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Public transport safety and crime patterns in Lagos and Abuja

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Abstract

The rising incidence of crime in public transportation systems across Nigerian cities has necessitated the analysis of safety measures and their effectiveness. This study examines public transport safety and crime patterns in Lagos and Abuja. Analysis of crime statistics reveals that Lagos recorded 2,847 transportation-related crimes across its BRT, traditional buses, and taxi systems, while Abuja reported 1,623 incidents during the same period. Researchers surveyed 784 passengers (402 in Lagos, 382 in Abuja) and interviewed 45 transport operators across both cities. The Incidence of Crime Index (ICI) and Passenger Safety Measure Index (PSMI) were employed to evaluate the effectiveness of security protocols. Results reveal significant differences in transportation-related crimes between the two cities, with Lagos reporting higher incidents (14.3 per 10,000 passengers) compared to Abuja (8.7 per 10,000 passengers). Three key relationships were identified: a strong negative correlation between technological interventions and crime reduction, a moderate positive relationship between socio-economic factors and crime probability, and a positive impact of community engagement on safety measure effectiveness. Notably, technological interventions partially mediate the relationship between socio-economic factors and crime incidents. Lagos demonstrated higher scores across all safety measure dimensions, including surveillance coverage (0.75), emergency response (0.68), security personnel (0.71), and technological intervention (0.74), compared to Abuja. These findings emphasize the importance of integrating technological solutions with community engagement while considering socio-economic conditions in developing effective urban transportation security strategies. The study contributes to understanding transportation security dynamics in rapidly evolving African urban environments and provides evidence-based recommendations for policy development.

1 Background to the study

The landscape of transportation safety in Africa's megacities is becoming increasingly intricate, especially in swiftly growing urban hubs such as Lagos and Abuja [36]. The explosive rise in population, alongside the growth of public transit systems, has posed unprecedented hurdles in ensuring the safety and security of passengers [48]. Public transport in Nigeria is plagued by several crime types. Passengers frequently experience

pickpocketing and theft of personal belongings in crowded buses and taxis [58]. Armed robbery targeting commercial vehicles on highways remains prevalent, with notorious incidents on the Lagos-Ibadan expressway [52]. Kidnapping of passengers for ransom has increased, particularly along rural routes [31]. "One-chance" operations—where criminals pose as legitimate transport operators—have become common in urban centers like Lagos and Abuja [54]. These crimes persist due to inadequate security measures and socioeconomic factors [4]. Recent research shows that crimes related to transportation in Nigerian urban areas have surged by 34% from 2020 to 2024, with Lagos and Abuja responsible for nearly 45% of these reported cases [56]. The emergence of various transportation options, such as Bus Rapid Transit (BRT) systems, conventional buses, and ride-hailing platforms, has called for a more holistic strategy to manage passenger safety and security [12].

While earlier studies have thoroughly explored the prevalence of crimes associated with transportation, there has been scant focus on the efficacy of safety measures put in place in Nigerian urban areas [56]. The link between crime deterrent techniques and their real-world effects on passenger security is still not well comprehended, especially in the fast-changing landscape of urban transport systems [42]. Recent innovations in technology have opened up fresh avenues for bolstering transportation safety, yet weaving them into current safety protocols poses notable hurdles [73].

This research tackles a vital issue by exploring the relationship between criminal activities and safety protocols within the public transportation networks of Lagos and Abuja. Drawing inspiration from the recent insights of Darko [21], who laid the groundwork for assessing transportation security measures, this inquiry utilizes the Incidence of Crime Index (ICI) and Passenger Safety Measure Index (PSMI) to evaluate the efficacy of existing security frameworks. The importance of this study lies in its capability to guide data-driven policy formulation and aid in crafting more robust safety measures within urban transit systems [74]. The transportation scene in Nigeria forms a crucial intersection of social, economic, and safety factors, especially in the swiftly growing urban settings of Lagos and Abuja [34]. The remarkable surge in population and urban sprawl has introduced intricate challenges regarding transportation infrastructure, safety, and security oversight [62].

Urban transportation networks function as the lifeblood of city life, enabling economic progress, social engagement, and everyday activities. In Nigerian metropolises, these systems are marked by their intricacy, variety, and inherent susceptibilities [6]. The dynamic relationship between established transit systems, such as Bus Rapid Transit (BRT), and informal transport methods creates a distinctive mobility ecosystem that necessitates advanced security measures. The rising security threats within Nigeria's urban transport frameworks mirror larger socio-economic shifts. From 2020 to 2024, crimes linked to transportation surged by 34%, underscoring the pressing demand for all-encompassing security interventions [65]. These occurrences not only pose immediate threats to safety but also significantly influence urban efficiency, community bonds, and public perception of shared spaces.

Technological innovation and urban expansion have fundamentally transformed the landscape of transportation. The rise of digital platforms, sophisticated surveillance tools, and smart transportation networks presents extraordinary opportunities for security management [70]. Nevertheless, deploying these technologies poses significant

hurdles in resource-limited urban settings, calling for tailored, context-sensitive solutions. The unique features of Lagos and Abuja create an intriguing research backdrop. As Nigeria's leading urban centers, these cities encapsulate a microcosm of widespread urban transport issues. Lagos, characterized by its intricate, densely populated infrastructure, contrasts with Abuja's organized urban layout, providing diverse settings for exploring transportation security dynamics [61].

Urban transportation security has transformed remarkably, shifting from conventional crime deterrence strategies to more comprehensive, cohesive methodologies. Current studies highlight the necessity of perceiving transportation security as a multifaceted system that encompasses technological, social, economic, and governance aspects [18]. The relevance of this research transcends mere security matters. By investigating the interplay between crime occurrences, safety protocols, and urban infrastructure, the research enriches dialogues surrounding urban resilience, social mobility, and sustainable growth in swiftly evolving African metropolitan landscapes. It addresses pivotal gaps in knowledge regarding transportation security within developing urban frameworks. Utilizing mixed-method research techniques, the study aspires to yield insights that can guide policy formation, technological advancements, and community-driven security initiatives.

The objectives of the research encompass: investigating crime trends within urban transit systems, assessing the efficacy of current safety protocols, examining the impact of technological innovations, and formulating evidence-informed recommendations to bolster transportation security in Nigerian metropolitan areas. By offering a contextually specific analysis of transportation security, the research enhances both theoretical understanding and practical policy formulation. The outcomes may have significant implications not only for urban settings in Nigeria but also for comprehending transportation security issues in analogous developing urban environments worldwide.

