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Multicriteria Evaluation of the Quality of Service (QoS) of Informal Public Transport (IPT):
A Case Study of Ngong Road, Nairobi Metropolitan Area

***Martin Taani, Yukitsugu Komazawa, Simpson N. Osano, Miracle Wachira and Francis Gitau**

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Abstract

Kenya's Informal Public Transport (IPT) sector faces substantial challenges, including absence of demand-based licensing leading to corridor oversupply and undersupply imbalances, limited coverage, and poor service quality. These deficiencies result in high transportation costs that disproportionately burden low-income households, consuming significant portions of wages and salaries. The financial strain particularly affects captive riders who, lacking alternatives, must bear these costs regardless of economic circumstances. Conversely, choice riders with alternative travel options may select different transport modes when service quality deteriorates or costs escalate. This disparity highlights inequitable access to affordable mobility. This study evaluates Quality of Service (QoS) in urban public transport to enhance productivity, affordability, and passenger satisfaction. Employing a multi-criteria assessment approach, the research analyzes key QoS indicators including affordability, waiting time, travel time, seat comfort, safety, and driver behavior. A questionnaire-based survey of 2,402 public bus passengers in the Nairobi Metropolitan Area examined overall quality of satisfaction levels, relationships with 14 specific service attributes, demographic variables, passenger experience, and gender disparities. Results revealed overall quality of satisfaction at 46.8%. Logistic regression analysis identified road safety and vehicle cleanliness as the most crucial factors for overall satisfaction, followed by service frequency, fare, driving behavior, and security. Gender analysis showed females less satisfied with road safety and punctuality than males. Conductor behavior correlated with overall satisfaction only for females, while service frequency and facility cleanliness correlated only for males. Harassment experiences negatively affected both genders' satisfaction, with particularly pronounced effects for females. Given the relatively high satisfaction levels regarding frequency, coverage, and connectivity, the public bus system possesses positive attributes. In evaluating these advantages of the public bus industry, it is advisable for the entire public transport sector to address the aforementioned issues and enhance satisfaction with crucial service attributes with prioritisation.

Keywords: Nairobi Metropolitan Area (NMA), Quality of Service (QoS), Customer Satisfaction, Informal Public Transport (IPT), Overall Satisfaction, Nairobi Public Transport Sector, Passenger satisfaction, Logistic regression Analysis

INTRODUCTION

Urban mobility in the 21st century presents one of the most pressing challenges for sustainable development, with over 4.4 billion people, more than half the world's population, now residing in cities, a figure projected to reach 6.7 billion by 2050 (United Nations, 2022). This unprecedented urbanization has fundamentally transformed transportation demand patterns, creating complex mobility ecosystems where formal and informal transport systems coexist, compete, and complement each other in intricate ways. Nowhere is this transformation more pronounced than in Sub-Saharan Africa, where Informal Public Transport (IPT) systems have emerged as the dominant mobility solution, providing approximately 70% of urban public transport services and serving as the economic lifeline for over 500 million urban residents (Mutiso &

**Corresponding author:*
Martin Taani *Transportation Engineer, Nairobi Metropolitan Area Transport Authority (NaMATA), Nairobi, Student, MSc Civil Engineering University of Nairobi*
Email: mtaani@students.uonbi.ac.ke

Behrens, 2021; World Bank, 2020).

The phenomenon of informal public transport represents a fascinating paradox in contemporary urban planning discourse. These systems, characterized by their market-driven operations, demand-responsive scheduling, and entrepreneurial ownership structures, have demonstrated remarkable resilience and adaptability in addressing mobility needs where formal transport systems have failed to penetrate or prove economically viable (Olowosegun et al., 2021). From Lagos's danfo buses to Nairobi's matatus, from Manila's jeepneys to Lima's combis, IPT systems have evolved into sophisticated networks that move millions of passengers daily, generating employment for over 20 million people across the developing world while contributing an estimated $40 billion annually to urban economies (Behrens et al., 2020; International Labour Organization, 2021).

Yet beneath this apparent success lies a complex web of operational challenges and systemic inefficiencies that fundamentally compromise service quality and urban sustainability. IPT systems operate in a regulatory vacuum characterized by what scholars term "institutional informality" - a condition where transport services exist outside formal regulatory frameworks while simultaneously filling critical gaps in urban mobility provision (Schalekamp et al., 2020). This institutional ambiguity creates operational environments where vehicles adjust routes and schedules based on real-time passenger demand rather than adhering to fixed timetables, where fare structures remain negotiable and market-determined, and where small-to-medium capacity vehicles navigate dense urban environments with remarkable efficiency yet questionable safety standards (Cervero & Golub, 2007).

The human cost of this regulatory informality is particularly stark in labor conditions, where drivers and conductors routinely work 16 - 18 hour shifts without adequate rest periods, directly contravening international labor standards and national employment legislation. In Kenya, for instance, such practices violate Section 27(2) of the Employment Act (2007) and Regulation 6(1) of the Regulation of Wages (General) Order (1982), which mandate maximum 52-hour work weeks, yet enforcement remains virtually non-existent (Government of Kenya, 2007). This regulatory disconnect perpetuates a cycle where economic necessity drives operational practices that compromise both worker welfare and passenger safety.

The quality of service challenge in IPT systems extends far beyond labor conditions to encompass fundamental issues of network planning, capacity allocation, and service reliability. Contemporary transport licensing mechanisms in most developing countries lack empirical foundation in passenger origin – destination patterns, demand analysis or optimal corridor capacity assessments. This creates what transport economists term "supply-demand disequilibrium" (Salon & Gulyani, 2020).

In Kenya, County Governments issue Road Service Licences (RSLs) and pick-up/drop-off permits without conducting statistical analysis of actual passenger demand or comprehensive corridor-level service assessments. Instead, licensing decisions are often made based on political considerations, operator lobbying, or arbitrary administrative processes. This non-scientific approach creates a paradoxical dual problem. First, systematic oversupply occurs in profitable corridors connecting central business districts to middle-income residential areas. Excessive vehicle competition drives down individual operator revenues while increasing congestion and environmental impacts. Second, corresponding undersupply emerges in peripheral areas where low passenger volumes render services economically unviable for private operators. This results in inadequate or non-existent transport services for low-income and peri-urban communities. Ultimately, this creates inefficient resource allocation where some areas suffer from service saturation while others remain completely underserved, fundamentally compromising the overall effectiveness of the urban transport system.

The resulting operational dynamics generate cascading system inefficiencies that fundamentally compromise service quality. In oversaturated markets, operators resort to aggressive driving behaviors, vehicle overloading, and route fragmentation as survival strategies, creating what Behrens et al. (2020) describe as a "race to the bottom" in service standards. Conversely, underserved corridors force residents, particularly

in low-income and peri-urban areas, to rely on walking as their primary transport mode, with average walking distances exceeding 5 kilometers daily for basic service access in many African cities (Kumar & Barrett, 2020).

