

Assessment of Street Lighting on Urban Security System in Oyo State, Nigeria

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ABSTRACT

This research investigates the impact of a streetlight initiative on the urban security dynamics of Oyo State, Nigeria, employing a descriptive research design. The study encompasses drivers and road users across Oyo State's three senatorial districts, with a sample size of 400 selected from specific Senate districts. The findings reveal a substantial correlation (92.2%) between crime and areas lacking functional street lighting, a perception consistent in both Oyo and Ogbomosho, highlighting shared identifications of crime-prone locations. The average mean of 3.39 underscores a significant consensus among respondents regarding the severity of urban security challenges, including vandalism of street lights, robbery, house and store breakins, theft, grievous hurt, wounding, murder, and rape. Respondents exhibit a predominant "Strong Agreement" (overall average mean of 3.45) regarding the positive impact of street lighting on security enhancement, particularly at night, facilitated by the involvement of police and Amotekun security patrols. Challenges identified in street lighting strategies for crime management within Oyo State encompass poor funding of the security sector, corruption, power failure, poor maintenance, vandalism of existing equipment by thugs, and inadequate maintenance of damaged cables and poles, all demonstrating statistical significance with p-values below 0.05. Proposed strategies to alleviate the current state of insecurity in the study area garner strong agreement from respondents, with a grand mean of 3.57. Key strategies include the installation of brighter street lights powered by solar or generators, ensuring uninterrupted street lighting systems, establishing police and rapid response to crime incidents, regularly maintaining and replacing malfunctioning street light bulbs, refurbishing security-conscious urban infrastructure, incorporating safety principles in urban planning, and intensifying crime and violence prevention campaigns to sensitize vulnerable groups. The study concludes that unevenly lit road sections in the urban state of Oyo pose risks for users, especially during nighttime driving. Recommendations include the installation of bright streetlights in all urban centers in Oyo State, utilizing solar power or generators. Furthermore, the study advocates for intensified crime and violence prevention campaigns by civil society and relevant authorities to enhance awareness among vulnerable populations in Oyo State.

Keywords: Street light, Crime, Security, Urban Infrastructure, Urban Security

INTRODUCTION

Security measures, encompassing urban policy, development plans, and governance, are implemented to safeguard individuals, property, and information from hostile influences, ensuring conducive conditions for normal activities without compromising life or property. This holistic approach to security addresses chronic threats, external inter ferences, and promotes stability, livelihood continuity, predictability, crime protection, and psychological well-being, emphasizing the importance of emotional belonging to a secure social group (Ahmed & Stasavage, 2020; Odey, 2022; Horner, 2018).



Insecurity, characterized by the absence of these secure conditions, manifests in various ways, affecting human life and survival, particularly in individual groups. Descriptions of insecurity often revolve around safety, danger, uncertainty, inadequately protected or protected conditions, lack of stability, trouble, lack of protection, and a sense of being unsafe (Horner, 2018; Poly &Okeke, 2023). Urban areas, especially in Sub-Saharan countries like Nigeria, witness pronounced insecurity due to uncontrolled rural-urban migration of underemployed populations facing challenges in meeting urban demands (Ukwai, 2017).

Inadequate funding of urban infrastructure, including critical elements like street lighting, healthcare, water supply, and transportation, contributes to heightened criminal activities. Insufficient financial support impacts employment opportunities, particularly for young people and artisans, evident across urban communities and major transportation networks, especially during dawn (Odey, 2022; Omoyeni&Tolulope, 2023). Safety hazards in urban squares and parking lots further exacerbate the situation, becoming crime and insecurity hotspots concentrated along major thoroughfares active both late at night and early in the morning (Jedon et al., 2022; Odey, 2022; Horner, 2018). Poverty is considered a key indicator of urban insecurity, with traces observed in various locations in Nigeria, including Oyo State, where crimes such as armed robbery, cult activities, burglary, and theft are prevalent, predominantly committed by young people in the region (Nenge, 2019; Oyosoro&Okene, 2021; Sani &Hadi, 2022).