2 Literature review

The domain of transportation security research has undergone significant evolution in recent years, particularly in relation to the development of urban settings. Investigations [38, 43] have underscored the complexities associated with public transportation safety, focusing on the interplay of socioeconomic variables, urban infrastructure, and strategies for crime prevention. The evaluation of criminal activities and safety protocols within public transportation constitutes a multifaceted challenge that has attracted considerable scrutiny in empirical studies. This review consolidates insights from five empirical investigations that delve into diverse aspects of crime within public transport systems, user perceptions of safety, and the efficacy of safety interventions designed to reduce risks.

The research conducted by Evenson et al. [25] elucidates the relationship between perceived safety and actual crime statistics in public domains, including transportation systems. This study underscores the necessity of differentiating among various crime types, such as incivilities versus violent acts, and stresses the importance of specificity in both exposure and outcome metrics. The results indicate that perceived safety markedly affects individuals' propensity to participate in physical activities, such as walking to transit stations, which is vital for the utilization of public transport. Additionally, the

study reveals that gender distinctions influence safety perceptions, a theme that recurs frequently in the literature on public transport safety.

In a related context, Alotaibi and Potoglou [7] investigate travel strategy perceptions regarding the newly developed metro and bus networks in Riyadh, Saudi Arabia. Their results corroborate those of Evenson et al. [25] by illustrating that the enhancement of safety and security measures within public transport facilities can substantially boost passenger confidence and utilization rates. The authors contend that the establishment of secure walking and cycling paths, in conjunction with improved public transport infrastructure, is essential for cultivating a safe travel environment. This research highlights the imperative of integrating safety considerations into urban planning to facilitate public transport as a practical alternative to private vehicles.

The influence of gender on safety perceptions in public transport contexts emerges as another significant issue emphasized by several studies. Mansoor and Hasan discovered that women typically report heightened levels of fear regarding crime victimization in public transport environments compared to men, particularly in relation to sexual assault and harassment [40]. This gender-based discrepancy in fear is further substantiated by the findings of Ouali et al., who examine how safety measures may exert differential effects on women and men, underscoring the necessity for gender-sensitive approaches within public transport safety policy [44].

Oliveira et al. [60] examine the particular phenomenon of bus robberies in Belo Horizonte, Brazil, presenting empirical data on situational variables that contribute to criminal activities within public transportation contexts. Their investigation reveals that the apprehension of crime notably influences individuals' decisions surrounding the use of public transport. By scrutinizing crime trends across diverse bus routes, the authors pinpoint critical determinants that shape passengers' perceptions of safety. This research underscores the necessity for focused interventions that specifically tackle distinct types of crime and bolster the overall security of public transport systems. The study conducted by Alonso et al. explores the impact of urban security perceptions on transportation alternatives. Their findings suggest that an elevated sense of security in urban locales is associated with a diminished dependence on public transport, as individuals may opt for walking or cycling in safer settings [6].

Furthermore, the investigation by Rahaman et al. [69] introduces a metric for assessing the quality of station design grounded in Crime Prevention Through Environmental Design (CPTED) principles. Their research accentuates the significance of environmental design in mitigating crime and enhancing the perception of safety within public transport facilities. By emphasizing aspects such as surveillance and access management, the authors offer a framework for assessing and improving the safety attributes of transit stations. This study enriches the discourse on the role of design and infrastructure in crime deterrence and user safety.

In addition, the analysis by Gallison and Andresen presents a case study of Ottawa's O-Train system, investigating crime trends in relation to transit stations. Their results indicate that the existence of transit stations can forecast crime in adjacent neighborhoods, highlighting the necessity for cohesive crime prevention strategies that account for the spatial dynamics of urban transit systems [27]. This spatial examination is augmented by the research of Irvin-Erickson and Vigne, who investigate the features of

Washington, DC Metro stations that contribute to crime generation and allure, unveiling temporal patterns in crime associated with station activity [32].

The empirical inquiries reviewed elucidate the interrelationship among crime occurrences, safety protocols, and public sentiment within the public transportation framework. Collectively, they underscore the importance of incorporating safety considerations into urban transport development, enhancing infrastructure, and executing effective crime prevention initiatives. The conclusions indicate that a multifaceted approach, addressing both tangible safety measures and user perceptions, is vital for cultivating a secure and dependable public transport system.

2.1 Theoretical foundations and conceptual frameworks

Criminal activities and safety protocols within public transportation frameworks represent a multifaceted issue grounded in various theoretical constructs and conceptual paradigms. This examination may be approached from diverse perspectives, including spatial crime dynamics, safety perceptions, the significance of collective efficacy, and the influence of urban governance on crime dispersion. Each of these dimensions enhances the comprehension of the interplay between crime and public transit systems, as well as the efficacy of safety initiatives designed to alleviate such occurrences.

A pivotal theory pertinent to this discussion is the routine activity theory, which asserts that criminal acts transpire when three conditions align: a motivated perpetrator, an appropriate target, and a lack of effective guardianship. This theory is exceptionally relevant to public transit contexts, where the flow of individuals generates opportunities for criminal behavior, especially in locales characterized by insufficient oversight or police visibility. For example, Mordwa's [46] research underscores that criminal activities are more prevalent at public transport terminals situated farther from police stations, indicating that the geographical distribution of these terminals is a critical factor influencing crime rates. Likewise, Burdick-Will et al. [15] underscore that students who depend on public transportation frequently encounter violent crime during their journeys, potentially resulting in absenteeism and a reduced perception of safety.

Understanding perceptions of safety is vital for analyzing crime within public transportation. Currie et al. [20] performed an empirical study revealing how the experiences of youths with criminal incidents shape their perceptions of personal safety, resulting in a diminished sense of security when utilizing public transit. This finding is consistent with Mansoor and Hasan [40], who observed that gender disparities significantly influence the fear of becoming a crime victim, with women exhibiting heightened anxiety regarding various forms of crime, including harassment on public transportation. Such perceptions can catalyze behavioral modifications, leading individuals to circumvent specific routes or transport modalities perceived as unsafe, thus affecting their mobility and access to communal spaces [39].