These service provision imbalances reflect broader systemic failures in urban transport governance, where fragmented institutional responsibilities, weak regulatory enforcement, and absence of integrated planning frameworks prevent optimization of network efficiency or achievement of equitable service distribution. The economic implications are profound: transport costs consume 15-25% of household income for the urban poor in most developing cities, compared to 10-15% in developed countries, creating what transport poverty researchers term "mobility-induced deprivation" (Mutiso & Behrens, 2021; Guzman et al., 2021).

For captive riders—those lacking alternative transport options—poor service quality coupled with high costs creates a double burden that constrains access to employment, education, healthcare, and social opportunities. This economic strain extends beyond low-income populations to affect middle-income households facing rising living costs and even vehicle-owning households who utilize public transport due to congestion, parking constraints, and fuel costs. The combination of widespread transport dependence and substandard service delivery perpetuates what urban geographers term "spatial inequality," where residential location determines access to urban opportunities (Salon & Aligula, 2020).

Against this backdrop, the imperative for rigorous quality of service assessment in IPT systems becomes paramount. Traditional transport performance metrics—developed for formal, regulated systems—prove inadequate for capturing the multidimensional nature of informal transport service delivery, where factors such as fare affordability, service frequency, comfort, safety, reliability, and user perception interact in complex, often conflicting ways (Macharis et al., 2009). This necessitates development of comprehensive evaluation frameworks that can accommodate the unique operational characteristics of informal systems while providing actionable insights for policy intervention and service improvement.

The Nairobi Metropolitan Area, with its extensive matatu network serving over 4 million daily passengers, provides an ideal laboratory for examining these dynamics. As Kenya's economic hub and one of Africa's fastest-growing cities, Nairobi's transport challenges mirror those faced across the developing world, while its relatively advanced institutional capacity offers potential for implementing evidence-based policy reforms. Understanding passenger satisfaction patterns, service quality determinants, and demographic variations in transport experiences within this context provides crucial insights for improving urban mobility outcomes across similar cities throughout the Global South.

This study addresses these critical knowledge gaps through comprehensive multicriteria evaluation of informal public transport quality of service, examining passenger satisfaction patterns, identifying key service quality determinants, and analyzing demographic variations in transport experiences. The findings contribute to the growing body of evidence demonstrating that while informal public transport systems provide essential mobility services, substantial quality improvements are necessary to support sustainable urban development goals and ensure equitable access to urban opportunities for all residents.

THEORY

Passenger satisfaction serves as a critical metric for assessing urban transport system quality, providing transport authorities valuable insights for policy enhancement (Mouwen, 2020). International benchmarks demonstrate significant variation in satisfaction levels: Singapore's public transport achieved 92% satisfaction in 2023, while London recorded 80% satisfaction with bus services (Public Transport Council, 2023; Transport Focus, 2023). These metrics reflect the widespread use of passenger satisfaction as a quality evaluation tool (Eboli & Mazzulla, 2020).

Standardized assessment techniques exist for measuring passenger satisfaction and service quality, including the TRB Handbook for Measuring Customer Satisfaction and Service Quality (TRB, 1999) and EC-CEN Transportation standards. CEN (2002) delineates urban transport quality through perceived quality (passenger

assessments via satisfaction surveys) and delivered quality (objective service metrics) (Eboli & Mazzulla, 2020). These frameworks enable practitioners to develop comprehensive public transportation quality evaluation systems.

Kenya's Informal Public Transport (IPT) sector faces substantial challenges including absence of demand-based licensing, creating corridor oversupply and undersupply imbalances, limited coverage, and poor service quality (Mutiso & Behrens, 2021). These deficiencies result in high transportation costs disproportionately burdening low-income households. The financial strain particularly affects captive riders lacking alternatives, while choice riders may select different transport modes when service deteriorates, highlighting inequitable access to affordable mobility (Kumar & Barrett, 2020).

Increased consumer satisfaction in transportation generates positive effects including market retention, increased system use, new consumer attraction, and improved public perception (Mouwen, 2020). Public transportation organizations must employ reliable techniques, as shown in **Figure 1**– overall customer satisfaction management plan, to identify service quality factors from passenger perspectives, enabling agencies to modify services to meet evolving requirements and expectations, resulting in enhanced passenger satisfaction and loyalty.

The quality of service (QoS) in IPT cannot be adequately assessed using single parameters due to the multidimensional nature of transport services, where factors such as fare affordability, service frequency, comfort, safety, reliability, and user perception often intersect and conflict (Behrens et al., 2020). Multicriteria Evaluation (MCE), also known as Multicriteria Decision Analysis (MCDA), provides a robust framework to incorporate these multiple variables through transparent and structured comparisons across diverse criteria (Macharis et al., 2009).

The dynamic, decentralized nature of IPT systems like Kenya's matatus means service delivery

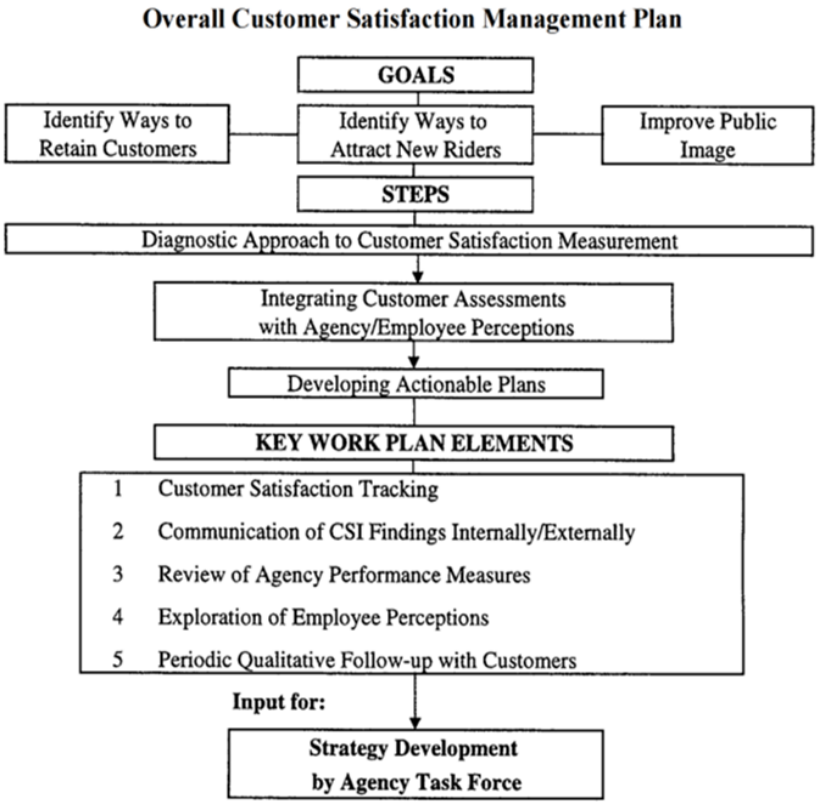

FIGURE 1
Customer satisfaction management plan
Source: Adapted from Mouwen (2020) and TRB (1999)

