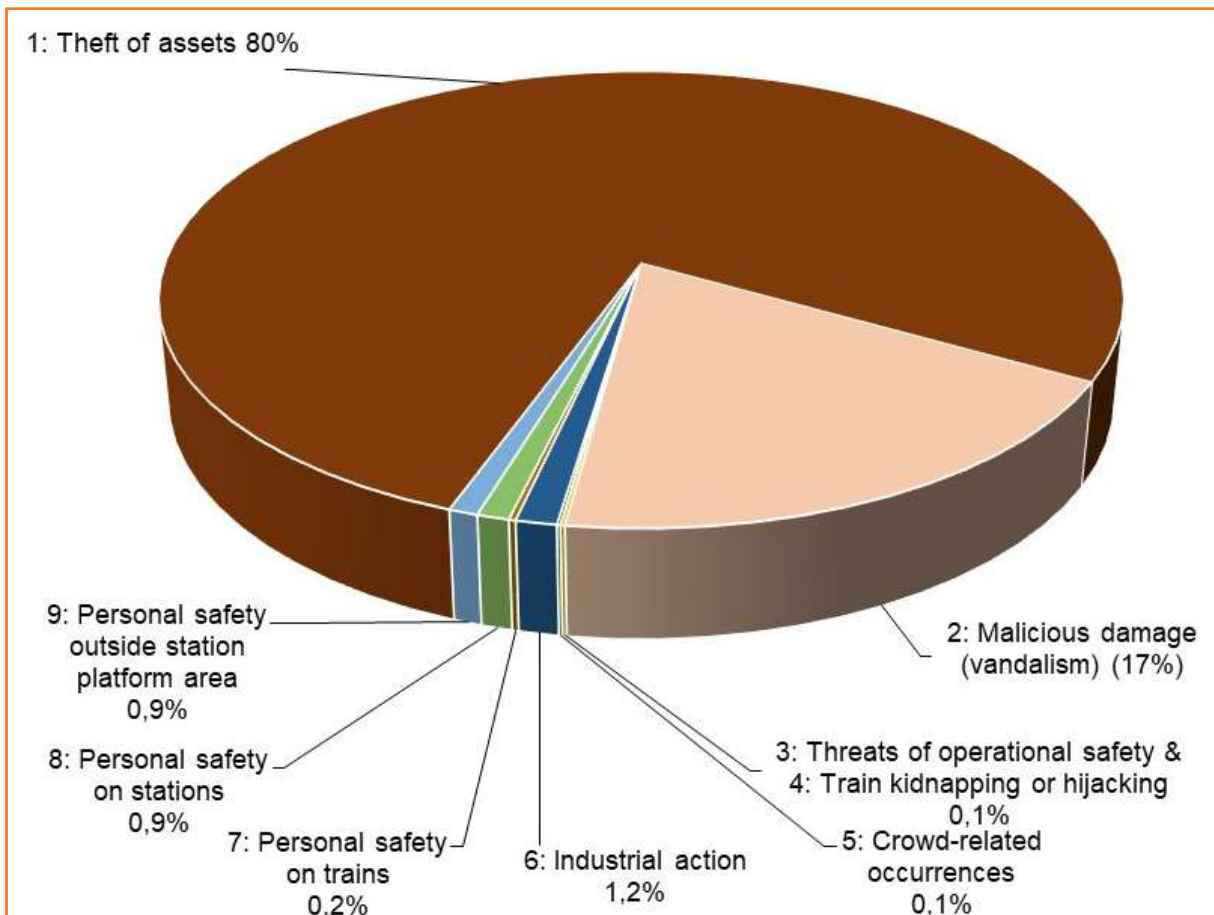


Figure 23: Percentage of security-related incidents per SANS Category for 2022/23 reporting period

Figure 24 shows the ongoing dominance of theft and malicious damage to property (vandalism) at all rail operators.

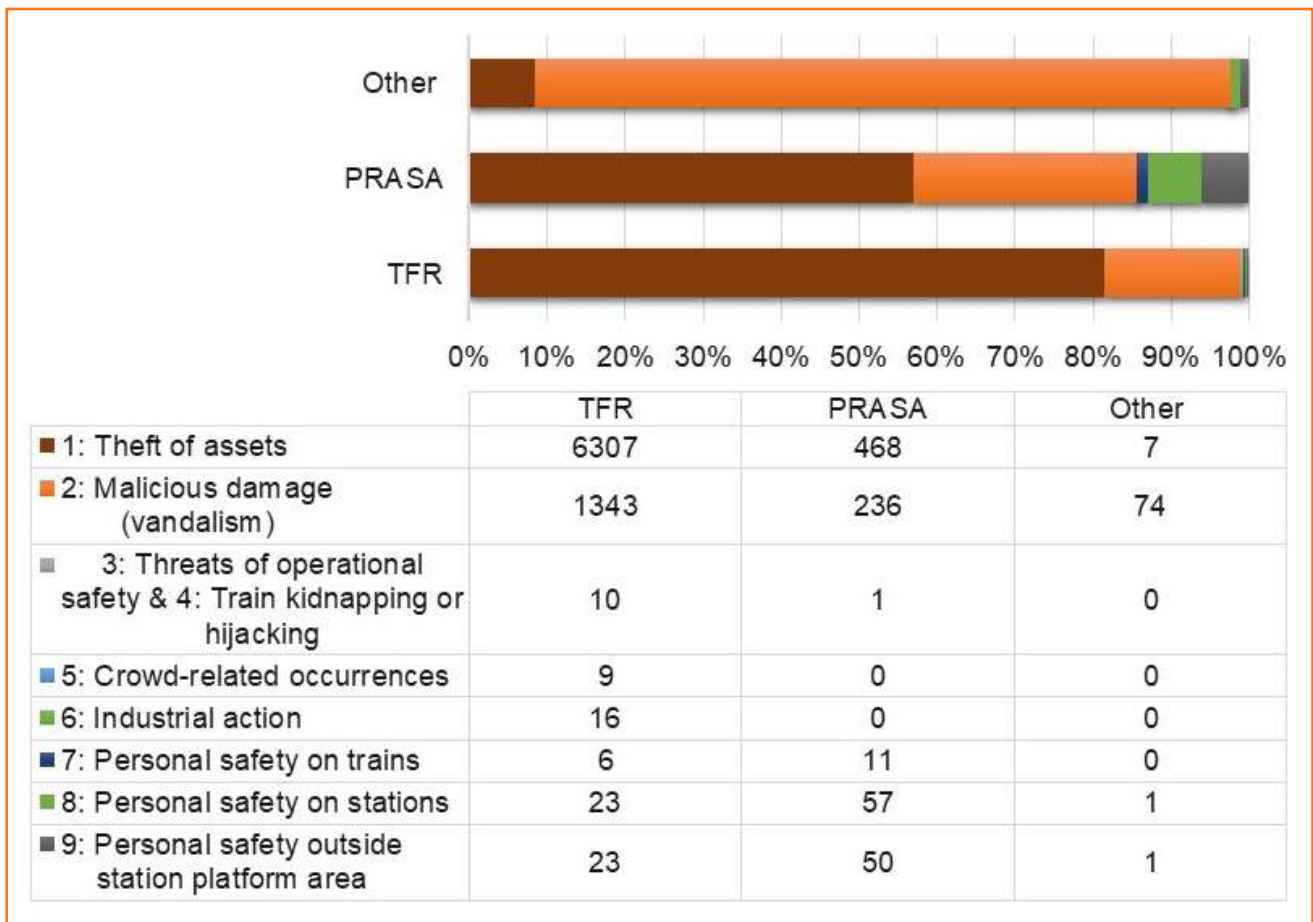


Figure 24: Number of security-related incidents per operator for 2022/23 reporting period

Figure 25 (fatalities) and Figure 26 (injuries) indicate that most security-related incidents resulted from risks to personal safety. In the 2022/23 reporting period, 10 out of 13 (77%) fatalities were recorded from Category 9, “Personal safety outside station platform area”. The rest of the fatalities was recorded under Category 8, “Personal safety on stations”. Similarly, in the 2022/23 reporting period, 23 out of 58 (40%) fatalities were recorded from Category 9, “Personal safety outside station platform area”, 28 out of 58 (44%) were recorded under Category 8, “Personal safety on stations”, 5 out of 58 (9%) were recorded under Category 5, “Personal safety on stations”, and 2 out of 58 (9%) recorded under Category 2, “Malicious damage (vandalism)”.

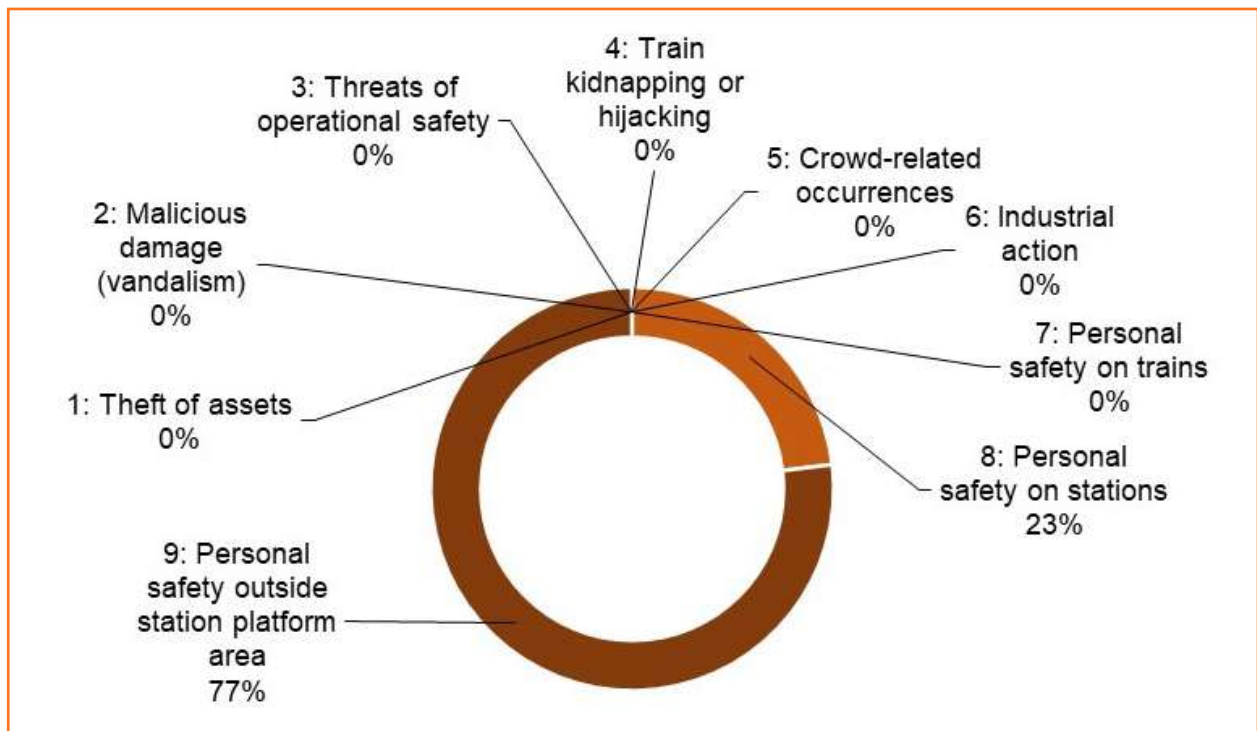


Figure 25: The 2022/23 reporting period security-related fatalities per SANS categories



Figure 26: The 2022/23 reporting period injuries as a result of security-related incidents per SANS categories





Analysis on Railway Operational Occurrences and Security- Related Incidents

Analysis on Railway Operational Occurrences and Security- Related Incidents

The analysis which follows in the sections hereafter was dominantly conducted through the South African National Standard (SANS 3000-1). As part of the changes in the reporting process, during the 2022/23 reporting period, the Regulations Regarding the Category and Type of all notifiable railway occurrences to be reported to the Chief Executive Officer of the Railway Safety Regulator was published on 02 March 2023. Clause 16 of the Regulations stipulates that these regulations are called Regulations On Notifiable Railway Occurrences, 2022 (RONO). The intention was to implement these regulations on 01 April 2023 as part on the new reporting period. However, there were challenges experienced on some parts of the regulations which needed to be corrected. After the corrections, the implementation notice was subsequently issued by the RSR on 22 June 2023. Therefore, the analysis using the new categories as contained in the RONO will dominantly be used in the subsequent reports. In the current report, the new categories will be considered in some parts of the analysis.

Collisions during movement of rolling stock

This section on collisions covers the safety risks related to collisions during movement of rolling stock. Both the SANS and RONO cover these occurrences as Category A with the following subcategories:

- [A-a] a collision between rolling stock on a running line;
- [A-b] a collision of rolling stock with an obstruction on a running line (including road vehicles that collide with rolling stock;
- [A-c] a collision of rolling stock with a stop block on a running line;
- [A-d] a collision of rolling stock other than on a running line;
- [A-e] a collision of rolling stock with an obstruction other than on a running line; and
- [A-f] a collision of rolling stock with a stop block other than on a running line.

Note: *Level-crossing collisions or persons struck by rolling stock in motion are excluded from this category. Special attention is given to collisions between rolling stock on running lines [A-a] as this sub-category presents with the greatest overall risk. Running lines pertain to railway tracks in the yards, depots and the mainline.*

A total of 599 collisions were reported in the 2022/23 reporting period. Important to note here is that since the 2018/19 reporting period to 2022/23 reporting period, operators produced 42% fewer train km.

2022/23 Headlines

- Zero fatalities and 24 injuries from collisions recorded during the 2022/23 reporting period.
- A total 90% of the 3 636 collisions between 2018/19 and 2022/23 reporting periods were reported in subcategory A-b “a collision of rolling stock with an obstruction on a running line (including road vehicles that collide with rolling stock)”.
- Train operators completed 14,5% fewer train km in 2022/23 reporting period and 42% fewer train km than in 2018/19 reporting period.
- Between the 2018/19 and 2022/23 reporting periods, Transnet Freight Rail (TFR) reported three times more collisions than derailments, and PRASA reported 4,4 times more derailments than collisions.
- The Gauteng province was responsible for 94% of all train collision harm since the 2018/19 reporting period.

Safety performance

Table 9 shows that 90% of the 3 636 collisions between the 2018/19 and 2022/23 reporting periods were reported in subcategory A-b “a collision of rolling stock with an obstruction on a running line including road vehicles that collide with rolling stock”.

Table 12: Collisions subcategories 2018/19 to 2022/23 reporting period

Collisions	2018/19	2019/20	2020/21	2021/22	2022/23	Variation 2021/22
A-a	12	6	9	14	8	-42,9%
A-b	797	771	609	571	514	-10,0%
A-c	1	2	2	2	1	-50,0%
A-d	19	30	20	34	23	-32,4%
A-e	36	25	14	26	41	57,7%
A-f	8	13	11	5	12	140,0%
Total	873	847	665	652	599	-8,1%

Train operators completed 14,5% fewer train km in the 2022/23 reporting period and 42% fewer train km than in the 2018/19 reporting period. On a normalised basis (per million train km), Figure 27 shows the dominance of SANS Category A-b a collision of rolling stock with an obstruction on a running line (including road vehicles that collide with rolling stock).

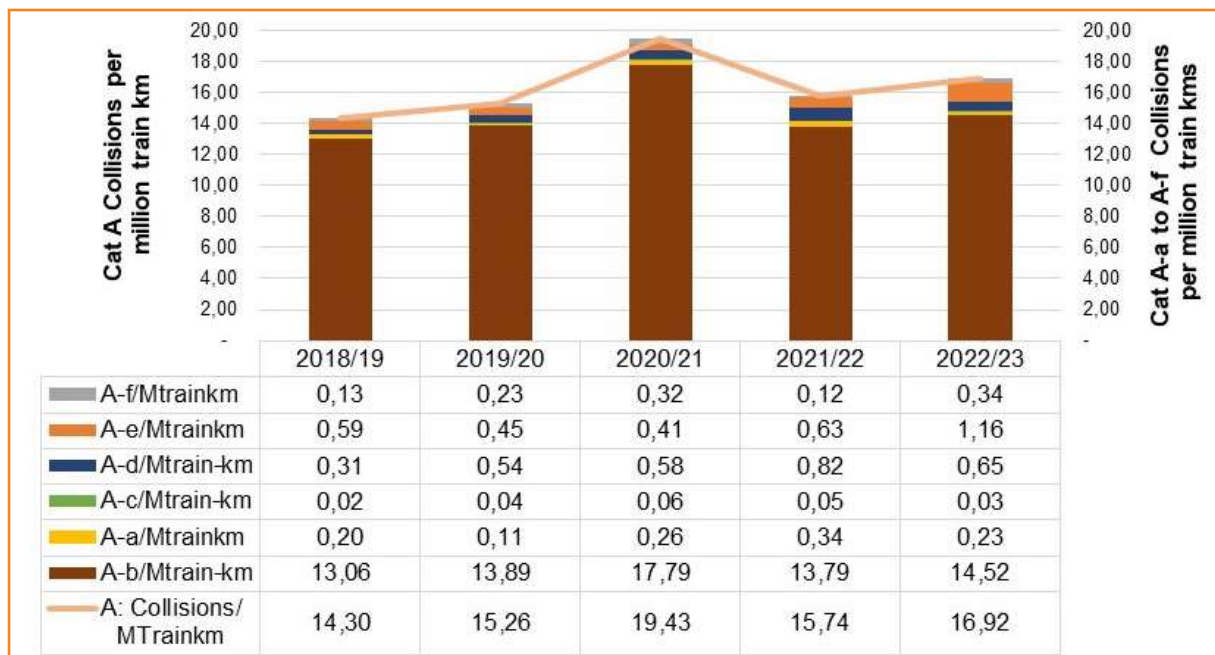


Figure 27: SANS Category A collisions and its subcategory occurrences per million train km

NOTE: The peak during the 2020/21 reporting period resulted from a 38% drop in train km (the normalization denominator) during that year as the PRASA train services essentially collapsed due to the COVID-19 hard lockdown and rampant theft and vandalism of the PRASA network. The peak in the 2022/23 reporting period, resulted from a 15% drop in train km. Since the 2018/19 reporting period, operators produced 42% fewer train km.

Table 13 shows TFR and PRASA's collision data normalised per million train km for the last 5 years. Between the 2018/19 and 2022/23 reporting periods, TFR reported three times more collisions than derailments and PRASA reported 4,4 times more derailments than collisions.

Table 13: Collisions normalised per million train km for TFR and PRASA

COLLISIONS (NORMALIZED PER MILLION TRAIN KM)					
Operator/ Reporting Period	2018/19	2019/20	2020/21	2021/22	2022/23
TFR	21,5	24,0	21,6	22,2	21,6
PRASA	2,8	2,6	1,6	2,3	7,6

TFR produced 30% fewer train km since the 2018/19 reporting period and 1% more collisions per million train km in the 2022/23 reporting period. PRASA produced 88% fewer train km since the 2018/19 reporting period and recorded 173% more collisions per million train km in the 2022/23 reporting period.

Figure 28 shows the provincial breakdown of FWI due to collisions since the 2018/19 reporting period. FWIs were dominated by Gauteng province (94%).

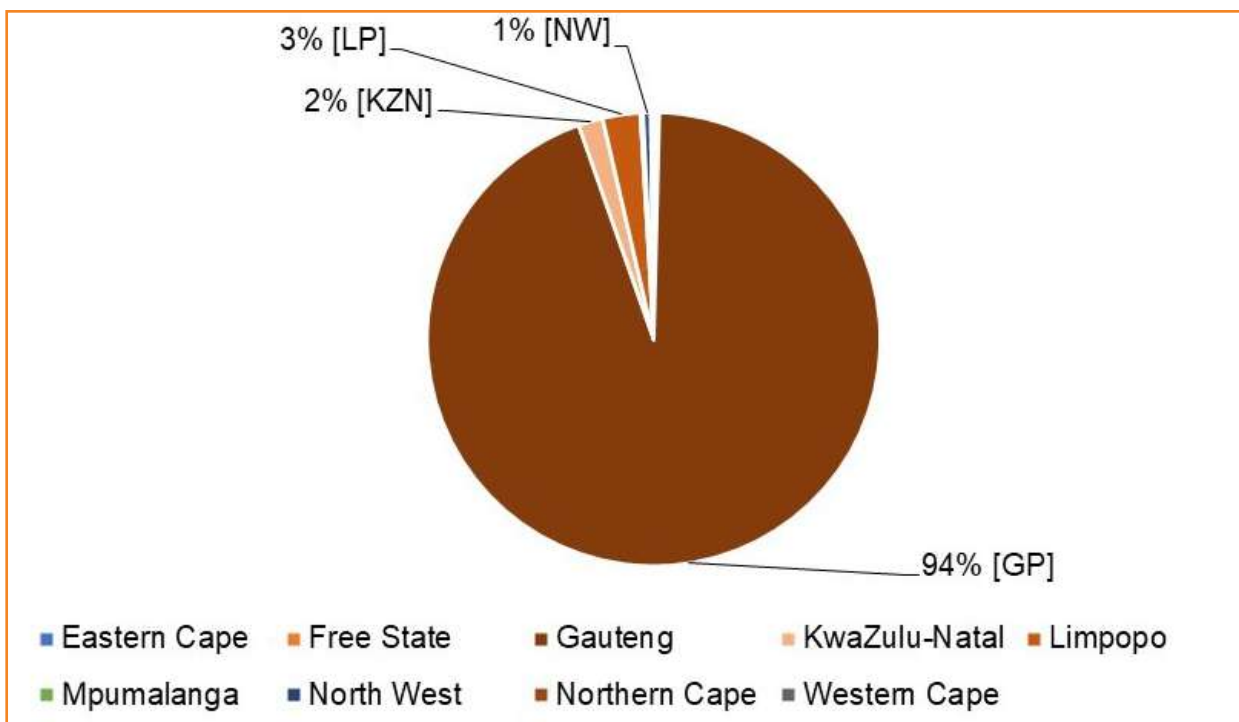


Figure 28: The 2018/19 to 2022/23 reporting periods FWI arising from collisions per province

Figure 29 illustrates how each of the SANS Category A subcategories contribute to the total number of collisions during movement of rolling stock recorded for the period 2018/19-2022/23 reporting period. Collisions with an obstacle on a running line (including road vehicles colliding with rolling stock) [A-b] contributed to almost 89,7% of all the train collisions during the 2018/19 – 2022/23 reporting periods. Collisions between rolling stock on a running line [A-a] were responsible for only 1,3% of train collisions.