The notion of collective efficacy, which pertains to the social solidarity among community constituents and their readiness to act for the common interest, has emerged as a viable strategy for crime deterrence in public environments. Gerell and Kronkvist's [28] investigation suggests that bolstering collective efficacy within neighborhoods can assist in diminishing violent crime, particularly in urban locales. This indicates that cultivating community relationships and informal social regulation may function as a buffer against crime in public transportation settings.

Furthermore, urban governance and neighborhood deprivation significantly influence crime patterns. Mansourihanis's [41] examination of crime statistics in Chicago reveals a general downturn in crime figures,however, it accentuates the spatial inconsistency of this decline, demonstrating that certain neighborhoods persist in experiencing elevated crime levels despite overarching trends. This underscores the necessity of targeted interventions in areas that are chronically afflicted by crime, particularly within public transit environments where marginalized groups may be disproportionately affected.

Situational crime prevention tactics represent a pivotal component in the enhancement of safety within public transport systems. Natarajan et al. [49] examined the adoption of expedited assessment techniques aimed at pinpointing high-risk locales within public transportation frameworks, thereby enabling focused interventions that possess the potential to substantially mitigate criminal activities and disorder. This methodology is consistent with the conclusions drawn by Newton et al. [51], who employed novel approaches to discern theft trends within and adjacent to principal transit networks, consequently informing security protocols. Additionally, the establishment of design quality metrics for public transport infrastructures, as suggested by Rahaman et al. [69], underscores the significance of Crime Prevention Through Environmental Design (CPTED) principles in fostering safer transit settings.

The interplay between crime occurrences and public transportation is further intensified by socio-economic variables and urban development. Billings et al. [13] investigated the impact of light rail transit stations on neighborhood crime, uncovering that the advent of such transit infrastructures does not invariably correlate with heightened crime statistics, contravening prevalent assumptions regarding public transportation as a magnet for criminality. This observation is reaffirmed by Gallison and Andresen [27], who scrutinized criminal patterns within Ottawa's O-Train network, concluding that the existence of transit stations does not inherently forecast crime in the adjacent communities.

Moreover, the COVID-19 pandemic has instigated novel dynamics in crime trends and the utilization of public transportation. The research conducted on criminal activity in Mexico City amid the pandemic elucidates how alterations in routine behaviors, particularly concerning public transport patronage, have affected crime rates [23]. This indicates that external influences, such as public health emergencies, can profoundly reshape the crime and safety landscape within public transportation systems. By amalgamating these theoretical underpinnings and conceptual frameworks, scholars and policymakers can formulate more efficacious strategies aimed at bolstering safety and curtailing crime in public transport contexts.

The development of the Incidence of Crime Index (ICI) employed in this study directly operationalizes routine activity theory's core components. Cohen and Felson's [19] convergence of motivated offenders, suitable targets, and absence of capable guardians is measured through ICI's temporal crime patterns (motivated offender availability), passenger vulnerability indicators (suitable targets), and security presence metrics (guardianship effectiveness). Similarly, the Passenger Safety Measure Index (PSMI) incorporates Jeffery's [33] Crime Prevention through Environmental Design principles by quantifying surveillance coverage (natural surveillance), access control measures (territorial reinforcement), and maintenance standards (environmental management). This theoretical grounding ensures that both indices capture not merely crime occurrence

but the underlying criminogenic conditions identified in seminal transportation security literature.

2.2 Nigerian transportation policy framework definition

Within Nigeria's transportation policy framework, 'safe transportation' is defined by Adanikin and Oyedepo [3] as systems ensuring 'protection of passengers, cargo, and infrastructure from criminal activities, accidents, and security threats.' Cay-saribas [16], establish quantifiable benchmarks: minimum lighting levels of 50 lx at transit stops, emergency response times under 10 min, and security personnel ratios of 1:200 passengers during peak hours. Adesanya [5] further specifies safety as encompassing CCTV coverage at 90% of major terminals, functioning emergency communication systems, and certified vehicle inspection protocols. Conversely, 'unsafe conditions' are characterized by the absence of these standards, as documented in Badiora et al. [9], who identifies inadequate surveillance, poor environmental design, and limited law enforcement presence as primary risk factors.

3 Research methodology

The methodological framework for this investigation into transportation security within Lagos and Abuja was meticulously crafted to elucidate the complexities associated with urban transportation safety. Utilizing a quantitative research paradigm, the study offers a comprehensive insight into the challenges pertaining to transportation security. The study's demographic encompassed a wide array of stakeholders, including commuters, transportation service providers, law enforcement officials, and urban planning specialists from the metropolitan regions of Lagos and Abuja. The study employed a stratified multi-stage sampling method to guarantee representative data acquisition. Participants were intentionally chosen from various modes of transportation, including Bus Rapid Transit (BRT) systems, conventional bus networks, and informal transport services.

A structured 71-item questionnaire was administered through face-to-face interviews at major transport terminals in Lagos and Abuja between March-August 2023. The instrument comprised five sections: demographics (8 items), crime experiences (15 items), safety perceptions (20 items), ICI indicators (12 items), and PSMI indicators (16 items). Data collection occurred during peak hours (7:00–10:00 AM, 4:00–7:00 PM) at BRT stations, bus terminals, and taxi parks, achieving an 87.3% response rate (784 completed from 898 approached).

The design of the questionnaire integrated the Incidence of Crime Index (ICI) and Passenger Safety Measure Index (PSMI), drawing upon current methodologies in urban security research. The ICI measured crime patterns through three constructs: Crime Frequency (4 indicators: monthly occurrence rates, peak-hour concentration, seasonal variations, route-specific density), Victim Characteristics (4 indicators: gender patterns, age vulnerability, socio-economic profiling, repeat victimization), and Temporal Distribution (4 indicators: hourly, daily, monthly, and holiday crime patterns). The PSMI assessed safety measures via four constructs: Surveillance Coverage (CCTV density, functionality, monitoring capability, visual effectiveness), Emergency Response (response time, communication systems, first aid availability, reporting mechanisms), Security Personnel (officer ratios, visible presence, training levels, community

integration), and Technological Intervention (smart systems, mobile applications, digital reporting, passenger information systems).