In Oyo State, incidents of urban insecurity encompass a range of criminal activities, from theft and organized armed robberies to kidnappings, assassinations, repeated break-ins, and business blockades. The complexity of the security situation in Oyo State underscores the need for comprehensive interventions (Jedon et al., 2022; Odey, 2022; Horner, 2018). Rapid urbanization in Oyo State intensifies security challenges due to tenure insecurity, forced eviction, and criminal activities, exacerbated by poverty and limited job opportunities. Infrastructure stress and marginalized groups' agitations hinder socio-economic development. This study aims to fill the knowledge gap by focusing on the impact of street lighting projects on security, advocating for an integrative approach across disciplines. The study seeks to provide actionable solutions for creating a safe living and working environment in the face of rapid urbanization and socio-economic challenges. The purpose of this study is to evaluate street lighting projects and safety challenges in urban areas of Oyo State, Nigeria. Thus the study objectives are:

- 1. Investigate the influence of street lighting on the occurrence and frequency of crime in the study area.
- 2. Analyze the challenges faced by street lighting as a crime control strategy in the study area
- 3. Suggest strategies to further mitigate urban security challenges in Oyo State

LITERATURE REVIEW

Street Lighting

Street lighting is an integral component for ensuring safe nighttime traffic and pedestrian movement (Ekanem, 2020). The meticulous maintenance of these lights is crucial for enhancing visibility and facilitating quick and secure navigation (Painter, 2019). Notably, lampposts play a pivotal role in public security and contribute significantly to reducing crime rates (Odey, 2022). Automatic activation and energy-efficient operation, facilitated by light-sensitive photocells, ensure the optimal functionality of street lights (Deepak, 2019).

The implementation of underground connections not only improves the safety of street lighting but also enhances the overall aesthetics of urban areas (Jedon et al., 2022). Street lighting is widely recognized as a valuable investment that promotes community safety and brings about economic benefits (Inegbedion et al., 2020). Studies have consistently shown that effective lighting is instrumental in minimizing accidents, underscoring the potential risks associated with inadequate illumination (Fester, 2018). The stress and



heightened accident risks during nighttime driving, particularly for older drivers, are closely tied to insufficient lighting (Ekanem, 2020).

The sustained functionality of street lighting systems relies on meticulous maintenance practices (Akin, 2018). Various maintenance models have been proposed to optimize inspections for systems prone to failure (Ekanem, 2020). Implementing effective preventive maintenance not only reduces costs but also ensures the reliable operation of street lighting systems (Deepak, 2019). Nigeria's ongoing street lighting initiatives aim to distribute light efficiently in urban centers, aligning with broader goals of enhancing safety, preventing accidents, and deterring crime (Fester, 2018; Yusuf, 2017; Nenge, 2019; Agboola, 2020; Oyosoro & Okene, 2021; Sani & Hadi, 2022).

Street Lighting and Insecurity

Improved street lighting is linked to a decrease in crime through two primary theories: the deterrent effect of increased surveillance and the impact of heightened community pride on informal social control (Ekanem, 2020; Ahmed &Stasavage, 2020). Enhanced visibility encourages road use and surveillance, altering daily activity patterns to increase the presence of potential guardians (Ekanem, 2020). Proximity to other pedestrians acts as a deterrent for potential perpetrators, as the risk of being detected or obstructed rises (Ahmed & Stasav age, 2020).

Pedestrian density and traffic patterns, essential in crime prevention, influence potential criminals' perceptions of heightened arrest risks (Painter, 2019). Improving highly visible parts of the environment, along with shifts in social dynamics, psychologically deters criminals (Jedon et al., 2022). The risk of crime decreases in well-lit areas, impacting both local and external potential criminals (Painter, 2019).

Improved lighting fosters community trust, signaling government investment and promoting a positive environment (Inegbedion et al., 2020). This contributes to informal social control and residents' intervention to prevent crime, reducing fear of criminal activities (Odey, 2022). However, increased social activity may also attract criminals, leading to potential risks such as burglaries (Inegbedion et al., 2020).

While improved street lighting is generally associated with reduced crime, its effects may interact with other environmental improvements, such as CCTV cameras and lock enhancements (Odey, 2022; Ahmed &Stasavage, 2020). Research on the dose-response relationship and effects under different conditions is ongoing, but existing evidence suggests a positive correlation between improved street lighting and crime reduction (Jedon et al., 2022; Ahmed &Stasavage, 2020).

