(RESEARCH ARTICLE)

A longitudinal analysis and projection of provincial murder trends in South Africa: Causation and spatiality (2022-2027)

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Abstract

This article conducts a longitudinal analysis of provincial murder trends in South Africa, examining the socio-economic and spatial factors contributing to violence. It highlights how extreme income inequality, unemployment, and regional disparities drive high murder rates, with a notable concentration in provinces such as Gauteng, Eastern Cape, and Western Cape. Utilising secondary data from the South African Police Service, the study identifies key motives for murder, including interpersonal conflicts, robbery, and gang violence. Forecasting techniques were employed to project murder trends, emphasising the urgency of targeted interventions in high-risk areas. Recommendations include implementing community-specific policing, conflict resolution programs, and economic support initiatives to address root causes. This research contributes a predictive perspective on crime trends, advocating for data-driven approaches to enhance public safety and reduce violence across diverse socio-economic landscapes in South Africa.

Keywords: Causative; Crime; Disparities; Forecast; Murder; Provinces; Spatial

1. Introduction

Sustainable Development Goals (SDGs) were established at the United Nations Conference on Sustainable Development in 2012 to address the world's most urgent challenges (United Nations Development Programme, 2024). Replacing the Millennium Development Goals (MDGs) initiated in 2000, the SDGs aim to complete unfinished MDG efforts while tackling critical global issues. One of the key goals, SDG 16, focuses on promoting peaceful and inclusive societies, ensuring access to justice for all, and building effective, accountable institutions (United Nations, 2023). Within this goal, Target 16.1 aims to significantly reduce all forms of violence and related death rates globally (United Nations Development Programme, 2024). However, despite these aims and goals, over recent decades, violence and murder have escalated, becoming significant global challenges (Fikrillah and Pancanigum, 2024).

High murder rates are indicators of a country's instability, with studies showing that regions with high rates of income inequality and youth unemployment are most affected (Kwabena, 2017). This is evident in Africa, where the prevalence of criminal activity has surged over the past decades, evolving into a major social problem that hinders the region's development (Zungu & Mtshengu, 2023). Africa grapples with a high level of unemployment particularly among the youth, a high Gini Coefficient of about 65 points, widespread income inequality, and low economic growth. Countries like Malawi, Ghana and South Africa exemplify these challenges, with youth unemployment rates exceeding 35% (Zungu and Mtshengu, 2023). South Africa, in particular, stands out as the most unequal country globally, with inequality in per capita consumption nearly 50%, higher than the average for other upper-middle-income nations (Sulla et al., 2022). This combination of severe inequality and high unemployment contributes to the region's rising crime rates, further impeding its socio-economic development.

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In South Africa, three people are murdered every hour, resulting in 76 deaths each day and a staggering annual total of 27 621 (SAPS, 2023). This translates to a murder rate of 45 per 100,000 people in 2022/23, six times higher than the global average (Matamba & Thobela, 2024; Global Burden of Disease Collaborative Network, 2018). The prevalence of violence in the country is compounded by deep-seated socioeconomic challenges, as aforementioned. The country's socioeconomic conditions emphasize the importance of understanding the spatial and temporal patterns of violent crime to design effective interventions because as economies transition from traditional to contemporary ways of living, it is predicted that changes in criminal activities will increase (Zungu and Mtshengu, 2023).

2. Rationale for the Study

Murder, defined as the intentional killing of another individual (Hagglund and Khan, 2020), has severe and far-reaching impacts. Beyond the loss of life, the consequences extend to financial strain on families, especially when the victim is the primary breadwinner, and psychological trauma on children (Fikrillah and Pancanigum, 2024). In South Africa, section 11 of the constitution enshrines the right to life (Constitution of the Republic of South Africa, 1996), highlight the importance of addressing the high murder rates in the country. This concern has been recognised at the highest levels of government, with the President emphasizing the need for concerted action against violence and crime (The Presidency, 2024). Furthermore, Lancaster and Kamman (2016) emphasise that understanding demographic patterns in high crime areas is critical to developing strategies for violence reduction. Therefore, this study aims to analyse murder trends, identify contributing factors, and project future rates in South Africa.

This study is unique due to its innovative forecasting component. Unlike previous research, which has primarily focused on retrospective analyses, it employs predictive modelling techniques to anticipate future homicide trends. This forward-looking approach enhances the understanding of spatial dimensions of crime and offers valuable insights to address violence in high-risk areas. By integrating spatial analysis with forecasting, this study aims to fill a critical gap in the existing literature and provide a comprehensive framework for understanding and preventing homicide in South Africa. Moreover, the introduction of forecasting aligns with and expands upon existing research, as studies by Bruce (2023) and Parker & McKinley (2018) have emphasised the importance of identifying crime trends.

3. Methodology

The study employs a quantitative research design to analyse the relationship between causative factors, place of occurrence, and the prevalence of murder and attempted murder across different provinces in South Africa. A quantitative approach was chosen due to the large-scale numerical nature of the secondary data used.

The analysis relies on secondary data obtained from publicly available crime statistics released by the South African Police Service (SAPS) for the period of 2021/22 to 2023/24. The dataset is presented in a tabular and graph format, with the number of incidents reported for each category and province.

Descriptive statistical methods were used to summarise the data, providing insights into the frequency and percentage of each cause of death. To contextualise the findings within broader historical trends, a temporal analysis was performed, comparing the 2024 data with historical data from previous years (2022-2023). The data was further analysed by province to examine regional disparities in the causes of death.

The study utilised secondary data available in the public domain. No personal or identifying information was involved, ensuring that the analysis adhered to ethical research standards regarding privacy and confidentiality. All literature and SAPS data were cited and referenced to acknowledge the original source.

4. Literature review

Understanding the dynamics of violent crime, particularly murder, has been a critical area of research across various disciplines. Murder not only deprives individuals of their fundamental right to life but also disrupts social stability and economic well-being. In recent years, the escalation of violent crimes has raised pressing concerns about the factors contributing to these trends (Zungu and Mtshengu, 2023; Kwabena, 2017) and the spatial distribution of crime across different regions. Researchers have explored multiple aspects of violent crime, including its socioeconomic determinants, geographic patterns, and the implications for public safety and policymaking.

Despite these efforts, gaps remain in the understanding of how regional variations and socioeconomic disparities contribute to the prevalence of violent crimes such as murder. While some studies have focused on the economic roots

of crime, including unemployment and income inequality (Zungu and Mtshengu, 2023), others have examined the psychological and demographic correlates (Fikrillah and Pancanigum, 2024). However, there is limited research that takes a comprehensive, longitudinal approach to analyse both causative and spatial factors affecting murder rates within a specific national context like South Africa.