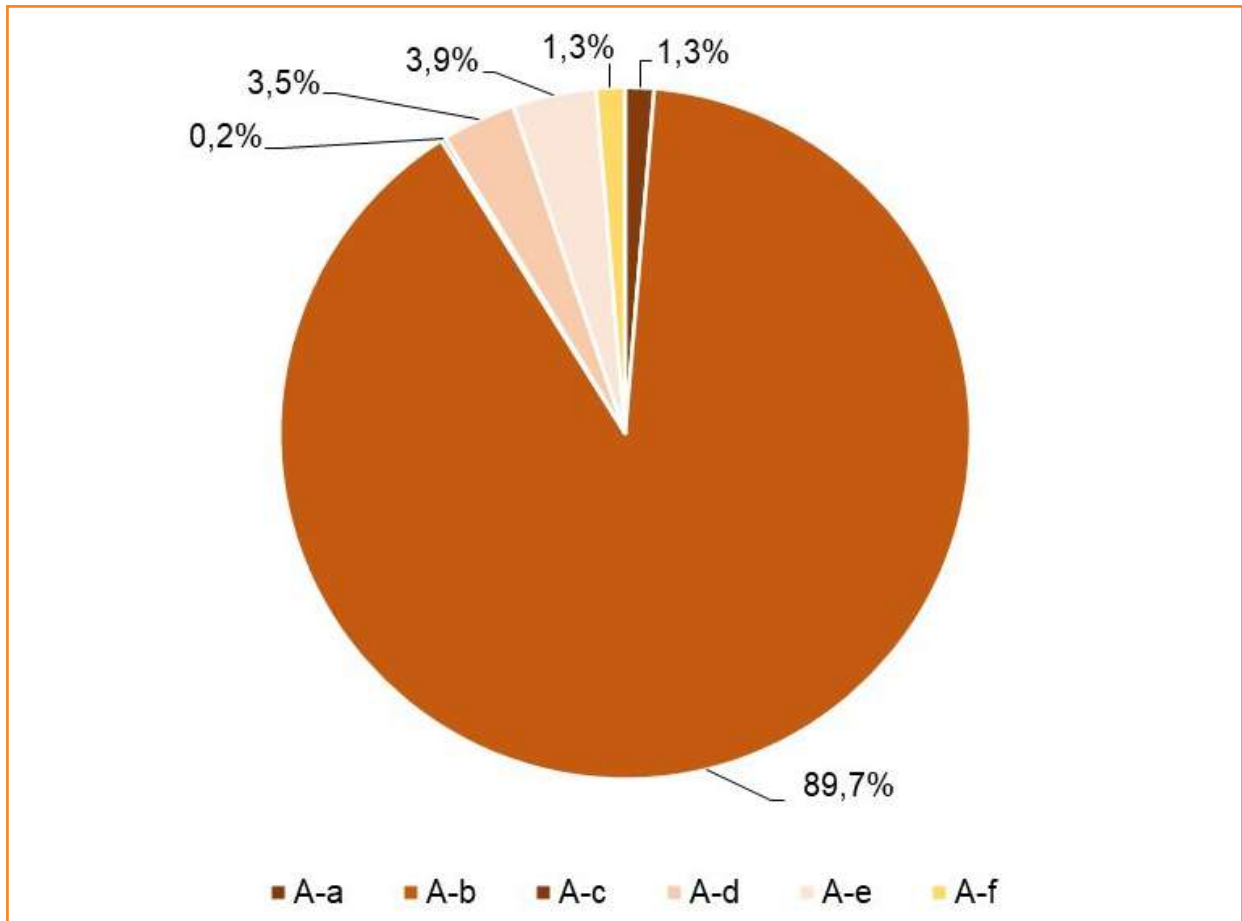


Figure 29: The 2018/19 to 2022/23 percentage distribution of train collisions as per SANS sub-categories

Figure 30 and Figure 31 illustrate that category [A-b] a collision of rolling stock with an obstruction on a running line (including road vehicles that collide with rolling stock) dominate the FWI since the 2021/22 reporting period thus displacing the 2018/19 to 2020/21 reporting periods of category [A-a] a collision between rolling stock on a running line. Although the FWI indicator is designed to amplify large-scale injury-prone events such as passenger train derailments or collisions, the lack of passenger rail activity in the 2022/23 reporting period amplified the FWI associated with freight rail services.

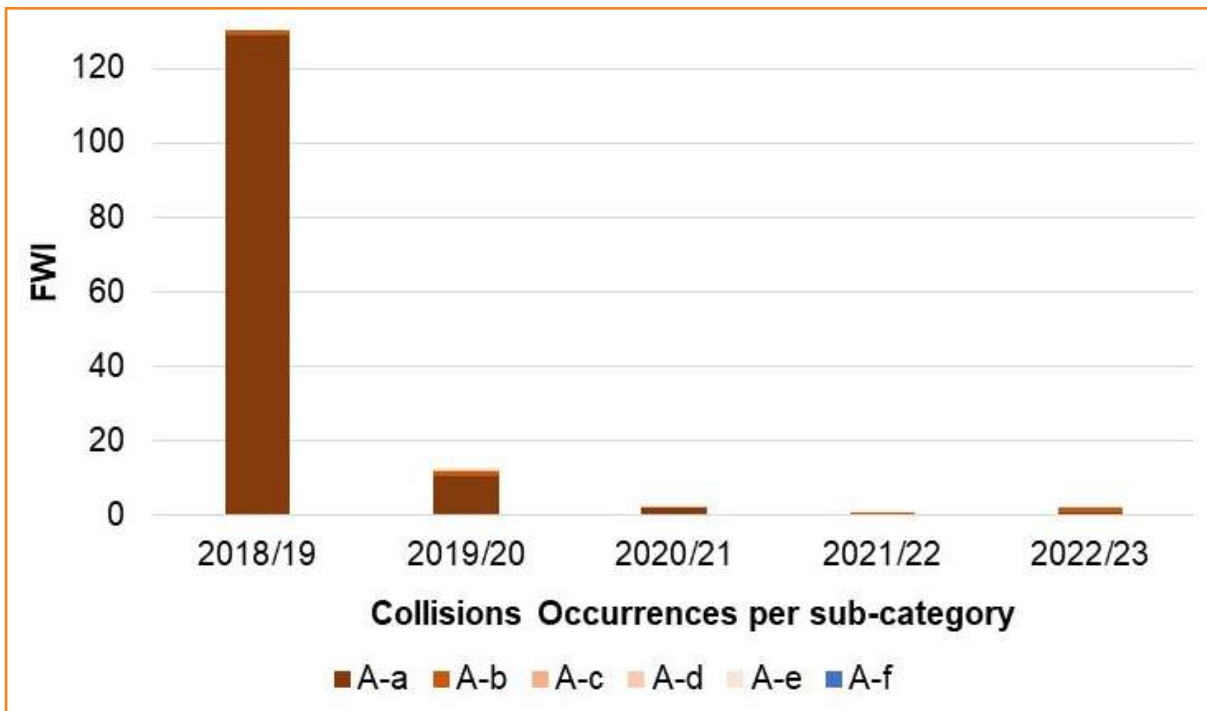


Figure 30: The 2018/19 to 2022/23 reporting period actual contribution of train collisions as per SANS sub-category to the overall FWI for train collisions

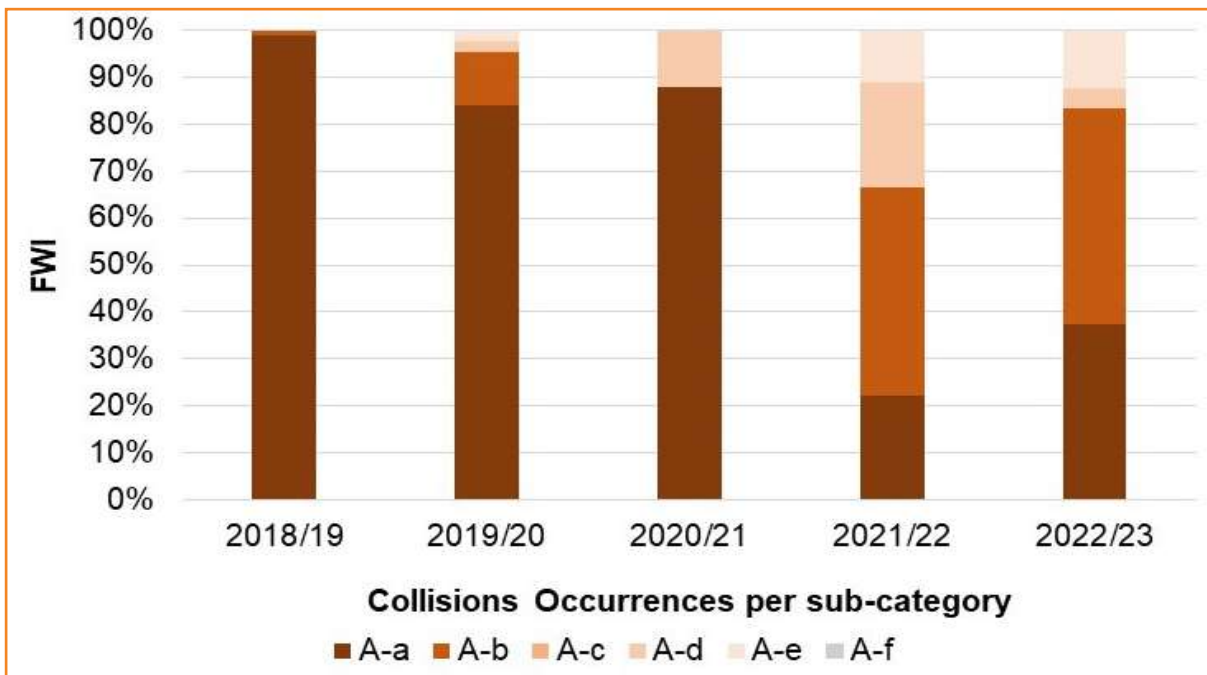


Figure 31: The 2018/19 to 2022/23 reporting period percentage contribution of train collisions as per SANS sub-category to the overall FWI for train collisions

Except for the three significant PRASA collisions in the 2018/19 reporting period (dominated by the collisions in Mountainview where 861 passengers were injured), Figure 32 shows that overall harm from collisions between rolling stock on a running lines [A-a] and collisions of rolling stock with an obstruction on a running line (including road vehicles that collide with rolling stock) [A-b] remained low during the subsequent years when the PRASA railway services remained curtailed.

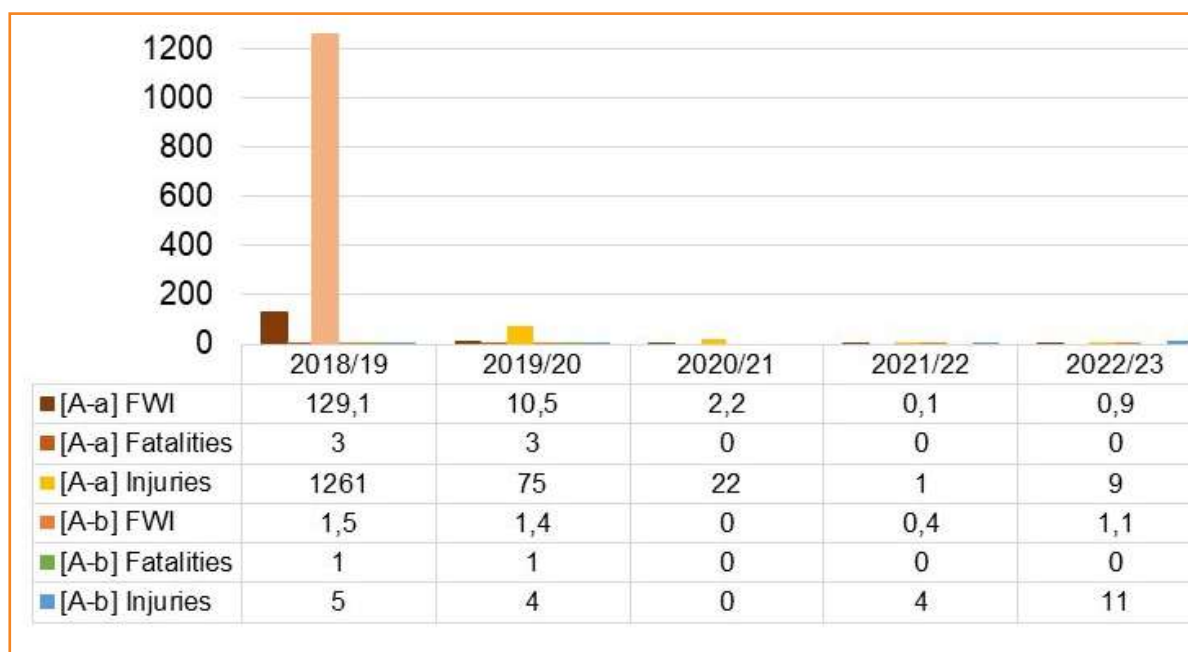


Figure 32: Fatalities Injuries and FWI from collision between rolling stock on a running line [A-a] and rolling stock with an obstruction on a running line (including road vehicles that collide with rolling stock) [B-b]

Figure 33 shows that since the 2020/21 reporting period, there were zero fatalities and 24 injuries from collisions.



Figure 33: Number of train collisions and related fatalities and injuries 2018/19 to 2022/23 reporting period.

Figure 34 reflects relative harm caused by collisions in South Africa at the aggregate level. The low FWI value is largely attributable to the dilutive effect of the TFR operations with many of its collisions involving few people compounded by the collapse of the PRASA passenger rail service.

Since the COVID-19 pandemic led to the collapse of the PRASA commuter rail service in the 2020/21 reporting period, the number of harm-free collisions now largely reflects the freight rail service and should not be taken as a fundamental improvement in harm-free train operations.

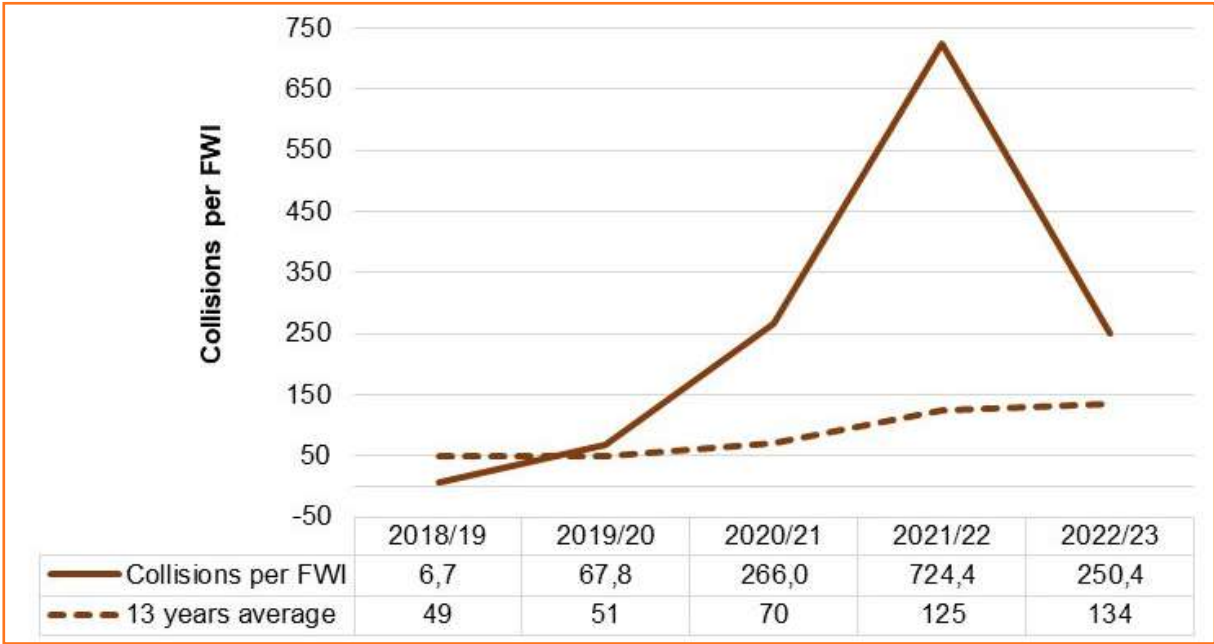


Figure 34: Harm-free collision ratios since 2018/19 reporting period



Derailments during movement of rolling stock

This section covers the safety risks of derailments during the movement of rolling stock on a running line. This section covers safety risks related to derailments during the movement of rolling stock, SANS occurrence Category B, which covers the following:

- [B-a] derailments of rolling stock on a running line;
- [B-b] derailments of rolling stock on a line other than a running line; and
- [B-c] derailments of rolling stock during tippler activities.

The section also presents information on the risk to passengers and the public. This analysis includes risks to the train crew and contractors when they are on or about the track and engaged in activities related to the movement of trains.

2022/23 Headlines

- 6% Decrease in total train derailments compared to the 2021/22 reporting period.
- 11% Increase in total train derailments per million train km compared to the 2021/22 reporting period.
- 28% Increase in derailments per million train km since the 2018/19 reporting period.
- Derailments of rolling stock on a running line [B-a] account for only 33% of all the recorded derailments but resulted in 78% of FWIs (25% of all fatalities and 94% of injuries) since the 2018/19 reporting period.
- The KwaZulu-Natal (46%), Mpumalanga (15%), Northern Cape (15%), Western Cape (15%), and Gauteng (8%) provinces account for all FWI harm to persons.

Safety performance

Figure 35 shows a 28% increase in all derailments per million train km since the 2018/19 reporting period despite a 42% decrease in million train km produced by operators.

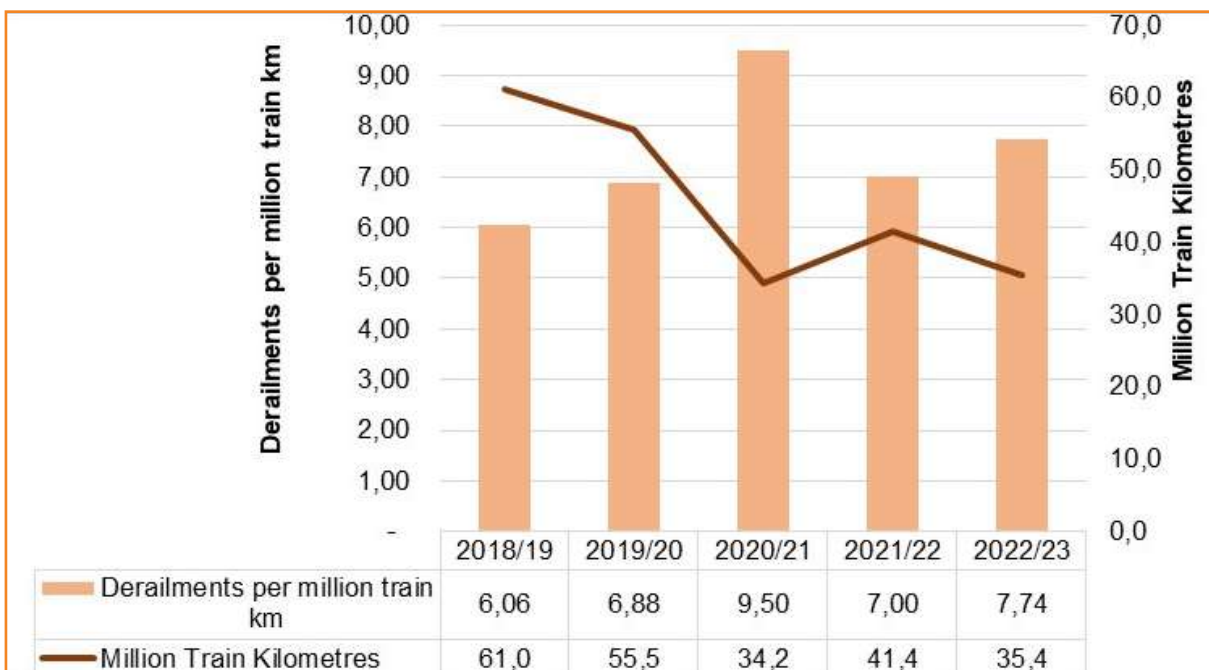


Figure 35: Trend on the number of train derailments per million train km from the 2018/19 to 2022/23 reporting period

The 2022/23 reporting period witnessed a decrease in total train derailments of 6% when compared to the 2021/22 reporting period. On a per-million train km normalised basis for the same reporting period (comparing 2021/22 and 2022/23), this is a 11% increase.