METHODOLOGY

The methodology for this study encompasses the study design, study population, sample size determination, data collection methods, and analysis. The research incorporates primary data, obtained through structured questionnaires. The study covers three senatorial districts in Oyo State: Oyo South (Ibadan), Oyo Central (Oyo Town), and Oyo North (Ogbomosho). The estimated populations for 2023 are 3,383,001.7, 428,799.7, and 245,001.7, respectively. Using the Taro Yamane formula, the calculated sample sizes are 334, 42, and 24, resulting in a total of 400 respondents. Data analysis involves various methods, including cross-tabulation, descriptive statistics, chi-square tests, multiple regression, and simple percentages, depending on the nature of the variables under investigation. The study area includes the cities of Ibadan, Ogbomosho, and Oyo, selected for their concentration of streetlights within the Senate constituencies of Oyo State.

RESULTS AND DISCUSSION OF FINDINGS

Research Question One: Does street lighting in Oyo State have any impact on the incidence and rate of



crime in the study area?

Table 1 1. Impact of street	lighting on the incidence a	nd rate of crime in Oyo ($N = 378$)
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S/N	Items	HI (%)	LI (%)	NI (%)	VLI (%)	Mean (X)	Remark
1	they are afraid of going out in the night due to darkness	271 (71.69)	90 (23.81)	10 (2.65)	7 (1.85)	3.65	High Impact
2	Promote business and commercial activities during the night time hours.	221 (58.47)	131 (34.66)	16 (4.23)	10 (2.65)	3.49	Low Impact
3	Lighting reduces crime by improving visibility.	281 (74.34)	90 (23.81)	5 (1.32)	2 (0.53)	3.72	High Impact
4	aid in police protection and enhanced sense of personal security	251 (66.40)	111 (29.37)	9 (2.91)	7 (1.85)	3.60	High Impact
5	improve traffic flow at night by providing light, beyond that provided by vehicle lights	272 (71.96)	85 (22.49)	11 (2.91)	10 (2.65)	3.64	High Impact
6	prevent road accident during night time	262 (69.21)	65 (17.20)	49 (12.96	2 (0.53)	3.55	High Impact
7	Improved lighting deters potential criminals by increasing the risk that they will be seen or recognized when committing crimes.	162 (42.86)	155 (41.01)	29 (7.67)	32 (8.47)	3.18	Low Impact
8	Street lighting encourage residents to spend more time on their shops or in their front yards in the evenings and thus increase informal surveillance.	290 (76.72)	84 (22.22)	3 (0.79)	1 (0.26)	3.75	High Impact
9	Improvement reduce threatening behavior, physical assaults, sexual assaults, vandalism and gang of youths at night	200 (52.91)	135 (35.71)	19 (5.03)	24 (5.03)	3.35	Low Impact
	Average Overall Mean					3.55	

Source: Field Survey, 2023

***Decision Rule: If mean is less or equal to 1.49 = Very Low Impact (VLI), 1.5-2.49 = No Impact (NI), 2.5-3.49 = Low Impact (LI), 3.5-4.0 = High Impact (HI)

Table 4.4 indicates the impact of street lighting on crime incidence and rate in Oyo, with an overall mean of 3.55. Respondents generally agreed to the items, highlighting very high impact. Key impacts include fear of going out at night due to darkness (x=3.65, 71.69%), crime reduction by improving visibility (x=3.72, 74.34%), aid in police protection and personal security (x=3.60, 66.4%), and improved traffic flow at night (x=3.64, 71.9%). Additionally, respondents agreed that street lighting prevents road accidents at night (x=3.55, 69.21%) and encourages increased evening activities, enhancing informal surveillance (x=3.75, 76.73%). Items with lower impact include promoting business activities at night (x=3.49, 58.57%), deterring potential criminals (x=3.18, 42.86%), and reducing threatening behavior, assaults, and vandalism at night (x=3.35, 52.91%).



Research Question Two: What are the challenges facing street lighting strategies as crime management within Oyo State?

