RAILWAY SAFETY REGULATOR

RAIL SAFETY ON THE RIGHT TRACK

PASSENGER PERSONAL SAFETY AND SECURITY REPORT

FEBRUARY 2022

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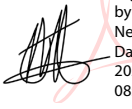
REVIEWED	**SENIOR MANAGER: TECHNICAL SERVICES**	**JOSEPH NETHATHE**  Digitally signed by Joseph Nethathe Date: 2022.02.18 08:09:36 +02'00'
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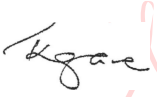
APPROVED	**CHIEF OPERATIONS OFFICER**	**TSHEPO KGARE**  Digitally signed by Tshepo Kgare Date: 2022.03.03 12:31:24 +02'00'
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1. EXECUTIVE SUMMARY

Passenger trains have a unique vulnerability to crime because they make scheduled predictable stops along fixed routes, have high ridership volumes, and numerous access points. Passenger trains also have operations designed to allow passengers to access the station and trains quickly and easily. In South Africa, passengers are vulnerable to crime inside trains, outside stations, and at the train stations. Most the of the security-related incidents reported are concentrated in the large metropolitan areas of Gauteng, Cape Town, and Durban, where large commuter train services are operated by Metrorail, the commuter rail services arm of the Passenger Rail Agency of South Africa.

This research project set out to identify the causality associated with security-related incidents that affect passenger safety at the Passenger Rail Agency of South Africa. From the data collected, passengers are particularly vulnerable to attacks at stations and on trains on weekdays, during the mornings and afternoons. The unfenced Passenger Rail Agency of South Africa railway network, inadequate closed-circuit television camera surveillance, and inadequate number of security personnel deployed make the railway network vulnerable to criminal activity aimed at passengers.

The study recommends that the following be implemented to reduce security-related incidents affecting passenger safety and security at stations, in the trains and outside the stations: use Crime Prevention Through Environmental Design methods to design away crime, maintain cleaner stations, install fencing to limit access to railway network, increase the presence of security cameras and monitoring of closed-circuit television and assign more marshals/security personnel at the stations and on the trains.

2. PURPOSE OF THE RESEARCH STUDY

Instances that impede on the personal safety and security of passengers create fear and anxiety and, in some instances, endanger the lives of passengers. These instances must be identified, studied, and managed. This research project will set out to identify the causality associated with security-related incidents that affect passenger safety at the Passenger Rail Agency of South Africa.

The following personal safety and security related categories in SANS 3000-1-2016 are reported on in the Annual State of Safety Reports:

- Category H – PTI Occurrences,
- Category 7 – Personal Safety on Trains,
- Category 8 – Personal Safety on Stations, and
- Category 9 – Personal Safety outside station platform area with subcategories such as murder, rape, assault, robbery, and theft.

This study will focus on categories 7, 8, and 9. The aim will be to produce accurate information regarding what the contributing factors to security-related incidents are and to use this information to promote a proactive security management process that consists of the early identification, risk mitigation and assessment and ultimately, improved passenger safety.

3. INTRODUCTION

As South Africa's Regulatory body, the Railway Safety Regulator is responsible for overseeing safety. It is also interested in promoting rail as the preferred mode of transport. The National Railway Safety Regulator Act, No. 16 of 2002, as amended, accepts that the Regulator plays a supporting role in railway security since safety and security concerns are interconnected. The data collected by the Railway Safety Regulator shows that South Africa currently has a high railway safety-related incident and operational occurrence rate. An analysis of the 2018/19 Annual State of Safety Report will show that trends in both security-related incidents and safety-related occurrences increased during that reporting period with security-related incidents per million train km increasing by 175%. The 2018/19 Annual State of Safety Report outlined that 33% of security related incidents recorded included personal safety incidents on trains, on stations and outside the station platform area. A further analysis of the recorded data shows that overall harm to persons during security-related incidents increased by 15% since 2017/18. The data available shows that most of these incidents occur at the Passenger Rail Agency of South Africa (PRASA).

The high instances of security-related incidents recorded is both significant and concerning as these incidents can lead to harm to persons and damage to railway infrastructure. Railways form a vital part of South Africa's transport system. Railways should thus provide safe travel for passengers. It is therefore pertinent to study and understand the causes of security-related incidents at PRASA as they relate to passenger safety and security.

4. LITERATURE REVIEW

Pietre and Chaudet (2010 stated in Hamid, Tan, Zali, Rahamat, & Aziz, 2015) defined safety as being focused on the freedom from danger, risk, or threat of injury, loss, or harm to personnel and/or property, whether caused by accident or deliberately. Security, however, denotes the protection against and prevention of assault, fraud, damage, theft, unlawful entry, invasion of privacy, and other such incidences caused by deliberate action. Security concerns emanate from actions that are voluntary and malicious (Hamid, et al., 2015). Within the transportation environment, both terms can be applicable in instances when there exists a high risk of encountering crime as people are not generally able to view external risks in an objective way, instead tending to internalise these risks (Hamid, et al., 2015).

The railway environment consists of stations, (among other elements) and these stations have numerous immediate access routes (Cozens, Neale, Hillier & Whitaker, 2004). Passenger trains have a unique vulnerability to crime because they make scheduled predictable stops along fixed routes, have high ridership volumes, have (at times) numerous access points with operations designed to allow passengers to access the station and trains and board the trains quickly and easily (Peterman, 2005). These attributes of passenger trains and the system they operate in make it impractical to screen passengers regularly (Peterman, 2005). These attributes also make passenger trains challenging to protect because of how accessible and extensive they are (Peterman, 2005). Additionally, with passengers entering and detraining at different points when the train stops which affects ease of access (Peterman, 2005). Instead, it is likely that criminals can learn the train routes and vulnerabilities to gain access to the railway network (Peterman, 2005). Additionally, stations can illicit more fear because they are often located in more isolated settings such as behind industrial areas and have less visible and accessible staff working unlike on buses (Kennedy, 2008).

What then often results from this exposure to crime is the formation of fear for passengers (due to safety concerns) using a transportation environment like the railway environment. This exposure to crime that leads to the fear of crime is linked to the risks that are present in and unique to the railway environment. These safety concerns tend to dissuade passengers from using rail transport, particularly if there are no visibly implemented security measures (Kennedy, 2008).

4.1. Passenger Perception and Fear

Passengers generally tend to feel safer around people than with no people at all (Loukaitou-Sideris & Fink, 2008). This however is not the case when they are surrounded by panhandlers, drunks, beggars, the homeless, and rowdy crowds at or near stations or stops (Loukaitou-Sideris & Fink, 2008). It appears that the presence of these people who are referred to as “social incivilities”, induces more anxiety on transit riders (Loukaitou-Sideris & Fink, 2008).

Research has found that anxiety and fear about personal security are among the main reasons why members of the public chose not to use public transportation (Needle and Cobb, 1997). Several people may choose to avoid certain stops or routes, use some routes only during the day or avoid public transportation altogether if they suppose that they may be victimised on a train, bus or at a station or stop (Loukaitou-Sideris, Bornstein, Fink, Samuels, & Gerami, 2009). Research from different Western world cities has verified that transit ridership is affected by fear of crime. The data from Great Britain has shown that there would be more journeys generated if members of the public felt safe waiting at stations and traveling (Carter, 2005). Similar findings have been recorded in Toronto, London, Los Angeles, and New York City; passengers choose not to use public transit services if they have a negative perception about transit security, particularly if the transport system is perceived as not safe and clean (Loukaitou-Sideris et al., 2009). Indeed, personal safety is crucial for passengers and determines their decision making when travelling.