varies significantly across operators, routes, and urban contexts. QoS becomes a multidimensional construct capturing affordability, reliability, safety, comfort, accessibility, environmental sustainability, and user perception (Cervero & Golub, 2007; Behrens, McCormick, & Mfinanga, 2016). These dimensions interact in complex, sometimes conflicting ways, improving service frequency may increase reliability but cause congestion, while reducing fares enhances affordability but potentially compromises vehicle maintenance and operator income (Behrens et al., 2020). A unidimensional evaluation approach risks obscuring these trade-offs, underscoring the need for comprehensive and integrative frameworks, hence a transit performance measure as illustrated in **Figure 2**.

Nonetheless, the analysis of factors influencing passenger satisfaction seems to vary across

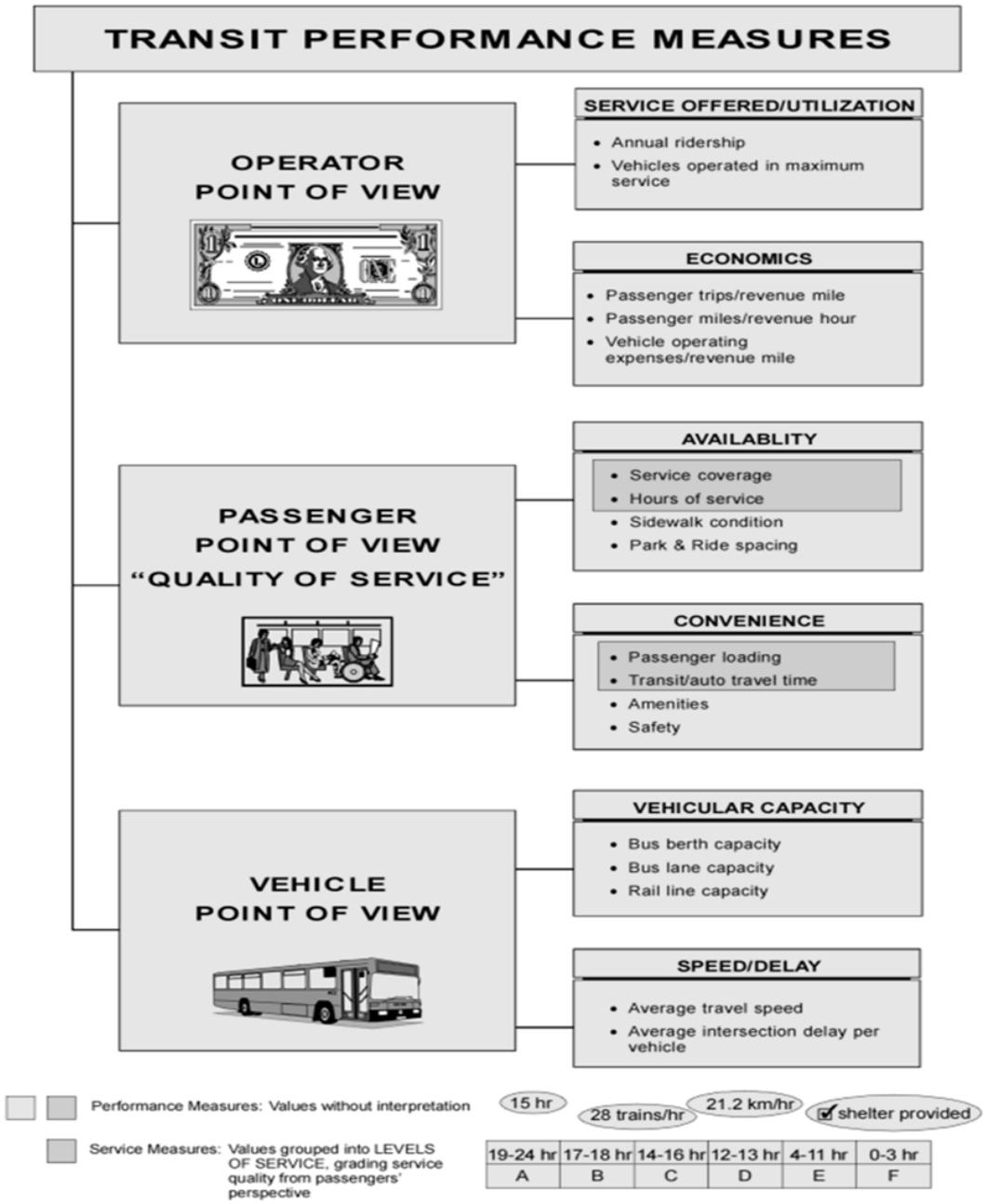

FIGURE 2
Transit performance measures
Source: TRC report 47

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different populations and countries, reflecting the diverse conditions of urban transport (Mouwen, 2020). Consequently, the interplay between overall quality satisfaction, specific service attributes, sociodemographic factors, and passenger experience may differ based on the particular state and context of the passenger. The Nairobi Metropolitan Area instance reveals a lack of comprehension regarding satisfaction levels and the correlation between overall satisfaction and pertinent aspects. Furthermore, comprehending the correlation between overall contentment and satisfaction with each service attribute is essential for devising effective strategies to enhance overall passenger satisfaction. The current literature has not comprehensively addressed this link (Eboli & Mazzulla, 2020). Moreover, despite the accumulation of gender discrepancies in travel behaviours, there is limited literature on gender differences regarding specific service attributes and their impact on bus passenger satisfaction (Laila et al., 2020).

This study intended to bridge the aforementioned knowledge gap:

i. To establish a multicriteria to evaluate the QoS of Informal Public Transport as perceived and experienced by passengers.
ii. To conduct QoS evaluation using the multicriteria established above, as perceived and experienced by passengers.
iii. To analyse the correlation among satisfaction level with overall quality and specific service attributes, and pertinent factors and examine its gender disparities.
iv. To disclose the satisfaction level with overall quality and specific service attributes of bus/ matatu services in the Nairobi Metropolitan Area and examine its gender disparities;

Quality of Service plays a crucial role in shaping passenger satisfaction and loyalty evidenced by various public transportation systems globally (Mouwen, 2020). Research indicates that service quality has a direct and significant impact on passenger satisfaction, with various studies demonstrating strong correlations between service attributes and overall satisfaction (Eboli & Mazzulla, 2020). Key areas for improving service quality include reducing waiting times, ensuring the availability of adequate facilities, and addressing concerns regarding accessibility and safety (Behrens et al., 2020).