Table 14 shows total derailments normalised per million train km for TFR and PRASA since they are the largest two operators in South Africa. Between the 2018/19 reporting period and 2022/23 reporting period, TFR produced 30% fewer train km and 20% fewer derailments, and PRASA produced 20% fewer train km and 58% fewer derailments.

Table 14: Total derailments normalised per million train km for TFR and PRASA

Derailments normalised per million train km						
Operator/RP	2018/19	2019/20	2020/21	2021/22	2022/23	Variance 21/22 – 22/23
TFR	6,3	7,7	7,1	7,2	7,2	0%
PRASA	2,4	2,4	10,7	1,7	8,5	388%

Figure 36 depicts the overall number of train derailments and their respective consequences (fatalities, injuries, and FWIs) for the 2018/19 to 2022/23 reporting period.

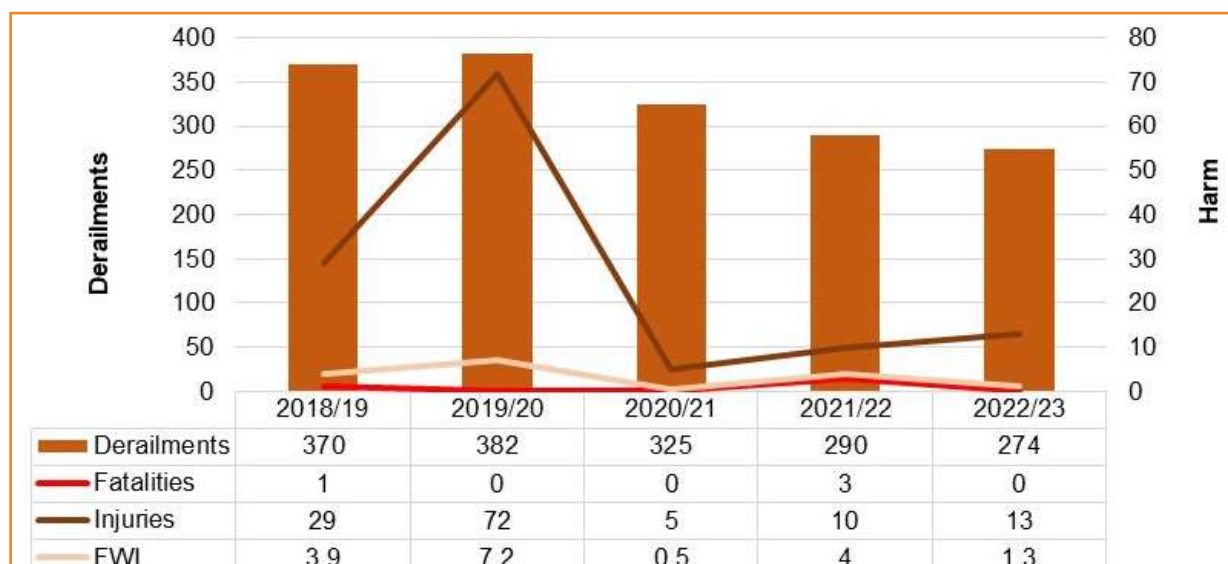


Figure 36: Number of train derailments and related fatalities, injuries and FWIs from the 2018/19 to 2022/23 reporting period

Derailments of rolling stock on a running line [B-a] (shown in Figure 37) accounted for only 33% of all derailments since the 2018/19 reporting period, 78% of FWIs, consisting of 25% recorded fatalities and 94% of injuries.

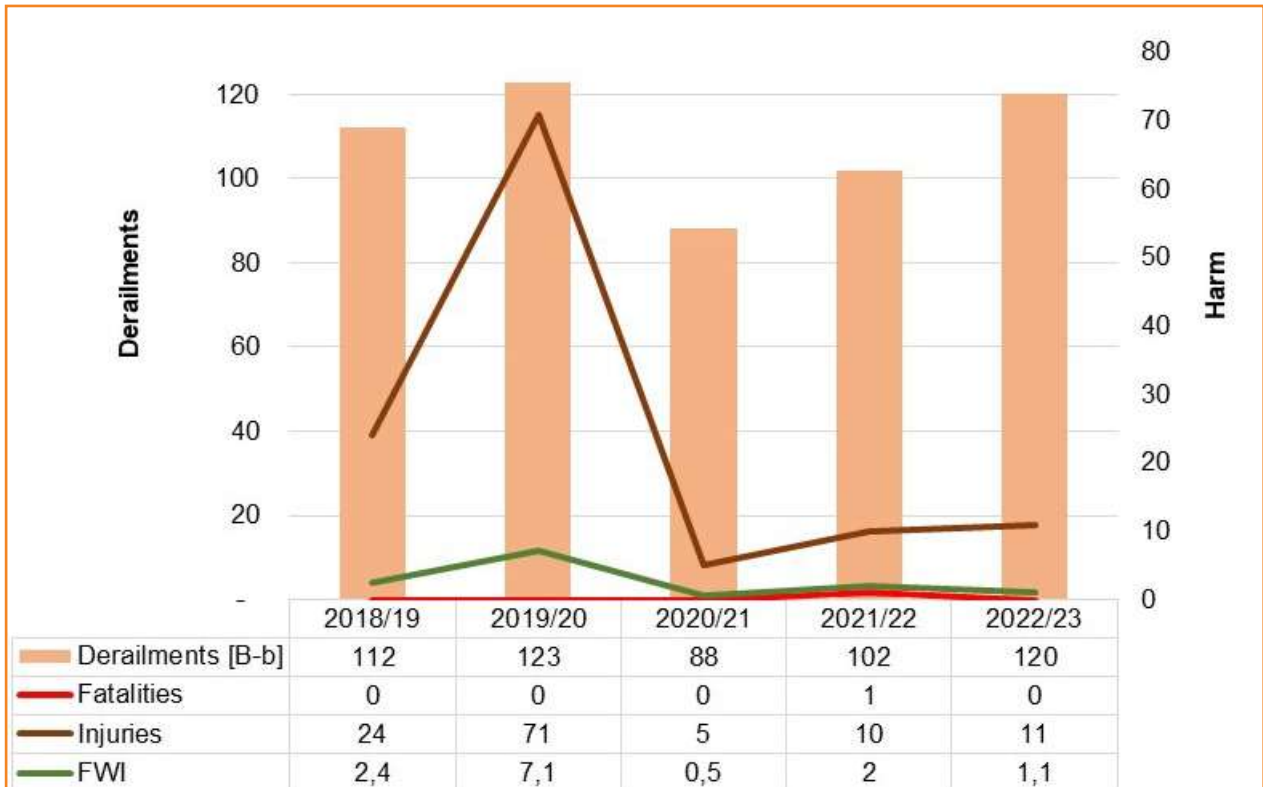


Figure 37: Total number of the 2018/19 to 2022/23 reporting period fatalities and injuries related to train derailments on running lines

Figure 38 shows the relative distribution for the provinces of the consequences of derailments expressed as FWI. Since the 2018/19 reporting period, three large-metro networked provinces account for the majority of the FWI consequences: Gauteng at 37%, and KwaZulu-Natal at 18%, and the Western Cape provinces at 26%. The provincial FWI contribution in the last reporting year, the 2022/23 reporting period, was quite different, with KwaZulu-Natal recording 46% of the FWIs, Gauteng only 8%, and 15% each in Mpumalanga, Northern Cape and Western Cape provinces.



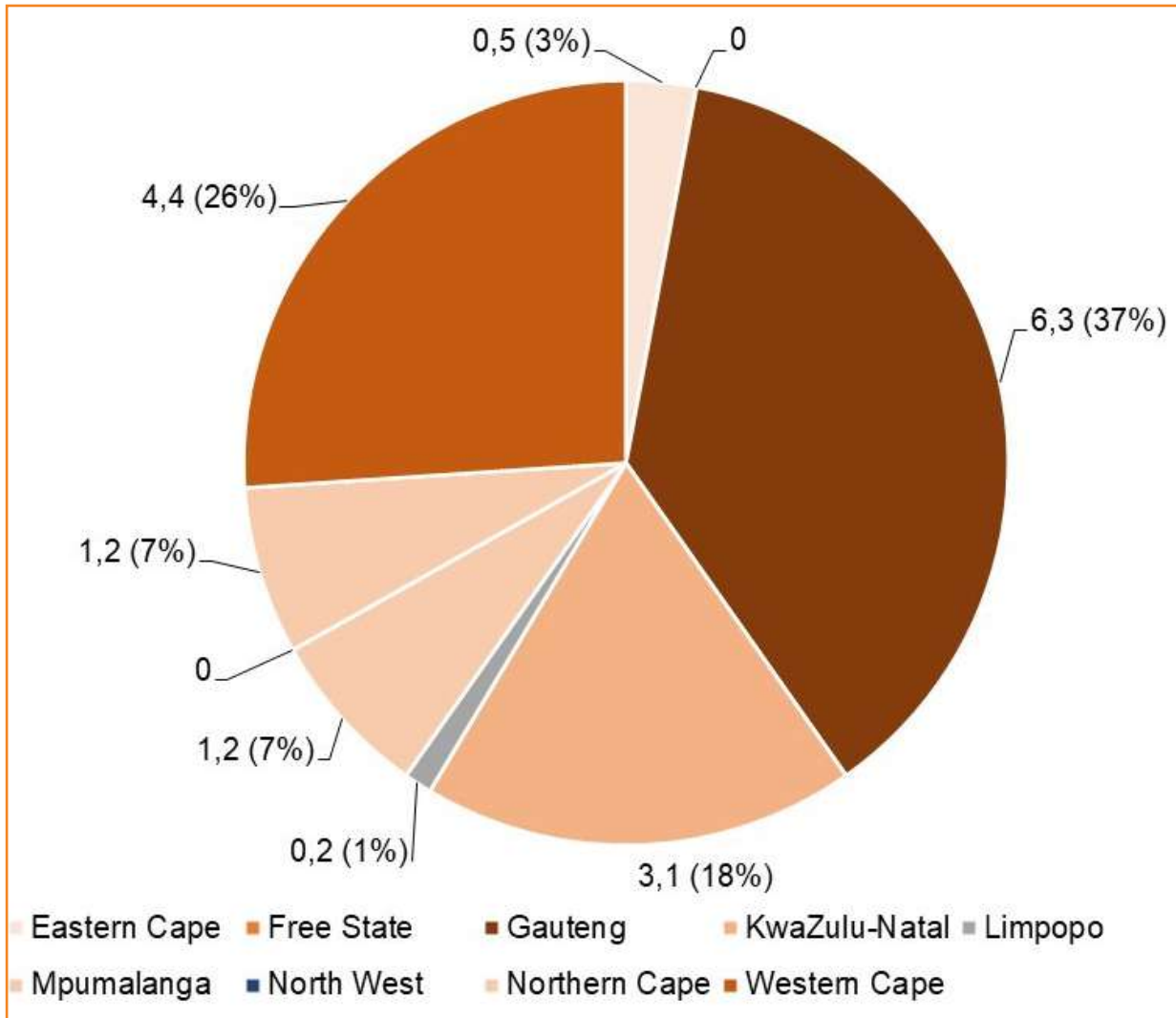


Figure 38: Geographical distribution of FWI consequences due to derailments expressed as FWI from the 2018/19 to 2022/23 reporting period.



Level Crossing Occurrences

This level crossings section presents an analysis of the risks arising from train accidents at level crossings. It also examines the relationships between occurrence sub-categories and their respective consequences. Distinctions are made between train passengers, pedestrians and road vehicle users (i.e. the public), and workforce (train drivers and assistants) for the 2022/23 reporting period to understand the risks of different road-rail user groups.

The section further covers the safety risks related to level crossings, where there is no grade separation for crossing trains and road vehicles or pedestrians. SANS occurrence Category D cover the following:

[D-a] Collisions between rolling stock and road vehicles (including motor vehicles, bicycles and animal-drawn vehicles) at a recognised level crossing on a running line;

[D-b] Collision between rolling stock and a road vehicle(s) (including motor-powered, bicycle or animal-drawn vehicles) on any line other than a running line (including yards, sidings and private sidings) at a recognised level crossing;

[D-c] A person(s) struck by rolling stock at an approved level crossing on a running line; and

[D-d] A person(s) struck by rolling stock at approved level crossing on a line other than a running line.

The chapter also examines level-crossing occurrence patterns using time series analysis (inclusive of seasonal variation and geographical distribution). A risk profile for level crossing illustrates the probability of a certain consequence class.

2022/23 Headlines

- North West (30%), KwaZulu-Natal (18%), Mpumalanga (18%), and the Western Cape provinces (11%) accounted for 77% of all level-crossing occurrences.
- 5% Decrease in level crossing occurrences from the 2021/22 to 2022/23 reporting period.
- Level crossing occurrences per million train km decreased by 6% overall since the 2018/19 reporting period.
- The 5-year average annual number of level-crossing occurrences is 94.
- The 2019/20 reporting period recorded the lowest level crossing occurrences per million train km of 1,8 – 10% less than in 2022/23. In the 2022/23 reporting period, the total number of level crossing occurrences per million train km decreased by 1% year-on-year.
- During the 2022/23 reporting period, six fatalities and 42 injuries were recorded because of level-crossings occurrences.
- Since the 2018/19 reporting period, there were 470 level-crossing occurrences resulting in 79 deaths, 250 injuries, and 104,0 FWIs.
- The overall level of harm at level crossings recorded in the 2022/23 reporting period was 10,2 FWIs compared to 15,4 FWI harm for the 2021/22 reporting period and long-term average harm of 20,8 since the 2018/19 reporting period.
- Most level crossing occurrences remain attributable to various factors. These include road user behaviour at level crossings, motorists who underestimate the speed of trains and disobeying level crossings warning signs. The uncontrolled vegetation further contributes to these occurrences. Therefore, road authorities and network operators need to increase their efforts to control the vegetation obstructing the railway line.

Safety performance

Table 15 shows an 18% decrease in level-crossing occurrences from the 2021/22 to 2022/23 reporting period. Since the 2018/19 reporting period, the average number of level-crossing occurrences was 94. The 2021/22 and 2023/23 reporting period level is now the lowest level of 73 level-crossing occurrences since the 2018/19 reporting period.

Table 15: Level Crossing occurrences by province since 2018/19 to 2022/23 reporting period

Province / Reporting Period	18/19	19/20	20/21	21/22	22/23	Total	Variation 21/22
North West	27	32	15	19	22	115	14%
KwaZulu-Natal	24	15	12	15	13	79	-15%
Western Cape	24	13	7	6	8	58	25%
Gauteng	13	7	5	1	1	27	0%
Mpumalanga	14	15	14	18	13	74	-38%
Free State	9	8	5	5	5	32	0%
Eastern Cape	11	5	4	5	4	29	-25%
Limpopo	7	5	2	5	5	24	0%
Northern Cape	4	4	9	3	2	22	-50%
Total	133	104	73	77	73	460	-5%

North West (30%), KwaZulu-Natal (18%), Mpumalanga (18%), and the Western Cape (11%) provinces accounted for 77% of all level-crossing occurrences (Figure 39).

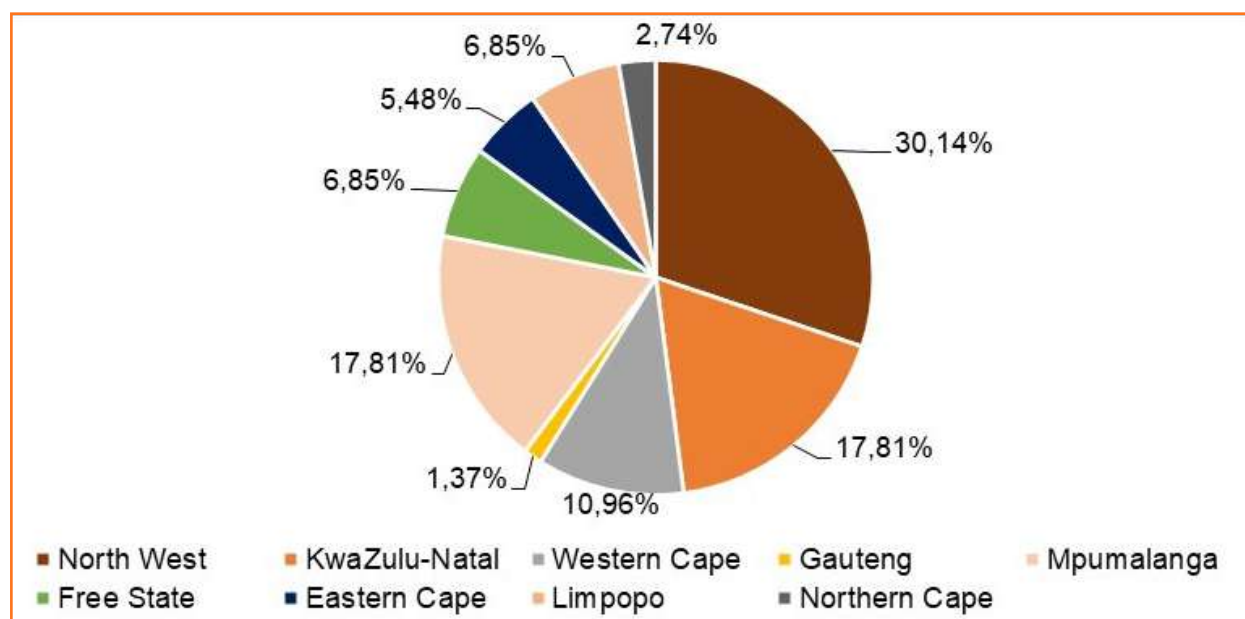


Figure 39: Level Crossing Occurrence by Province (2022/23)

Figure 40 shows the number of level-crossing occurrences and their consequences (fatalities, injuries and FWI) between the 2018/19 and 2022/23 reporting periods.

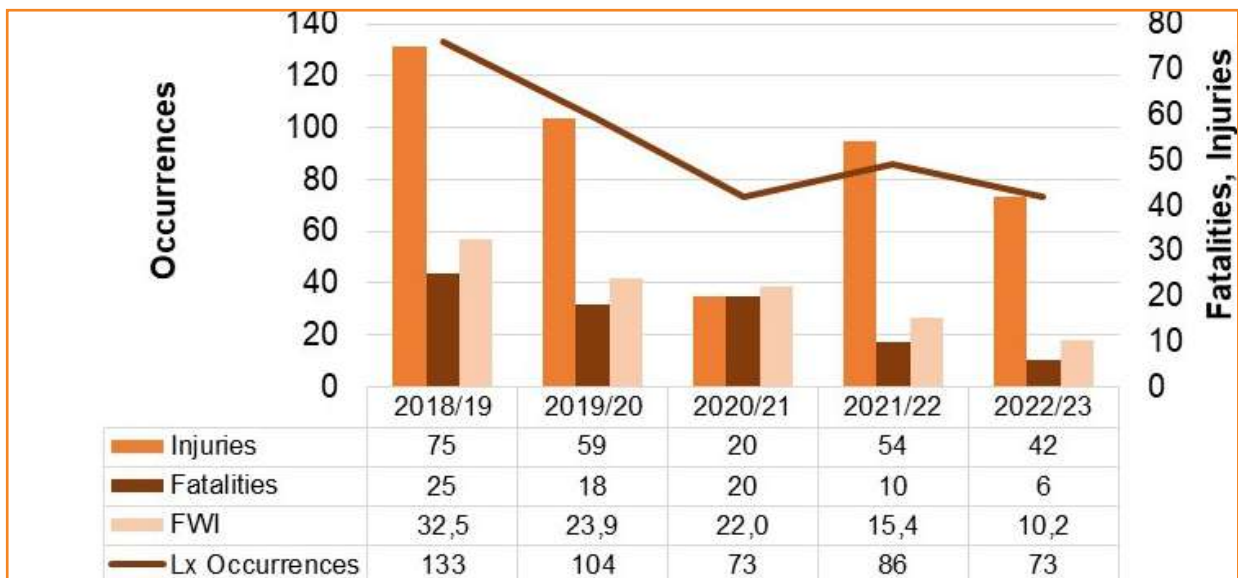


Figure 40: Respective fatalities and injuries consequences associated with the number of level crossing occurrences between 2018/19 and 2022/23 reporting periods.

On average annually, 16 people pass away tragically from level crossing occurrences since the 2018/19 reporting period, and the FWI per level crossing occurrence remains low at 0,22. By implication, this means 2 FWI is recorded for every 9 level crossing occurrences.

A more detailed analysis of the various level-crossing occurrence categories that examined the relationships between occurrences and consequences indicated that most level-crossing occurrences with substantial consequences occur on a running line and comprise collisions between rolling stock and road vehicles. This overall trend for level-crossing occurrences is dominated by level crossing occurrence subcategory Collisions between Rolling Stock and Road Vehicle/s on a Running Line [D-a] (Figure 41).