When looking at the details of the effects of anxiety and fear about personal safety and security on passengers, researchers found that the fear in transit environments tended to be more pronounced among women, the elderly, and low-income people (particularly among those who tend to live in high-crime neighborhoods) (Loukaitou-Sideris et al., 2009); fear of victimisation and crime is more widespread among women due to the existing continuity of violence against them (Loukaitou-Sideris et al., 2009). Fear, whether it is due to real or perceived threats, has some substantial consequences for women. It can cause women to adopt certain behavioural mechanisms when in public that form part of the precautionary measures and strategies that impact their travel patterns (Loukaitou-Sideris et al., 2009).

To understand the factors that influenced perceptions of personal safety on public transport, Currie, Delbosc, & Mahmoud (2013) conducted a survey on young people (aged 18 to 25 years) in Australia. They found that while young men tended to feel safer than young women, gender and actual experience of personal safety incident influenced perceptions of personal safety (Currie et al., 2013). This was further highlighted by the finding that passengers who used public transport more frequently were less fearful (Currie et al., 2013). The young men feeling safer could therefore have been linked to them having had fewer experiences with personal safety incidents because experiences with crime decrease feeling of safety (Currie et al., 2013). The users of public transport considered it safer to travel during the day than at night (Currie et al., 2013). Currie et al. (2013) found that the effect of being attacked or threatened on the feeling of safety was relatively small, suggesting that perceptions of safety and the fear of crime were also linked to the perceptions about the area/environment.

In the report published in 2008, the British Transport Police Authority (BTPA) found that fear was caused by previous personal experience with crime that may come about from being a victim of crime or witnessing a crime being committed. Other factors that may cause fear of a specific public space may include BTPA, 2008):

- having knowledge that an area is a location where crime is committed;
- witnessing anti-social behavior (though not specifically a crime being committed);
- having to travel alone or late at night;
- poor environmental maintenance such as a lack of lighting, graffiti and litter not removed which act as a signal of lack of control over an area; and
- the nature of the rail environment primarily the uniquely enclosed and isolated nature of trains and stations.

Studies on personal security and safety have found a link between the physical characteristics of the immediate neighborhood where a bus stop or station is located and the perception of people about fear and risk; it appears that there is a positive relationship between fear and physical incivilities such as graffiti, litter, and run-down empty buildings (Wilson and Kelling, 1982). Indeed, certain environmental factors in a public setting can trigger more fear and anxiety about security (Loukaitou-Sideris et al., 2009). Environmental factors such as desolation, darkness, poorly maintained areas, substandard environmental quality, lack of surveillance (both by the public and by cameras mounted on surrounding establishments) can increase fear (Loukaitou-Sideris et al., 2009).

It is possible for transportation settings to induce fear in passengers because of specific design characteristics (Loukaitou-Sideris et al., 2009). Spaces with a lot of corners, nooks, or objects where someone could perceivably hide as well as areas with limited escape options tend to make people fearful; similarly, people will have more fear and anxiety moving in surroundings where they do not have a clear line of sight (Loukaitou-Sideris et al., 2009; Kennedy et al., 2008). Therefore open, ground-level transport facilities typically induce less fear than tunnels, underpasses, and dark underground stations (Loukaitou-Sideris et al., 2009). This fear and anxiety that may be felt by people is compounded in desolate areas with few people like staff members and other passengers and a lack of activity in transportation settings like station platforms and inside trains (Loukaitou-Sideris et al., 2009). It appears that the anxiety and fear in these settings is driven by the belief that there will be no one to help if a crime occurs (Loukaitou-Sideris et al., 2009).

An empirical study was conducted by Friman, Lättman, & Olsson (2020) on public transport users in 5 European cities found that there were links between service quality, safety perceptions, and perceived accessibility, with service quality being directly linked to perceived accessibility. The study also found that providing passengers with more information did not have an impact on their perceptions of safety unless the passengers infrequently used trains.

Passengers also tend to be more fearful in transition spaces; passengers typically feel more fear while waiting for a train or bus and on their way to and from a stop or station (Loukaitou-Sideris et al., 2009; Kennedy et al., 2008). This fear seems to be justified by empirical research that recorded most crimes occurring near stations or stops and at stations or stops (Loukaitou-Sideris et al., 2009). The anxiety and fear experienced by passengers – and would be passengers – is compounded by the prospect of long wait times for the train or bus due to the perceived additional risk that waiting for extended periods of time can entail (Loukaitou-Sideris et al., 2009).

In understanding the fear of crime that passengers perceive, it is important to understand some of the socioeconomic variables that contribute to the fear of crime and the risk on passengers. In their research paper, Anser, Yousaf, Nassani, Alotaibi, Kabbani, & Zaman (2020) found that income inequality and unemployment rate resulted in increased crime resulting in nations with inequitable income distribution having higher intentional homicide

rates. Anser et al. (2020) reported that property crime in India was influenced by poverty whereas violent crime was influenced by a high literacy rate with districts with a higher female to male ratio experiencing lower murder rates. Essentially, the presence of young males in a district was associated with increased murder rate (Anser et al., 2020). Anser et al. (2020) further showed that, after having reviewed data from 16 countries from 1990 to 2014 (South Africa being among these), a direct proportionality existed between poverty and homicide as well as between inequality and homicide. Their finding that a high rate of crime was linked to inequality, injustice, unemployment, and low spending on education and health infrastructure with income inequality chiefly contributing to the crime rate in South Africa was indicative of existing socioeconomic challenges that contributed to the perceptions of safety and security that may be present within South Africa; perceptions that possibly pour over into most, if not all facets of the day to day lives of people living in South Africa.

4.2. Systemic safety requirements

Hessami (2015) outlined derived System Level Requirements (SLR) which included a picture of the required system safety properties and performance requirements. The SLR for safety covers the expected level of safety and norms as well as the exposure of people (namely clients, operators, service providers and the public) to the harmful effects, accidents, and system failures expected (Hessami, 2015). The SLR for security includes the immunity of the system to malicious intent in physical and cyber spaces including surveillance, espionage, attacks, contamination, etc. (Hessami, 2015).

In his paper, Hessami (2015) outlined the findings of a risk profile project that set out to study the whole railway system from the vantage point of safety risks posed to passengers, the public, and workers/employees in the UK Railways. The system level safety requirements (SLSR) for the entire railway were determined by combining the core hazards and the detailed hazards. Hessami (2015) purported that since hazards and the requirements were system level properties that were influenced by the national culture, it was best for each country to formulate their own SLSR that were specific to their environment. The suggested course of action was for each nation to conduct independent studies to develop culture sensitive safety risks of their railways to the population (Hessami, 2015).

While the author could account for vandalism as being the actions of some youth members,

other categories of security threats (such as acts of terrorism) were noted as being concerning and difficult for the being transportation authorities to predict, prevent or contain (Hessami, 2015). Scientific structured approaches and methodologies applied in safety engineering were thus proposed as potentially efficient methods to provide assurance in transportation security in rail. Hessami (2015) wrote that due to the level of inter-relatedness of many facets of the system's performance, the starting point for optimisation should ideally begin with a knowledge of the desirable system performance profile and properties. A crucial point of gaining this knowledge needed to include factoring in system level vulnerabilities and security threats (Hessami, 2015).