By examining key studies and findings, this review intends to identify patterns and establish a foundation for the present study, which seeks to conduct a longitudinal analysis and projection of provincial murder trends in South Africa between 2022 and 2027. In line with previous research, Fikrillah and Pancanigum (2024) indicate that the terms "murder" and "homicide" are often used interchangeably to describe unlawful killings. For consistency, this article will also use these terms interchangeably.

4.1. The Influence of Socio-Economic Factors

The prevalence of violence and crime in countries like South Africa is profoundly influenced by socio-economic inequalities. Meth (2016) highlights that these disparities significantly shape crime patterns, while Kujala et al. (2019) found that factors such as the Gini coefficient, unemployment, and material deprivation are positively associated with crime, even in European contexts. In South Africa, characterised by high levels of inequality, alarmingly elevated rates of murder and other violent crimes are prevalent compared to other countries (Kwabena, 2017). Multiple studies have identified youth unemployment, poverty, and the proliferation of firearms as key drivers of violent crime. For example, Mazorode (2020) established a positive correlation between youth unemployment and murder rates, emphasising the vulnerability of young people in economically disadvantaged conditions. Additionally, Fikrillah and Pancanigum (2024) noted that violent crimes such as homicide, theft, and sexual assault reflect the ongoing social instability affecting many communities.

Historically, unemployment was considered the primary concern in South Africa, with crime ranked second in public priorities, as reported in a survey by the Centre for the Study of Violence and Reconciliation (CSVR) in 2006. However, by 2008 and 2009, crime had emerged as the highest public priority, reflecting the escalating rates of violence (CSVR, 2008, 2009). Among these crimes, the increasing rate of murder is particularly concerning (Kwabena, 2017).

4.2. Spatial Distribution of Murder

The spatial context and design of areas play a significant role in influencing violence and crime in South Africa. Informal settlements are particularly vulnerable due to the lack of adequate security features, leading to an increased fear of break-ins and murder (Meth, 2016). In South Africa most informal settlements are in Gauteng (GP), Western Cape (WC) and Kwa-Zulu Natal (KZN) (Socio-Economic Rights Institute of South Africa [SERI], 2018). Residents express concerns about inadequate safety measures which contribute to the hyper-permeability of housing (Meth, 2016). This permeability has exacerbated residents' vulnerability to crime in the past (Sampson & Groves, 1989) and continues to do so (Meth, 2016).

Housing inequality is closely linked to crime rates. Studies show that a rise in housing inequality correlates positively with increased incidents of various crimes, including murders. An increase of one standard deviation in housing inequality can explain a 9-13% rise in criminal offenses (Roxana et al., 2021). This correlation suggests that socio-economic disparities manifest spatially, creating environments where crime can thrive. In areas marked by pronounced inequality, residents feel marginalised and powerless, fostering environments where violent crime and murder become means of survival or expression of frustration (Kramer & Hagan, 2001). Reflecting this dynamic, Statistics South Africa [Stats SA] (2019) reported that the Eastern Cape had the highest levels of inequality in 2015, followed by the Western Cape and Mpumalanga (MP) provinces that have also seen high rates of violent crime.

Law-abiding citizens have also raised concerns about acts of violence, inclusive of murder on public transport. Nxele and Ngubane (2024) found that the lack of patrol officers on trains and at train stations, as well as the high level of overcrowding on trains, are contributing factors to high crime and murder.

Spatial trends indicate that murders and violent crimes are concentrated in specific provinces. The Western Cape, KwaZulu-Natal, Gauteng, and the Eastern Cape exhibit the highest murder rates per capita (South African Police Service, 2023). These patterns align with Meth's (2016) findings, which highlight a correlation between informal settlements and murder rates, and SERI's (2018) observations that informal settlements are predominantly located in Gauteng, the Western Cape, and KwaZulu-Natal

In 2023/24, Gauteng, KwaZulu-Natal, and the Western Cape were responsible for 75% of all firearm-related murders in South Africa. Additionally, these provinces, along with Mpumalanga, accounted for 93.5% of such incidents

nationwide (Bruce, 2024). This trend corresponds with the high levels of inequality in these regions, particularly in the Western Cape and Mpumalanga (Stats SA, 2019). In terms of historical trends, the Eastern Cape and KwaZulu-Natal have seen the sharpest rises in murder rates since 2011/12, with Gauteng also experiencing significant growth (Bruce, 2023).

These statistics illustrate the interconnectedness between spatial inequalities and crime dynamics in South Africa. Factors such as inadequate housing infrastructure and concentrated inequalities in certain regions contribute significantly to crime patterns. The geographical concentration of violence continues to reinforce existing socio-economic divides.

4.3. Motives for murder

Motives refer to the underlying reasons why individuals engage in specific behaviours (Parker & McKinley, 2018). One significant motive is financial gain. Matamba and Thobela (2024) found that under South Africa's collaborative criminal governance, financial incentives often drive criminals to commit murder. Economic factors were also cited as the primary motive in a study by Muryanti (2023), which found that 57% of murders were driven by economic reasons such as debt and job loss.

Emotional motives also play a crucial role. Studies reveal that personal killings for reasons like romantic disputes and insurance claims are frequent in South Africa (Matamba & Thobela, 2024). According to Muryanti (2023), 19% of murders were due to romantic issues, while jealousy was identified as a common motive. Similarly, Jones (2021) found that 3.5% of women cited jealousy as their motive for committing murder. In Johannesburg, which records the highest volume of serious crime, emotional factors are often intertwined with other motives like jealousy and revenge (Kwabena, 2017).

Substance abuse is another significant contributor. Jules-Macquet (2016) identified a clear association between substance use and increased rates of criminal behaviour. Among the top 12 offenses where offenders reported substance use, culpable homicide ranked third, and murder and attempted murder ranked fifth. Jones (2021) confirmed that in South Africa, 70% of men and 54% of women committed murder under the influence of alcohol and/or drugs, indicating that substance use heightens the likelihood of violent acts.

Cocio-economic conditions also play a role. According to the Centre of Research and Innovation for Black Survivors of Homicide Victims (2020), the social determinants of homicide include anti-Black racism, income inequality, lack of education, and mass incarceration. A study in South Africa showed that 5.3% of murderers had no formal education, while 80.7% did not complete their schooling (Jones, 2021), highlighting the link between lack of education and violent behaviour.

In sum, motives for homicide in South Africa are diverse, ranging from financial gain and romantic disputes to substance abuse, socio-economic conditions, and psychological factors. These motives not only reflect individual circumstances but are also shaped by broader social and economic contexts.