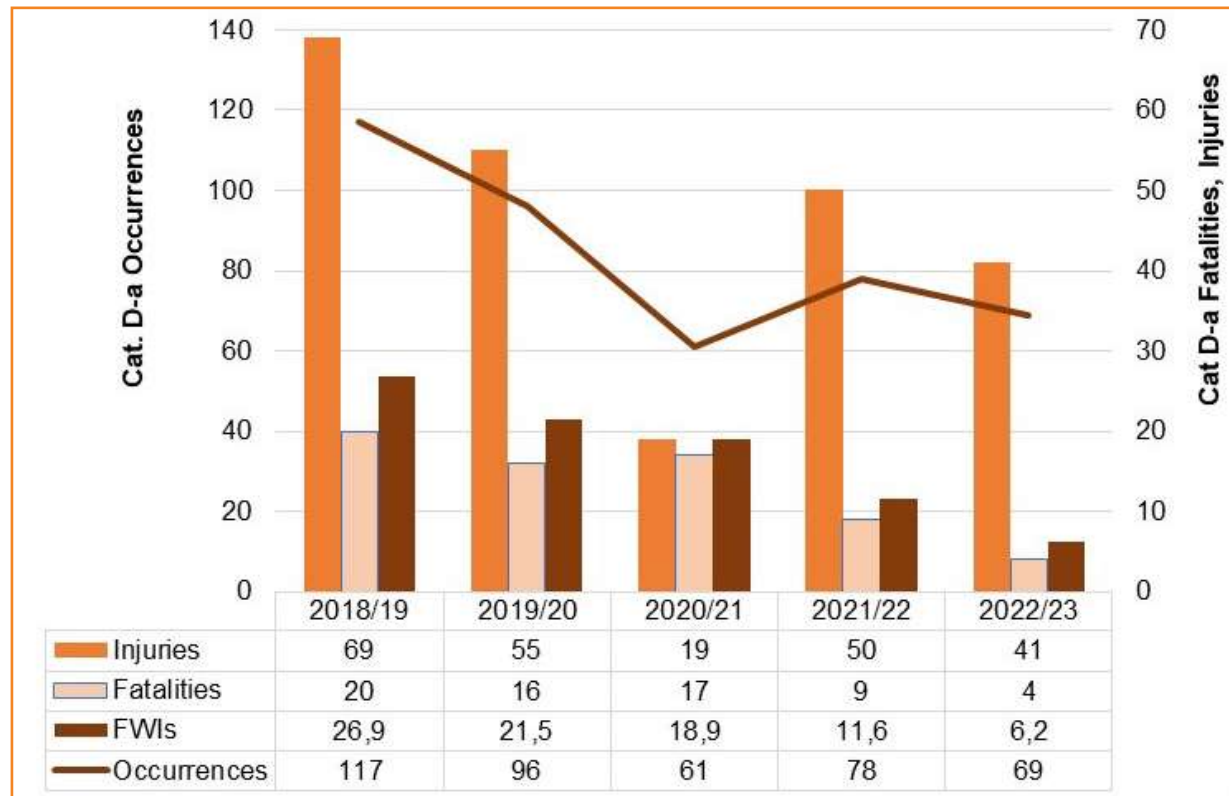


Figure 41: Total 2018/19 to 2022/23 collisions between rolling stock and road vehicles on a running line with related fatalities and injuries, Cat D-a

The running average of harm-free collisions between rolling stock and road vehicles on a running line with related fatalities and injuries [Cat D-a], measured as the number of Category D-a collisions per FWI has deteriorated from 5,9 in 2018/19 to 6,0 in the 2022/23 reporting period.

In the 2022/23 reporting period, this subcategory [D-a] level crossing contributed 95% of the level crossing occurrences compared to 91% in the 2021/22 reporting period. This translates to 67% of the recorded level-crossing fatalities during the 2022/23 reporting period compared to 100% in the 2021/22 reporting period and 98% of injuries compared to 94% in the 2021/22 reporting period. This subcategory [D-a] collisions between rolling stock and road vehicles (including motor vehicles, bicycles and animal-drawn vehicles) at a recognized level crossing on a running line FWIs were 60% of the total in 2022/23 compared to 98% recorded during the 2021/22 reporting period.

Figure 42 shows that during the 2022/23 reporting period, level-crossing operational occurrences peaked in the second quarter, with 30% reported between July and September 2022, as was the case in the 2021/22 reporting period. The Quarter 4 2022/23 reporting period reported 23% of the level-crossing occurrences, while 19% occurred in Quarter 1 and 13% in Quarter 3.

In Figure 42, the actual number of occurrences recorded between the 2018/19 to 2022/23 reporting period (5-year period) are being summed up under respective quarter and compared the total occurrences recorded under the same quarter during the 2022/23 reporting period.

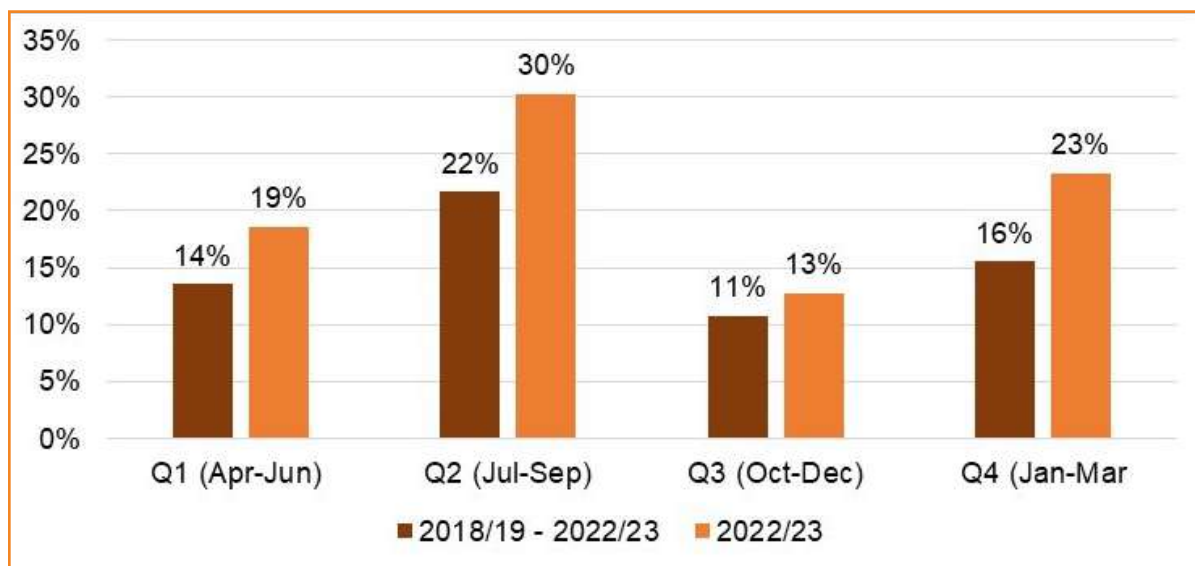


Figure 42: Quarterly distribution of level crossing occurrences since the 2018/09 reporting period

Whilst there is recorded increase on the actual number of level crossing occurrences nationally, Figure 43 graphically shows an encouraging trajectory for level-crossing occurrences in the Gauteng province. The 2022/23 entries shows that there has been a single entry (01) increase when comparing the 2022/23 reporting period entries to the 2021/22 reporting period.

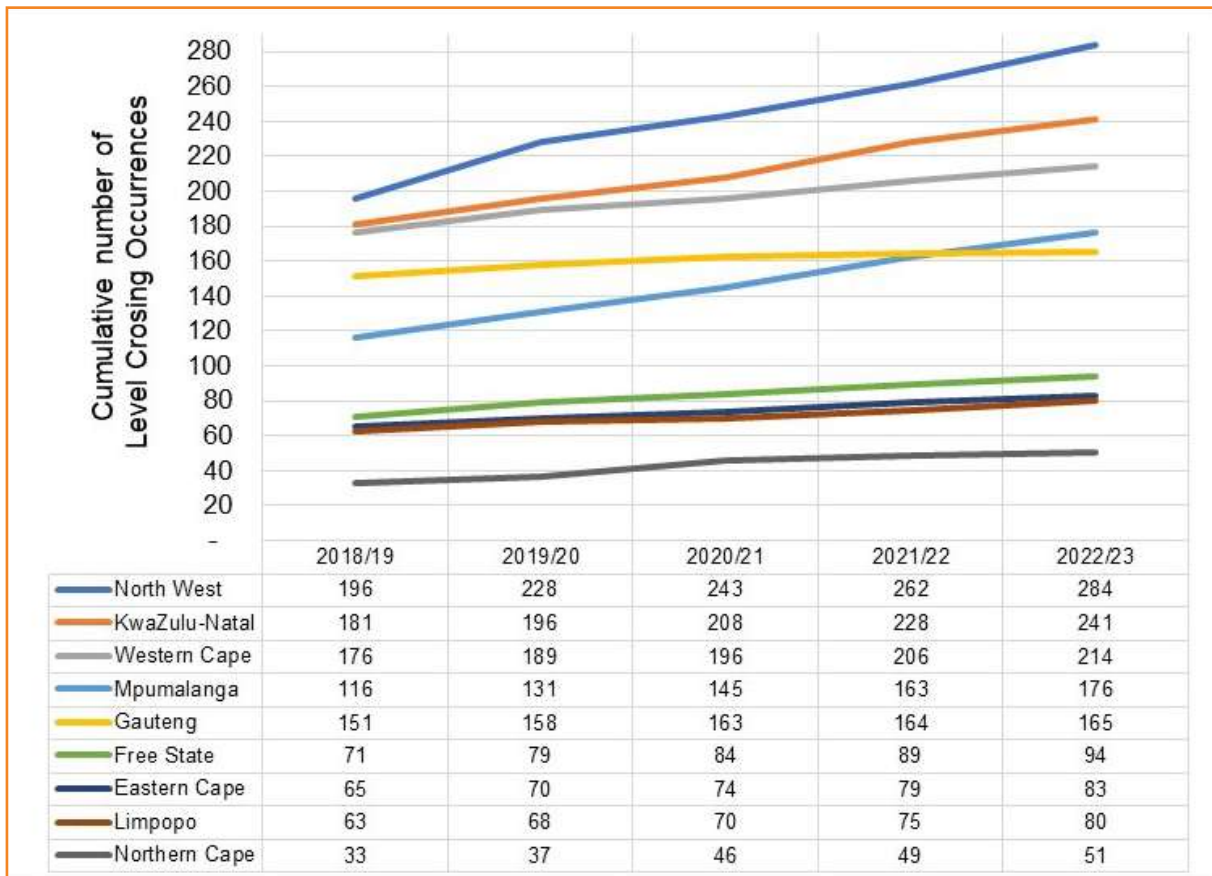


Figure 43: Cumulative number of level crossings by province since 2018/19

As illustrated in Figure 44, the 2022/23 level crossing occurrences per million train km (2,06) equates to the five-year average. During this period, the best performing year was the 2019/20 reporting period, with 1,87 level crossing occurrences per million train km. In the 2022/23 reporting period, the total number of level crossing occurrences per million train km decreased by 5,6% year-on-year. The rather flat trend is misleading since the largest operators produced 42% fewer train km post the COVID-19 pandemic.

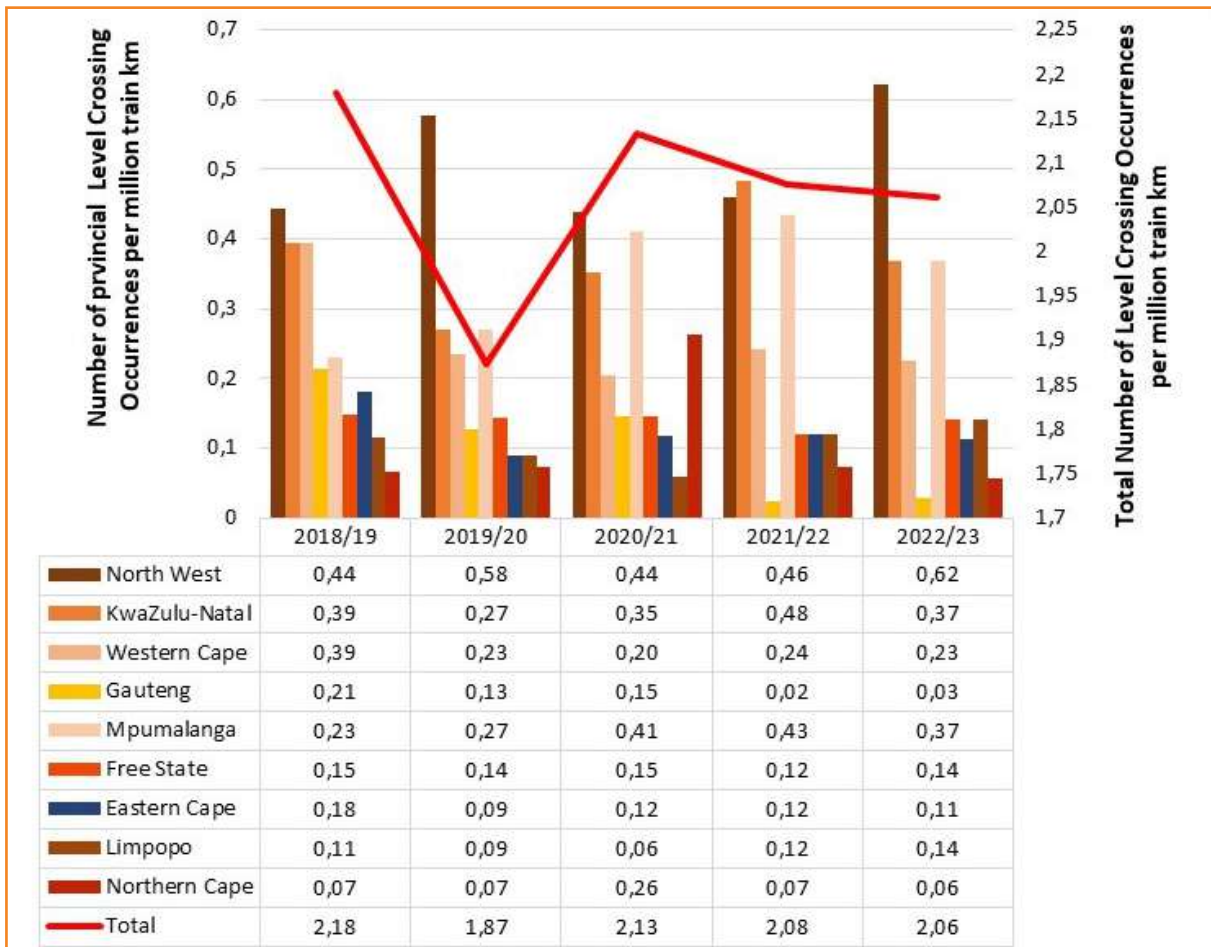


Figure 44: All operators 2018/19 to 2022/23 reporting period level crossing occurrences per million train km



Persons struck during movement of rolling stock

This section presents an analysis of the safety risks related to persons struck by trains and excludes pedestrian level crossing occurrences as these are accounted for in the level crossings section. Inclusive in this occurrence category are members of the public, railway employees and railway contractors. The section presents the safety risks related to persons struck during movement of rolling stock, SANS occurrence Category E which covers the following:

[E-a] occurrences where a member of the public is struck by rolling stock on a running line;

[E-b] occurrences where an employee is struck by rolling stock on a running line;

[E-c] occurrences where a contractor or a contractor's employee is struck by rolling stock on a running line;

[E-d] occurrences where a member of the public is struck by rolling stock on a line other than a running line;

[E-e] occurrences where an employee is struck by rolling stock on a line other than a running line; and

[E-f] occurrences where a contractor or a contractor's employee is struck by rolling stock on a line other than a running line.

Because the majority of risk is borne by members of the public when interacting with a running line, the outcomes of the time series (inclusive of time-of-day analysis and geographical distribution) and risk analysis primarily focus on those occurrences where a member of the public is struck by rolling stock on a running line.

2022/23 Headlines

- The number of people struck by trains decreased by 31,9% between the 2021/22 and 2022/23 reporting period.
- The calculated FWI count decreased by 75,7% between the 2018/19 and 2022/23 reporting periods.
- People struck by trains occurrences are lethal, with one death occurring on average every 2,3 days since the 2018/19 reporting period. Since the 2018/19, 54,7% of all people struck by trains occurrences were fatal. Hence, the FWIs on average, are only 8% higher than actual fatalities.
- Gauteng (24%), KwaZulu-Natal (30%), and Western Cape provinces (17%) recorded 71% of the people struck by trains during movement of rolling stock occurrence category in the 2022/23 reporting period, lower than the long-term trend of 82% since the 2018/19 reporting period.
- All people struck by trains occurrences per million train km decreased by 15% in the 2022/23 reporting period, and by 55% since the 2018/19 reporting period. Note that since most people struck by trains occurrences occur on the PRASA network, the impact of a 74% reduction in PRASA train km in the 2022/23 reporting period distorts the statistics favourably. The longterm harm average is 3,74 FWI per million train km.

Safety performance

The number of persons struck by train occurrences and their respective consequences (fatalities and injuries) and the calculated FWI for the 2018/19 reporting period to the 2021/21 reporting period are illustrated in Figure 46.

During the 2022/23 reporting period, the number of persons struck by trains decreased by 31,9% compared to the 2021/22 and 75,7% from the 2018/19 to 2022/23 reporting periods. The calculated FWI count decreased by 33% in the 2022/23 reporting period and 75,7% since the 2018/19 reporting period.

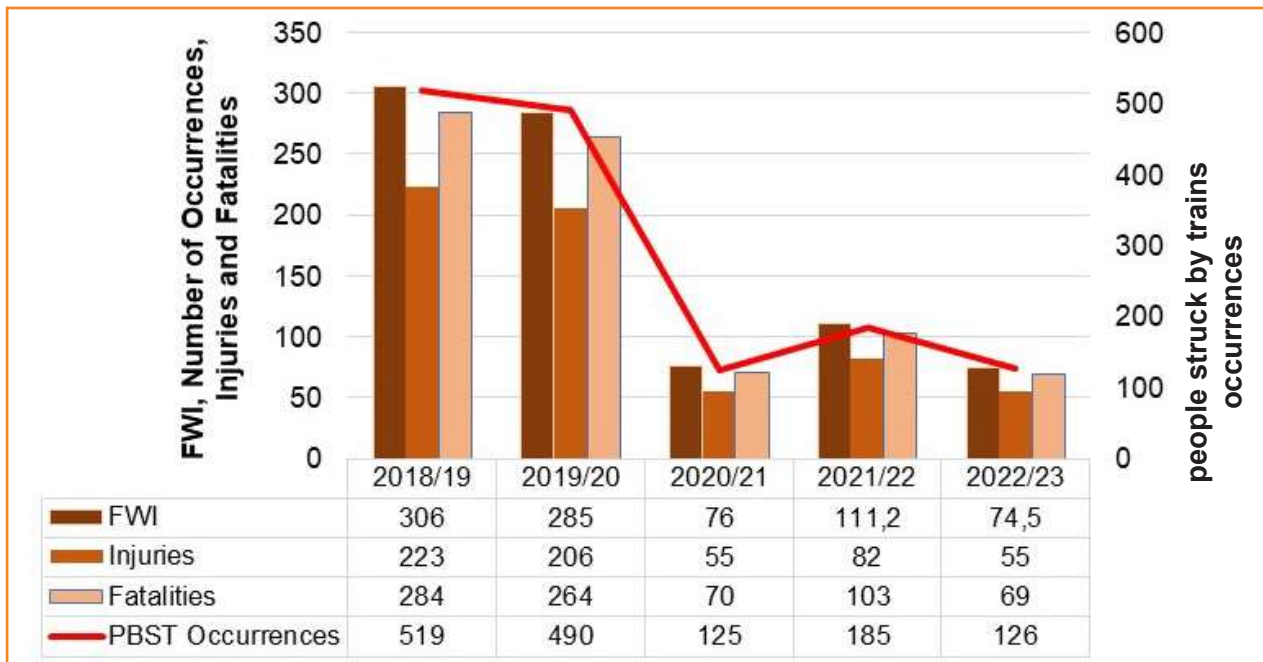


Figure 45: Actual number of people struck by trains operational occurrences and related harm to persons

People struck by train occurrences are lethal, with 790 fatalities occurring (i.e. 1 fatality every 55 hours) between the 2018/19 and 2022/23 reporting period. The FWI, on average, is only 8% higher than actual fatalities. Of all the people struck by trains between 2018/19 and 2022/23, 54,7% died.

Since the 2018/19 reporting period, Gauteng, KwaZulu-Natal, and Western Cape provinces recorded a 72% reduction in persons struck during the movement of rolling stock occurrences category. This is illustrated in Figure 46.