4.3. Measures to Improve Passenger Security

Mitigating crime risks and improving passenger safety at stations, in trains and outside stations can be approached systematically using the "Five Es" which are: Evaluation, Enabling, Engineering, Education, and Enforcement (House of Commons, 2006).
The measures implemented to make the railway and stations safer for passengers ought to include a combination of different initiatives that do not solely rely on platform supervision or ticket office staff focused measures (House of Commons, 2006). These measures should take the context of tackling crime in the railway space and in the communities the stations serve (House of Commons, 2006). Resource allocation and targeting needs to be modified to ensure that resources go where they are most needed (House of Commons, 2006). This may require prioritizing the busier stations with higher crime rates (House of Commons, 2006).

Measures implemented by train operators in the UK that have been shown to prevent crime rely on the use of measures that make it difficult to commit violence (target hardening) (House of Commons, 2006). These methods involve: using design innovation to design crime out by rebuilding or renovating stations to, among other things, removing "crime blind spots" or dark corners, deploying trained and resourced security staff to patrol and be visible, patrolling known hot spots, deploying police community support, installing gates at/around stations to limit access to station from persons who are not genuine passengers, increasing lighting levels at stations and parking/access areas, using closed-circuit television (CCTV) (including systematic surveillance and evidence gathering), prioritising (and maintaining) the lights, intelligence to detect organised crime, and creating help points linked directly to a

control room (House of Commons, 2006). Some measures require funding that could come partly from local government. Ensuring that the stations are fully staffed will not stop crime alone (House of Commons, 2006). To effectively stop crime, the challenge would be best handled by railway operators, the communities affected and the governments. Measures on a more systemic level that could assist in the reduction of crime include the development of policies to drive pro poor reforms, an increase in investments in both Health and Education by government, the development and monitoring policies to reduce crime rate and increase per capita income and increasing social expenditure to ensure that all the citizens live above the poverty line (Anser et al., 2020).

Research has produced notable support for the use of measures created to design crime out of the stations. In their discussion of crime prevention through environmental design (CPTED), Cozen et al. (2004) asserted that the appropriate design and effective use of the built environment had the ability to lead to an improved quality of life for passengers through a reduction in the fear of crime and the incidence of crime.
CPTED can aid in the reduction of crime by designing or modifying the environment to reduce opportunities for crime and fear of crime by promoting (Cozen et al., 2004):

- Natural Surveillance designed to maximise visibility by placing physical features, activities, and people in such ways as to ensure that there are no dark corners or blind spots with very few people (staff members) and surveillance. Lighting of public spaces and walkways at night are therefore important components of this strategy.
- Natural Access Control that physically guides people entering and exiting a space by the judicial placement of signs, entrances, exits, fencing, landscaping, and lighting.
- Territorial Reinforcement using physical attributes that express ownership, such as landscaping, fences, artwork, pavement treatments, signage, and placement of buildings.
- Image/Maintenance that serves as a representation of ownership and allows for the continued use of space for its intended purpose. The use of positive images communicated through the specific materials, design, and scale selected will also add to discouraging criminal activity.

The results from CPTED implementation have shown that the station with CPTED is

perceived as safer (Cozens et al., 2004 & van der Linde, 2015). CPTED measures however must be tailored and site specific; their implementation must be preceded by an analysis of crime and the fear of crime in an area (Cozen et al., 2004). Successful implementation of security improvement measures is likely to result in an increase in railway passengers (Cozen et al., 2004 and Kennedy, 2008).

In their study, the House of Commons found that installing 20 000 CCTV cameras (as a deterrent and assistance to security convictions) at stations and depots, recruiting security staff to patrol stations and trains, removing graffiti, cleaning & painting stations, litter clearance, and station remodelling (that may have included removing a redundant building that may have been hidden corners that encouraged crime) were effective measures for lowering crime and improving passenger safety and security.

The study conducted by Hamid et al. (2015) revealed that the availability of security officers, the layout and design of the stations and the lighting had the most significant contribution towards affecting safety perception. Railway stations should ideally have formal risk assessments conducted that comprise of threat assessments, vulnerability assessments and criticality assessments (Peterman, 2005). The cost of improving security efforts can be costly to both the train operators, the government, and the public (Peterman, 2005). These costs can include money, time, limitations on personal freedoms, and inconvenience (Peterman, 2005).

In the report published in 2010, the Ministry of Transport, Public Works, and Water Management (MTPW) found that for measures designed to reduce the number of safety incidents in public transport to be effective, they needed to employ a strategy that made use of preventive measures, preparatory measures, and follow up measures. Effective preventative measures needed to improve the registration of public transport incidents, formulate standards and values for the entire public transport sector, use punishment to enforce prohibition orders, and enhance the powers of investigating officers (MTPW, 2010). Preparatory measures were more effective when they included the improvement of CCTV supervision and the efficient deployment of security officers to security hotspots (MTPW, 2010). The follow-up measures to be implemented needed to simplify the reporting process (MTPW, 2010).

5. METHODOLOGY

The South African railway industry is comprised of numerous railway operators, some transporting raw materials, freight, and dangerous goods, and other railway operators transporting passengers. There are two large railway operators that transport passengers, namely the PRASA and Bombela Operating Company (BOC), trading as Gautrain. PRASA, as reported by the State of Safety reports throughout the years, has been the operator to which most of the security-related occurrences were attributed. Consequently, this study focuses exclusively on passenger personal safety risks on PRASA's trains, at PRASA's stations and outside PRASA stations.

5.1. Data Collection

The data collection approach employed both qualitative and quantitative data collection methods. The quantitative and qualitative data collection procedures included the collection and analysis of security reports and data submitted to the Regulator, the review of Corrective Action Plans developed by PRASA, the review of security statistics provided by PRASA and BOC, the identification of risk mitigation methodologies used by similar international rail commuter operators, conducting meetings with relevant PRASA personnel to gather their insights on security related risks and interventions as well as an analysis of other relevant information from PRASA. A gap analysis was conducted using the data received from PRASA.

Security-related incidents recorded outside PRASA stations, at the stations and inside the trains between 2017/18 and 2020/21 were analysed. The data was categorised according to incident/occurrence type (assault, rape, attempted murder, etc.), time of day, day of the week, victim profile, assailant profile, weapon used, province, year, and injuries. The security-related incidents recorded outside BOC stations, at the stations and inside the trains between 2017/18 and 2020/21 were also analysed. The aim of this analysis was to compare the security-related incidents recorded at PRASA to those recorded at BOC as they are both railway operators that transport passengers in South Africa, albeit with different operation sizes.

6. RESULTS AND DISCUSSION

6.1. Benchmarking Summary

The summary of the benchmarking process that was conducted is included in Table 1 below.