5. Results

The following section discusses the findings related to the motives and spatial distribution of murder in South Africa, utilising the most recent data from the South African Police Service (SAPS) for the first financial quarter of 2024 (April to June).

In the first financial quarter of 2024, an analysis of the causes of deaths in South Africa revealed that the leading motivator was arguments, accounting for 38.7% of fatalities. This was followed by robbery-related deaths at 16.5%, vigilantism at 14.3%, and gang-related incidents at 11.6%. Retaliation incidents contributed to 9.6% of the deaths, while 3.1% occurred during the commission of other crimes. Deaths due to hijackings represented 2.2%, and those related to the taxi industry accounted for 1.9%. Less than 1% of deaths were attributed to law enforcement and security personnel in the line of duty (0.9%), intervention during arguments (0.5%), rape-related incidents (0.4%), and illicit mining activities (0.3%). This analysis points to a complex interplay of socio-economic, cultural, and institutional factors driving violence and fatalities in South Africa.
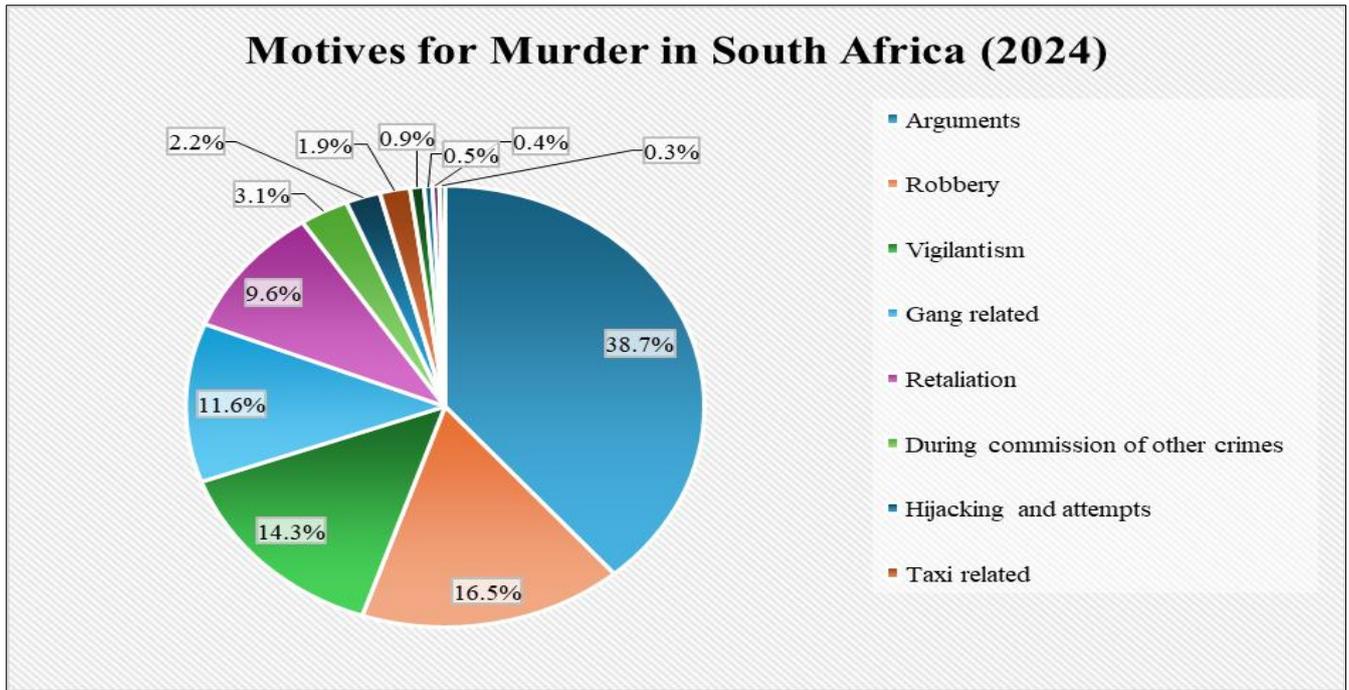
Source: Graph created by the author, based on data retrieved from the South African Police Service (SAPS), 2024.

Figure 1 Motives for murder in SA 2024

Table 1 Heatmap murder distribution in each province due to each causative factor

Causative factors	EC	FS	GP	KZN	LP	MP	NW	NC	WC	RSA
Arguments	62%	58%	26%	54%	55%	23%	30%	81%	24%	39%
Robbery	8%	19%	25%	18%	18%	17%	29%	3%	16%	17%
Vigilantism	16%	6%	20%	15%	19%	46%	19%	6%	8%	14%
Gang-related	3%	0%	7%	0%	0%	0%	2%	0%	27%	12%
Retaliation	1%	8%	2%	7%	3%	1%	6%	6%	20%	10%
During commission of other crimes	5%	0%	3%	2%	3%	1%	9%	3%	3%	3%
Hijacking and attempts	1%	3%	3%	3%	1%	9%	4%	0%	1%	2%
Taxi-related	0%	0%	9%	0%	0%	0%	0%	0%	2%	2%
Law enforcement on duty	1%	0%	2%	1%	1%	1%	0%	3%	1%	1%
Intervention in an argument	0%	3%	1%	1%	0%	1%	1%	0%	0%	1%
Rape-related	1%	3%	1%	1%	0%	0%	1%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: Table created by the author, based on data retrieved from the South African Police Service (SAPS), 2024.

The heatmap above reveals shows which murder causes dominate in each province. It presents the provincial variations in murder causation, highlighting several key factors that contribute to the overall murder landscape in South Africa. Each province has unique profiles based on the dominant causative factors, with a few prominent trends.

Across most provinces, arguments appear as the primary contributor to murder cases, with an average national contribution of 39%. EC (62%), Free State (FS) (58%), and KZN (54%) show the highest concentrations of murders linked to arguments. This indicates a significant prevalence of interpersonal conflicts turning violent, often in regions with socio-economic stressors. Mpumalanga stands out with vigilantism accounting for 46% of its murder cases, the highest percentage among all provinces. This suggests a strong reliance on extrajudicial actions, potentially due to distrust in law enforcement or inadequate access to formal justice systems. The Western Cape is heavily impacted by gang-related activities, which account for 27% of all murder cases in the province. This is significantly higher than other regions, where gang-related murders remain minimal or non-existent. The data aligns with historical trends of organised crime and gang dominance in this province, making it a persistent hotspot for gang violence.