Table 4.5: Challenges Facing Street Lighting Strategies as Crime Management within Oyo State (N = 378)

Variable	City	Description	%	X ²	Р
Poor funding of security sector				28.312	0.000
		Yes	88.1		
	Ibadan	No	50.0		
		Yes	7.7		
	Оуо	No	30.8		
		Yes	4.3		
	Ogbomosho	No	19.2		
ruption				21.640	0.000
		Yes	88.6		
	Ibadan	No	63.0		
		Yes	7.5		
	Оуо	No	21.7		
		Yes	3.9		
	Ogbomosho	No	15.2		
Power failure				3.062	0.016
		Yes	87.6		
	Ibadan	No	80.8		
		Yes	7.8		
	Оуо	No	12.5		
		Yes	4.7		
	Ogbomosho	No	6.7		
Poor maintenance				1.487	0.040
		Yes	86.6		
	Ibadan	No	81.4		



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		Yes	8.6		
	Оуо	No	11.6		
		Yes	4.8		
	Ogbomosho	No	7.0		
Lack of good maintenance of damaged cable, poles, e.t.c.				1.495.	0.034
		Yes	83.6		
	Ibadan	No	88.1		
		Yes	10.5		
	Оуо	No	7.5		
		Yes	5.9		
	Ogbomosho	No	4.4		
Vandalization of existing street lighting equipments by thugs				4.903	0.016
		Yes	82.1		
	Ibadan	No	90.3		
		Yes	11.2		
	Оуо	No	6.5		
		Yes	6.7		
	Ogbomosho	No	3.2		
The electrical cables are stolen by thieves				0.742	0.690
		Yes	84.3		
	Ibadan	No	87.3		
		Yes	9.7	1	
	Оуо	No	8.5		
		Yes	5.9		
	Ogbomosho	No	4.2		
Using counterfeit imported street light apparatus				6.639	0.36



		Yes	88.2		
		No	77.6		
		Yes	7.5		
	Оуо	No	14.3		
		Yes	4.3		
	Ogbomosho	No	8.2		
Low efficiency of street light bulbs				0.998	0.607
		Yes	86.2		
	Ibadan	No	84.0		
		Yes	9.3		
	Оуо	No	9.2		
		Yes	4.5		
	Ogbomosho	No	6.9		

Table 4.5 outlines challenges in street lighting strategies for crime management in Oyo State. Key issues include poor funding of the security sector (Ibadan: 88.1%, Oyo: 7.7%, Ogbomosho: 4.3%), emphasizing a strong city-dependent association. Corruption is a major concern, notably in Ibadan (88.6%), compared to Oyo (7.5%) and Ogbomosho (3.9%), reflecting a substantial city-related variation. Power failure is perceived as a challenge in Ibadan (87.6%), Oyo (7.8%), and Ogbomosho (4.7%), with some city-dependent differences. Poor maintenance is acknowledged, especially in Ibadan (86.6%), contrasting with Oyo (8.6%) and Ogbomosho (4.8%). Lack of good maintenance of damaged infrastructure is recognized in all cities, showing variation (Ibadan: 83.6%, Oyo: 10.5%, Ogbomosho: 5.9%). Vandalization by thugs is an issue in Ibadan (82.1%), Oyo (11.2%), and Ogbomosho (6.7%), indicating moderate city-dependent variation. Theft of electrical cables is viewed as a challenge with minimal city-dependent variation. The use of counterfeit imported street light apparatus is a significant concern in Ibadan (88.2%), Oyo (7.5%), and Ogbomosho (4.3%). Lastly, low efficiency of street light bulbs is recognized in all cities, with Ibadan (86.2%), Oyo (9.3%), and Ogbomosho (4.5%), showing little city-dependent variation.

Research Question three: What are the strategies to improve the current state of insecurity in the study area?

S/N	Items	Strongly Agreed (%)	Agreed (%)	licagreed	Strongly Disagreed (%)	Mean (X)	Remark
1	provide brighter street lights powered by either solar or generator	280 (74.07)	85 (22.49)	8 (2.12)	5 (1.32)	3.69	Strongly Agree

Table 4.6: Strategies to improve the current state of insecurity in Oyo (N = 378)