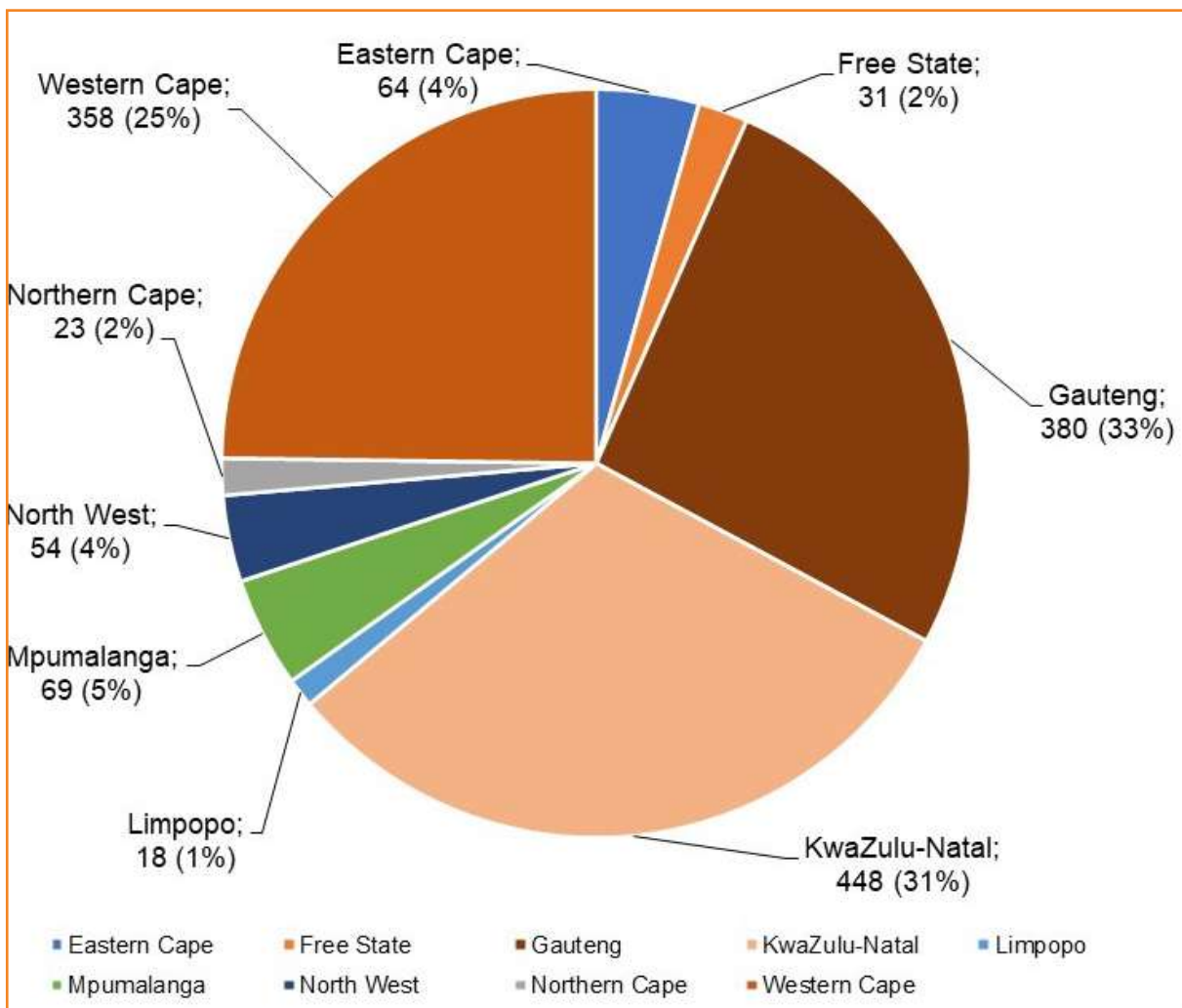


Figure 46: The 2018/19 to 2022/23 reporting periods provincial distribution of people struck by trains operational occurrences

Figure 47 shows a continued dominance of people struck by trains during movement of rolling stock occurrences by the three largest metros during the 2022/23 reporting period (71%). The Gauteng, Western Cape, KwaZulu-Natal and Mpumalanga provinces made up 76% of the people struck by trains during movement of rolling stock occurrences category.

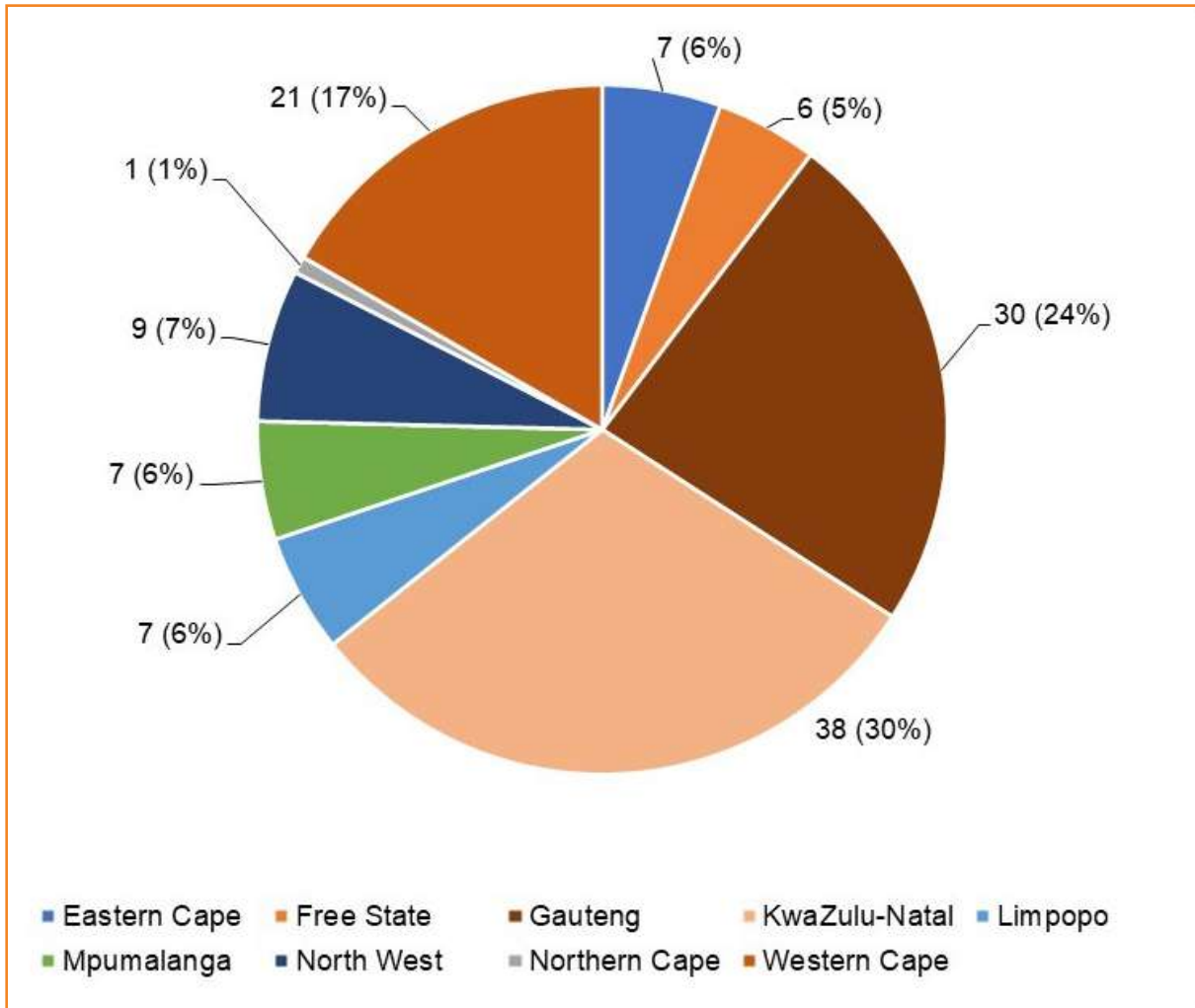


Figure 47: The 2022/23 reporting period provincial percentage distribution of people struck by trains occurrences

The time-of-day analysis in Figure 48 indicates that the public during the 2022/23 reporting period were most at risk during the mid-morning (08h00-12h00) with 13% of the daily people struck by trains during movement of rolling stock occurrences, and the extended evening peak between 16h00-20h00 (33%). This is indicative of people commuting between work and places of learning. The results suggest an illegal crossing and trespassing on the running line.

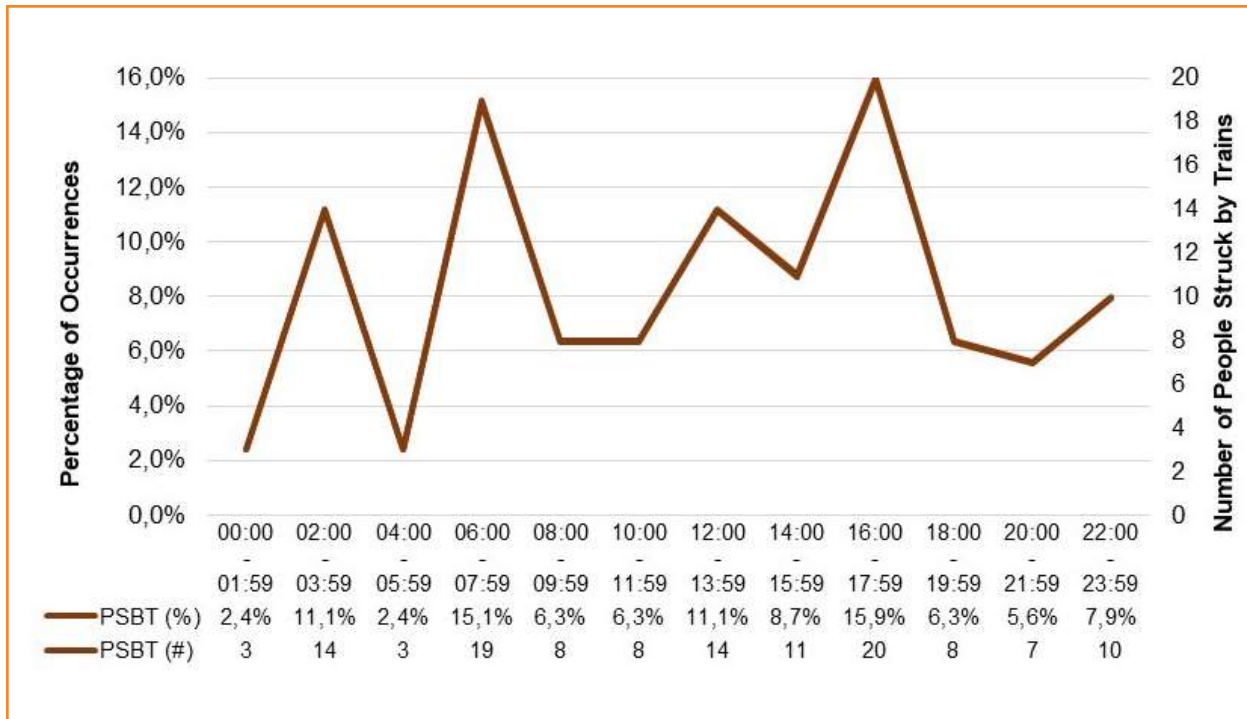


Figure 48: 2022/23 reporting period time-of-day analysis for people struck by trains operational occurrences

Figure 49 shows that in the 2022/23 reporting period, the occurrences per million train km of all people struck by trains decreased by 15% compared to a decrease of 55% since the 2018/19 reporting period. The FWI per million train km decreased by 7% in the 2022/23 reporting period compared to a 50% decrease since the 2018/19 reporting period.

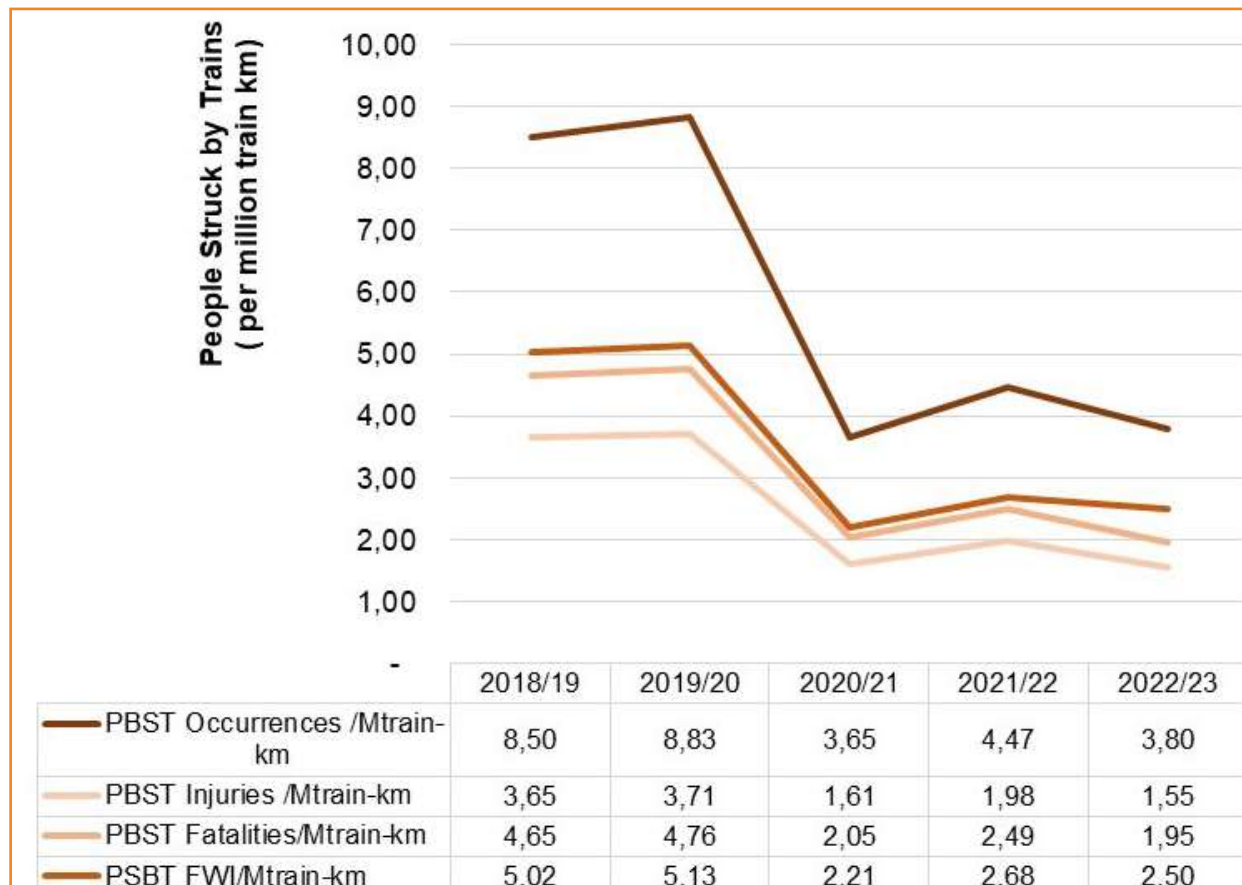


Figure 49: All people struck by trains operational occurrences, Injuries, Fatalities and FWI per million train km from 2018/19 to 2022/23 reporting period.

For all people struck by trains occurrences since the 2018/19 reporting period, the average FWI indicates that 2% of all people struck by trains occurrences are harmless. Since the 2018/19 reporting period, on average, 267 380km was completed for every FWI incurred.

Platform-Train Interchange (PTI)

The Platform-Train Interchange section focuses on those occurrences which occur at the station or on the platform as passengers and workforce entrain and detrain. It follows the same approach used to look at the safety risks related to people struck by trains. Because the majority of risk is borne by train passengers, the time-of-day, day of week and geographical distribution risk analysis primarily focus on train passengers, as opposed to the workforce.

The section elaborates on the safety risks related to derailments during movement of rolling stock, SANS occurrence Category H which cover the following:

- [H-a] occurrences where a passenger fell between the train and the platform whilst entraining/detraining a stationary or moving train;
- [H-b] occurrences where a passenger fell on the platform whilst entraining/detraining a stationary or moving train;
- [H-c] occurrences where an employee fell between the train and the platform whilst entraining/detraining a stationary or moving train;
- [H-d] occurrences where an employee fell on the platform whilst entraining/detraining a stationary or moving train;
- [H-e] occurrences where a contractor or a contractor's employee fell between the train and the platform while entraining or detraining ?
- [H-f] occurrences where a contractor or a contractor's employee fell on the platform whilst entraining/detraining a stationary or moving train.

2022/23 Headlines

- 34 PTI occurrences contributed to 2% of the overall recorded operational occurrences in the 2022/23 reporting period.
- The 2022/23 reporting period PTI occurrences decreased by 56% compared to a 77% increase during the 2021/22 reporting period.
- PTI occurrences have decreased by 95% since the 2018/19 reporting period.
- Since the 2018/19 reporting period, PTI occurrences, on average, resulted in 3,8 fatalities annually, and 90,1% of PTIs resulted in injuries.
- The traditional trend suggested PTI occurrences to be a weekday (97% in 2022/23 reporting period), peak-hour (53% during 06:00-8:00 and 26% during 14:00-16:00 in 2022/23) phenomenon which is earlier than the traditional 16:00-20:00 peak observed.
- Since the 2018/19 reporting period, 44,9% of PTI occurrences were recorded in the Gauteng province, followed by 30,2% in KwaZulu-Natal and 23,3% in the Western Cape provinces. The three large metropolitan areas represent 98,3% of 2022/23 reporting period PTI occurrences.
- Since the 2018/19 reporting period, PTI per million train km reduced by 91% and for the 2022/23 reporting period, it reduced by 49%. This is largely due to the reduced PRASA service.

Safety performance

Whilst Platform-Train Interchange (PTI) occurrences historically accounted for a significant number of occurrences recorded at train stations within South Africa, the total number of platform-train interchange occurrences recorded for the 2022/23 reporting period was 34 as compared to 78 occurrences recorded in 2021/22 reporting period and 247 on average since the 2018/19 reporting period. PTIs in the 2022/23 reporting period decreased by 56 %.

PTIs represented 1,9% of all safety occurrences for 2022/23 reporting period compared to 3,8% in the 2021/22 reporting period and 2,2% for the 2020/21 reporting period. Given that a significant proportion of these occurrences may be attributed to PRASA, the collapse of the PRASA Metrorail service since the COVID-19 lockdown in 2020 has reduced PTI occurrences by a factor of 7.

PRASA accounted for 100% of all Platform-Train Interchange safety occurrences annually between the 2018/19 and 2022/23 reporting periods. PRASA recorded an 70% increase in Platform-Train Interchange safety occurrences per million train km since the 2021/22 reporting period, compared to a 54% decrease since the 2018/19 reporting period.

Figure 50 shows that since the 2018/19 reporting period, PTI occurrences on average, result in 3,8 fatalities annually and 233 injuries per annum.

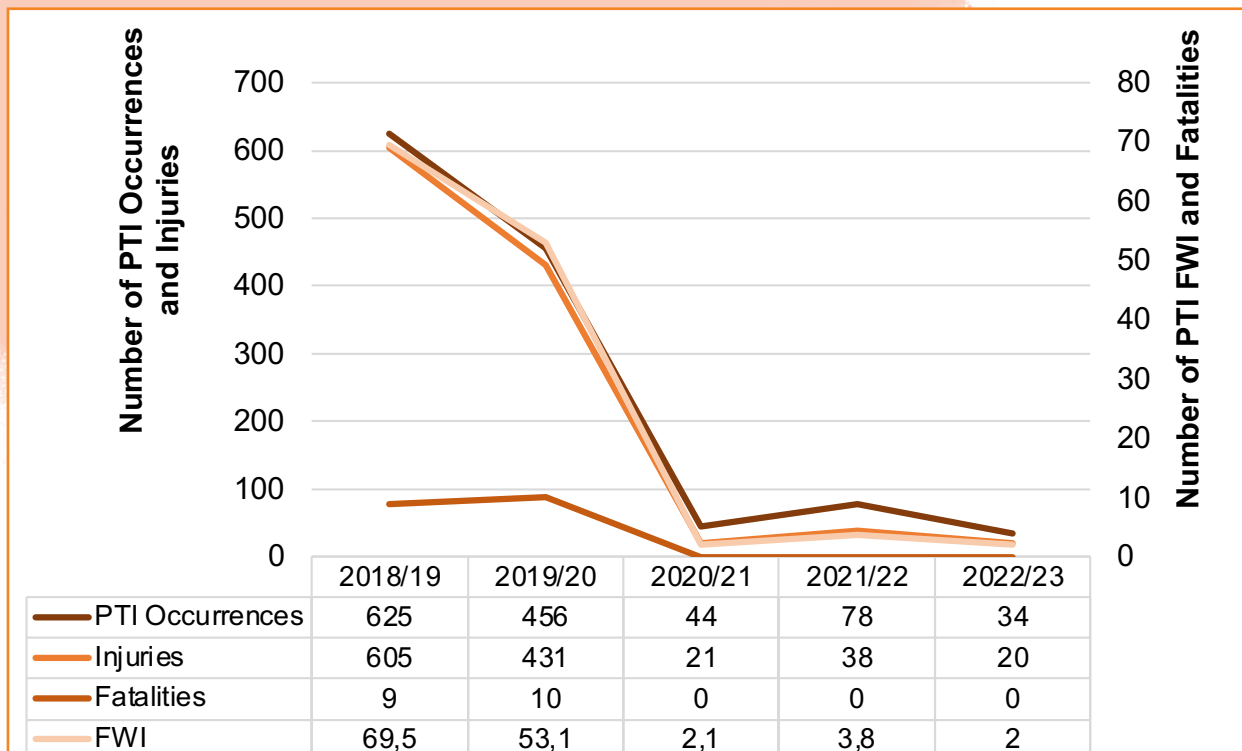


Figure 50: Total number of platform-train interchange operational occurrences and related fatalities and injuries time series

PTI analysis in terms of time of day

The time of day analysis illustrated in Figure 51-A indicates that commuters during the 2022/23 reporting period were most at risk during the morning peak hours (06:00-10:00) with 53% of the PTI occurrences, and the afternoon peak between 14:00-18:00 (26%). This pattern indicates overcrowding at stations during peak travel hours from normal travel volumes.