Retaliation-driven murders are also prevalent in the Western Cape (20%) compared to the national average of 10%. This factor suggests a cycle of revenge and retaliation, possibly tied to gang conflicts. GP (25%) and North West (NW) (29%) have high percentages of murder cases linked to robbery, likely influenced by economic conditions. GP emerges as a hotspot for taxi-related murders, contributing to 9% of its murder cases. This percentage is significantly above the national average (2%) and points to ongoing conflicts within the transport sector, involving disputes over routes, territory, and control of the lucrative taxi industry (Mmakwena, 2022).

The Northern Cape (NC), despite being less densely populated, displays an exceptionally high percentage of murders arising from arguments (81%), indicating deeply entrenched interpersonal conflicts. Murders committed during other criminal activities stand out notably in the North West province (9%). This is significantly higher than the national average of 3%, indicating that crime-related violence, rather than isolated interpersonal conflicts, plays a substantial role in murder cases in NW. Mpumalanga presents a concerning trend with 9% of its murders linked to hijackings and attempted hijackings. This is substantially above the national average of 2%.

The Northern Cape (3%) shows a slightly higher rate of murders involving law enforcement officials compared to the national average (1%). However, in provinces like North West and Free State, this factor remains relatively low or absent. The Free State and GP demonstrate a slightly higher occurrence of murders arising from interventions in arguments (3% each), indicating that attempts to de-escalate conflicts often result in fatalities. Additionally, rape-related murders, while comparatively low across provinces, are most prominent in Free State (3%), Gauteng (3%), and KwaZulu-Natal (1%), pointing to a link between sexual violence and homicide in these regions.

Table 2 Heatmap of the percentage each province contributes to the national total for each causative factor

Causative factors	EC	FS	GP	KZN	LP	MP	NW	NC	WC	RSA
Arguments	28%	2%	9%	24%	4%	2%	3%	3%	23%	100%
Robbery	9%	2%	20%	18%	3%	4%	8%	0%	36%	100%
Vigilantism	20%	1%	18%	18%	4%	11%	6%	1%	21%	100%
Gang-related	5%	0%	8%	0%	0%	0%	1%	0%	87%	100%
Retaliation	2%	1%	3%	12%	1%	0%	3%	1%	77%	100%
During commission of other crimes	27%	0%	14%	10%	3%	1%	13%	1%	31%	100%
Hijacking and attempts	12%	2%	20%	22%	2%	14%	8%	0%	20%	100%
Taxi-related	5%	0%	61%	2%	0%	0%	0%	0%	32%	100%
Law enforcement on duty	20%	0%	25%	15%	5%	5%	0%	5%	25%	100%
Intervention in an argument	8%	8%	17%	33%	0%	8%	8%	0%	17%	100%
Rape-related	30%	10%	30%	20%	0%	0%	10%	0%	0%	100%

Source: Table created by the author, based on data retrieved from the South African Police Service (SAPS), 2024.

The table above highlights which provinces are most affected by specific causes of murder indicating the unique dynamics of homicide across the country.

The most significant shares of argument-related murders are concentrated in KwaZulu-Natal (24%) and the Western Cape (23%). In contrast, provinces like Free State, Mpumalanga, and NC show relatively low rates of argument-driven murders (2%-3%). Robbery emerges as a significant contributor to murder cases, with 36% of these incidents occurring in the Western Cape and 20% in Gauteng. This highlights the economic motivations behind violence in these regions, where urbanisation and economic disparities might drive crime. The near absence of robbery-related murders in NC suggests a different socio-economic environment or crime dynamics.

Vigilantism is prominent in the Eastern Cape (20%), KwaZulu-Natal (18%), and the Western Cape (21%). This is contrasted by significantly lower rates of vigilantism in other provinces like Free State and NC (1%). Gang-related violence is overwhelmingly concentrated in the Western Cape, accounting for 87% of such murders nationwide. This aligns with historical patterns of gang activity and organised crime in the province, showing the ongoing issue of gang-related violence. The near-zero gang-related murders in provinces like KwaZulu-Natal and NC emphasise the localised nature of this crime type.

Retaliation-driven murders are concentrated mainly in WC (77%) and KZN (12%). These regions exhibit cyclical violence patterns, where acts of retribution perpetuate ongoing conflicts, often within gang or community-level disputes. Other provinces like LP and Mpumalanga show minimal occurrences of retaliation-driven violence. Murders committed during other crimes are notably prevalent in EC (27%) and WC (31%). The high concentration in these provinces suggests an intersection between violent crime and other criminal activities.

Gauteng (20%) and KZN (22%) exhibit the highest shares of hijacking-related murders. Mpumalanga also shows a significant proportion (14%) of hijacking-related murders, highlighting its growing vulnerability. Gauteng accounts for a staggering 61% of taxi-related murders, a pattern tied to the competitive and often violent nature of the taxi industry in this region (Mmakwena, 2022). The Western Cape (32%) also shows a considerable percentage of these cases, suggesting similar challenges in regulating the transport sector and preventing violence.

Gauteng (25%) and EC (20%) have the highest proportions of murders involving law enforcement officials on duty. Other provinces show varying, but generally lower, occurrences of these cases. KZN (33%) displays the highest percentage of murders occurring from interventions in arguments. This suggests a tendency for attempts to mediate disputes to escalate into fatal incidents in this region. Other provinces like Gauteng (17%) and FS (8%) also show significant shares of these cases, indicating challenges in conflict resolution. Rape-related murders are most prevalent in EC (30%) and GP (30%), with KZN following at 20%. The distribution indicates that sexual violence remains a serious issue in these regions, often culminating in fatal outcomes.