RESEARCH METHODS

Study area

The survey was conducted at two strategically selected bus terminals in Nairobi that serve as critical nodes in the city's public transport network. The Bus Station terminus along Temple Road in the Central Business District (CBD) serves as the primary terminus for trips along main corridors, facilitating connectivity across the metropolitan area. Prestige Terminus, located on Ngong Road, functions as a principal terminus on this major trunk road, serving as a vital link between the city centre and western suburbs.

Sample and Methodology

A comprehensive questionnaire-based survey was conducted in February 2024 with 2,402 participants, ensuring statistical significance and representativeness of the diverse passenger population (Mouwen, 2020). Systematic sampling captured varied experiences across demographic segments and travel patterns.

Samples were collected over four-time intervals to ensure temporal representativeness (Ingvardson & Nielsen, 2020): weekday morning peak (6:00-9:00 am, N=750), weekday off-peak (9:00 am-5:00 pm, N=500), weekday evening peak (5:00-8:00 pm, N=750), and weekends (9:00 am-5:00 pm, N=402), capturing commuters, mid-day travelers, and leisure users.

Trained enumerators positioned at strategic terminal locations intercepted passengers using systematic random sampling techniques (every nth passenger) to ensure randomness while maintaining feasibility (Salon & Aligula, 2020; Klopp et al., 2020). Participants provided informed consent before completing the 10-15 minute survey, ensuring high response rates and data quality through question clarification opportunities.

Measurement

Passenger satisfaction comprised 15 elements based on EC-CEN Transportation framework, rescaled from 5-point to binary scales (CEN, 2002; Mouwen, 2020). Demographics included gender (binary) and age (three categories: <24, 25-34, >35 years). Vehicle type was categorized as 14-seater, 33-seater, and 50+ seater buses. Socioeconomic factors included employment status and

residential location. Passenger experience captured harassment incidents, boarding difficulties, and missed drop-offs using three-point frequency scales (Laila et al., 2020; Abdullah et al., 2022). Passenger satisfaction comprises 15 elements, including overall quality and 14 service aspects detailed in **Table 1**.

Data Analysis

The data analysis employed multiple statistical techniques to examine passenger satisfaction patterns and identify key determinants of service quality perceptions (Mouwen, 2020). Logistic regression was selected as the primary approach due to binary dependent variables and ability to provide interpretable odds ratios (Hosmer et al., 2013). One-way analysis of variance (ANOVA) tested differences across demographic groups. Gender disparities were examined using z-tests for population proportion differences. All analyses used $p<0.05$ significance levels (Agresti, 2018; Field, 2018).

To investigate relationships with overall satisfaction, both ordered logit and logistic regression analyses were applied (Salon & Aligula, 2020). While ordered logit analysis preserved the ordinal nature of 5-point satisfaction ratings, logistic regression was adopted as the primary approach due to easier coefficient interpretation (Long & Freese, 2014; Hosmer et al., 2013). Satisfaction variables were rescored into binary scales: very dissatisfied, dissatisfied, and neutral responses coded as [0], and satisfied and very satisfied responses coded as [1].

Gender disparities were examined using z-tests for population proportion differences (Agresti, 2018; Laila et al., 2020). Logistic regression calculated odds ratios with 95% confidence intervals to

TABLE 1
Passenger satisfaction items

Satisfaction Item	Question Description
Overall Quality	Overall quality of bus/matatu services in your route.
Frequency	Availability of bus/matatu services in terms of frequency and time for daily trips.
Service Coverage	Availability of bus/matatu services in terms of service coverage area (routes, destination) for daily trips.
Connectivity	Routes' connectivity for trips. (Time it takes to get another vehicle to connect from one route to the other route to complete a trip.)
Punctuality	Punctuality of bus/matatu services (operation).
Information	Information guidance such as destination, fare, departure time and travel time when taking bus/matatu services.
Fare	Bus/Matatu fare.
Conductors Behaviour	Behaviours of conductors in providing service to passengers on bus/matatu.
Vehicle Cleanliness	Overall cleanliness inside public bus/matatu vehicles.
Facility Cleanliness	Overall cleanliness at bus stop and terminus.
Comfort	Comfort level of rides on bus/matatu.
Driving Behaviour	Driving behaviour of matatu/bus drivers. (Recklessness)
Safety	Overall safety during trips on bus/matatu. (Road Traffic Safety)
Security inside Vehicle	Security inside vehicle in terms of crime, harassment and any unpleasant situations inside bus/matatu.
Security outside Vehicle	Security before getting into bus/matatu and after alighting from bus/matatu.

Source: Adapted from CEN (2002) and Mouwen (2020)

quantify associations between predictor variables and overall satisfaction (Field, 2018; Abdullah et al., 2022). Gender-stratified analyses examined differential impacts of service attributes between male and female passengers. All analyses used $p<0.05$ significance levels, with results presented as odds ratios, confidence intervals, and p-values for transparency and reproducibility.

RESULTS

Sample Attributes

Figure 3 illustrates that 41.5% of subjects were female, and 79% of respondents were aged between 18 and 34 years, while those under 17 constituted merely 0.9%. 77.4% of participants lived in Nairobi City County, while 10.7% and 8.3% resided in Kiambu and Kajiado Counties, respectively.

Adverse Experiences and Attitudes Regarding Public Bus Operations

According to the adverse experience **Figures 4** and **5,** 8.3% of participants reported experiencing harassment frequently or very frequently, while 24.0% and 19.1% of participants indicated