Figure 51-A: The 2022/23 reporting period time-of-day analysis for platform-train interchange operational occurrences

Figure 51-B shows that the PTI afternoon peak has moved earlier from the 16:00 slot to the 14:00 slot since the 2021/22 reporting period.

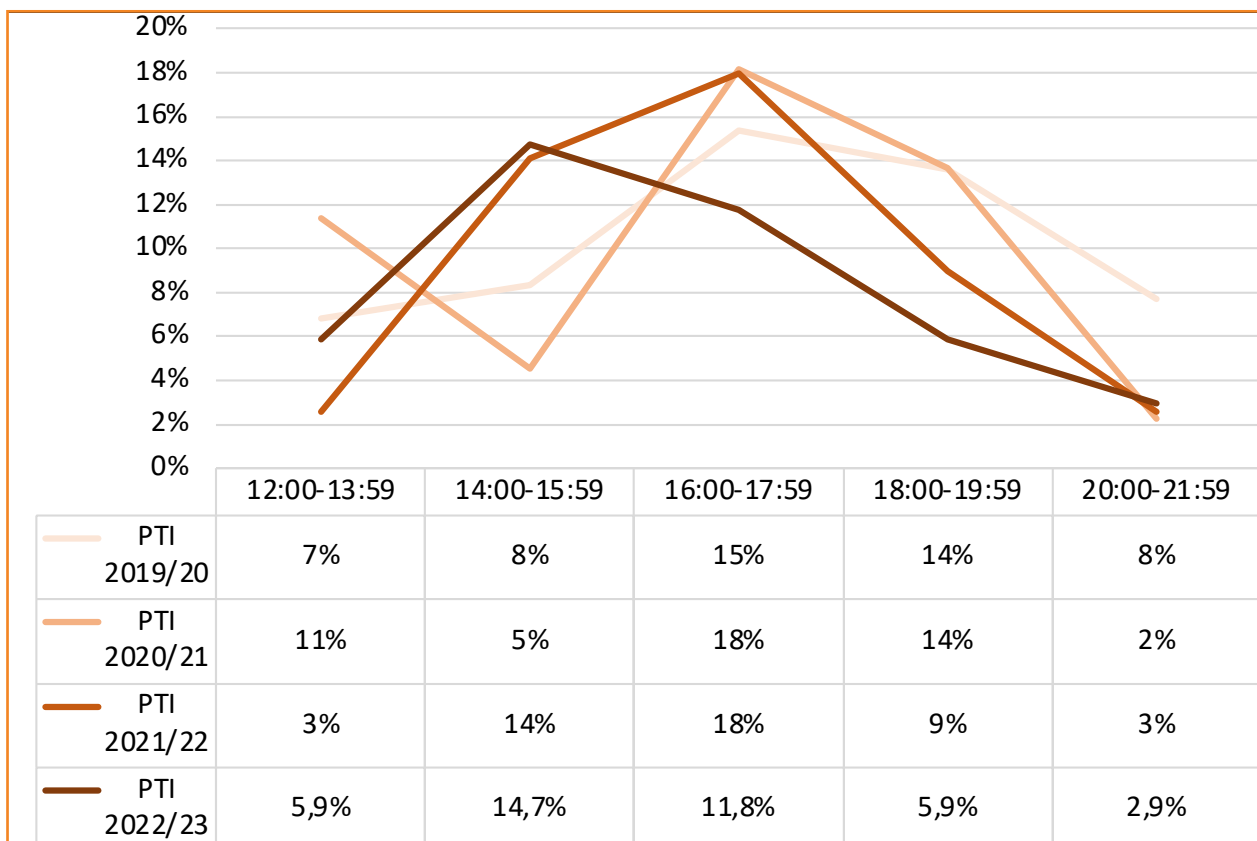


Figure 51-B: Since 2021/22 reporting period, the PTI afternoon peak has moved from 16:00 to 14:00.

PTIs are a work-day phenomenon suggesting overcrowding (especially at normal traffic levels) as a major contributing factor to this occurrence category. Figure 52 shows that in previous years weekday examination of PTI occurrences indicated a tendency for such occurrences to occur during the week, with peak levels on Tuesdays and Thursdays. In the 2022/23, this has shifted to Wednesdays and Thursdays. Sunday is now the only PTI-free day in the week.

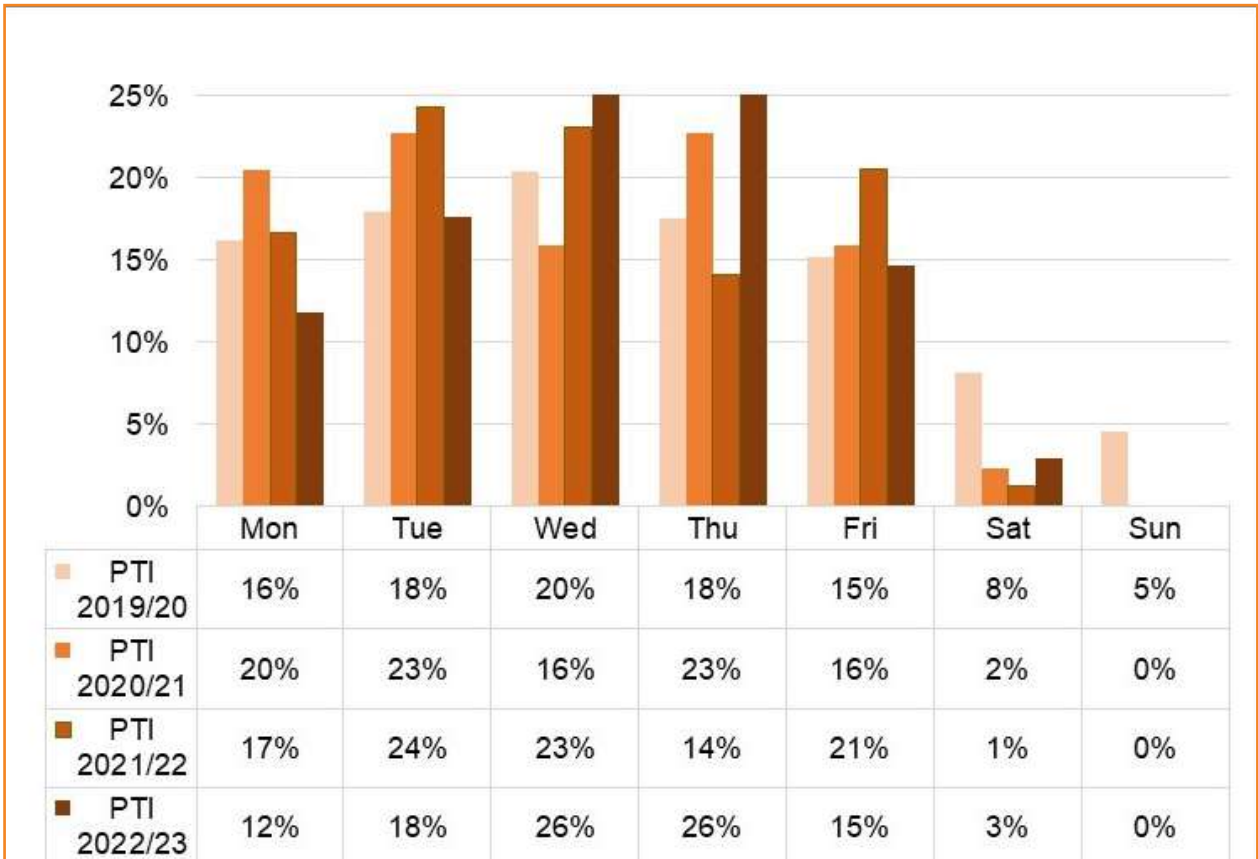


Figure 52: The 2019/20 to 2022/23 reporting period analysis for day-of-week platform-train interchange occurrences show a changing travel pattern

PTI analysis in terms of province

Further analysis of these occurrences was done to establish within which provinces these occurrences occur. The Gauteng province (44,9%) dominated PTI occurrences from 2018/19 to 2022/23 reporting periods (Figure 53-A).

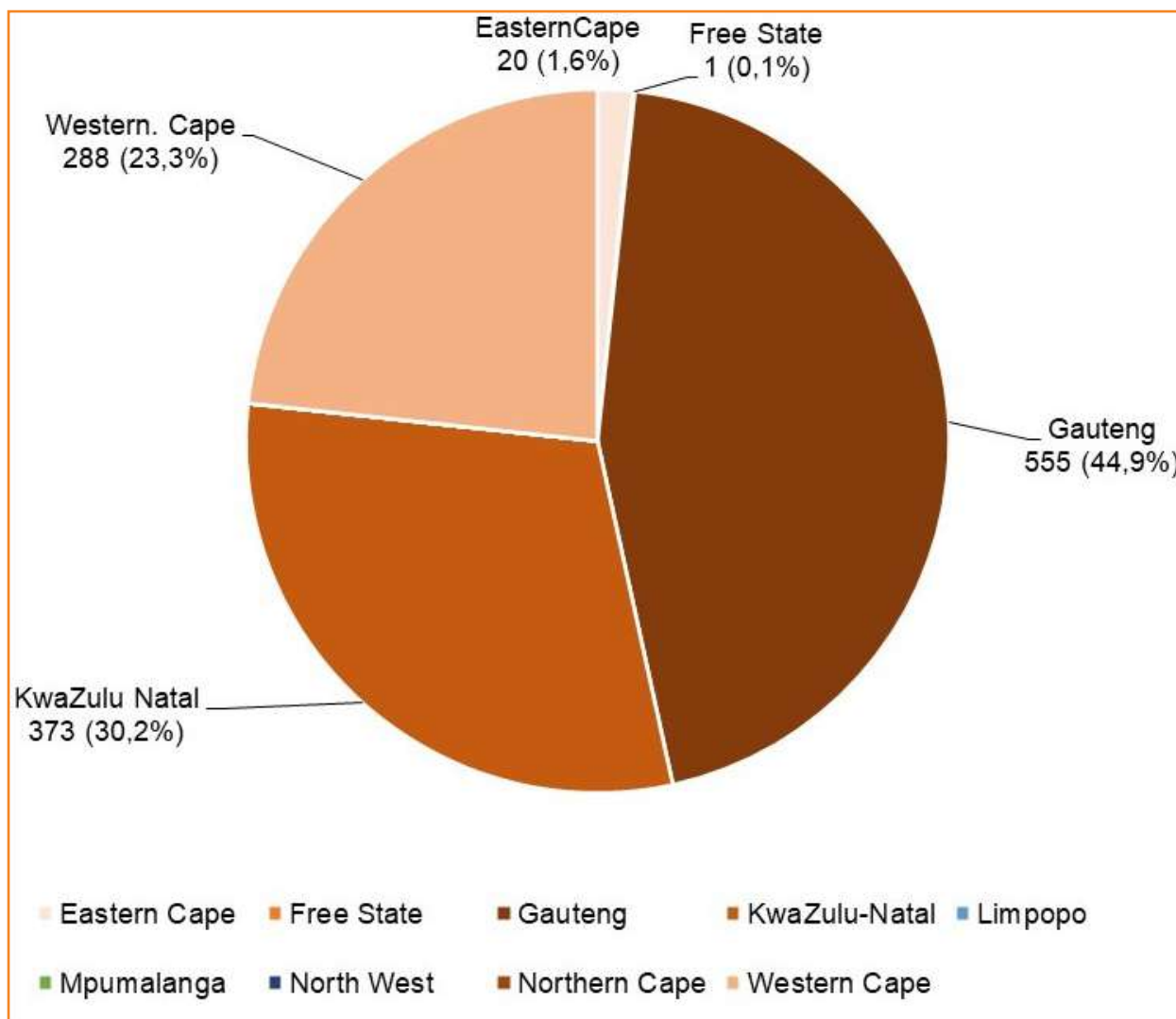


Figure 53-A: 2018/19 to 2022/23 reporting period distribution of PTI occurrences by province

As shown in Figure 53-B, for the 2022/23 reporting period, KwaZulu-Natal province dominated these occurrences with 62% of PTI occurrences.

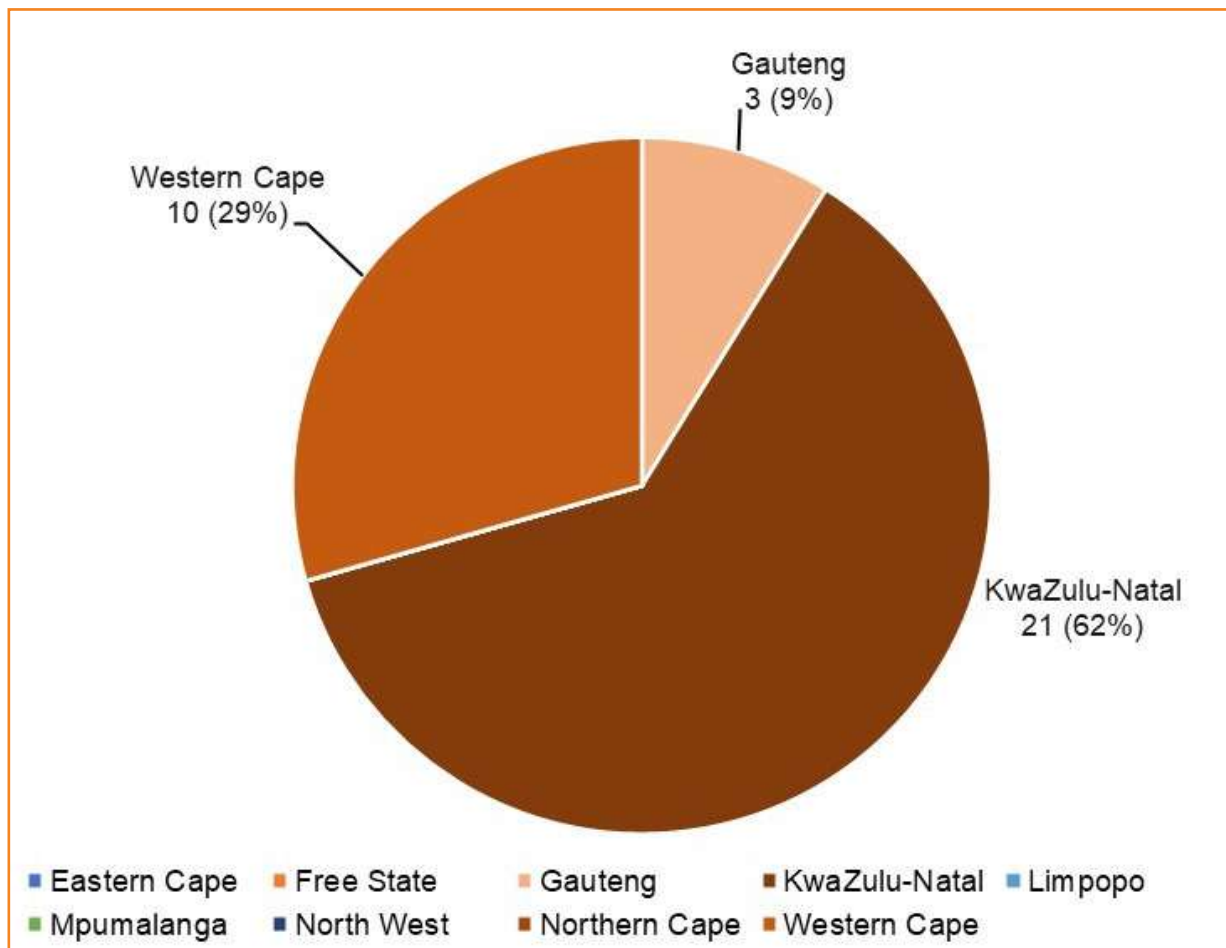


Figure 53-B: The 2022/23 distribution of PTI operational occurrences by province

Figure 54 depicts that despite a 54% decrease since 2018/19 reporting period in Platform-Train Interchange occurrences per million train km for all operators, there was a 70% increase in the 2022/23 reporting period. The intensity of Platform Train Interface Operational Occurrences per million train km is higher for PRASA than all the other operators.

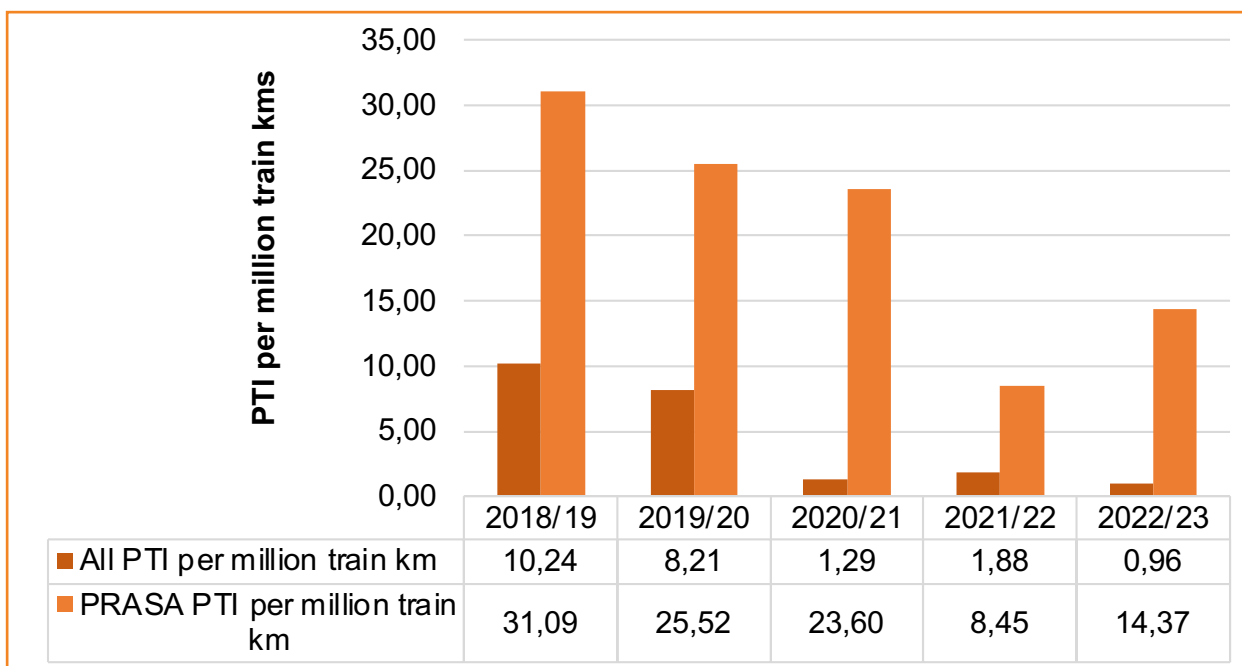


Figure 54: The intensity of Platform Train Interface Operational Occurrences per million train km

Railway security

This section presents an analysis of the railway security-related incidents reported to the RSR by railway operators. It examines the most prevalent security concerns and provides a geographical overview of the overall harm arising from security-related incidents. Due to the nature and format of reporting security-related incidents, neither risk analysis per rail user group nor risk profiles can be calculated.

This section presents assets and human security risks reported in ten (10) categories as stipulated by SANS, as follows:

Category 1

Security-related incidents cover the theft of the following assets, causing an impact on operational safety:

- [1-a] Theft of rolling stock components in section;
- [1-b] Theft of rolling stock components in yards and sidings;
- [1-c] Theft of civil infrastructure components in section;
- [1-d] Theft of civil infrastructure components in yards and sidings;
- [1-e] Theft of overhead traction equipment in section;
- [1-f] Theft of overhead traction equipment in yards and sidings;
- [1-g] Theft of train authorisation, control and telecommunication systems and equipment in section;
- [1-h] Theft of train authorisation, control, and telecommunication systems and equipment in yards and sidings;
- [1-i] Theft of ancillary equipment, including public address (PA) systems, information boards and closed-circuit television (CCTV);
- [1-j] Theft of freight, including dangerous goods in section; and
- [1-k] Theft of freight, including dangerous goods in yards and sidings.

Category 2

Security-related incidents cover malicious damage (vandalism) to the following, causing an impact on operational safety:

- [2-a] Malicious damage (vandalism) of rolling stock components in section;
- [2-b] Malicious damage (vandalism) of rolling stock components in yards and sidings;
- [2-c] Malicious damage (vandalism) of civil infrastructure components in section
- [2-d] Malicious damage (vandalism) of civil infrastructure components in yards and sidings;
- [2-e] Malicious damage (vandalism) of overhead traction equipment in section;
- [2-f] Malicious damage (vandalism) of overhead traction equipment in yards and sidings;
- [2-g] Malicious damage (vandalism) of train control equipment (signalling) in section;
- [2-h] Malicious damage (vandalism) of train control equipment (signalling) in yards and sidings; and
- [2-i] Malicious damage (vandalism) of ancillary equipment including public address systems, information boards, CCTV.