The figure below offers a detailed explanation of places of occurrence for murder incidents to enhance understanding of the various environments in which these crimes take place.
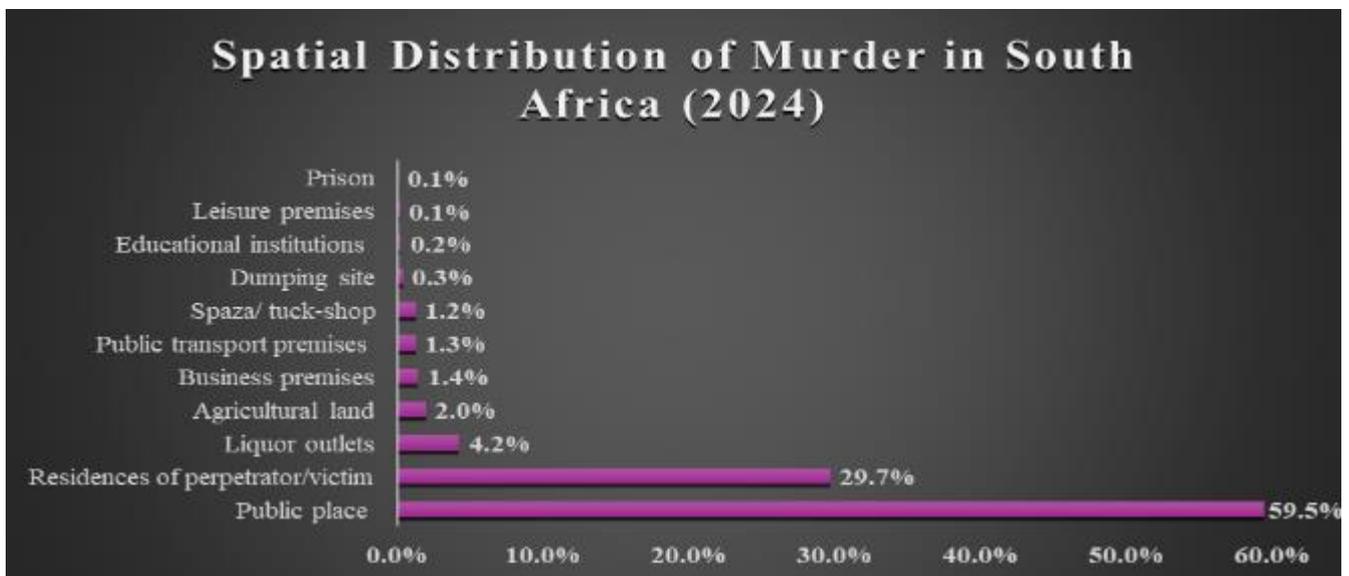
Source: Graph created by the author, based on data retrieved from the South African Police Service (SAPS), 2024.

Figure 2 Spatial Distribution of Murder in South Africa (2024)

In the first financial quarter of 2024, a troubling trend emerged regarding the locations of fatalities in South Africa. Alarmingly, over half of the deaths, accounting for 59.5%, occurred in public places, which includes locations such as streets, open fields, recreational centres, parks, beaches, and parking areas (SAPS, 2024). In addition, close to a third of deaths 29.7% occurred in the residences of either the perpetrator or the victim. This statistic suggests that a considerable number of fatal incidents are happening within domestic settings, pointing to potential issues related to interpersonal violence and domestic disputes.

The remaining locations where deaths occurred account for just over 20% of the total. Among these, liquor outlets, establishments like shebeens, taverns, pubs, nightclubs, and bottle stores, where alcohol is served (SAPS, 2024) were noted as sites for 4.2% of fatalities, aligning with the correlation between alcohol consumption and violent incidents. Agricultural land and business premises accounted for 2% and 1.4%, respectively, while public transport premises, which include buses, planes, boats, ships, and taxis (SAPS, 2024), represented 1.3% of the occurrences. Spaza shops, often crucial in community trading, accounted for 1.2% of deaths. Other less common locations included dumping sites (0.3%), educational institutions (0.2%), leisure premises (0.1%), and prisons (0.1%). These figures reflect a diverse range of environments where fatalities can occur, showing the multifaceted nature of violence and the various contexts in which it takes place.

Table 3 Heatmap of the distribution of Murder Occurrences by Place in South Africa (Percentage by Province)

Place of occurrence	EC	FS	GP	KZN	LP	MP	NW	NC	WC	RSA
Place of occurrence	60%	57%	64%	58%	48%	60%	52%	39%	66%	60%
Public place	31%	25%	25%	34%	36%	23%	30%	51%	27%	30%
Residences of perpetrator/victim.	6%	7%	4%	4%	8%	7%	9%	4%	2%	4%
Liquor outlets	1%	9%	2%	0%	2%	5%	5%	4%	2%	2%
Agricultural land/	1%	0%	2%	1%	1%	2%	1%	1%	2%	1%
Business premises	1%	1%	1%	2%	5%	0%	2%	0%	1%	1%
Spaza/Tuck shop	0%	1%	1%	0%	0%	1%	0%	0%	0%	0%
Dumping site/refuse site	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Petrol station premises	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
Educational institutions	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%
Leisure premises	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Prison/holding cells	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: Table created by the author, based on data retrieved from the South African Police Service (SAPS), 2024.

This section explores the spatial distribution of murders by location across various provinces in South Africa. The analysis aims to provide insights into where violent incidents most frequently occur, highlighting regional patterns and provincial characteristics.

Public places emerge as the most common location for murders across all provinces, with a national average of 60%. This trend indicates that public areas are particularly vulnerable to violent confrontations. Western Cape leads with the highest proportion of murders occurring in public places, accounting for 66%, possibly linked to gang activities. Gauteng follows closely at 64%. Other provinces such as KZN (58%), FS (57%), and EC (60%) also report significant proportions of murders in public places, further emphasising a national trend of violent incidents taking place in open or communal spaces.

Residences of either the perpetrator or victim are the second most frequent murder location, with a national average of 30%. This indicates that domestic violence, disputes between family members, or conflicts among acquaintances are critical factors influencing murder rates in private settings. Northern Cape exhibits the highest proportion of murders

occurring in residences, at 51%. KZN and LP also demonstrate relatively higher occurrences of murders in residences, at 34% and 36%, respectively. Provinces such as Mpumalanga and GP have comparatively lower proportions of murders in residences, at 23% and 25%, indicating a somewhat lesser impact of domestic or residential-based violence.

Liquor outlets, including taverns and informal bars, account for 4% of murders nationally. Although this percentage appears modest, it is crucial to recognise the potential impact of alcohol consumption on violent crime. Limpopo stands out with 8% of murders occurring in liquor outlets, which may point to a strong correlation between alcohol-related disputes and violent outcomes in this province. Other provinces such as MP (7%) and NC (4%) also show relatively higher occurrences of murders in these establishments. This may indicate an increased prevalence of alcohol-induced violence in these regions. The Western Cape on the other hand, reports the lowest proportion (2%) of murders at liquor outlets, suggesting that public spaces rather than taverns are the focal points for violent incidents in this province.

Murders occurring on agricultural land or farms make up 2% of the national total. However, there are stark regional differences, particularly in provinces with significant agricultural activity. Free State reports the highest proportion at 9%, reflecting the prominence of agriculture and potentially highlighting land-related disputes, farm attacks, or conflicts among agricultural workers as significant issues in the province. Other provinces such as Mpumalanga (5%) and NW (5%) also report a notable share of murders occurring on agricultural land, albeit lower than in Free State.