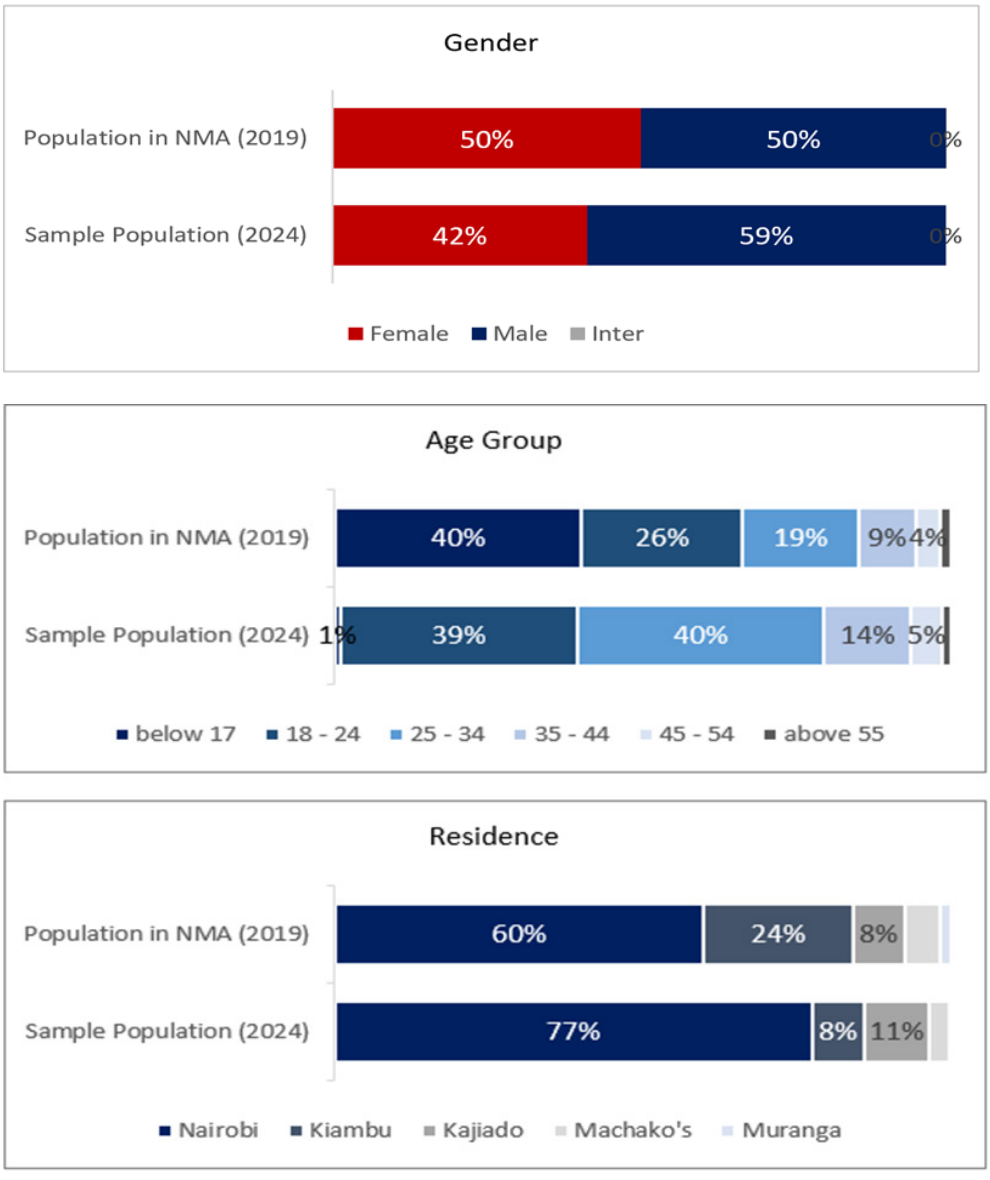

FIGURE 3
Characteristics of sample population (gender, age and residence)
Source: Authors' field survey (2025)

they frequently or very frequently encountered difficulties in entering and exiting a vehicle, respectively.

Passenger Satisfaction

Individuals who reported being pleased or extremely satisfied with the overall quality of bus/matatu service constituted 46.8%. According to certain service attributes, the highest satisfaction levels were observed in frequency, service coverage, and connectivity (**Figure 6**). Conversely, the lowest satisfaction levels were recorded for fare, facility cleanliness, and safety outside the vehicle.

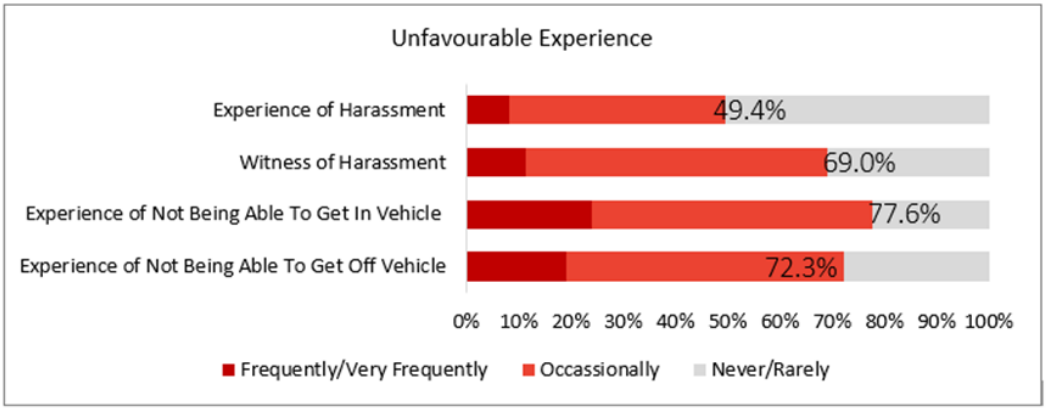

FIGURE 4
Unfavourable experience
Source: Authors' field survey (2025)

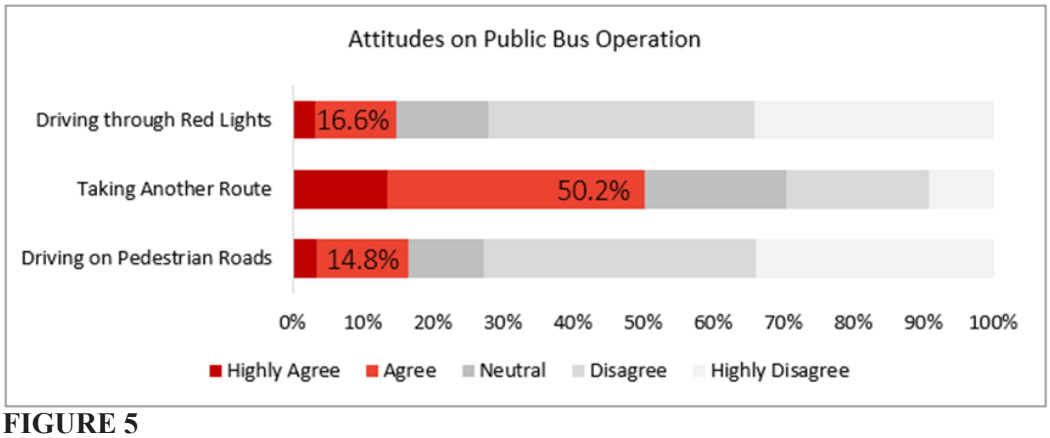

FIGURE 5
Attitudes on public bus operation
Source: Authors' field survey (2025)