Table 1: The summary of the benchmarking process that was conducted

Organisation	Intervention Measures to Improve Passengers Safety & Security
Land Transport New Zealand	• Increased presence of security cameras (CCTV) & monitoring of CCTV and response times if an incident occurs. • Higher visibility of personnel at stations. • Increased presence of security people during train journey. • Provision of real-time information through woman magazines, television, billboards, on internet banner communication methods. • Provision of emergency phones or panic buttons. • Better co-ordination of bus & train schedules/timetables • Random security officer patrols at stations during less busy times. • Open cafés/kiosks at stations.
United Kingdom Government	• Crime prevention through environmental design (CPTED). • Improved lighting. • CCTV installation. • Increase in number of staff. • Installation of transparent shelters. • Maintenance of cleaner stations. • Cutting back vegetation. • Signs at entrances and exits. • Installation of fencing. • Landscaping.
House of Commons, Britain	• CCTV installation at stations and depots. • Recruiting security staff to patrol stations and trains. • Removing graffiti. • Cleaning & painting stations. • Litter clearance. • Station remodelling.

Australian Railway Stations	• Vegetation control to be conducted. • Improve lighting at stations. • Have emergency panic buttons & public address systems at stations. • Remove level crossings around stations. • Provide more CCTV cameras linked to the control rooms. • Monitor entry points to increase perceptions of safety.
Malaysia Railways	• Campaigns against anti-social behaviour. • Better lighting. • CCTV visible monitoring. • Layout of stations. • Identified help points. • Visibility of hazards. • Rail staff visible on trains. • Police visibility on trains. • Adequate or better located park-and-ride facilities. • Adequate passageways, stairways, & escalators to ensure that platforms are cleared before the arrival of the next train. • Providing enough seats at the platform waiting area. • Providing schedules as well as route information. • Signage.
Indian Railways	• Trains escorted by Railway Protection Force & Government Railway Police daily on vulnerable & identified routes/sections. • Security helpline number visibility. • Use of social media platforms to keep in touch with passengers to enhance security & to address their security concerns. • Surveillance of vulnerable stations through CCTV network & access control. • Filling vacancies in rail police structures.
BOC	• Visible security officers on trains. • Visible security officers at stations. • CCTV on trains, stations, & along the railway system. • Closed railway system through fencing. • Maintenance of clean stations. • Lighting at stations. • Access control at stations. • Random security patrols.

The table above shows that the organisations summarised used an array of different methods to reduce security incidents and improve passenger safety and security. The intervention measures employed appear to address gaps that may exist in the different parts of the railway safety systems that affect passengers. The strategies employed include a combination of preventative design measures, preparatory measures, and follow-up measures as recorded by MTPW (2010). The preventative design measures commonly

utilised included installing fences, station remodelling, signage, maintenance of cleaner stations, installing fences, better lighting, landscaping, etc. These measures are in line with the findings of research that purported that measures that design crime out of the stations or rely on the reduction of crime by designing or modifying the environment to reduce opportunities for crime and fear of crime (Cozen et al., 2004) could be effective.

The preparatory measures employed involved increasing the number of security officers, communicating with passengers, installing/monitoring CCTV, monitoring access control to stations, making panic buttons and help points visible, etc. These measures appear to function through target hardening that makes it difficult to commit crime successfully (House of Commons, 2006). The follow-up measures included filling vacancies for security staff, increasing security monitoring, etc.

It is apparent from reviewing the intervention measures in Table I that improving safety is being approached systematically; it may even be suggested that the “Five Es” (Evaluation, Enabling, Engineering, Education, and Enforcement) as noted by House of Commons (2006) are in effect in the measures noted above.

6.1. Security Incident Analysis

The following figures show the results of the data analysis conducted on the reported security-related incidents that occurred between 2017/18 and 2020/21. This data contained reported incidents; it is known that there are several other incidents that go unreported and therefore unrecorded. While the data was analysed to highlight the profiles of the assailants and victims, it is noted that there were a lot of missing details. For instance, the type of information that was not consistently recorded included number of assailants, the race of the assailants, the gender of the assailants, the gender of the victims, the number of victims, etc. It should therefore be noted that the results below are based on that data that had some gaps. It is likely the case that there were more incidents that occurred.

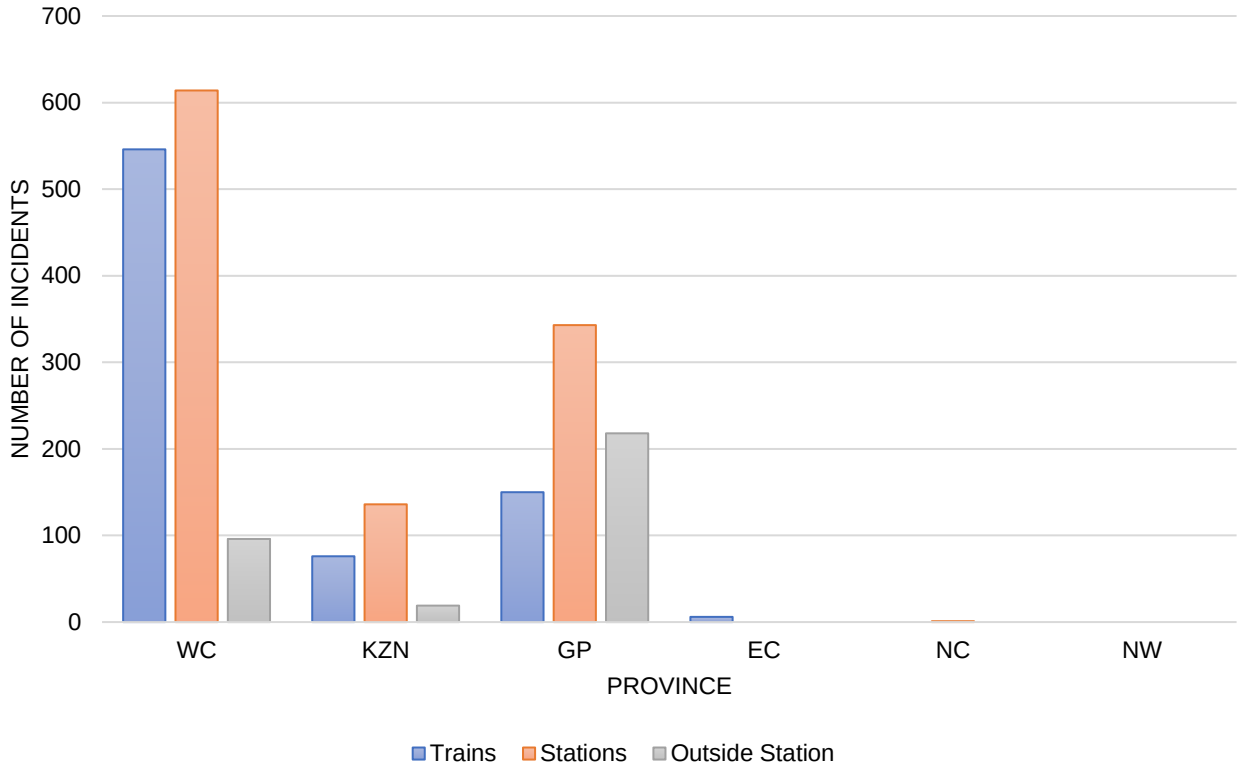

Figure 1: Total incidents recorded

Figure 1 shows that more incidents were recorded at the stations than in the trains and outside the stations. The second highest incident category was inside the trains. The Western Cape, Gauteng, and Kwa-Zulu Natal accounted for the most personal safety and security incidents.