Business premises account for 1% of murders nationally, with little variation across provinces. This indicates that businesses are relatively safer locations compared to other spaces like public places or residences. Murders at spaza or tuck shops are slightly higher in LP (5%), indicating potential risks associated with small retail businesses in this province. Several other locations account for a minimal share of murder incidents, each contributing less than 1% nationally. Dumping sites or refuse sites are reported in Free State (FS) and GP, indicating isolated incidents of criminal activities in these less monitored areas. Petrol station premises see marginal occurrences in MP and North West, pointing to potential vulnerabilities in these high-traffic, but often less secure, locations. Educational institutions and leisure premises report negligible occurrences of murders, suggesting these areas are relatively secure, though the presence of any incidents may still warrant preventive measures. Prison or holding cells report no occurrences, indicating that the security measures in these facilities are generally effective at preventing violent crimes.

The findings highlight that public places and residences are the predominant locations for murders.

Table 4 Heatmap of the Breakdown of Murder Locations in South Africa (Percentage by Specific Location and Province)

Place of occurrence	EC	FS	GP	KZN	LP	MP	NW	NC	WC	RSA
Public place	20%	3%	17%	25%	3%	5%	4%	1%	22%	100%
Residences of perpetrator/victim.	21%	3%	13%	30%	4%	4%	5%	2%	18%	100%
Liquor outlets	27%	5%	14%	22%	6%	8%	9%	1%	8%	100%
Agricultural land/	14%	14%	15%	6%	4%	13%	12%	3%	21%	100%
Business premises	18%	0%	23%	22%	3%	7%	3%	1%	24%	100%
Spaza/Tuck shop	9%	3%	17%	33%	13%	2%	6%	0%	17%	100%
Dumping site/refuse site	11%	11%	56%	0%	0%	17%	6%	0%	0%	100%
Petrol station premises	8%	0%	33%	0%	0%	17%	17%	0%	25%	100%
Educational institutions	17%	0%	17%	42%	0%	8%	0%	8%	8%	100%
Leisure premises	14%	14%	29%	29%	14%	0%	0%	0%	0%	100%
Prison/holding cells	20%	0%	20%	20%	0%	20%	0%	0%	20%	100%

Source: Table created by the author, based on data retrieved from the South African Police Service (SAPS), 2024.

This heatmap above presents a proportional analysis of murder incidents by their places of occurrence across different provinces in South Africa.

Public places remain the most common sites for murders across the country distributed as follows: KZN reports the highest proportion, with 25%. This indicates that confrontations or public violence are a significant issue in this province, potentially influenced by protests, or public disputes. WC follows closely at 22%, reinforcing the province's vulnerability to public violence, often linked to gang activities. Provinces like GP (17%) and Eastern Cape (EC) (20%) also report considerable proportions, indicating a national trend of public place incidents.

Residences of perpetrators or victims account for a notable proportion of murders nationally, highlighting the prevalence of domestic violence or conflicts between known individuals. KZN emerges as the province with the highest proportion of murders occurring in residences (30%). Eastern Cape (21%) and WC (18%) also report significant proportions, suggesting that private violence is an ongoing concern in these regions. Provinces like Gauteng and Mpumalanga show comparatively lower proportions at 13% and 4%, respectively, indicating a lesser frequency of domestic-based violence.

Liquor outlets are significant murder locations. EC reports the highest proportion at 27%, indicating a strong association between alcohol consumption and violent crime in this province. This may point to tavern-related disputes or incidents fueled by excessive drinking. Other provinces like KZN (22%) and GP (14%) also show relatively high percentages, suggesting a trend of violence linked to alcohol outlets in these regions.

Western Cape reports the highest proportion of murders in agricultural land at 21%, which may be linked to the prevalence of farms and agricultural activities in the province. The figure highlights the vulnerability of rural communities to violent crime. Free State (FS) and GP both report 14%, indicating that these provinces also experience considerable violence in rural areas. KwaZulu-Natal, though lower at 6%, still faces challenges in securing rural farming regions. WC (24%) and Gauteng GP (23%) report the highest proportions of murders in business premises. These findings point to the risks businesses face in these regions, possibly due to armed robberies or disputes escalating into violence.

Spaza or tuck shops are notable locations for violent incidents in KZN (33%) and WC (17%), reflecting the heightened risk for these small businesses, often targeted due to their cash-based nature and informal setup. Murders occurring at dumping or refuse sites show significant concentration in GP (56%), MP (17%), and EC (11%). This may indicate the use of such sites for concealing crimes or resolving disputes away from public view. Petrol stations show notable occurrences of murders in Gauteng (33%), suggesting that these high-traffic areas are vulnerable to criminal activities. Educational institutions report the highest occurrences in KZN (42%), which may indicate isolated but serious incidents within these learning environments. Leisure premises see isolated murders in various provinces, with GP (29%) and KZN (29%) leading. This highlights risks associated with social or recreational activities in these areas. Murders in prison or holding cells occur rarely, but EC and WC report 20% each.

Provincial murder projections (2024 to 2027).
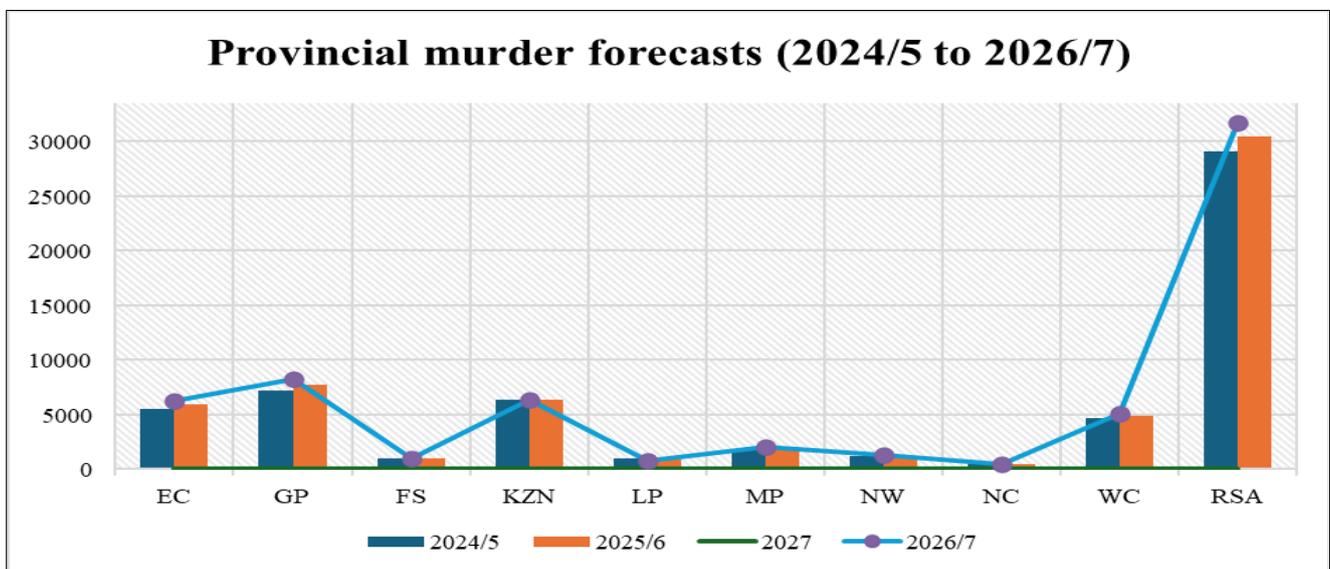
Source: Author (2024).