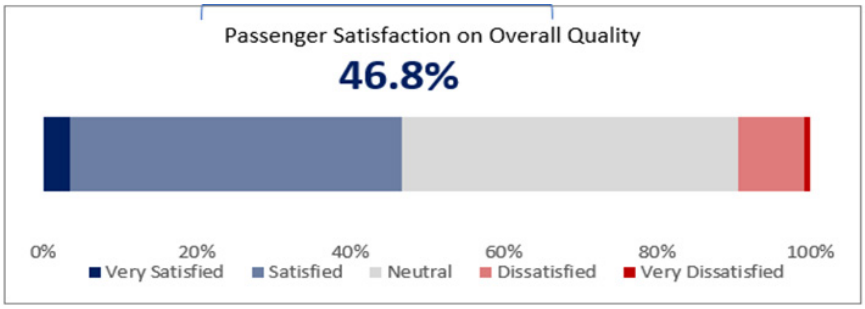

FIGURE 6
Passenger satisfaction on overall quality of service of matatu/bus
Source: Authors' analysis based on survey data (2025)

Correlation between Satisfaction Level with Overall Quality of Service Satisfaction and those with the 14 Service Attributes

The satisfaction level of 14 specific service attributes is shown in **Figure 7**. Satisfaction level of frequency, service coverage and connectivity were the top 3 items (73.6%, 68.2% and 59.7% respectively), and fare, facility cleanliness and safety outside vehicle were the worst 3 items (33.0%, 34.6% and 40.3% respectively). When looking at dissatisfaction, the dissatisfaction rates were the highest in facility cleanliness, fare and security outside vehicle (28.2%, 22.9%, 16.3% respectively).

Difference in 14 service attributes by Gender, Age Group, and Bus Type

Complementing the logistic regression analysis, one-way analysis of variance (ANOVA) was conducted to examine systematic differences in the 14 service attributes across gender, age groups, and vehicle types, providing deeper insights into passenger satisfaction heterogeneity across demographic segments. Statistical significance at the 5% level ($p < 0.05$) is denoted by asterisk notation (*), indicating that observed differences between groups for the respective service attributes are statistically meaningful and unlikely to have occurred by chance. This significance threshold ensures robust identification of genuine variations in passenger satisfaction across demographic and vehicle type categories, providing reliable evidence for targeted service improvement interventions.

Gender-Based Service Attribute Variations

Figure 8 shows ANOVA results, which revealed statistically significant gender disparities in two critical service dimensions: road safety and punctuality. Female passengers demonstrated significantly lower satisfaction levels compared to their male counterparts in both attributes, corroborating established literature on gender-differentiated transport experiences. These findings suggest that safety perceptions and reliability expectations constitute gender-sensitive service quality dimensions requiring targeted policy interventions to address differential user experiences in informal public transport systems.

Age-Stratified Satisfaction Patterns

Age-group analysis, as depicted with **Figure 9**, revealed significant satisfaction variations across 11 of the 14 service attributes, with frequency, punctuality, and information provision showing no statistically significant differences ($p > 0.05$). The satisfaction hierarchy demonstrated a clear inverse relationship with age: passengers above 35 years recorded the lowest satisfaction levels across multiple service dimensions, followed by the 25-34 age cohort, while passengers below 24 years exhibited the highest satisfaction ratings. This age-satisfaction gradient suggests that service

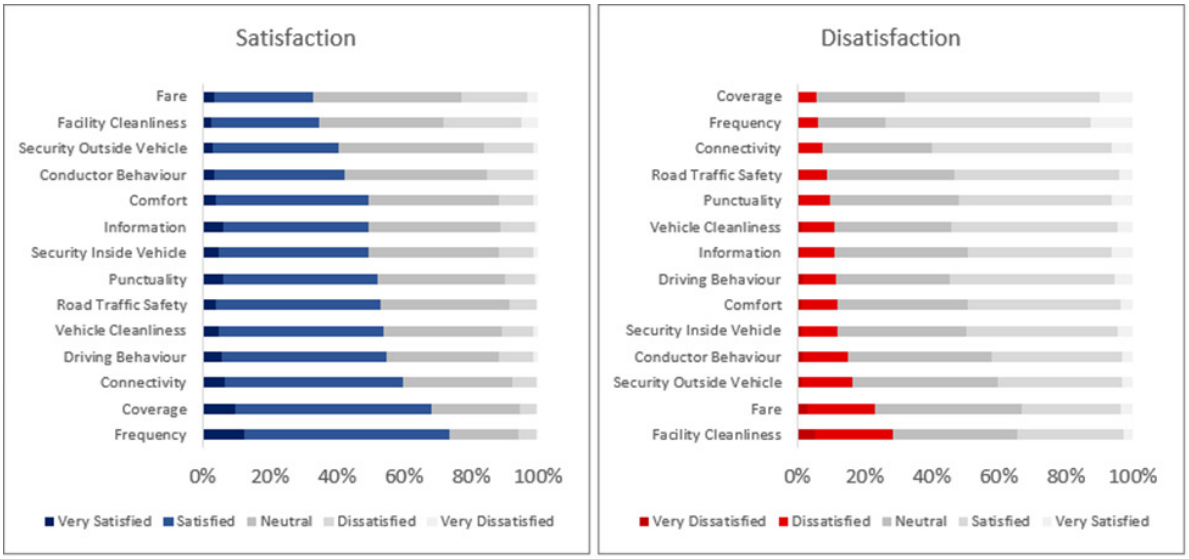

FIGURE 7
Passenger Satisfaction of the 14 service attributes (satisfaction and dissatisfaction)
Source: Authors' analysis based on survey data (2025)

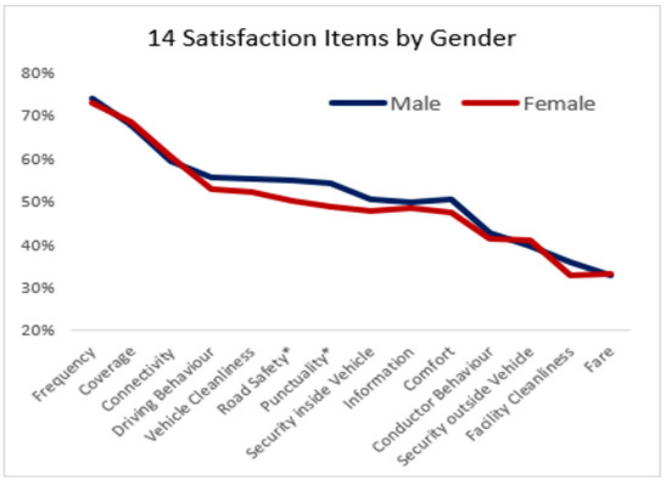

FIGURE 8
Gender-based service attribute
Source: Authors' analysis using ANOVA results (2025)