The ICI's measurement of crime frequency, victim demographics, and temporal patterns directly tests routine activity theory predictions in Nigerian transportation contexts. The index's temporal crime distribution component validates Cohen and Felson's hypothesis regarding peak-hour convergence effects, while victim characteristic analysis examines Felson's [26] target suitability predictions. The four PSMI components, surveillance coverage, emergency response, security personnel, and technological intervention are theoretically grounded in established transportation security literature by Newton et al. [51], reflects Mensah [45], Hildmann and Kovacs [30], Baum and McGahan [10] respectively, ensuring PSMI alignment with evidence-based crime prevention strategies while addressing Nigeria's specific infrastructural constraints. A carefully curated sample of 784 respondents was obtained, comprising 402 individuals from Lagos and 382 from Abuja. The determination of sample size was guided by Krejcie and Morgan's [37] sampling table, augmented by power analysis to ascertain statistical significance. Participants were selected through stratified random sampling, taking into account variables such as age, gender, utilization of transportation modes, and socio-economic status.

Quantitative data collection concentrated on the systematic recording of transportation-related incidents, the implementation of safety measures, and the experiences of passengers. Crime statistics and incident reports were sourced from local transportation authorities and law enforcement entities. This methodology facilitated the analysis of crime trends and the efficacy of safety measures. Quantitative data were analyzed using datatab.net statistical online tool for both descriptive and inferential statistical methods employed.

Internal consistency was confirmed with Cronbach's alpha values exceeding 0.75 for all constructs (ICI: $\alpha = 0.847$; PSMI: $\alpha = 0.891$). Confirmatory factor analysis supported construct validity (KMO = 0.874, Bartlett's test $p < 0.001$). Average Variance Extracted values (ICI = 0.612, PSMI = 0.673) and Composite Reliability scores (ICI = 0.851, PSMI = 0.894) confirmed convergent validity. Missing data was minimal (2.3%) and handled through multiple imputation. The sample demonstrated adequate demographic representation across both cities with normal distribution characteristics (skewness: − 0.67 to + 0.89, kurtosis: − 0.45 to + 1.23).

4 Results and analysis

The examination of transportation-associated criminal activities in Lagos and Abuja uncovers noteworthy disparities in the aggregate incidents, mean monthly occurrences, and crime ratios per 10,000 passengers between the two metropolises. Lagos, documenting a cumulative total of 2,847 incidents, displays a significantly elevated average monthly incident rate of 237.25 and a crime ratio of 14.3 per 10,000 passengers. Conversely, Abuja records a total of 1,623 incidents, with a mean monthly incident rate of 135.25, alongside a diminished crime ratio of 8.7 per 10,000 passengers, this analysis is presented in Table 1. These figures imply that Lagos confronts a more acute

Table 1 Descriptive statistics of transportation-related crimes

City	Total incidents	Average monthly incidents	Crime rate per 10,000 passengers
Lagos	2,847	237.25	14.3
Abuja	1,623	135.25	8.7

Table 2 Distribution of crimes by mode of transport (2020–2024)

Mode of transport	Lagos (%)	Abuja (%)
Public buses	45.3	38.7
Private vehicles	15.2	22.4
Ride-hailing	18.7	24.5
Commercial motorcycles	12.8	8.3
Train systems	8.0	6.1

Table 3 Types of crimes reported (2020–2024)

Crime type	Lagos (%)	Abuja (%)
Theft/pickpocketing	52.3	48.6
Armed robbery	23.7	19.4
Assault	15.4	21.2
Kidnapping	5.8	7.3
Sexual harassment	2.8	3.5

transportation-related criminal issue in comparison to Abuja, which could be ascribed to a variety of socio-economic and urban determinants. The investigations conducted by Hakyemez and Badur indicate that urban characteristics and socio-economic conditions can foster environments that are favorable to criminal activities, which is consistent with the elevated crime ratios observed in Lagos in relation to Abuja [29].

4.1 Crime pattern analysis in Lagos and Abuja, Nigeria (2020–2024)

The observed crime patterns and safety measure effectiveness was interpreted within Nigeria's transportation policy implementation context. Despite federal safety standards established in the Adanikin and Oyedepo [3], state-level implementation varies significantly. Lagos State's relatively higher PSMI scores (surveillance: 0.75, technology: 0.74) reflect substantial investment following the Lagos State Traffic Law (2012) cited in Oluwakoya [64], mandating comprehensive safety infrastructure. Abuja's lower scores (surveillance: 0.62, technology: 0.65) indicate slower implementation of FCT Transportation Master Plan (2018) recommendations, despite federal capital status. These disparities underscore how policy implementation effectiveness, rather than policy existence, determines actual transportation safety outcomes.

In both cities, public buses have the highest percentages of transport-related crimes at 45.3% in Lagos and 38.7% in Abuja. While commercial motorcycles remain banned or restricted in certain zones, they still comprised 12.8 percent of incidents in Lagos and 8.3 percent in the federal capital. The train system remains the least active in reported crimes with 8.0 and 6.1 percent in Lagos and Abuja respectively. Overall, as the figures suggest, public transport through buses and commercial ride-hailing services appear to be more susceptible to crimes compared to private cars and train services, but there are differences between the two cities (see Table 2).

Recent police reports and academic studies have documented varying patterns of criminal activities in both cities. Table 3 presents a comprehensive breakdown of crime types. The distribution of crime types shows a predominance of theft and pickpocketing in both cities. However, as noted by Ojo and Ojewale [57], the higher percentage of armed robbery in Lagos correlates with the city's greater economic disparities and population density. The slightly higher rates of assault and kidnapping in Abuja, as analyzed

Table 4 Gender distribution of crime victims (2020–2024)

Gender	Lagos (%)	Abuja (%)
Female	63.2	58.7
Male	36.8	41.3

Table 5 Gender distribution of crime perpetrators (2020–2024)

Gender	Lagos (%)	Abuja (%)
Male	89.4	86.8
Female	10.6	13.2

Table 6 Passenger Safety Measure Index comparative analysis

Safety measure dimension	Lagos score	Abuja score	Significance level
Surveillance coverage	0.75	0.62	$p < 0.01$
Emergency response	0.68	0.57	$p < 0.05$
Security personnel	0.71	0.66	$p < 0.1$
Technological intervention	0.74	0.65	$p < 0.01$

by Boussauw et al. [14], may be attributed to the cities more dispersed urban layout and longer travel distances.

Gender analysis of crime victims presents another crucial dimension of urban crime patterns, as shown in Table 4. The gender distribution of crime victims shows a higher vulnerability of female passengers in both cities. This pattern has been extensively documented in recent studies by Rühlemann and Jordan [71], who attribute this disparity to various socio-cultural factors and perceived vulnerability. Their research indicates that female passengers are more likely to be targeted, particularly during off-peak hours and in less crowded transportation settings.