Both the Western Cape and Kwa-Zulu Natal had the greatest number of incidents recorded at their stations, followed by in the trains then lastly outside the stations. Gauteng followed a different trend with the greatest number of incidents recorded at the stations, followed by outside the stations then lastly, in trains. The Eastern Cape had only 6 recorded incidents in trains.

From figure 1, it is evident that the Western Cape had the greatest number of incidents over the 4-year period of analysis. The figure shows that there were 614 incidents recorded at stations in the Western Cape compared to the 343 incidents recorded at stations in Gauteng. There were 136 incidents recorded at stations in Kwa-Zulu Natal. There were almost double the number of incidents recorded at stations in the Western Cape than in Gauteng and over 4 times the number of incidents recorded at stations in the Western Cape than in Kwa-Zulu Natal. 564 incidents were recorded in trains in the Western Cape compared to the 76 incidents recorded in Kwa-Zulu Natal and 150 incidents recorded in trains in Gauteng. Again, the Western Cape had a significantly higher number of occurrences.

A total of 25 incidents were recorded at Gautrain between 2017/18 and 2020/21. All the incidents occurred in Gauteng. The Gautrain data analysed did not include details on the assailant, victim details, or the weapon used during the armed robberies.

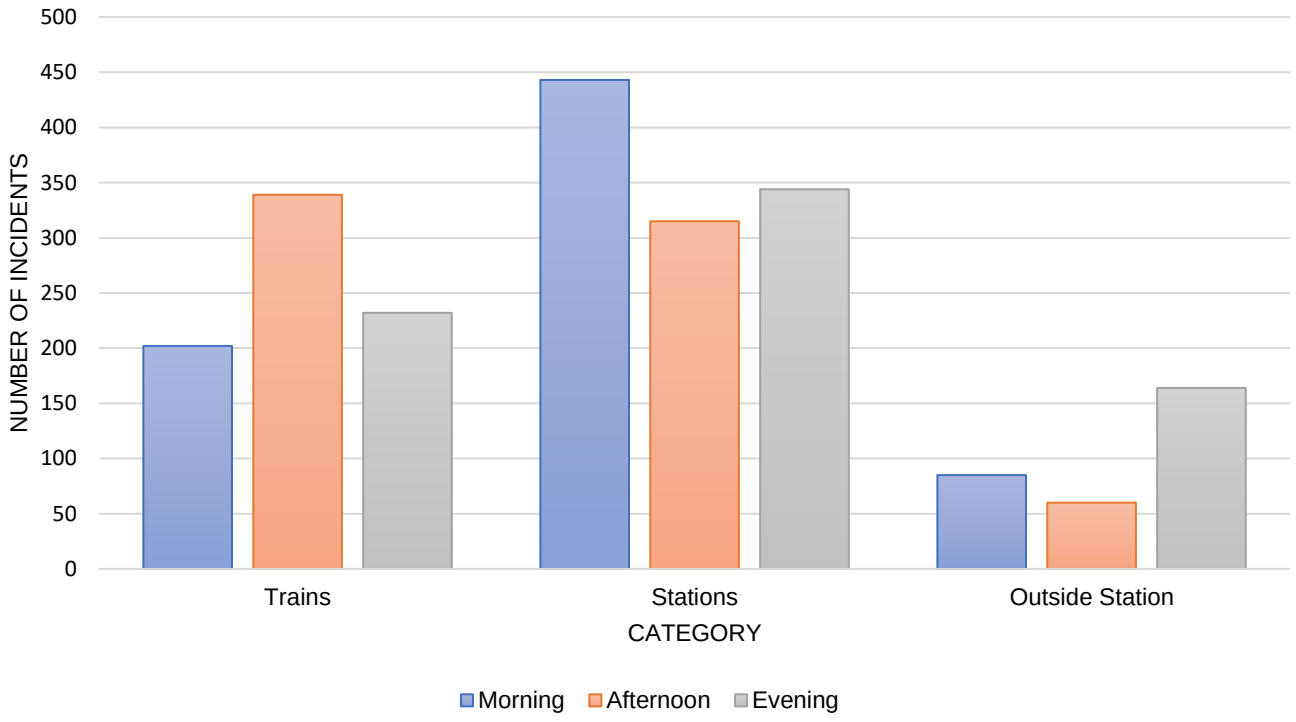

Figure 2: Time of day of security-related incidents

Figure 2 shows that the greatest number of recorded incidents occurred in the afternoon inside trains, in the morning at the stations, and in the evening outside the stations. There were a total of 740 incidents that occurred in the evening and a total of 730 incidents that occurred in the morning. The greatest number of personal safety and security incidents – morning, afternoon, and evening – occurred at the stations with the second highest number of incidents occurring inside trains. A lower number of incidents occurred outside the station. It may be inferred that passengers are likely to encounter an incident that threatens their personal safety both in the evening and in the morning, with their location being the determining factor; it appears that passengers using railway transport in the morning are likely to encounter a personal safety and security threat at the station, while passengers who use railway transport in the afternoon are likely to encounter an incident inside one of the PRASA trains. A personal safety and security incident is likely to occur outside the station in the evening although evening remain high risks times regardless of the location.

Of the 25 incidents recorded at Gautrain, 11 occurred in the afternoon, 3 in the evening, and 11 in

the morning.

In their study, Currie et al. (2013) purported that the users of public transport considered it safer to travel during the day than at night. It appears however that this assumption would be incorrect in the South African railways where victims seem to be at risk through-out the day. The figure above shows that passengers were more likely to be victimised during the day than at night.