Category 3

Security-related incidents cover the following threats to operational safety:

- [3-a] Bomb threats to network;
- [3-b] Bomb threats to station;
- [3-c] Bomb threats to rolling stock;
- [3-d] Threats due to electrical power outages; and
- [3-e] Threats other than bomb and power outage threats.

Category 4

Security-related incidents cover the kidnapping of train crews and the hijacking of

- [4-a] Unauthorised person taking control of passenger trains,
- [4-b] Unauthorised person taking control of freight trains; and
- [4-c] Unauthorised person taking control of other rolling stock.

Category 5

Security-related incidents cover crowd-related incidents and include stampedes.

Category 6

Security-related incidents cover industrial action that causes a threat to safe railway operations or to security.

Category 7

Security-related incidents cover the following:

- [7-a] Murder;
- [7-b] Attempted murder;
- [7-c] Rape;
- [7-d] Assault;
- [7-e] Indecent assault;
- [7-f] Aggravated robbery;
- [7-g] Common robbery;
- [7-h] Theft; and
- [7-i] Bomb explosions.

Category 8

Security-related incidents cover the following:

- [8-a] Murder;
- [8-b] Attempted murder;
- [8-c] Rape;
- [8-d] Assault;
- [8-e] Indecent assault;
- [8-f] Aggravated robbery;
- [8-g] Common robbery;
- [8-h] Theft; and
- [8-i] Bomb explosions.

Category 9

Security-related incidents cover the following regarding personal safety outside station platform areas (in sections between stations, including yards, sidings and depots):

- [9-a] Murder;
- [9-b] Attempted murder;
- [9-c] Rape;
- [9-d] Assault;
- [9-e] Indecent assault;
- [9-f] Aggravated robbery;
- [9-g] Common robbery;
- [9-h] Theft; and
- [9-i] Bomb explosions.

Category 10

Security-related incidents cover the following regarding human bodies found within the railway reserve:

- [10-a] A body of a dead person found within the railway reserve
- [10-b] A body of dead person found on the railway line.
- [10-c] A commuter who died on board
- [10-d] An unknown dead body discovered within the rolling stock

2022/23 Headlines

- Although security-related incidents increased by 14% overall in the 2022/23 reporting period, there was a long-term decrease of 7% since the 2018/19 reporting period.
- In the 2022/23 reporting period, 97% of all security-related incidents were reported as theft and vandalism, compared to the long-run average of 94% since the 2018/19 reporting period. It is fair to state that since the 2021/22 reporting period, all security-related incidents have been out of control.
- The operational impact of 97% of theft and vandalism in 2022/23 reporting period on train operations is significant. It could be evidenced by the high number of manual train authorisations recorded at both TFR and PRASA.
- Whereas on average, 232 security-related incidents were reported for every 100 safety occurrences since 2018/19 reporting period, and 398 during 2021/22 reporting period, there were 476 security-related incidents for every 100 safety occurrences during 2022/23 reporting period.
- The 2022/23 reporting period FWI index for security-related incidents decreased by 79% since the 2018/19 reporting period compared to a 30% decrease reported for 2021/22 reporting period.
- The overall harm to persons was reduced by 28% for the 2022/23 reporting period. The harm to persons associated with Categories 3 to 9 reduced by 27% for the 2022/23 reporting period.
- Security-related incidents resulted in 58 injuries and 13 fatalities during the 2022/23 reporting period, compared to 79 injuries and 19 fatalities during the 2021/22 reporting period.

Overview performance

Table 16 presents all recorded security-related incidents between the 2018/19 and 2022/23 reporting period. Compared to the 2021/22 reporting period, the RSR recorded data from railway operators suggests a 14% increase in security-related incidents. This is 7% lower than in the 2018/19 reporting period. Compared over the long term since the 2018/19 reporting period, it is justifiable to state that the level of security-related incidents remains relatively out of control. On average, 327 security-related incidents were reported for every 100 safety operational occurrences between the 2018/19 and 2022/23 reporting period. However, during 2022/23, 472 security-related incidents were reported for every 100 safety occurrences. This indicates the need for more security personnel and/or police force within the railway network.

Table 16: Security-related incidents recorded for 2018/19 – 2022/23 reporting period

Reporting Year / SANS Category	2022/23						2021/22	2020/21	2019/20	2018/19
	All	TFR	PRASA	Other	2022/23 Var 2021/22	2022/23 Var 21/22	All	All	All	All
1: Theft of assets	6 782	6 307	468	7	6%	12%	6 040	6 390	7 180	6 291
2: Malicious damage (vandalism)	1 653	1 343	236	74	13%	25%	1 320	1 462	1 884	1 810
3: Threats of operational safety	11	10	1	0	-63%	N/A	0	30	64	66
4: Train kidnapping or hijacking	0	0	0	0	N/A	-100%	4	0	0	0
5: Crowd-related occurrences	9	9	0	0	13%	29%	7	8	11	35
6: Industrial action	16	16	0	0	33%	78%	9	12	28	35
7: Personal safety on trains	17	6	11	0	-23%	-37%	27	22	389	461
8: Personal safety on stations	81	23	57	1	35%	-14%	94	60	312	429
9: Personal safety outside station platform area	74	23	50	1	9%	-3%	76	68	128	141
TOTAL	8 643	7 737	823	83	7%	1%	7 577	8 052	9 996	9 268

Figure 55 shows that Category 1: Theft of assets contributed 77,6% of the security-related incidents in 2022/23 reporting period compared to the 65% this category contributed during the 2018/19 reporting period. Category 2: Malicious damage (vandalism) incidents contributed 19% in 2022/23 reporting period compared to the 20% contributed during the 2018/19 reporting period.

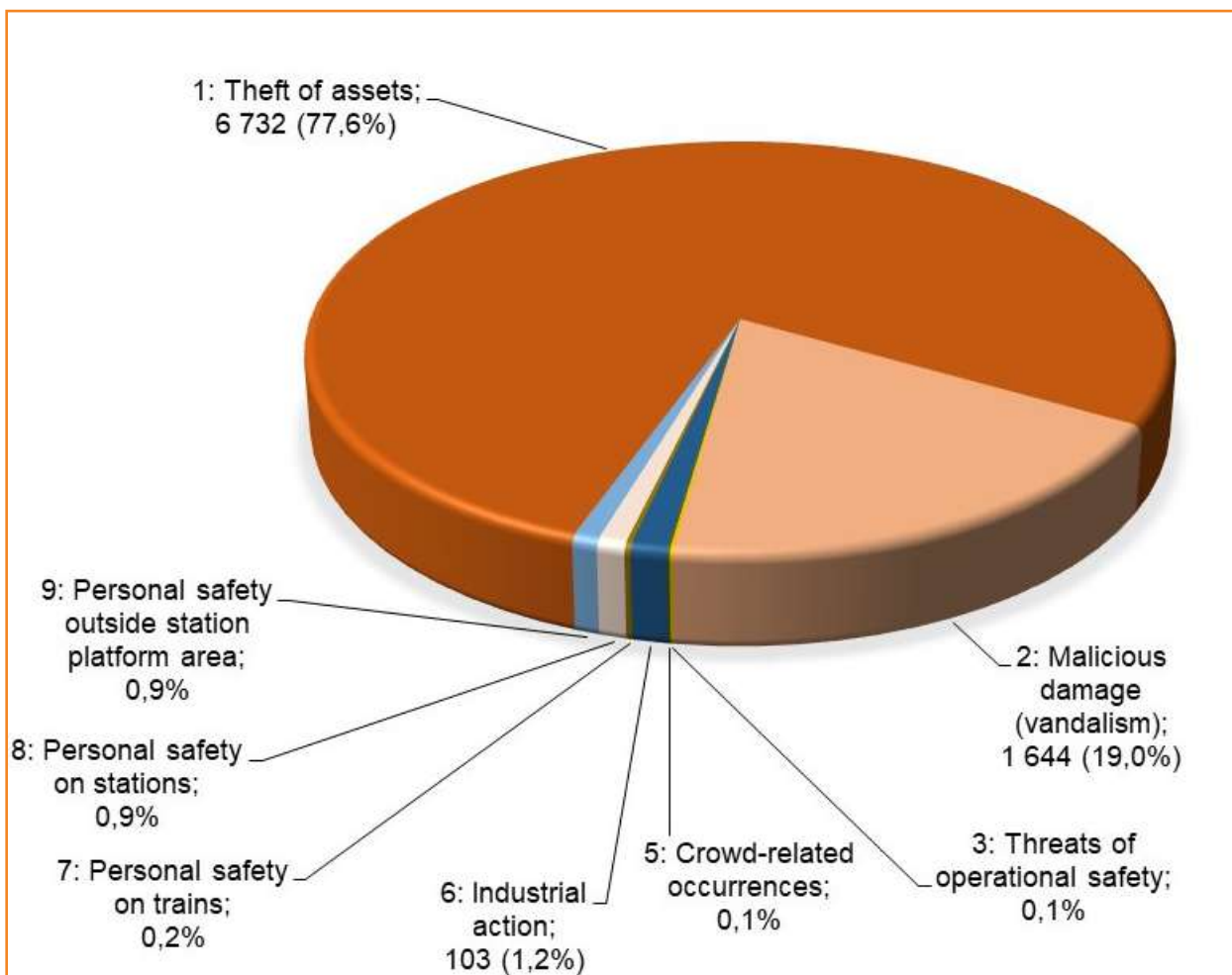


Figure 55: The 2022/23 recorded security-related incidents

As a percentage of security-related incidents during the 2022/23 reporting period, personal safety incidents are low, probably amplified by a steep 74% decrease in PRASA train km from 9,2 million to 2,4 million train km. In the 2022/23 reporting period, Category 7 Personal safety on trains contributed 0,2%, Category 8: Personal safety on stations contributed 0,9%, and Category 9: Personal safety outside station platform area contributed 0,9%. This compares with 5% (Category 7), 5% (Category 8), and 2% (Category 9) in the 2018/19 reporting period.

Categories 1, 2 and 6 dominated the security-related incidents in the 2022/23 reporting period. The overall harm to persons (Categories 3 to 9) decreased by 30% during the 2022/23 reporting period compared to a 38% increase in the 2021/22 reporting period.

Figure 56 shows the split of security-related incidents for the 2022/23 reporting period, with 97% just from theft and vandalism compared to 94% recorded since the 2018/19 reporting period. The operational impact on train operations is significant, evidenced of the high number of manual train authorisations at both TFR and PRASA Rail. This important safety metric should be reported by the RSR in the future. Security-related harm to persons reduced by 28% in the 2022/23 reporting period and 88% since the 2018/19 reporting period.

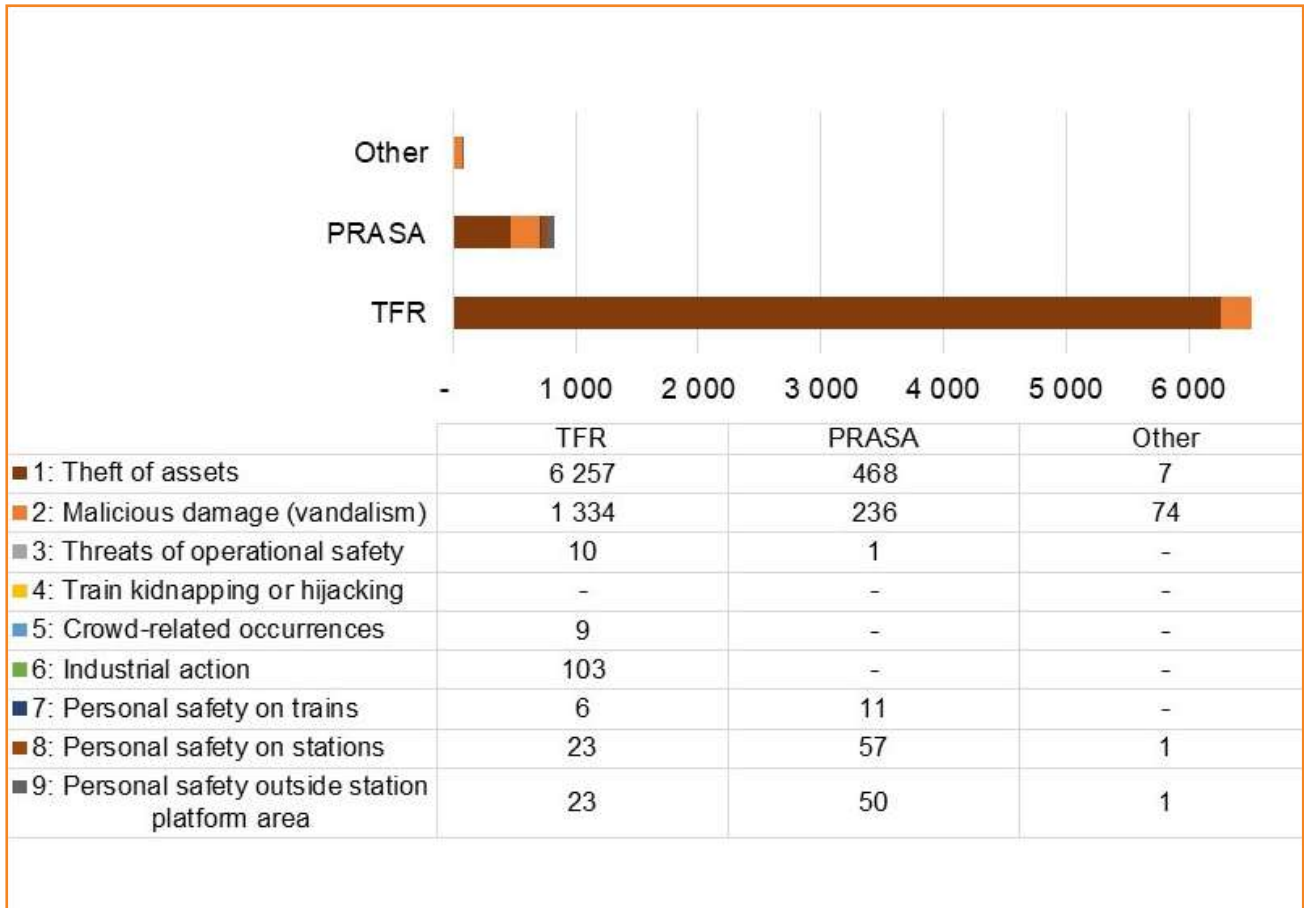


Figure 56: Breakdown of 2022/23 reporting period security-related incidents by category

Figure 57 shows that in the 2022/23 reporting period, injuries and fatalities decreased by 28% compared to 85% since the 2018/19 reporting period. The 2022/23 reporting period FWI index increased by 18,8% and reduced by 79% since the 2018/19 reporting period.



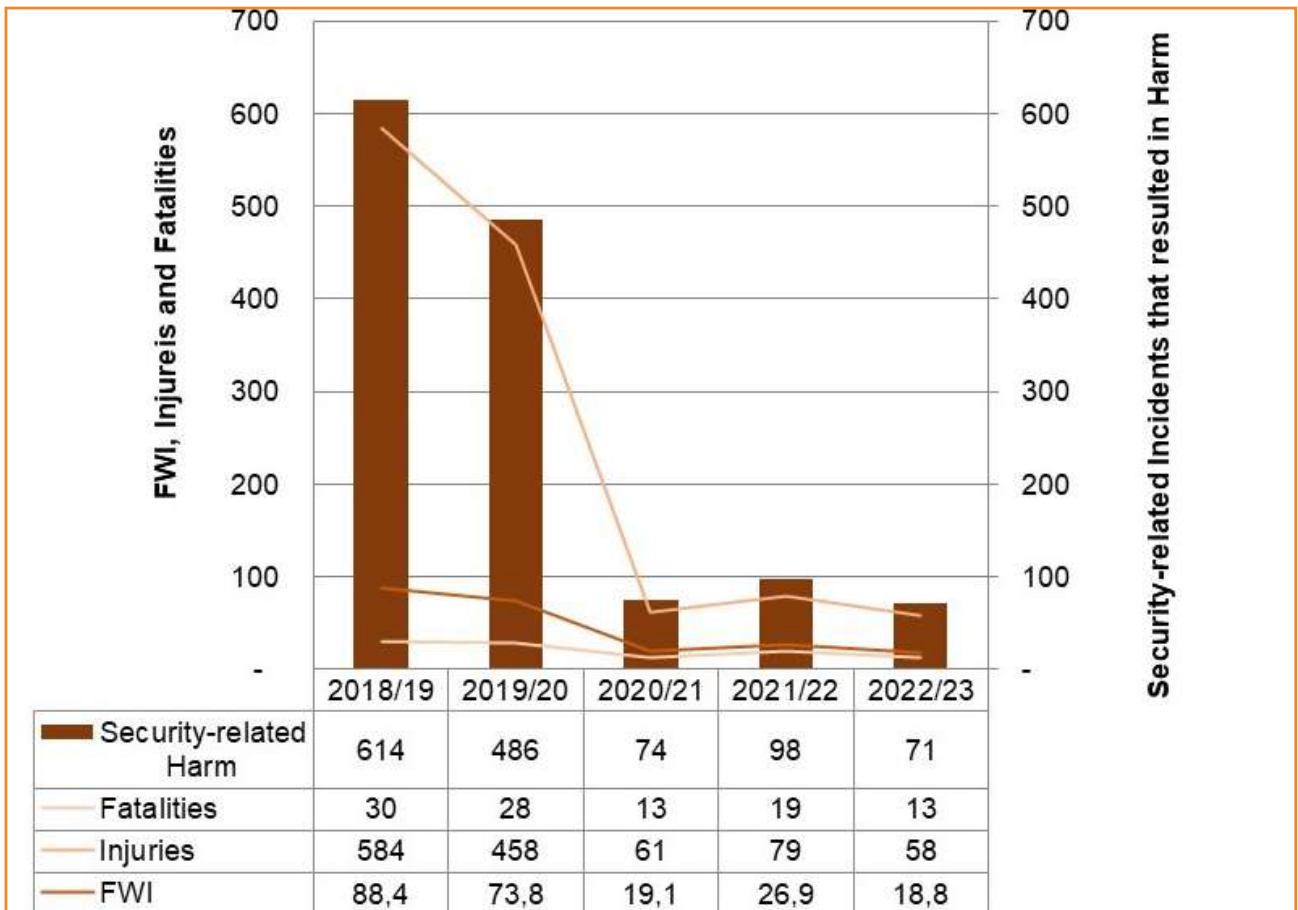


Figure 57: The 2018/19 to 2022/23 reporting period security-related harm to persons

Table 17 shows the SANS category breakdown of security-related harm (FWI) to persons in the 2022/23 reporting period, which increased by 2% since the 2021/22 reporting period.



Table 17: SANS category breakdown of security-related harm to persons in 2022/23

SANS category & subcategory	Category description	Count	Fatalities	Injuries	FWI
Security Incidents		64			
1: Theft of assets		0	0	0	0
2: Malicious damage (vandalism)		2	0	2	0,2
2-a	Malicious damage (vandalism) of rolling stock components in section	1	0	1	0,1
2-g	Malicious damage (vandalism) of train control equipment (signalling) in section	1	0	1	0,1
3: Threats of operational safety		0	0	0	0
4: Train kidnapping or hijacking		0	0	0	0
5: Crowd-related occurrences		0	0	0	0
6: Industrial action		0	0	0	0
7: Personal safety on trains		5	0	5	0,5
7-b	Attempted murder	4	0	4	0,4
7-i	Bomb explosion	1	0	1	0,1
8: Personal safety on stations		26	3	28	5,8
8-a	Murder	3	3	0	3
8-e	Indecent assault	8	0	8	0,8
8-i	Bomb explosion	15	0	20	2
9: Personal safety outside station platform area		31	10	23	12,3
9-a	Murder	8	8	0	8
9-b	Attempted murder		0	4	0,4
9-e	Indecent assault	4	0	7	0,7
9-f	Aggravated robbery	6	1	1	1,1
9-i	Bomb explosion	10	1	9	1,9
9-j	Robbery	2	0	2	0,2
plus safety occurrences		209	92	175	109,5
plus unpromulgated events		98	88	63	94,3
NO RSR		25	12	63	18,3
O-a		50	53	0	53
10-a		22	22	0	22
10-b		1	1	0	1
All events		371	193	296	222,6

Table 18 shows the distribution of theft of assets by province for the 2022/23 reporting period while Table 19 shows the distribution of malicious damage (vandalism) by province. The Gauteng, KwaZulu-Natal, and Mpumalanga provinces suffered 65% of theft incidents. Gauteng, KwaZulu-Natal, and Western Cape provinces suffered 67% of malicious damage to property (i.e. vandalism) during the 2022/23 reporting period.