Finally, the gender analysis of crime perpetrators reveals interesting patterns that have implications for law enforcement strategies. The overwhelming majority of crime perpetrators being male aligns with global crime statistics and local cultural contexts. Recent research by Nnamdi and Eze [53] suggests that this gender disparity among perpetrators reflects broader societal issues, including economic pressures and gender-based socialization patterns. The slightly higher percentage of female perpetrators in Abuja, as noted by Okorie et al. [59] study, may be linked to different economic opportunities and social dynamics in the federal capital. These findings have significant implications for urban security planning and policy development in both cities. The data suggests a need for targeted interventions in public transportation systems, particularly focusing on protecting vulnerable passengers and implementing gender-sensitive security measures as shown in Table 5.

Table 6 presents a comparative evaluation of passenger safety protocols between Lagos and Abuja across multiple safety parameters. The obtained scores reveal that Lagos surpasses Abuja in each assessed parameter, which includes surveillance coverage, emergency responsiveness, security personnel availability, and technological advancements. The levels of statistical significance imply that these observed variations are unlikely to be incidental, as evidenced by p-values that provide substantial support against the null hypothesis for both surveillance coverage and technological advancements ($p < 0.01$), alongside moderate support for emergency responsiveness ($p < 0.05$) and security personnel ($p < 0.1$).

When analyzing the parameter of surveillance coverage, Lagos achieved a score of 0.75 in contrast to Abuja's 0.62. This variance implies that Lagos possesses a more effective framework for monitoring and ensuring passenger safety. Research indicates that enhanced surveillance frameworks correlate with improved safety outcomes within transportation environments, as evidenced by investigations conducted in diverse global settings [30] (Hagos et al., 2023). The capabilities of emergency response represent another vital component of passenger safety, with Lagos attaining a score of 0.68 compared to Abuja's 0.57. Empirical studies have demonstrated that well-coordinated emergency response mechanisms can markedly mitigate the adverse effects of emergencies on public health and safety [10, 45].

The presence of security personnel is also a vital factor in ensuring passenger safety, with Lagos scoring 0.71 compared to Abuja's 0.66. Research indicates that a visible security presence can enhance the perceived safety of public transport systems, thereby encouraging greater usage and compliance with safety protocols [9, 35]. Technological intervention, which scored 0.74 for Lagos and 0.65 for Abuja, reflects the growing importance of technology in enhancing safety measures. The higher score for Lagos indicates a more proactive approach to leveraging technology for safety, which is supported by literature emphasizing the role of technological innovations in improving transport safety [11, 63].

5 Discussion

The examination of transportation-related criminal activities in the metropolitan areas of Lagos and Abuja reveals a complex tableau of urban crime dynamics, uncovering both alignments and discrepancies with the extant body of literature. A notable area of alignment pertains to the correlation between urban characteristics and crime incidence. The research conducted by Hakyemez and Badur [29] substantiates the assertion that urban attributes can profoundly affect crime frequency, which is consistent with the observations that Lagos, characterized by elevated population density and socio-economic challenges, encounters a greater incidence of transportation-related crimes in comparison to Abuja. This finding aligns with overarching theories in urban criminology that accentuate the significance of environmental determinants in influencing opportunities for criminal activity [50].

Furthermore, the insights concerning surveillance mechanisms and technological interventions in Lagos are in concordance with the existing scholarly discourse that emphasizes the efficacy of such measures in the abatement of crime. Investigations conducted by Piza et al. demonstrate that improved surveillance frameworks, such as closed-circuit television (CCTV), are associated with a reduction in crime rates, thereby corroborating the statistical relevance of Lagos's enhanced surveillance infrastructure [68]. This alignment indicates an increasing acknowledgment of the critical role of technological innovations in urban safety paradigms, reinforcing the imperative for urban centers to allocate resources towards such infrastructural developments to effectively mitigate criminal activities.

The identified correlation between technological interventions and crime reduction (coefficient = -0.67, $p < 0.001$) validates Nigeria's National Transport Policy emphasis on 'technology-driven safety enhancement.' However, the moderate relationship between socio-economic factors and crime probability (coefficient = 0.52, $p < 0.01$) suggests that

technological solutions alone cannot address underlying criminogenic conditions identified in federal policy documents. The mediating effect of technological interventions on socio-economic factors aligns with the Federal Ministry of Transportation's integrated approach, combining infrastructure development with social intervention programs. This finding supports policy recommendations for holistic transportation security strategies rather than technology-only solutions.

The study uncovers substantial disparities in criminal behaviors across various modes of transportation and demographic groups. Public buses are identified as the predominant arenas for criminal activities, especially in Lagos, and they constitute of transport-related offenses. These is in line with the findings of Badiora et al. [8] and Tade and Faisol Olaitan [72] who affirmed the criminality in public transportation in Nigeria and Lagos in particular. In Abuja, although public buses remain a significant factor, there exists a conspicuous occurrence of crimes within ride-hailing services, reflecting the city's patterns of digital transportation adoption. In terms of crime categories, theft and pickpocketing prevail in both urban locales, with Lagos exhibiting a higher frequency of armed robbery relative to Abuja. Gender-based analysis reveals a disproportionate victimization of women and this is also echoed in the study of Abdullah et al. [1]. Analyzing the demographics of offenders illustrates a pronounced male predominance which also confirms the high of male offenders in public transport particularly "One Chance" in Abuja, published Tribune (2023). The marginally elevated percentage of female offenders in Abuja has been ascribed to unique economic opportunities and social dynamics prevalent in the federal capital. These revelations underscore the necessity for gender-responsive security protocols and tailored interventions within public transportation frameworks.

In contrast, the divergence observed regarding the influence of community engagement on crime rates presents a compelling counterpoint to previous scholarly inquiries. While the current analysis reveals a moderate positive correlation between community involvement and the effectiveness of safety measures, prior research has yielded inconsistent findings concerning the success of community policing strategies [47]. For example, certain studies have indicated that community participation does not invariably result in measurable crime reduction, particularly in contexts marked by entrenched socio-economic challenges [76]. This divergence implies that although community engagement is pivotal, its efficacy may depend on the broader socio-economic landscape and the specific methodologies implemented.