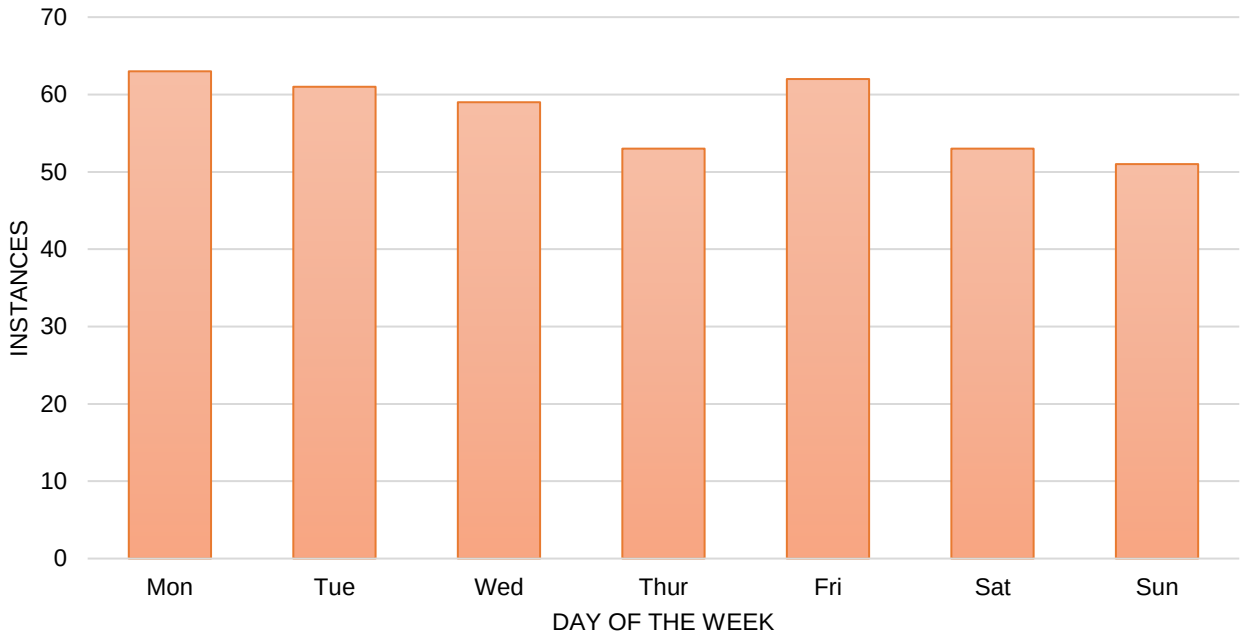

Figure 3: Day of the week of security-related incidents

Figure 3 illustrates the day of the week distribution of personal safety and security incidents. The data distribution appears to be relatively homogeneous with slight variations; it appears that more personal safety and security incidents occurred on weekdays with Mondays, Fridays and Tuesdays reporting the highest number of personal safety and security incidents. Fewer incidents were recorded on Thursday and Saturdays. The least number of incidents were recorded on Sundays. Based on the results of figure 1 which showed that the greatest number of personal safety and security incidents occurred at the stations and inside the trains, it follows that there would generally be less incidents over the weekend as there are fewer passengers then. It may be that the assailants do not have as many people to victimise on weekends.

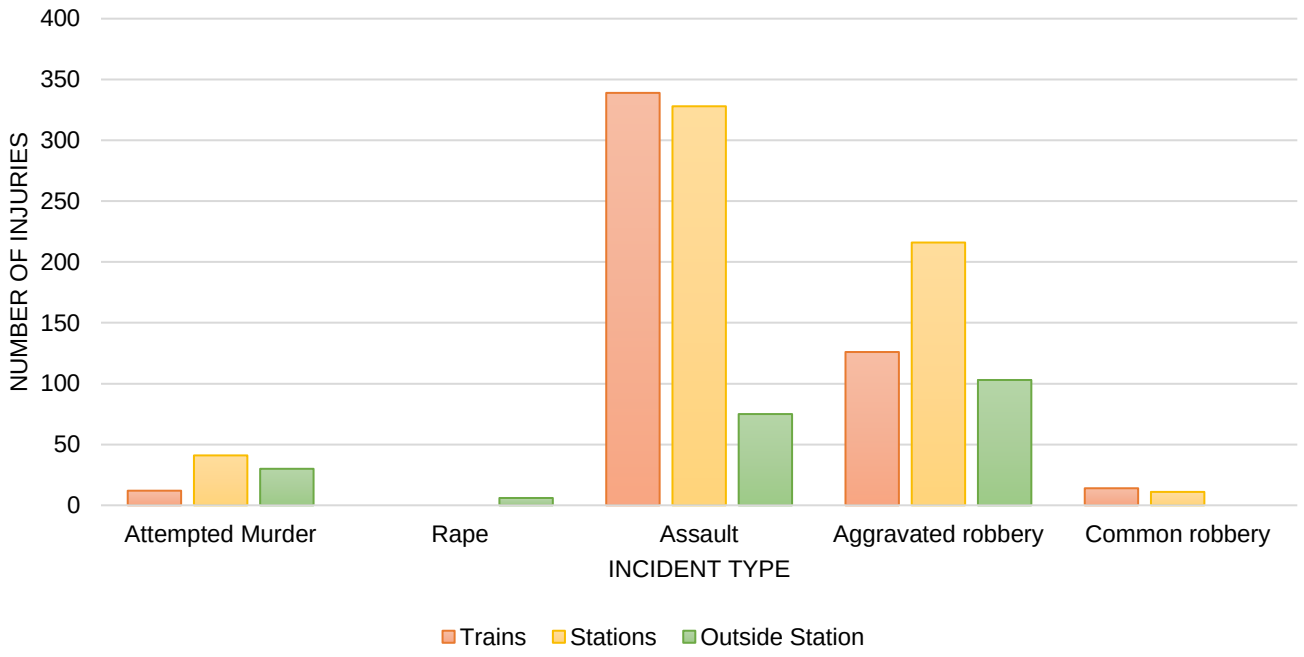

Figure 4: Total injuries reported after security-related incidents

Figure 4 illustrates that assaults accounted for the largest number of injuries at 742 in total. Aggravated robbery accounted for the second largest number of injuries at 445 with attempted murder accounting for the third highest number at 83. Common robbery accounted for 25 injuries while rape accounted for 6 injuries. Most rapes occurred outside the stations. The greatest number of assaults happened on trains and the second greatest number occurring at stations. The largest number of aggravated robberies and attempted murders occurred at stations. More injuries were sustained inside trains and stations. The data suggests that passengers are more likely to be injured inside the trains or at the stations; in particular, it appears that a passenger is more likely to be assaulted on the train than robbed on the train. When passengers were robbed in the trains, their assailants tended to act while the train was in the section between stations. Passengers would mostly be robbed of personal items such as their monthly train tickets, cellphones, wallets, cash, jewellery, clothing, and electronics. Passengers were subjected to a lot of violent acts; some passengers were robbed in sections while train was standing after it experienced a fault. Some passengers were thrown out of moving trains. Women in particular experienced rapes, a risk category primarily unique to women. In some of the recorded instances of rape, the security officers were the perpetrators. A few rapes occurred in train yards.

It was noted that a significant number of robberies in the Western Cape were carried out by groups

of between 2 to 10 people armed with knives and guns.

Gautrain only recorded 8 injuries because of security-related incidents at the station, on the trains and outside the stations. There were no fatalities recorded. 11 of the incidents were from robbery, 9 from assault, 3 from sexual assault, and 2 from armed robbery. The bulk of the incidents recorded at Gautrain occurred at the stations; these incidents included 3 armed robberies, 3 assault cases, and 11 common robberies. The incidents recorded at Gautrain stations resulted in 3 injuries. The incidents that occurred outside Gautrain stations included 1 assault cases resulting in an injury, one robbery, and 3 sexual assault cases resulting in 3 injuries. One injury was recorded on a Gautrain train from an incident of one passenger assaulting another. Only 2 incidents were recorded on the Gautrain train.

It is evident from the data analysed that the most number of incidents occurred where there was the greatest opportunity from criminals to interact with passengers (at the stations and inside the trains).