Table 18: Distribution of theft of assets by province for the 2022/23 reporting period

Category 1. Theft of Assets	1-a	1-b	1-c	1-d	1-e	1-f	1-g	1-h	1-i	Total	% of Total
Eastern Cape	3	0	1	0	44	1	108	2	8	167	2%
Free State	1	11	22	1	431	16	94	8	0	584	9%
Gauteng	130	137	155	27	689	30	220	34	23	1445	21%
KwaZulu-Natal	18	45	43	3	1033	6	517	14	107	1786	27%
Limpopo	1	20	4	2	27	2	37	8	4	105	2%
Mpumalanga	23	34	36	5	449	15	565	13	20	1160	17%
North West	15	6	37	4	277	4	94	4	9	450	7%
Northern Cape	5	0	3	2	51	4	99	6	1	170	3%
Western Cape	199	101	32	6	306	3	197	11	9	864	13%
Total	394	354	333	50	3307	81	1931	181	181	6731	100%

Table 19: Distribution of malicious damage (vandalism) by province for 2022/23 reporting period

Category 2. Malicious Damage (Vandalism)	2-a	2-b	2-c	2-d	2-e	2-f	2-g	2-h	2-i	Total	% of Total
Eastern Cape	2	0	0	0	17	0	41	1	1	62	4%
Free State	3	0	5	0	91	7	34	2	1	143	9%
Gauteng	17	61	89	4	192	12	51	5	2	433	26%
KwaZulu-Natal	34	5	6	1	218	5	138	2	2	411	25%
Limpopo	1	1	1	0	2	0	13	1	0	19	1%
Mpumalanga	6	3	9	0	100	0	64	0	2	185	11%
North West	1	1	4	0	58	1	22	0	5	93	6%
Northern Cape	2	1	1	0	11	2	23	0	0	39	2%
Western Cape	56	15	4	0	80	14	94	3	3	259	16%
Total	122	97	119	5	769	32	480	14	16	1644	100%

South African Police Services – Rapid Rail Police (RRP) Intervention

According to the 2022/23 reported incidents, a total of 8 671 security-related incidents were recorded, compared to 7 577 in the 2021/22 reporting period, and 8 052 in the 2020/21 reporting period. This is a 14,4% increase when comparing the 2021/22 reporting period to the 2022/23 reporting period.

In the 2022/23 reporting period, the RRP reported 1 890 incidents of theft, which includes 1 254 cable theft incidents and 304 infrastructure theft incidents. The RRP data also indicates that there were 332 “theft other” incidents which are unclassified theft incidents included in the 1 890 incidents. The 1 890 suggests a 33 49 % reduction when compared to the 2 817 recorded during the 2021/22 reporting period. The RRP also reported 332 incidents of malicious damage to property during the 2022/23 reporting period. This indicates a 18,07% decrease when compared to the 393 incidents recorded during the 2021/22 reporting period. The RRP data indicates a 28,57% increase in illegally crossing of railway lines incidents during the 2022/23 reporting period. This is indicative of the fact that there are still a number of non-railway persons in the railway environment. These are people who are most likely to be struck by trains, increasing the total number of PSBT entries. At the same time, these are also people who are most likely to be criminals and/or persons who vandalise railway infrastructure.

The RRP also identified Sinnoville, Mmakau, Springs, De Doorns, Swartkops, Vryheid, Pienaarsrivier, Potchefstroom, Kimberley, Kroonstad and Blinkpan to be among the areas with high cable and infrastructure-related crimes during the 2022/23 reporting period. What is more concerning is that places such as Akasia, Meyerton, Bellville, East London, Camperdown, Delmas and Bohlokong recorded no less than 20 incidents during the period under review, yet they are most likely to be interpreted as being remote areas and/or close to police services and stations.

In an attempt to establish the contributing factors to railway crimes, the RRP again identified unused buildings, no or lack of security personnel, encroachment of the railway reserves, and security not clearly identified to be part of the main generators of railway-related criminal activities during the 2022/23 reporting period.

Similar to the 2021/22 reporting period, no train burnings were recorded during the 2022/23 reporting period.





Railway Safety Regulator Interventions

Railway Safety Regulator Interventions

This section presents the interventions and efforts by the RSR during the 2022/23 reporting period. These interventions and/or efforts are aimed at promoting and ensuring safety.

Overview of the RSR Safety Compliance Mandate

The RSR is legally responsible for safety oversight of the railway industry, thereby making railway operators directly accountable to the Regulator with regard to their safety performance and management rules, policies, procedures, and systems. To execute its legislative mandate, the Regulator, amongst others, enforces the prescripts contained in the Act, issues Safety Permits, drafts Regulations, the Safety Management System (SMS) determinations, and railway safety standards through various departments within the RSR. In the subsequent sections, the significant contributions made by these different departments within the RSR will be highlighted.

Safety Permit Management

As part of the commitment to good governance and clean administration, Safety Permit Management and other internal stakeholders within the RSR conducted a series of stakeholder engagement meetings held in multiple provinces, including KwaZulu-Natal, Western Cape, Northern Cape, Eastern Cape, Mpumalanga, and Gauteng.

The primary objective of these engagements was to provide railway operators with a platform to interact with the Regulator on a range of topics, encompassing safety permits, occurrence and reporting, audits and inspections, with a strong emphasis on the significance of adherence to compliance standards. These engagement sessions occurred on a quarterly basis. Inspections as to emphasise the importance of compliance. These engagements took place on a quarterly basis.

Some of the topics covered during these engagements were:

- The RSR's legislative mandate.
- Who should apply for a safety permit?
- Submission process for the different types of permits.
- Safety Permit and ASIP submission processes.
- Occurrence reporting.
- Audits and inspections.

Safety Permit Holders during the 2022/23 reporting period

In terms of the National Railway Safety Regulator Act of 2002, as amended, all active rail operators are required to be in possession of a valid safety permit to legalise their rail operations. A safety permit is issued on the basis of a Safety Management System (SMS) that meets the requirements as provided for in the relevant legislation and applicable standards. Table 20 presents the various classes of safety permits issued to permit holders per province in the 2022/23 reporting period.

Table 20: Number of safety permit types issued in 2022/23 reporting period.

Province	Permit Class				Grand Total
	A	B	C	T*	
Gauteng	16	08	03	01	28
Kwa-Zulu Natal	08	06	03	02	19
Mpumalanga	20	02	00	00	22
Western Cape	03	03	03	00	09
Eastern Cape	01	00	00	01	02
Northern Cape/Free State	06	04	02	00	12
TOTAL	54	23	11	04	92

Annual Safety Improvement Plans (ASIPs) assessed during 2022/23 reporting period.

During the 2022/23 reporting period, the following Annual Safety Improvement Plans (ASIPs) were submitted by various operators and subsequently assessed by the RSR.

Table 21: Number of Annual Safety Improvement Plans assessed.

Province	Permit Class			Grand Total
	A	B	C	
Gauteng	04	07	20	31
Kwa-Zulu Natal	08	06	19	33
Mpumalanga	15	01	05	21
Western Cape	02	05	11	18
Eastern Cape	02	00	01	03
Northern Cape/Free State	04	03	05	12
TOTAL	35	22	61	118

RSR Compliance Monitoring

Section 33 of the Act empowers the RSR to conduct an audit on the operator's Safety Management System (SMS). The oversight role of the Regulator is undertaken through Safety Management Audits and Inspections.

These activities are aimed at conducting a thorough evaluation of the operator's SMS and operational processes. The outcome of these assessments provides a comprehensive understanding of the necessary interventions required to enhance the ongoing safety of railway operations.

Section 36 of the Act grants RSR inspectors the authority to address unsafe conditions by issuing directives.

Safety compliance and enforcement is conducted by the 3 RSR Regional Offices, which are strategically located in different provinces. These offices include the Central Region in Gauteng, Coastal Region in the Western Cape and the Eastern Region in KwaZulu-Natal.

Central Region

The Central Region comprises of Gauteng, Northwest, Limpopo, Mpumalanga, part of Free State, and Northern Cape provinces, inclusive of Mahikeng, Komatipoort, and Musina. There are about 114 operators with 430 sidings under the Central regional control.

Audits and Inspection and Investigations outcomes

The Central Region Office conducted 98 audits, six RM3 assessments, and 216 inspections during the 2022/23 reporting period. Part of the key findings from their safety interventions done through audits and inspections were:

- Non-adherence to maintenance and inspection schedules
- Theft and vandalism due to lack of security to protect the rail infrastructure resulting.
- Human factor-related noncompliance - refresher training and substance abuse testing not conducted (due to COVID-19)

- Some SMS documents are not reviewed such as risk assessment, and an interface risk assessment is conducted.

The region responded to 11 occurrence sites for the reporting period and below is the summary of the findings:

- Faded road markings and missing signage at level crossings.
- Non-adherence to road traffic rules by the driver of the motor vehicle- not stopping at the stop sign.
- Overgrown vegetation obstructing the line of sight for train and vehicle drivers.
- No proper protection of the occupation site
- Open rail network next to informal settlements and people illegally crossing the railway line and children playing on the railway.
- Theft of assets: derailment as a result of stolen rail infrastructure such as rail clips.

As a consequence of the above-mentioned shortcomings, the region utilized the following compliance tools:

- Contravention notice was issued to Mozambique Port and Railways (CFM) for failure to report a reportable occurrence to the RSR.

The Region issued 15 improvement directives. The were four issued to PRASA and seven issued to TFR. The following were some of the key findings:

- An improvement directive was issued to PRASA for the use of personal cell phones to facilitate train movement at the GNC as well as the gap in SACTO's training provided to the TCO's
- An improvement directive was issued to PRASA for the non-adherence to standards in the OHTE restoration project in the sections between Pretoria to Mabopane, and Wintersnest to DeWildt.
- An improvement directive was issued to TFR for poor drainage resulting in stagnant water on the railway line at Mahikeng Marshalling yard.

- An improvement Directive was issued to Mozambique Ports and Railways, for expired annual medicals of safety-critical grades employees, and the non-administering of substance abuse testing.
- An Improvement Directive was issued to Samancor Chrome Limited for poor drainage resulting in stagnant water in their siding.

Coastal Region

The Coastal Regional Office comprises of the Western Cape, Eastern Cape, Northern Cape, and part of Free State province as their areas of responsibility. The region is responsible for the oversight of a total of 47 operators with one hundred and forty 140 sidings respectively.

Audits and Inspections

The Coastal Regional Office conducted 86 Audits and 143 inspections. Based on the findings of previous audits and permit application conditions, the focus of these audits and inspections was on, monitoring, fitness for duty, operation maintenance and emergency activities, network coordination activities, review of the SMS, distribution of authorities and responsibilities, risk management and document management control as prescribed by the SMS Determination and as guided by the approved Safety Intervention Macro and Tactical Implementation Plan. Below is the summary of key findings from the safety intervention from the audit, and inspection:

- Document management.
- Maintenance and inspection issues.
- Corrective action development.
- Risk management.
- Distribution of authorities and responsibilities.
- Interface agreement.
- Infrastructure maintenance.

As a consequence of the above-mentioned short comings, the region has utilized various available RSR compliance tools

In the 2022/23 reporting period, the region issued 29 Improvement Directives. PRASA was issued with 13 and TFR issued with 16.

The key findings identified included:

- Critical substation maintenance was not done in line with the submitted maintenance plans due to critical vacancies.
- Tracks related defects.
- No track records of substation routine testing.
- Damaged station facilities due to theft and vandalism.
- Medical surveillance not conducted for the safety-critical grades.

Five Improvement Directives were issued to other operators in the 2022/23 reporting period for the following findings:

- Level crossing protection not in accordance with the standard.
- Joint level crossing risk assessment not done.
- Exposed 3.3 kV AC and 0.5 kV DC electrical bus bars, cables were exposed at the traction substation.
- No work and test permit books or systems used to conduct substation work or testing under isolated and earthed conditions.
- Derailer not installed in line with the Private Siding Agreement.

Theft and vandalism impact: PRASA

Although PRASA started the implementation of its corridor recovery programme, the Central Line (from Nyanga to Khayelitsha and Mitchells Plain) and the Northern Corridor; Eersterivier via Stellenbosch to Muldersvlei stations have remained closed for the following reasons:

- Removal/stolen OHTE infrastructure.
- Theft of perway infrastructure such as rails, sleepers, and associated equipment between Langa to Chris Hani and Kapteinsklip stations.

- Informal settlements built on the railway line and some in close proximity to the railway line on the railway reserve in various areas between Langa, Chris Hani, and Kapteinsklip stations.
- Removal/damage of telecoms infrastructure that is installed on OHTE mast poles from Langa to Chris Hani and Kapteinsklip stations.

Eastern Region

The Eastern Region is responsible for all operators within KwaZulu-Natal and part of Mpumalanga province, as well as the Kingdom of Eswatini. There are currently 59 operators that comprise 122 sidings. TFR and PRASA comprise 37 major depots excluding train stations and 136 collective sites in major depots, which include the port terminals.

Audits and inspections

As part of the Eastern Region's core functions to monitor and enforce safety compliance, during the 2022/23 reporting period, the region conducted 65 audits and 124 inspections. Follow-ups on all the outstanding audits and inspection findings were also conducted, and notices of compliance issued for implemented corrective actions. The conducted audits and inspections comprised 35% of the small operators and 65% of the big operators (TFR and PRASA).

Based on the findings of previous audits and permit application conditions, the focus of these audits and inspections was on, monitoring, fitness for duty, operation maintenance and emergency activities, network coordination activities, review of the SMS, distribution of authorities and responsibilities, risk management and document management control as prescribed by the RSR Determination of the SMS and SMSR and as guided by the approved Safety Intervention Macro and Tactical Implementation Plans. Below is the summary of key findings from the safety intervention from the audit, and inspection.

Key findings

The key findings of the SMS were on the following elements:

- Risk management (i.e., control of risks associated with the activities of the operator and risks arising from the activities of other parties)
- Monitoring (i.e., internal auditing of the SMS and review of the SMS)
- Organisational learning (i.e., corrective action development)
- Structures (i.e., distribution of authorities and responsibilities)
- Documentation (i.e., annual safety improvement plan)
- Safety standards for engineering and operational systems (i.e., procedures to meet applicable rules to ensure compliance throughout life-cycle of equipment/ operation – infrastructure maintenance and inspection related issues)
- Operational, maintenance and emergency activities (i.e., management of interface agreement)

Improvement Directives

Overall:

For issued Improvement Directives, the findings are dominated by TFR and the majority are infrastructure related, led by signalling, electrical, level crossings and permanent way. The theft and vandalism of infrastructure assets have also contributed to the maintenance backlog for both TFR and PRASA.

PRASA and TFR:

The region issued 39 Improvement Directives in the 2022/23 reporting period. Transnet Freight Rail was issued with 31 and PRASA issued with eight.

The key findings identified included:

- Wayside signalling equipment, i.e., points machines, colour light signals at Felixton train station not working due to vandalism and theft of wayside

signalling equipment and/or cables as well as stolen signalling equipment inside apparatus cases.

- No visual indications of movement or positions of trains on the VDUs at the CTC due to the track circuits that were down because of theft and vandalism of some railway signalling equipment, as confirmed by the TCO at Newcastle CTC.
- Concerning backlog for electrical equipment calibration, the submitted record reflects that the last calibration was done in the 2021/22 reporting period.
- Concerning backlog for the annual functional testing of protection components for the Hlelo River and Piet Retief traction tie substations. The functional testing was last conducted on 17 June 2016.
- Compromised level of protection on the level crossing as the boom gates are not functioning, and no temporary measures such as the use of a flagman.

Other operators

A total of 07 Improvement Directives findings were issued to small/ other operators in the 2022/23 reporting period. The key findings identified included:

- Minimum protection for the level crossing not implemented in accordance with Level Crossing Standard, SANS 3000-2-2-1:2021 at the road/rail weighbridge area.
- Chipped switch blade for the right-hand turn-out, missing lock pins on both sides of the lock stretcher rod as well as rotten sleepers for the hand tumbler points at Stainton Train Station.
- The whistle boards implemented for all level crossings between ArcelorMittal and Intercement were non-compliant to the requirement of reflectiveness as per the Level Crossing Standard, SANS 3000-2-2-1:2021.
- There is no evidence provided regarding the

presence of serviced and calibrated pressure/vacuum and/or air gauges installed on the funkies to verify the accuracy of measurements.

- Incomplete baseline risk assessment as the residual risk was not rated and ranked as per the operator's documented processes for risk assessments.

Theft and vandalism impact: TFR and PRASA

Some identified common and contributory factors with a resultant negative effect on efficient passage of trains and thus affecting Reliability, Availability, Maintainability, Sustainability and Safety – RAMSS; and resulting in prevalent Manual Train Authorisations – MTAs, in the region: -

- Single line working and/or manual train authorisations due to theft and vandalism of OHTE and signalling equipment on the Container Corridor (Durban to Heidelberg).
- A concerning high number of manual train authorisation on the North Coast Line due to: -
- Theft and vandalism of OHTE which has resulted in haulage by rail only feasible by diesel locomotives.
- Theft and vandalism of signalling equipment, such as wayside equipment, cables, and battery banks in Relay Rooms with has led to all the points machines in the section being clamped for the running line.
- Local community encroaching on rail property, such as the Canelands Relay Room, and illegally occupying the premises.
- PRASA's A-Corridor Line runs under a reduced number of operating lines (between Clairwood and Berea train stations) due to theft and vandalism of cables and equipment.
- No remote visual image/footage on some train station perimeters via CCTV cameras due to vandalized telecommunication cables.
- The Pinetown and Crossmoor Lines are closed due to theft and vandalism of rail infrastructure.

Research and Technical services

The South African railways are constantly under risk from theft and vandalism. The RSR Research and Technical services conducted an Investigation into the Impact of Theft and Vandalism on Train Operations. According to the study's findings, equipment theft and vandalism resulted in section failures and unreliable train operation. This leaves the passenger network in an unacceptable state and limit the ability of train operations. The department also explored the railway collisions during movement of rolling stock. These are ordinarily serious occurrences that can result in fatalities, injuries, and significant financial costs. In Evaluating the link between abnormal working and occurrence of collisions it was found there are several human factors related failures and deficiencies in the railway environment contributing to these collisions. Lastly, the department's research paper explored security systems utilised within the passenger railway system in South Africa to improve passenger safety. The study was concluded with the recommendations aimed at improving passenger security. These included the need for railway operators to continually conduct risk assessments of their environment, update absolute security systems, carry out research on latest trends in railway security management and benchmark against best practises.

RSR awareness activities

Enhancing Railway Safety through Education and Awareness: RSR's Transformative Interventions

In the complex and dynamic world of railway safety, education and awareness stand as indispensable pillars, safeguarding individuals who interact with or are in proximity to railway tracks and trains. This multifaceted approach serves as a guiding light, disseminating knowledge about the potential dangers and risks tied to rail environments while equipping people with the tools to make prudent decisions and take decisive actions.

Empowering Change through Rail Safety Promotions

Within this realm, rail safety promotions have emerged as powerful catalysts for change. These promotions are carefully crafted to engage, captivate, and resonate with distinct target audiences, etching memorable safety lessons in minds that matter most. By illuminating the path to safe behaviors and practices, these promotions are instrumental in curbing mishaps and tragedies linked to rail environments and trains.

Amid these efforts, the RSR has proactively fostered collaborations with key stakeholders, including PRASA, TFR, Gautrain, RRP, municipalities, and commuter forums, to plan and roll out transformative rail safety initiatives. Informed by the Annual State of Safety Report (ASoSR) and enriched by insights garnered from engaged stakeholder: these initiatives have zeroed in on critical hotspot areas that demand immediate attention.

A Glimpse into a Year of Unyielding Efforts

The reporting period of 2022/23 stands testament to the RSR's commitment to change. An ambitious plan was unveiled, envisioning the execution of 30 rail safety initiatives across South Africa. Through meaningful physical interactions, these interventions honed in on specific areas each with a distinct focus. Here's a snapshot of the diverse campaigns undertaken:

Level Crossing Safety Campaigns: Spanning provinces such as the Eastern Cape, Free State, Mpumalanga and Gauteng, the RSR's efforts were concentrated on promoting safety at level crossings. Campaigns such as those at Nomathamsanqa, Baakens, Thaba-Nchu, and Mtubatuba targeted the crucial area of level crossing safety.

Community and Commuter Safety: The RSR's outreach extended to communities and commuters adjacent to railway lines. Campaigns like the Deputy Minister's Safety Awareness campaign at the Tshelimnyama community

and the Johannesburg Park Station Commuter Safety Awareness campaign were geared toward fostering rail safety awareness within these dynamic spaces.

Schools as Catalysts for Change: Recognizing the pivotal role of education, the RSR engaged with schools across provinces, promoting rail safety among students. Learner Awareness Campaigns at schools like Matsumane Secondary School, Coronation Secondary School, and Nonophla Senior Primary School exemplify the RSR's dedication to nurturing safety-conscious citizens from a young age.

Shaping the Future Through Collaboration

The RSR's journey extends beyond initiatives alone.

It encompasses the establishment and nurturing of relationships with stakeholders. A notable milestone was the collaboration forged with the Transport Education Training Authority (TETA). This partnership breathed life into virtual career exhibitions that showcased diverse opportunities available to learners, ensuring their paths align with safe practices and a secure rail industry.

In a world of constant motion, where the rails traverse distances both physical and metaphorical, the RSR's commitment to education and awareness shines as a beacon of hope. Each campaign, each engagement, and each partnership stitch together a narrative of transformation, weaving a safer future for South Africa's railway landscape.





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