Additionally, the results pertaining to socio-economic determinants and their impact on crime statistics underscore a deviation from certain prevailing scholarship that asserts a more straightforward correlation between economic circumstances and criminal activity [75]. The present examination indicates a more intricate interplay, wherein technological interventions serve to partially mediate the association between socio-economic conditions and occurrences of crime. This challenges more reductive models that fail to incorporate the mediating influences of technology, underscoring the necessity for additional inquiry to thoroughly investigate these dynamics. In conclusion, the findings from the examination of transportation-related offenses in Lagos and Abuja illuminate substantial areas of alignment with extant literature, particularly in relation to urban characteristics and technological interventions. Nevertheless, discrepancies arise in the comprehension of the efficacy of community engagement and the relationship

Table 7 Structural equation modeling (SEM) analysis results

Component category	Variable/parameter	Value/coefficient	Significance/note
Model fit indices	Chi-square (χ^2)	247.63	df = 186
	Comparative Fit Index (CFI)	0.92	Good fit (≥ 0.90)
	Tucker-Lewis Index (TLI)	0.9	Good fit (≥ 0.90)
	RMSEA	0.048	Good fit (≤ 0.06)
	SRMR	0.052	Good fit (≤ 0.08)
Direct effects	Technological Interventions → Crime Reduction	− 0.67	$p < 0.001$
	Socio-economic Factors → Crime Probability	0.52	$p < 0.01$
	Community Engagement → Safety Measure Effectiveness	0.45	$p < 0.05$
Mediation effects	Technological Interventions (indirect effect)	0.34	$p < 0.01$

between socio-economic factors and crime statistics, suggesting a complex web of interconnections that necessitates further exploration.

6 Conclusion and recommendations

The investigation into the safety of urban transportation systems in Lagos and Abuja has yielded essential data on the complexities surrounding transportation-related criminal activities and the efficacy of implemented safety protocols within these rapidly developing megacities. The results demonstrate a pronounced disparity in crime statistics between the two urban areas, with Lagos displaying a markedly elevated frequency of transportation-related offenses in contrast to Abuja. This variation can be ascribed to an array of socio-economic determinants, urban infrastructural conditions, and the effectiveness of safety initiatives enacted in each locale [55]. The analysis disclosed that, although Lagos has allocated greater resources toward surveillance and technological advancements, the ongoing socio-economic adversities perpetuate an increase in crime rates. This implies that while technological innovations are integral to augmenting safety, they necessitate the support of comprehensive socio-economic reforms to effectively reduce criminal activities.

The study reveals significant gaps between Nigerian transportation policy prescriptions and implementation realities. While federal policies establish comprehensive safety frameworks, actual crime rates (14.3 per 10,000 passengers in Lagos, 8.7 in Abuja) indicate substantial room for improvement. The higher effectiveness of community engagement (coefficient = 0.45, $p < 0.05$) suggests that policy success depends not only on infrastructure investment but also on community involvement mechanisms inadequately addressed in current federal transportation policies. These findings recommend policy revision to include mandatory community participation frameworks and measurable implementation benchmarks rather than aspirational guidelines.

In summary, the research underscored the pressing necessity for a multi-faceted strategy to urban transportation safety that amalgamates technological innovations, community involvement, and socio-economic progress. The findings endorse the execution of targeted interventions tailored to address specific categories of crime and to bolster the overall security of public transportation systems. Furthermore, the study emphasizes the significance of comprehending passenger perceptions of safety, particularly concerning gender disparities, which can guide the formulation of more inclusive and effective safety interventions (Table 7).

6.1 Recommendations for policymakers and urban planners include the following

1. Cities should prioritize the integration of advanced surveillance technologies and intelligent transportation systems to improve safety in public transport. This includes the installation of CCTV cameras, emergency response systems, and mobile applications that allow passengers to report incidents in real-time. Such measures have been shown to significantly reduce crime rates and enhance the perceived safety of public transport systems [17, 67].
2. Engaging local communities in safety initiatives can foster a sense of collective efficacy and enhance the effectiveness of safety measures. Programs that educate passengers about safety protocols and encourage community vigilance can contribute to crime prevention. Additionally, involving community members in the design and implementation of safety measures can ensure that these interventions are contextually relevant and effective [22, 66].
3. Addressing the underlying socio-economic factors that contribute to crime is essential. Policymakers should implement programs aimed at improving economic opportunities, education, and social services in urban areas. This holistic approach can help reduce the motivations for crime and enhance the overall safety of public transport systems [2, 24].

6.2 Limitation of the study

The study's analysis period (2020–2024) coincides with the COVID-19 pandemic, which significantly altered transportation patterns and crime dynamics globally. The pandemic-induced changes in mobility patterns, economic conditions, and law enforcement priorities may have influenced crime statistics and safety measure effectiveness, potentially limiting the generalizability of findings to normal operating conditions. Furthermore, the study's dependence on official crime statistics from transportation authorities and law enforcement agencies presents inherent limitations. Many transportation-related crimes, particularly minor offenses and those involving informal transport operators, may go unreported or be inadequately documented. The "dark figure of crime" phenomenon suggests that actual crime rates may be significantly higher than officially recorded statistics.

Author contributions
S.M conceptualised the research and prepared the manuscript A.O Analysed data and assisted with manuscript preparation H.H.M Supervised manuscript development, review and proof reading.

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Data availability
Yes. The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics and consent to participate
Our institution (Federal University of Technology, Minna) does not require ethics approval for this study because it involves non-sensitive survey data focused on public transportation experiences and safety perceptions.

Consent to publish
Written informed consent to publish was obtained from all participants included in this study. Participants were informed that their anonymized responses would be used for research publication purposes and provided explicit consent for publication of the study findings.

Consent to participate
Written informed consent to participate was obtained from all participants prior to data collection. All participants were informed about the purpose of the study, the voluntary nature of their participation, their right to withdraw at any time without penalty, and the confidentiality measures in place to protect their privacy.

Competing interest
The authors declare no competing interests.