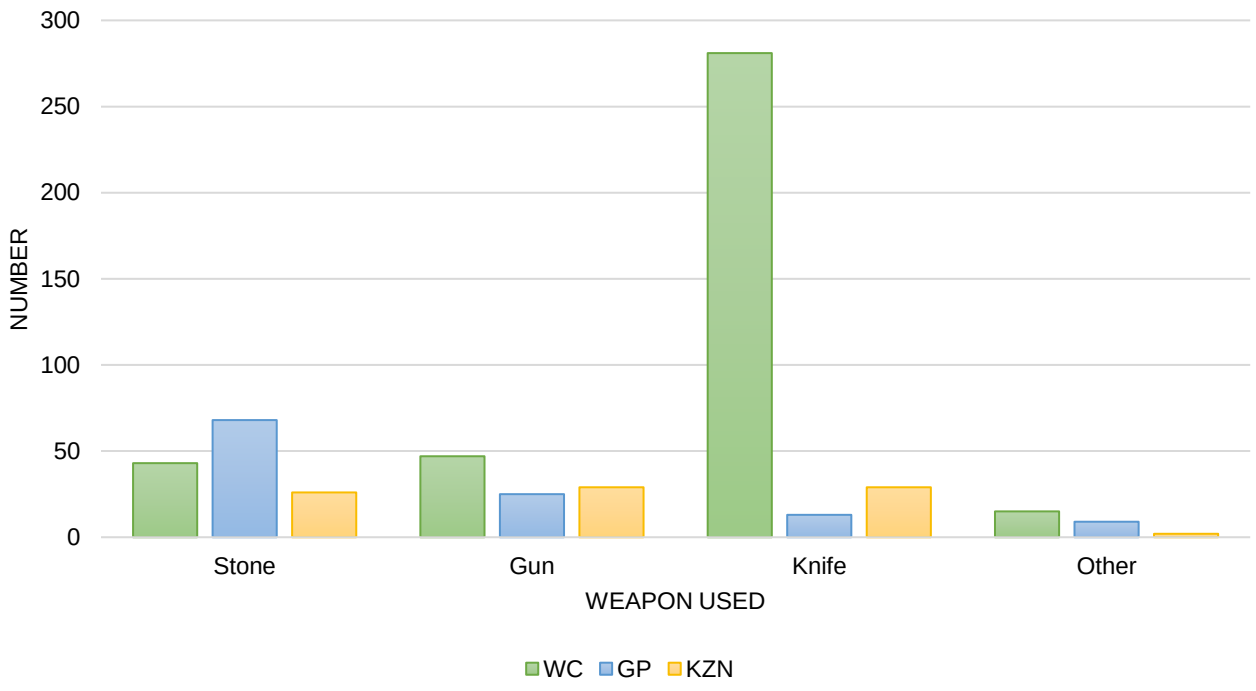

Figure 5: Weapons used during security-related incidents

Figure 5 depicts the data on the types of weapons used during personal safety and security incidents. A knife is the weapon of choice in 323 of the recorded incidents whereas a gun was used in 101 incidents. Knives may be preferred because they are relatively easy to conceal, acquire and

bring into the station and train with little detection. Stones accounted for the second most used weapon at 137. The “other” category included the use of weapons like steel chains, poles, bottles, and pepper spray.

The Western Cape region accounted for the bulk of use of weapons during the incidents recorded. Assailants used knives to either intimidate or stab victims in 281 recorded instances. More incidents involving the use of stones recorded in Gauteng than any other region. Many of the cases where a stone was used involved community members throwing stones at a moving PRASA train. These stones would often pass through an open train window and strike a passenger sitting inside the train. More guns were used in Western Cape; Kwa-Zulu Natal was accounted for the second largest number of guns used at 29 and Gauteng accounted for the lowest instance of gun use during a security incident at 25 instances.

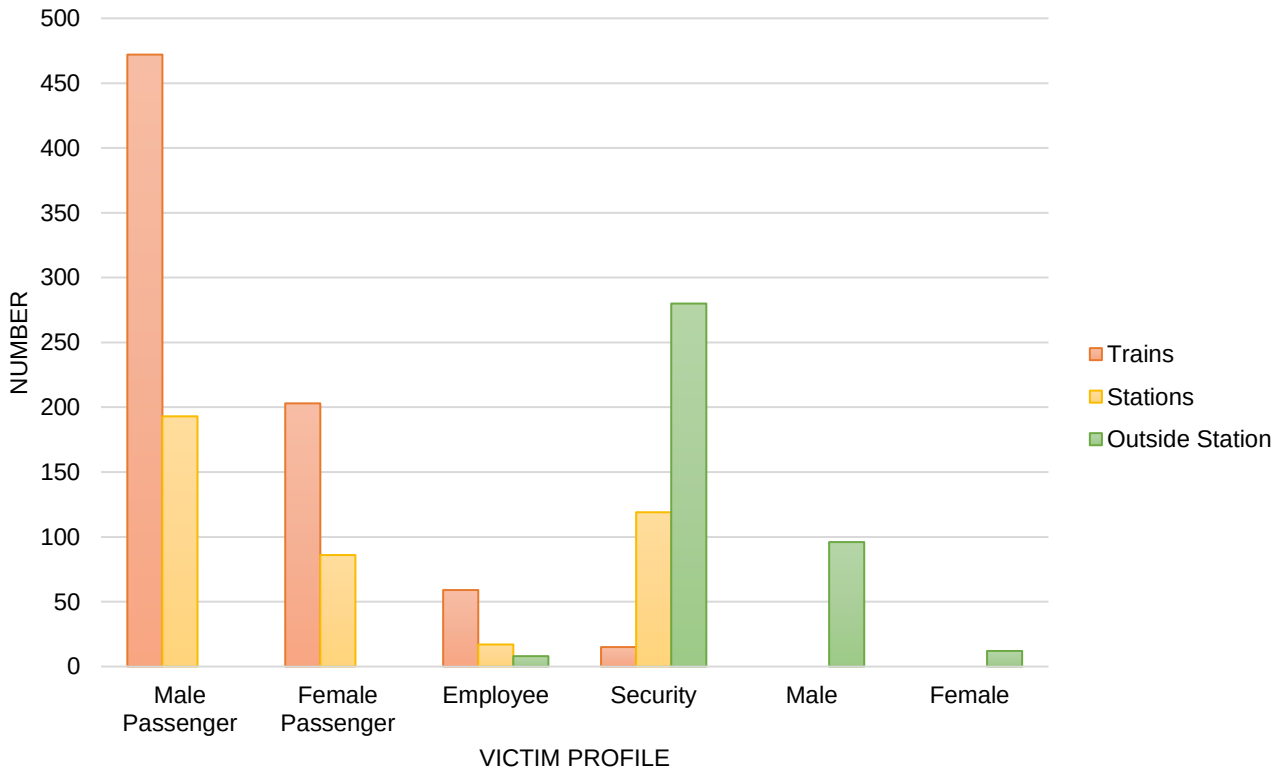

Figure 6: Victim profiles

Figure 6 shows that most victims were males. Most victims outside the station and in the stations were the security officers. PRASA employees were victimised more on the trains than on stations and outside the station. A PRASA employee was twice as likely to be victimised on a PRASA train than on the other 2 locations combined. Most passengers were victimised at the stations.

As stated in earlier chapters, research has found that passengers are willing to change their travel behaviour to avoid being victimised (Loukaitou-Sideris et al., 2009); these changes usually involve taking precautionary measures and strategies that impact their travel patterns such as avoiding certain routes and travelling at certain times of the day only. Authors like Currie et al. (2013) suggested that perceptions of safety and the fear of crime were linked to the perceptions about the area/environment. The data above shows that the occurrence of crime and the fear and anxiety that may be linked to it, may be based less on perceptions of the environment but on the lived experiences of passengers. A passenger intending to use railway transport but hesitating due to safety concerns would be justified in their concerns as they are likely to encounter assailants inside the trains and at the stations. These passengers are more likely to be victimised during the day than at night at stations and inside PRASA trains. It may be that the usual adages of safety in numbers and safety in travelling during the day do not completely apply in this setting. Even if passengers were to take precautionary measures like travelling at certain times of the day only, these may not work well as the assailants seem to alter their patterns depending on when there is a greater number of passengers (or would be victims).