Figure 3 Provincial murder forecast (2024 to 2027)

The forecasted data suggests that the number of murders across most provinces in South Africa is expected to consistently increase over the next few years. In the Eastern Cape, the number of murders is projected to increase from 5,083 in 2023/24 to 5,526 in 2024/25, then rise further to 5,896 in 2025/26, and reach 6,266 by 2026/27. Similarly, Gauteng is expected to experience a steady climb, with murders rising from 6,584 in 2023/24 to 7,177 in 2024/25, increasing to 7,711 in 2025/26, and continuing to 8,244 by 2026/27.

In the WC, the forecast indicates a steady upward trend, with murders projected to rise from 4,544 in 2023/24 to 4,716 in 2024/25, then to 4,919 in 2025/26, and reaching 5,123 by 2026/27. KwaZulu-Natal on the other hand, is expected to remain relatively stable with slight fluctuations: from 6,403 murders in 2024/25 to a minor decrease at 6,369 in 2025/26, and 6,335 in 2026/27.

Other provinces, such as MP and NW, are also forecasted to experience noticeable increases in their murder rates. In Mpumalanga, where there were 996 murders in 2023/24, the number is expected to rise sharply to 1,737 in 2024/25, reaching 2,095 by 2026/27. Similarly, the North West, with 1,131 murders in 2023/24, is projected to see an increase from 1,189 in 2024/25 to 1,296 by 2026/27.

In contrast, Limpopo (LP) is projected to show a downward trend, with murders declining steadily from 975 in 2023/24 to 774 by 2026/27. The Free State (FS) and NC are expected to exhibit relatively minor changes over this period. The Free State is anticipated to remain almost constant, with murder numbers hovering around 994, 995, and 996 over the forecasted years. Meanwhile, NC which recorded 400 murders in 2023/24, is projected to see a slight increase, rising from 419 in 2024/25 to 455 by 2026/27.

Nationally, according to the latest annual starts covering April 2023 to March 2024, South African recorded a number of 27 621 murders (SAPS, 2023) which is expected to increase to 29,123 in 2024/25 and again to 30,430 in 2025/26, and further to 31,737 in 2026/27, an increase of over 11% in three years. This steady rise is driven largely by growth in murder rates within the country's most populous provinces, particularly Gauteng and the Eastern Cape.

6. Discussion

The findings of this study align with existing literature, reinforcing the link between socio-economic disparities, spatial inequalities, and rising murder rates in South Africa. Public places are the predominant sites of violent crime. This trend suggests that public spaces, such as streets, parks, open fields, and recreational centers, are highly susceptible to violent confrontations. The lack of structured oversight in public spaces and the high likelihood of encounters between potential victims and offenders contribute to increased crime rates in public spaces (Tillyer & Eck, 2007).

The Western Cape emerges as a critical hotspot, with 66% of murders occurring in public places. This aligns with earlier research highlighting the prevalence of gang-related activities and community unrest in the Western Cape (Bruce, 2024). Public spaces are often utilised by organised crime groups and gangs as operational zones, leading to higher rates of violent crimes in these areas. Bruce (2023) emphasises that gang-related activities in urban areas frequently spill over into public spaces, where gangs exert territorial control, turning these zones into areas of conflict. Liquor outlets in public areas often serve as settings where tensions can escalate into violence. Jules-Macquet (2016) found a strong association between public drinking and crime in South Africa, emphasising that public places with easy access to alcohol are particularly prone to violent encounters.

The spatial analysis also highlighted significant regional disparities, with the highest murder rates projected in the densely populated provinces of Gauteng and the Eastern Cape. These findings are consistent with the literature, which links socio-economic inequalities, such as income disparity, unemployment, and inadequate service delivery, to increased crime (Meth, 2016; Kujala et al., 2019). Roxana et al. (2021) specifically demonstrated that housing inequality is positively correlated with various types of crime, including murder, with spatial disparities often exacerbating the prevalence of violent incidents, with StatsSA (2019) confirming Eastern Cape's history of inequality. The persistence of high murder rates in urbanised provinces supports findings from Meth (2016) and Kwabena (2017), who argue that urban centers, due to their dense population and concentrated poverty, often experience higher rates of violent crime. The concentration of murders in provinces like Gauteng also aligns with earlier studies that identified the intersection of economic stressors, inadequate security measures, and densely packed informal settlements as critical drivers of violent incidents.

Interpersonal conflicts were identified as leading causes of murder, particularly in high-crime provinces. Parker and McKinley (2018) identified gain, jealousy, revenge, and anger as prominent motivators behind homicides. The dominance of arguments as a leading cause of murders, especially in provinces like the Eastern Cape and KwaZulu-Natal, supports earlier research by Zungu and Mtshengu (2023), which emphasised the social instability and unresolved conflicts driving interpersonal violence. The analysis of causes of death in South Africa for the first financial quarter of 2024 presents a concerning picture of the social dynamics behind violence in the country. Interpersonal disputes or arguments accounted for nearly 39% of deaths, suggesting that many violent incidents stem from escalated social conflicts. This trend reflects deeper societal issues such as stress, unresolved grievances, and inadequate conflict resolution mechanisms.

Economic-driven crimes, such as robberies and vigilantism, also emerged as significant contributors to murder rates. This finding aligns with Matamba and Thobela (2024), who noted that financial incentives and collaborative criminal governance are key motivators behind homicides in economically stressed communities. The prevalence of robbery-related murders and vigilantism indicates persistent socio-economic deprivation and community-level mistrust in law enforcement, reflecting broader issues of inequality and social marginalisation. When communities take the law into their own hands, it reflects frustrations with perceived inefficiencies in formal justice systems, creating a dangerous cycle of extrajudicial violence that erodes the rule of law.