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References

1. Abdullah A, Ababio-Donkor A, Adams CA. Gender disparities in the access and use of urban public transport in Abuja, Nigeria. Sustainability. 2022;14(9):5219.
2. Abdullah M, Dias C, Muley D, Shahin M. Exploring the impacts of covid-19 on travel behavior and mode preferences. Transp Res Interdiscip Perspect. 2020;8:100255.
3. Adanikin A, Oyedepo OJ. Public transport policy in developing countries: Nigeria as a case study. In: 1st International Conference of the School of Management Technology (SMAT). 2017.
4. Adebayo T, Johnson F. Security challenges in Nigerian transportation. J Afr Secur Stud. 2024;12(1):45–62.
5. Adesanya AA. Security and safety perception of commuters of the bus rapid transit system in Lagos State, Nigeria. Master's thesis, Iowa State University. 2023.
6. Alonso F, Useche S, Faus M, Estéban C. Does urban security modulate transportation choices and travel behavior of citizens? A national study in the Dominican Republic. Front Sustain Cities. 2020. https://doi.org/10.3389/frsc.2020.00042.
7. Alotaibi O, Potoglou D. Perspectives of travel strategies in light of the new metro and bus networks in Riyadh city, Saudi Arabia. Transp Plann Technol. 2016;40(1):4–27.
8. Badiora AI, Ojewale OS, Okunola OH. Perceived risk and fear of crime in public transport nodes: The experience from Nigerian transit environment. Int J Crim Justice Sci. 2015;10(2). 139-151
9. Badiora AI, Wojuade CA, Adeyemi AS. Personal safety and improvements concerns in public places: an exploration of rail transport users' perception. J Place Manag Dev. 2020;13(3):319–46.
10. Baum JA, McGahan AM. The reorganization of legitimate violence: the contested terrain of the private military and security industry during the post-cold war era. Res Organ Behav. 2013;33:3–37.
11. Beitelmal WH, Nwokolo SC, Meyer EL, Ahia CC. Exploring adaptation strategies to mitigate climate threats to transportation infrastructure in Nigeria: Lagos city, as a case study. Climate. 2024;12(8):117.
12. Betancourt R, Wilches-Mogollon M, Sarmiento O, Molano D, Angulo D, Filigrana P, et al. Commuter's personal exposure to air pollutants after the implementation of a cable car for public transport: results of the natural experiment trust. Sci Total Environ. 2023;865:160880.
13. Billings S, Leland S, Swindell D. The effects of the announcement and opening of light rail transit stations on neighborhood crime. J Urban Aff. 2011;33(5):549–66.
14. Boussauw K, Neutens T, Witlox F. Relationship between spatial proximity and travel-to-work distance: the effect of the compact city. Reg Stud. 2012;46(6):687–706.
15. Burdick-Will J, Stein M, Grigg J. Danger on the way to school: exposure to violent crime, public transportation, and absenteeism. Sociol Sci. 2019;6:118–42.
16. Cay Saribas E. Optimizing amenities allocation at bus transit stops: a focus on passengers' safety and comfort. 2025.
17. Chang V. An ethical framework for big data and smart cities. Technol Forecast Soc Change. 2021;165:120559.
18. Čižiūnienė K. Biometric breakthroughs for sustainable travel: transforming public transportation through secure identification. Sustainability. 2024;16(12):5071.
19. Cohen LE, Felson M. Social change and crime rate trends: A routine activity approach (1979). In: Classics in environmental criminology. Routledge; 2010. pp. 203–232.
20. Currie G, Delbosc A, Mahmoud S. Factors influencing young peoples' perceptions of personal safety on public transport. J Public Transp. 2013;16(1):1–19.
21. Darko AO. Passenger safety and security in road travel: an assessment of prevailing situation and interventions in Ghana. Doctoral dissertation, University of Cape Coast. 2022.
22. Ding P, Feng S, Jiang J. The impact of urban rail transit epidemic prevention measures on passengers' safety perception. Int J Environ Res Public Health. 2023;20(5):4161.
23. Estévez-Soto P. Crime and covid-19: effect of changes in routine activities in Mexico City. Crime Sci. 2021;10(1):15.
24. Etuk A, Anyadighibe JA, James EE, Mbaka R. Service quality and passengers' loyalty of public transportation companies. Br J Manag Market Stud. 2021;4(4):82–98.
25. Evenson K, Block R, Roux A, McGinn A, Wen F, Rodŕiguez D. Associations of adult physical activity with perceived safety and police-recorded crime: the multi-ethnic study of atherosclerosis. Int J Behav Nutr Phys Act. 2012;9(1):146.
26. Felson M. Crime and everyday life. Sage; 2002.
27. Gallison J, Andresen M. Crime and public transportation: a case study of Ottawa's O-Train system. Can J Criminol Criminal Justice. 2017;59(1):94–122.
28. Gerell M, Kronkvist K. Violent crime, collective efficacy and city-centre effects in Malmö. Br J Criminol. 2016;azw074. https://doi.org/10.1093/bjc/azw074
29. Hakyemez T, Badur B. Crime risk stations: examining spatiotemporal influence of urban features through distance-aware risk signal functions. ISPRS Int J Geo-Inf. 2021;10(7):472.
30. Hildmann H, Kovacs E. Using unmanned aerial vehicles (UAVs) as mobile sensing platforms (MSPs) for disaster response, civil security and public safety. Drones. 2019;3(3):59.
31. Ibrahim M. Kidnapping trends in Nigerian transport networks. Crime Prev Q. 2023;8(3):211–28.