The higher crime rates at specific times of the day, week and at specific areas of the railway system suggests that criminals have learned the train vulnerabilities and train routes on the PRASA railway network. It appears that criminals go as far as attacking when there are likely to be more people using the railway network (like in the morning at stations and in the afternoon on trains). The criminals may have an added advantage as some people may not expect to be victimised in the morning or in the afternoon.

The data above shows that railway passengers in South Africa are exposed to crime; this exposure to crime likely contributes to the formation of fear for passengers due to safety concerns (Kennedy, 2008). The clear risks present in and unique to the railway environment affect railway transport users every day. The safety concerns that passengers may develop may dissuade passengers from using rail transport. The likelihood of passengers being dissuaded from using rail as their preferred mode of transport will be worsened if there are no visibly implemented security measures (Kennedy, 2008).

6.2. **PRASA's security-related measures**

The table below shows a summary of the measures implemented at PRASA to manage passenger safety and security.

Table 2: Passenger Safety & Security Measures at PRASA

Risk	Existing Controls	Control Effectiveness	Planned Additional Controls
Passenger & Staff Assaults	1. Security deployment 2. CCTV surveillance camera coverage. 3. Rapid Rail response	1. Not enough security officers deployed 2. CCTV surveillance camera system not operational. 3. Rapid Rail does not assist 100% of the time	Upgrade CCTV surveillance camera system to be operational, linked to central CCTV surveillance control centre.
Robbery of Passengers	1. Security deployment 2. CCTV surveillance camera coverage.	1. Security officers do not have two-way radio (or other means of fast communication) to coordinate with other security personnel. 2. CCTV surveillance camera system not operational.	Upgrade CCTV surveillance camera system to be operational.
Encroachment & Trespassing	1. Security deployment 2. Fence installation alongside tracks 3. Communication with the community. 4. Joint operations to remove structures &/or informal residents.	1. Not enough security officers deployed 2. Incomplete perimeter fence 3. No success in removing squatters.	1. Walling project enclosing the rail tracks either side of the stations for some distance. (Implemented at some stations) 2. Use of drones to patrol the rail reserve. (Not implemented) 3. Involve the community in the vicinity of stations.

Table 2 shows that while PRASA has plans to manage passenger safety and security, a lot of the existing controls are not effective. The primary controls that are repeated through-out are the use of CCTV surveillance camera systems and the deployment of security officers, yet both controls are yet to be fully implemented. A large part of having security officers deployed at different areas is ensuring that they can communicate with each other; the inability to have sufficient quick and functional communication methods for security officers inhibits their effectiveness. While the walling project has been implemented at some stations, it is yet to be implemented at all the stations. The

plans to involve the community in the vicinity of stations in crime prevention efforts, including protecting infrastructure to allow trains to operate, is yet to be implemented on a wide scale.

The inability to successfully implement some of the planned measures is compounded by the open railway network that PRASA has that may make it difficult to limit unauthorised access to the rail network.

The table below depicts the findings of a gap analysis that was conducted by the researchers.

Table 3 PRASA security data gap analysis

Document	Gaps
Annual Safety Improvement Plan (ASIP) 2021/22	• No immediate causes outlined for categories 7, 8 and 9. • Safety targets not included for categories 7, 8 and 9. • No action plans included for categories 7, 8 and 9. • The appointment of private security is noted but training on rail for these is not mentioned. • Personal Safety is not part of the action plan.
PRASA Security Plan 2021	• The PRASA Security Plan is a generic document on issues regions should consider in developing a security plan. It is not a corporate security plan from which the regions will be able to develop theirs. • An overall security plan was absent, instead each region has its own Security Plan. • The submitted procedure does not mention the Identification of Controls (both proactive and reactive) to mitigate the risks. • Annex F PRASA Security Risk Assessment table has controls such as CCTV instalment plans and deployment of Private Security. Implementation timetables do not exist. • No Security policy and procedure included. • The crime patterns are ever changing but PRASA reviews its Security Risk Assessment every two years.
Corporate Plan 2021-2024	• An independent assessment on PRASA Security plan was conducted between February and April 2021. • Roll out of the modernization projects including the introduction of the EMUs was not integrated with Security Plan. • The plan is not fully implemented.

The review of the ASIP sent by PRASA shows that there were action plans to address the tabulated high numbers of murder, assault, and robbery like they did for the other categories. Instead, the

action plans that address categories 1-9 focus primarily on the theft of assets. Since addressing personal safety did not form part of the action plan, it suggests that PRASA is not prioritising the safety of their commuters. While the appointment of private security is mentioned, it is not clear if the private security personnel will be trained.

The occurrences where the members of the public were struck by trains were consistently high between 2016/17 to the 2019/20.These high incidents could be reduced - improving personal safety in trains, on stations and between stations- by the implementation of the walling project. This project could improve safety by limiting access to the railway reserves.

There were other gaps identified during the conducting of this research; factors that create gaps includes the inconsistent way in which security incidents are captured. Sometimes, the incidents captured would indicate the details of the victims (details such as the identity number, race, gender, and address) and the assailants (gender, race, number) whereas other incident reports would have very vague details given. Passengers must report at PRASA stations if they can find staff.

7. CONCLUSIONS

This project set out to study and understand the causes of security-related incidents at PRASA as they relate to passenger safety and security. The study found that passengers were victimised primarily at the stations and on PRASA trains with more of the security incidents occurring during the day and on weekdays. The project found that while PRASA had preparatory measures such as a CCTV surveillance camera system, security deployed, and communication with the community as planned intervention strategies, these strategies were either not operational – in the case of the CCTV surveillance camera system – or not successfully implemented.

When evaluating measures found to be effective at reducing security-related incidents and improving passenger safety and security, CPTED methods, increasing security personnel and improving lighting were found to produce significant reductions in crime.

8. RECOMMENDATIONS

It is recommended that PRASA implement an array of methods to reduce security incidents and improve passenger safety and security. The recommended strategies that PRASA should employ should include time and budget-based preventative, preparatory, and follow-up measures. PRASA should consider implementing the following:

- Crime Prevention Through Environmental Design (CPTED) including station remodelling, and landscaping,
- The reviewing of the Security Risk Assessment at a frequency that is synchronised with the rate at which the crime patterns change,
- Identifying hot spots and engaging the local municipal authorities, locals, and police in combating crime,
- Conducting crime awareness campaigns in identified hot spots/corridors,
- Erecting crime-warning signage on trains and stations to increase awareness,
- Developing crime awareness and prevention pamphlets to be given to passengers at the ticket offices,
- Developing a comprehensive corporate security plan that would inform regional safety and security plans,
- Maintenance of cleaner stations (removal of graffiti, cleaning and painting stations, cutting back vegetation, clearing litter in and around station),
- Repairing damage train windows, train doors, and paint over graffiti on trains,
- Increasing presence of security cameras and monitoring of CCTV inside trains and at stations to deter criminals,
- Increasing incident response times if an incident occurs,
- Installation of fencing to limit access to railway network,
- Training security officers,
- Improving lighting,
- Increasing presence and visibility of security officers inside the trains, outside stations and at stations,
- Maintenance and construction of signs at entrances and exits,
- Provision of emergency phones or panic buttons at stations and on trains, and

- Improving train operation timetables and public address announcements at stations and inside trains.

Implementation of the above strategies will encourage an increase in the use of rail transport by commuters.

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