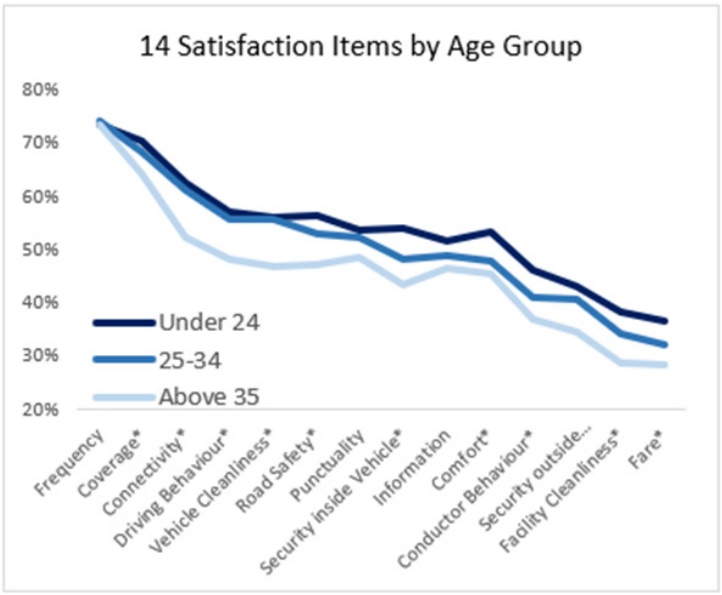

FIGURE 9
Age-group analysis
Source: Authors' analysis using ANOVA results (2025)

expectations and tolerance thresholds evolve with passenger maturity and transport experience, indicating the need for age-responsive service design considerations.

Vehicle Type Service Quality Differentiation

ANOVA analysis across vehicle categories revealed significant satisfaction differences in 12 of the 14 service attributes, with only coverage and fare showing non-significant variations ($p > 0.05$). **Figure 10**, shows the satisfaction hierarchy demonstrated clear vehicle-size effects: 33-seater buses achieved the highest passenger satisfaction levels, followed by 14-seater matatus, while 50+-seater buses recorded the lowest satisfaction scores across multiple service dimensions. This pattern suggests that medium-capacity vehicles optimize the balance between service accessibility, operational efficiency, and passenger comfort, while larger vehicles may suffer from overcrowding-related service quality degradation and reduced operational flexibility in dense urban environments.

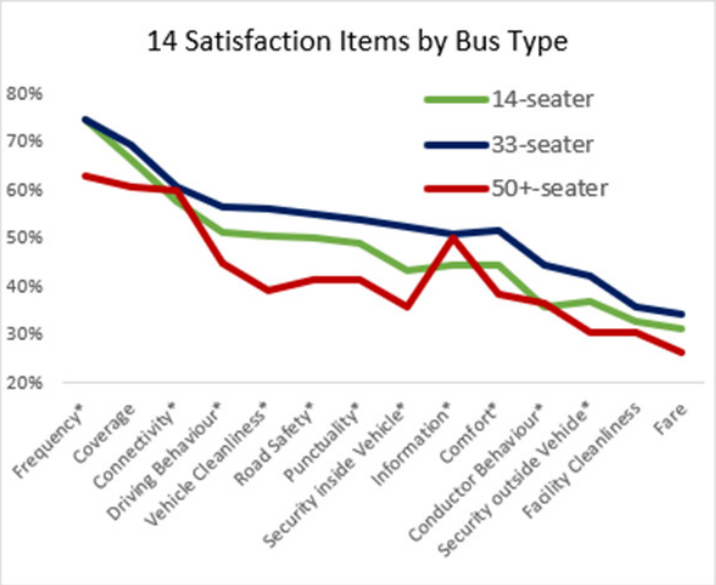

FIGURE 10
Analysis across vehicle categories
Source: Authors' analysis using ANOVA results (2025)

DISCUSSION

This study analysed the passenger satisfaction level with overall quality and the 14 service attributes of public bus and matatu services, the correlation between satisfaction level with overall quality and those with the 14 service attributes, and the correlation between satisfaction level with overall quality and pertinent factors with considering the gender disparities.

Essential Service Attributes Contributing to Overall Quality Satisfaction

The percentage of passengers satisfied with the overall quality was less than half. This level mirrored passenger satisfaction in similar economic level countries (Rahman et al., 2017) and significantly lagged behind that of developed countries (Public Transport Council, 2023; Transport Focus, 2023). The service features of efficiency, including frequency, coverage, and connectivity, had the three highest satisfaction ratings; however, satisfaction percentages for fare, facility cleanliness, security outside vehicle, conductor behaviour, comfort, security inside vehicle and information were below 50%. Particularly regarding the fare, past literature indicates that elevated fare levels may have resulted in diminished satisfaction levels. (Imam, 2014) Given its poor satisfaction rating and its importance to overall quality satisfaction, fare should be prioritized for improvement.

Essential Strategies for Enhancing Passenger Satisfaction Regarding Overall Quality

The analysis identified safety and security as the most critical determinants of overall passenger satisfaction, alongside service frequency, fare affordability, vehicle cleanliness, and passenger comfort, indicating that passengers prioritize both physical safety and service reliability when evaluating transport quality (Laila et al., 2020; Mouwen, 2020). The prominence of road safety reflects ongoing concerns about traffic accidents, reckless driving, and inadequate vehicle maintenance standards characterizing informal transport operations (Abdullah et al., 2022; Klopp et al., 2020).

Demographic factors significantly influenced satisfaction levels. Passengers aged 35 years and above showed lower satisfaction rates, suggesting higher service expectations or reduced tolerance for service disruptions (Salon & Aligula, 2020). Similarly, passengers using larger vehicles (over 50-seater buses) reported lower satisfaction, potentially due to overcrowding and longer boarding times. Most significantly, passengers experiencing harassment or forced boarding abandonment showed substantially lower overall satisfaction, underscoring the importance of

addressing operational inefficiencies and safety concerns (Abdullah et al., 2022).

These findings highlight three priority improvement areas aligned with contemporary best practices (Ingvardson & Nielsen, 2020). First, enhancing safety and security measures should be primary focus, including road safety improvements and harassment prevention through improved lighting, security personnel, and emergency communication systems (Mouwen, 2020). Second, operational improvements are essential, particularly ensuring adequate service frequency, maintaining affordable fares, and eliminating passenger abandonment practices (Salon & Aligula, 2020). Third, investments in vehicle quality and driver training are crucial for improving cleanliness, comfort, and driving standards, with targeted interventions required for different vehicle categories given observed satisfaction disparities across vehicle types (Klopp et al., 2020).

Gender Discrepancy in Passenger Satisfaction and Correlated Factors

No gender disparity was detected in overall passenger satisfaction, contrasting with international studies that found significant gender differences in public transport satisfaction (Abdullah et al., 2022). However, females exhibited lower satisfaction with road safety and punctuality than males, reflecting documented patterns where women express heightened safety concerns and reliability expectations (Laila et al., 2020).