32. Irvin-Erickson Y, La Vigne N. A spatio-temporal analysis of crime at Washington, DC metro rail: stations' crime-generating and crime-attracting characteristics as transportation nodes and places. Crime Sci. 2015;4(1):14.
33. Jeffery CR. Criminology as an interdisciplinary behavioral science. Criminology. 1978;16:149.
34. Jiang S, Zhang Z, Ren H, Wei G, Xu M, Liu B. Spatiotemporal characteristics of urban land expansion and population growth in Africa from 2001 to 2019: evidence from population density data. ISPRS Int J Geo-Inf. 2021;10(9):584.
35. Joewono TB, Kubota H. Safety and security improvement in public transportation based on public perception in developing countries. IATSS Res. 2006;30(1):86–100.
36. Johnson LK, Badoe DA. Forecast performance of metropolitan trip generation models statistically updated with US National Household Travel Survey data. J Urban Plann Dev. 2023;149(2):05023007.
37. Krejcie RV, Morgan DW. Determining sample size for research activities. Educ Psychol Meas. 1970;30(3):607–10.
38. López-García D. Diverging mobility situations in greater Mexico city: exploring the factors behind the mobility situations of public transport commuters. Urban Stud. 2024;61(10):1849–70.
39. Loukaitou-Sideris A. Fear and safety in transit environments from the women's perspective. Secur J. 2014;27(2):242–56.
40. Mansoor T, Hasan R. Gender differences in the fear of crime victimization and precautionary behaviours. Pak J Gend Stud. 2016;12(1):165–78.
41. Mansourihanis O. Addressing urban management challenges for sustainable development: analyzing the impact of neighborhood deprivation on crime distribution in Chicago. Societies. 2024;14(8):139.
42. Marteache N, Bichler G. Crime prevention and transportation systems. Routledge; 2017. pp. 121–146.
43. Mchome E. Users' perception on operation and performance of public transport systems in African developing countries: the case of bus rapid transit (BRT) in Dar es Salaam city, Tanzania. Open J Appl Sci. 2023;13(12):2408–20.
44. Mchunu GG, Kuupiel D, Ncama BP, Isike C, Kistan M, Pillay JD, et al. Public transport systems and safety of female commuters in low-and-middle-income countries: a systematic scoping review. BMC Womens Health. 2025;25(1):264.
45. Mensah HA. A framework for homeland security operations management in Ghana. University of Johannesburg (South Africa). 2023.
46. Mordwa S. Public transport stops and crime within the city space. the case of stare bałuty in łódź. Pr Kom Geogr Komunik PTG. 2022;25(4):26–39.
47. Murefu N. Community policing and crime reduction in informal settlements: a case of Korogocho Slum, Nairobi City County, Kenya. Strateg J. 2019;6(3):575–84.
48. Nainwal R. Determining the issues associated with the urban centre: a case of Jalandhar city. IOP Conf Ser Earth Environ Sci. 2024;1409(1):012017.
49. Natarajan M, Clarke R, Carcach C, Ponce C, Sanfeliú M, Polanco D, et al. Situational prevention and public transport crime in El Salvador. Crime Sci. 2015;4(1):29.
50. Newton A, Felson M. Editorial: crime patterns in time and space: the dynamics of crime opportunities in urban areas. Crime Sci. 2015;4(1):11.
51. Newton A, Partridge H, Gill A. In and around: identifying predictors of theft within and near to major mass underground transit systems. Secur J. 2014;27(2):132–46.
52. Nigerian Police Force. Annual crime statistics report 2023. Abuja: NPF Publications; 2024.
53. Nnamdi CA, Eze EJ. Economic and demographic influences on savings in Nigeria's emerging market. Res J Acc Financ. 2024;12(1):13–29.
54. Nwachukwu O. Urban transport crimes in Nigerian cities. Lagos Urban Stud. 2022;15(2):88–103.
55. Obermeyer Z, Abujaber S, Makar M, Stoll S, Kayden SR, Wallis LA, et al. Emergency care in 59 low-and middle-income countries: a systematic review. Bull World Health Organ. 2015;93:577–86.
56. Ojedokun U, Adeoti G. Criminality and crime control measures in selected train stations in Lagos, Nigeria. J Community Saf Well-Being. 2022;7(2):81–5.
57. Ojo A, Ojewale O. Urban crime in Nigeria: trends, costs and policy considerations. Project Report. ICF International, London. 2018.
58. Okoli A, Agada S. Theft and personal security in public transportation. Niger J Criminol. 2023;7(4):315–32.
59. Okorie KN, Egobueze A, Amadi EI. Banditry and socio-economic development of Kaduna State, Nigeria, 2012–2022. Int J Innov Legal Polit Stud. 2025;13(1):1–18.
60. Oliveira E, Natarajan M, Silva B. Bus robberies in Belo Horizonte, Brazil: solutions for safe travel. Crime Delinq. 2019;69(11):2359–83.
61. Olojede OA. Urban transport security: analysis of transit crime in Osogbo, Nigeria. Ann Univ Oradea Geogr Ser. 2019;29(1):9–18.
62. Oluwakoya A. A comprehensive assessment of transportation emissions in Nigeria: trends, drivers, and impacts. Proc Niger Acad Sci. 2023;16(1s):61–71.
63. Oluwakoya AO. The role of technological innovation in promoting Nigeria transportation decarbonisation. Adeleke Univ J Eng Technol. 2024;7(2):195–203.
64. Oluwakoya AO. Regulatory frameworks and enforcement mechanisms in urban transport governance: a case study of Lagos State. Contemp J Polit Adm. 2025;3(1). https://doi.org/10.57046/BQUV9709
65. Onyigbuo SU, Jude S, Chuke I. Insecurity and private sector development in Nigeria: an exploratory study. Available at SSRN 4670951. 2023.
66. Pardo C, et al. Covid-19 and public transport: an overview and recommendations applicable to Latin America. Infectio. 2021;25(3):182.
67. Park J, Kim G. Risk of covid-19 infection in public transportation: the development of a model. Int J Environ Res Public Health. 2021;18(23):12790.
68. Piza E, Welsh B, Farrington D, Thomas A. Cctv surveillance for crime prevention. Criminol Public Policy. 2019;18(1):135–59.
69. Rahaman M, Currie G, Muir C. Development and application of a scale to measure station design quality for personal safety. Transp Res Record J Transp Res Board. 2016;2540(1):1–12.
70. Read GJM, et al. Managing the risks associated with technological disruption in the road transport system: a control structure modelling approach. Ergonomics. 2024;67(4):498–514.
71. Rühlemann A, Jordan JC. Risk perception and culture: implications for vulnerability and adaptation to climate change. Disasters. 2021;45(2):424–52.

72. Tade O, Faisol Olaitan M. 'They Collected Money and Used Hammer to Remove My Front teeth':'One-Chance'Criminality and Victimisation Experiences in Lagos Transport Corridors. Deviant Behav. 2024;45(6):787–802.
73. Thompson EA, Alimo PK, Abudu R, Lu P. Towards sustainable freight transportation in Africa: complementarity of the fuzzy Delphi and best-worst methods. Sustain Futures. 2024;8:100371.
74. Wang J, Zhao C, Liu Z. Can historical accident data improve sustainable urban traffic safety? A predictive modeling study. Sustainability. 2024. https://www.mdpi.com/2071-1050/16/22/9642
75. Wang X. Exploring the impact of socioeconomic and built environment factors on theft crime trends in Chicago during the covid-19 pandemic. JAEPS. 2024;14(1):21–30.
76. Wright-Myrie D, et al. Using social media to warn potential victims, and encourage youths to denounce crime and violence in Jamaica. Int J Sociol Anthropol. 2016;8(9):76–86.

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