The projected increase in murder rates in emerging hotspots like Mpumalanga and the North West suggests the rapid deterioration of socio-economic conditions and growing spatial inequalities. Conversely, the projected decline in murder rates in Limpopo aligns with research highlighting the importance of social cohesion and effective community-based interventions in reducing crime (Bhorat et al., 2017). This trend suggests that specific structural measures in Limpopo may be contributing to lower crime rates. The forecasted data indicates that several provinces, including Gauteng, the Eastern Cape, and Mpumalanga, are expected to see consistent increases in murder rates over the next few years. This trend also raises concerns about the socio-economic conditions in these provinces, given the established links between economic disparities and crime rates (Meth, 2016; Roxana et al., 2021). The rising trend in these provinces suggests that without targeted interventions, the socio-economic stressors and spatial inequalities driving violent crime are likely to persist or worsen.

For instance, the forecasted rise in Gauteng's murder rate from 6 584 in 2023/24 to 8 244 by 2026/27 highlights the urgent need for comprehensive urban-focused strategies. Similarly, the anticipated increase in the Eastern Cape, from 5 083 in 2023/24 to 6 266 by 2026/27, suggests a growing crisis in a province already grappling with poverty and social instability. These projections align with earlier findings linking urbanisation and economic deprivation to crime and indicate that these challenges will continue to influence violence levels unless addressed through focused policy measures (Bruce, 2023; Zungu & Mtshengu, 2023).

The relatively stable projections in provinces like KwaZulu-Natal, despite slight fluctuations, demonstrate that certain regions may have implemented effective crime prevention measures or possess social structures that help stabilise murder rates. Conversely, the projected decline in Limpopo suggests that successful interventions or socio-economic improvements in this province could serve as a model for other regions facing similar challenges. The forecasted rise in murder rates aligns with historical trends documented by various studies (Kwabena, 2017; Meth, 2016).

Limitations:

The existing academic literature on crime forecasting in South Africa is notably limited, particularly concerning the social factors that influence crime rates and community responses. As such, future research should prioritise primary qualitative studies to fill this gap. Conducting interviews, focus groups, and ethnographic studies can provide rich, contextual insights into the lived experiences of community members and law enforcement officials.

It is also crucial to note that the current forecasting does not account for potential future events or developments in South Africa that could significantly impact crime rates and social dynamics. This includes unforeseen socio-political changes, economic shifts, or public health crises that may arise. Therefore, ongoing refinement and adaptation of predictive models will be essential to remain responsive to the evolving landscape of crime and safety in the country.

6.1. Future Research (Potential Refinements in Forecasting)

While this study primarily focuses on provincial trends, future research could benefit from a more localised approach, analysing trends at the municipal or district level. This would provide a finer understanding of spatial disparities and enable even more targeted interventions. Additionally, integrating qualitative data could enhance the predictive model by capturing the social dynamics and community perceptions that quantitative data alone may not reflect.

6.2. Recommendations

The use of forecasting in this study has important implications for policy development. The disparities between provinces highlight that a one-size-fits-all approach is unlikely to be effective in reducing violent crime across South Africa. Instead, interventions must consider the unique socio-economic and spatial characteristics of each province. This forward-looking perspective allows for that.

Provinces such as Gauteng and the Eastern Cape, which are projected to experience the most substantial increases in violent crime, could greatly benefit from intensified socio-economic support programs. These programs could include measures like strengthened community policing efforts and targeted anti-gang initiatives. By focusing on socio-economic support, policymakers can address the underlying factors contributing to crime, such as poverty and lack of opportunities, thus creating a more comprehensive strategy for crime reduction

The importance of investing in data-driven policing and crime prevention strategies cannot be overstated. Forecasting indicates that law enforcement agencies should leverage predictive modeling to allocate resources more efficiently. This approach allows for the identification of high-risk areas and helps prioritize where interventions should be implemented. By aligning resources with forecasted trends, law enforcement agencies can enhance their ability to prevent crime proactively, rather than simply responding to incidents after they occur.

The prominence of interpersonal conflicts as a leading cause of murders highlights the need for community-level conflict resolution mechanisms. Establishing mediation services, providing mental health support, and running public awareness programs can foster a culture of non-violence and improve access to support services. This, in turn, could reduce the likelihood of conflicts escalating into violent incidents.

Another vital recommendation is the establishment and strengthening of community police forums in all provinces. These forums can serve as critical platforms for collaboration between law enforcement and community members ensuring that policing strategies reflect the unique needs and concerns of local populations. By actively involving community members in the decision-making process regarding safety and security, these forums can enhance public trust in law enforcement, improve communication, and promote community-led initiatives to prevent crime. Additionally, CPFs can play a vital role in addressing issues such as substance abuse, domestic violence, and youth delinquency, which often contribute to crime in communities. By partnering with social services and non-profit organisations, these forums can facilitate access to support resources for individuals and families affected by these issues. This holistic approach not only addresses the symptoms of crime but also targets the underlying social factors that contribute to it.

A visible police presence can significantly deter criminal activity and build trust within communities, fostering a sense of security among residents. This proactive measure not only helps prevent crime but also encourages community cooperation with law enforcement. A tangible police presence serves as a deterrent to potential offenders. When individuals know that law enforcement officers are actively patrolling their neighbourhoods, they are less likely to engage in criminal behaviour due to the increased risk of apprehension. Building trust through increased visibility can also enhance community cooperation with law enforcement. Residents who feel secure and supported by their police force are more likely to report crimes, share information, and participate in community safety initiatives. This cooperation is essential for effective crime prevention and response, as community members often possess valuable knowledge about local crime trends and issues. By working together, law enforcement and community members can develop strategies tailored to the specific needs and concerns of the area.

Overall, the findings strongly support the adoption of data-driven policing strategies that utilize predictive modeling to anticipate future crime trends. By identifying emerging hotspots and high-risk areas, law enforcement can proactively allocate resources and implement crime prevention measures in advance. This forward-looking approach not only addresses the immediate concerns of violent crime but also lays the groundwork for long-term community safety and resilience.

7. Conclusion

In conclusion, this study reveals the complex interplay between socio-economic factors, spatial inequalities, and murder trends in South Africa. The findings highlight the urgent need for proactive, region-specific interventions that address the socio-economic drivers of crime while considering the unique characteristics of each province. By incorporating predictive modelling and spatial analysis, this research provides a forward-looking perspective that can inform more effective policy decisions and resource allocation for crime prevention in high-risk areas. The insights gained from this

study offer a comprehensive framework for understanding and addressing the persistent challenge of murder in South Africa.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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