The relationship between overall satisfaction and specific service attributes differed between genders, implying that perceived values of service attributes vary by gender (Mitullah et al., 2020). While road safety and security are critical for both genders, males prioritized frequency significantly more than females, suggesting men may emphasize service availability when evaluating transport quality (Salon & Aligula, 2020). This may reflect different travel patterns and time constraints, with male passengers potentially having less flexible schedules or greater work-related transport dependence.

Although gender disparity in security inside vehicles was not statistically significant, prior research indicates females are less likely to feel public buses are safe (Laila et al., 2020). Satisfaction with vehicle security correlated with overall quality among females, aligning with studies showing women's transport experiences are significantly shaped by personal security concerns and harassment (Abdullah et al., 2022).

Notably, no fare satisfaction disparity was identified, contrasting with existing literature showing females are less satisfied with transport fares due to income disparities (Abdullah et al., 2022). This unexpected finding may reflect Nairobi's specific economic context or sample demographic composition.

Harassment experiences significantly reduced satisfaction among females more than males, emphasizing the urgent need for comprehensive anti-harassment policies and enforcement mechanisms (Laila et al., 2020). The differential impact of conductor behavior on female satisfaction suggests staff training programs should emphasize respectful treatment and zero tolerance for discriminatory behavior (Mitullah et al., 2020). Recent research highlights the importance of gender-sensitive transport policies addressing women's safety concerns through improved lighting, enhanced security presence, and comprehensive harassment reporting mechanisms (Klopp et al., 2020).

CONCLUSION

This comprehensive multicriteria evaluation of informal public transport quality of service in the Nairobi Metropolitan Area reveals critical deficiencies that demand immediate policy intervention and systematic reform. With only 46.8% of passengers expressing satisfaction with overall service quality, the current system significantly underperforms compared to international standards, where developed transit systems achieve satisfaction rates of 80-92% (Public Transport Council, 2023; Transport Focus, 2023). This performance gap represents not merely a service delivery challenge, but a fundamental barrier to sustainable urban development and economic productivity in one of Africa's most important metropolitan regions.

The logistic regression analysis identified road safety and vehicle cleanliness as the strongest predictors of overall satisfaction, followed by security measures, service frequency, and fare

affordability. These findings provide quantitative evidence for prioritizing safety infrastructure investments and vehicle maintenance standards—interventions that align with global best practices in public transport quality enhancement (Cervero & Golub, 2007). The persistence of harassment experiences and passenger abandonment incidents represents systemic operational failures that disproportionately affect vulnerable populations and undermine the transport system's social equity objectives.

The gender-stratified analysis reveals significant disparities in service attribute importance, with female passengers demonstrating lower satisfaction with road safety. These findings corroborate international research demonstrating that transport systems often systematically disadvantage women through inadequate safety provisions and unreliable service delivery (Abdullah et al., 2022; Laila et al., 2020). The differential importance of conductor behavior for females and facility cleanliness for males indicates that gender-responsive service design is essential for achieving equitable mobility outcomes.

Despite these challenges, the relatively high satisfaction with network characteristics, frequency (73.6%), coverage (68.2%), and connectivity (59.7%), demonstrates that Nairobi's informal public transport system possesses fundamental structural advantages that provide a foundation for quality improvements. This finding suggests that the primary barriers to satisfaction lie in operational and safety domains rather than network design, indicating that targeted interventions in vehicle standards, driver training, and safety infrastructure could yield substantial improvements in overall system performance.

The policy implications are clear and urgent. First, regulatory frameworks must establish and enforce minimum standards for vehicle condition, driver behaviour, and passenger safety that address the identified satisfaction determinants. Second, gender-responsive transport planning must be institutionalized to address the documented disparities in service experience and safety perceptions. Third, systematic monitoring and evaluation mechanisms should be implemented to track progress against international benchmarks and ensure continuous improvement in service quality.

This study contributes to the growing body of evidence demonstrating that informal public transport systems, while providing essential mobility services in developing cities, require substantial quality improvements to support sustainable urban development goals. The multicriteria evaluation framework developed here provides a replicable methodology for assessing and monitoring transport service quality in similar contexts across the Global South. Future research should examine the cost-effectiveness of specific interventions and develop implementation strategies that balance quality improvements with affordability constraints in resource-limited environments.

The transformation of Nairobi's public transport system from its current state to one that meets international quality standards is not merely a technical challenge, it is an imperative for urban sustainability, economic competitiveness, and social equity. The evidence presented here provides the foundation for evidence-based policy reform that can serve as a model for other rapidly urbanizing cities across sub-Saharan Africa.

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Data Availability
The datasets generated and analysed during this study are available in accordance with the data

provision policy of the Nairobi Metropolitan Area Transport Authority (NaMATA). Access to research data may be requested through formal application to NaMATA, subject to institutional review and approval processes. Data sharing arrangements will comply with applicable privacy regulations, ethical guidelines, and institutional data governance frameworks established by NaMATA under the Ministry of Roads and Transport of the Republic of Kenya.

RECOMMENDATIONS

A safety-first approach should guide improvements in informal public transport. Drivers need proper training, rest hours, and regular vehicle inspections. Repairing blackspots along Ngong Road would reduce accidents. Because safety and cleanliness strongly affect satisfaction, all operators should meet set safety and hygiene targets. Those who comply should get licence renewal priority, while offenders face penalties.

Fare control should balance affordability and sustainability. High fares lower satisfaction, especially for low-income passengers. Authorities should create route-based pricing that reflects distance and demand. Discounts for students and frequent users would ease the cost burden. Fares should be reviewed transparently and linked to real service improvements so riders know what they are paying for.

Licensing and route planning need a demand-based system. Oversupply in some corridors and shortages in others cause inefficiency. Corridor plans should limit vehicle numbers, standardize stops, and promote mid-sized buses that offer comfort and reliability. Licence renewal should depend on meeting service frequency, coverage, and safety standards verified by regular audits.

Service reliability can improve with simple technology. Digital route boards showing fares and schedules would reduce confusion. Mobile and USSD updates can help passengers plan better and cut waiting times. Regular reviews of travel data can guide operators to adjust routes and timing more effectively.

Gender-sensitive transport design should be mandatory. Women in the study expressed lower satisfaction with safety and harassment issues. Anti-harassment codes, security staff at key stops, and better lighting will make travel safer. Conductors and drivers should be trained to treat passengers respectfully, with random checks to ensure compliance.

The multicriteria evaluation framework should be used for regular monitoring. Quarterly reports tracking safety, affordability, and comfort will improve transparency. Linking results to operator incentives will encourage compliance. Piloting this on Ngong Road before expanding to other routes can support gradual and lasting improvement in Nairobi's public transport.

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