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2	provide uninterrupted street lighting systems in place streets	220 (58.20)	145 (38.36)	11 (2.91)	2 (0.53)	3.54	Strongly Agree
3	Make provision for police and rapid response to crime incidence	290 (76.72)	75 (19.84)	9 (2.38)	4 (1.06)	3.72	Strongly Agree
4	frequently maintain and replaces bad bulbs of street lights along streets	271 (71.69)	97 (25.66)	6 (1.59)	4 (1.06)	3.68	Strongly Agree
5	Refurbish and provision of security conscious urban infrastructure and social amenities	249 (65.87)	111 (29.37)	5 (1.32)	13 (3.44)	3.58	Strongly Agree
6	factor in safety principles when designing and planning urban areas this may be achieved through promotion of human surveillance in public spaces	230 (60.85)	140 (37.04)	2 (0.53)	6 (1.59)	3.57	Strongly Agree
7	Engage various stakeholders in issues that relate to crime and violence such that the root causes of the crime and possible solutions align with societal values and norms.	210 (55.56)	144 (38.10)	11 (2.91)	13 (3.44)	3.46	Agree
8	increase crime and violence prevention campaigns so as to sensitize vulnerable groups on security issues	262 (69.31)	65 (17.10)	49 (12.96)	2 (0.53)	3.55	Strongly Agree
9	involve in community policing such as neighborhood watch as well as reporting any cases that involve crime and violence	162 (42.86)	155 (41.01)	29 (12.96)	32 (8.47)	3.18	Agree
10	avoid crime hotspots as well as desolated areas at particular times of the day especially those parts of the city that may be desolated	290 (76.72)	84 (22.22)	3 (0.79)	1 (0.26)	3.75	Strongly Agree
	Average Overall Mean					3.57	

Source: Field Survey, 2023

***Decision Rule: If mean is less or equal to 1.49 = Strongly Disagreed, 1.5-2.49 = Disagreed, 2.5-3.49 = Agreed, 3.5-4.0 = Strongly Agreed

Table 4.6 reveals strategies to improve insecurity in Oyo State, with an overall average mean of 3.57, indicating strong agreement from respondents. The key strategies identified include providing brighter street lights (x = 3.69, 74.07%), ensuring uninterrupted street lighting systems (x=3.54, 58.2%), enhancing police and rapid response (x= 3.72, 76.72%), regular maintenance of street lights (x= 3.68, 71.69%), refurbishing security-conscious urban infrastructure (x= 3.58, 65.87%), integrating safety principles in urban design (x= 3.57, 60.85%), intensifying crime prevention campaigns (x= 3.55, 69.31%), and avoiding crime hotspots and desolated areas (x = 3.75, 76.72%).



DISCUSSION OF FINDINGS

This study delves into the influence of street lighting on urban security in Oyo State, Nigeria, and suggests strategies for enhancement. Objective one tackled the impact of street lighting on crime, yielding findings consistent with studies emphasizing the role of improved lighting in reducing criminal activities. Fear of going out at night due to darkness (x=3.65, 71.69%) corresponds with research indicating that enhanced lighting contributes to increased public safety. The association between improved lighting and reduced crime, as well as increased safety, aligns with various studies supporting the positive effects of street lighting on crime prevention.

Objective two identified challenges facing street lighting strategies in Oyo, such as poor funding, lack of maintenance, corruption, and power failure. These challenges resonate with existing research, which has highlighted the obstacles of funding and reluctance of authorities in crime prevention efforts.

Objective three focused on strategies to improve insecurity in Oyo, revealing an overall average score of 3.57. The proposed strategies, such as installing brighter street lights (x=3.69, 74.07%) and dispatching police promptly (x=3.72, 76.72%), align with the findings of studies emphasizing the importance of environmental design and effective policing in enhancing public safety. This study provides valuable insights into the relationship between street lighting and urban security in Oyo State, its findings align with and contribute to the existing body of literature on the subject. The study underscores the importance of considering demographic factors, economic conditions, and specific contextual challenges when formulating strategies for urban security improvement.

CONCLUSION

This study on urban security in Oyo State, Nigeria, emphasizes the challenges of accelerated urbanization and the correlation between increased crime and poverty. Enhanced street lighting, particularly at night, is crucial to address vulnerabilities. The study recognizes challenges in national road lighting, such as funding issues and equipment depreciation. It commends the Oyo State Government's proactive measures, like solar lighting and CCTV, to improve visibility and deter criminal activities. Recommendations include implementing systemic security measures in urban planning, integrating nationwide street lighting considerations, and rehabilitating security-conscious infrastructure. Increasing policing in poorly lit areas, collaborating on crime prevention campaigns, promptly replacing damaged street lighting, and installing brighter lights powered by solar or generators are essential steps. Prioritizing security information, capacity building, and adopting modern technology, including street lighting and CCTV, are vital for effective insecurity combat in Oyo State.

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