

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

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Certification

This thesis entitled “**Assessment of Street Lighting on Urban Security System in Oyo State, Nigeria**” was carried out by **Adesina Yakubu OYELAMI** with Matric No.**LCU/PG/002184** in the Department of Urban and Regional Planning, Faculty of Environmental Design and Management, Lead City University, Ibadan, Oyo State under my supervision and that this work has not been previously submitted.

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Dedication

This project is dedicated to God who has eternal mercy on me. I also dedicated this thesis to my parents.

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Acknowledgement

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Abstract

The prevailing security situation in Oyo State remains a pressing concern, with many expressing dissatisfaction with the government's efforts to address the issue effectively. However, the provision and maintenance of streetlights could play a significant role in mitigating these challenges. Thus, this study investigates the impact of a streetlight initiative on the urban security dynamics of Oyo State, Nigeria. The study adopted a descriptive research design. It elicits information from residents, road users (commercial drivers and passengers) and park managers across selected routes with street lighting in Oyo State. A sample size of 400 respondents was selected randomly. Three major cities (Oyo, Ogbomosho, and Ibadan) in Oyo state were selected using purposive sampling to collect data. Data analysis employed descriptive and mean, with a mean score of 2.5 used as a decision threshold. A strong correlation (92.2%) was found between crime and areas lacking functional street lighting, consistent in both Oyo and Ogbomosho. The average mean of 3.39 highlights a significant consensus on the severity of urban security challenges. Respondents strongly agreed (mean of 3.45) on the positive impact of street lighting on security, particularly at night. Challenges identified include poor funding, corruption, power failures, vandalism, and inadequate maintenance. Proposed strategies to alleviate insecurity include installing brighter streetlights, ensuring uninterrupted lighting, establishing police patrols, regularly maintaining streetlights, refurbishing urban infrastructure, incorporating safety principles in urban planning, and intensifying crime prevention campaigns. 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 centres 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

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Chapter One

Introduction

1.1 Background to the Study

Security is the situation created by establishing measures [urban policy, comprehensive development plan and governance to protect people, information and property from hostile people, influences and actions^{1, 2, 3}. It is the existence of conditions (urban and environmental design, infrastructure development, and employment opportunities) under which members of a society can carry on their normal daily activities without endangering life or property^{2, 3}. Security also includes all measures (urban policy, comprehensive development plan and governance) aimed at protecting citizens and individuals, organizations, businesses and national resources from sabotage and violence^{2, 5, 6}. You need security from chronic threats and protection from haul interferences⁴. Security is stability and livelihood continuity (a steady and stable income)², predictability of everyday life (knowing what will happen)³, protection from crime (a sense of security)⁴, and freedom from psychological harm (safety or protection from emotional stress). It stems from the belief and knowledge that one is wanted, accepted, loved and protected by one's community, neighborhood and surroundings. It focuses on the emotional and psychological sense of belonging to a social group that can offer protection^{2, 4}.

The non-existence of those conditions is called insecurity. There are many ways in which insecurity affects human life and survival. This concept has therefore been described in a variety of ways, particularly in relation to its impact on individual groups^{1, 3, 4}, explanation for insecurity is the need for safety, danger; uncertainty; unsure; doubtful; inadequately protected or protected, lack of stability, in trouble, lack of protection and unsafe^{3, 4, 5}. On the other hand, insecurity is particularly pronounced in urban areas, especially in Sub-Saharan countries such as Nigeria^{3, 6}. This is due to uncontrolled rural-urban migration of population

that are underemployed and are unable to meet urban challenges^{4, 5, 7}. As a result, it is virtually impossible for them to make ends meet, and they must resort to all manner of legal and illegal means to earn a living. On the one hand, the economy imposes varying degrees of needs and anxieties on marginalized and neglected young people in most urban areas, but these needs are primarily targeted by women, children, elderly and young people.

The surge in criminal activities can be attributed to the insufficient funding of urban infrastructure and services, including street lighting, healthcare facilities, water supply projects, transportation, and communication, with electricity being a significant factor. This shortfall in funding has resulted in a lack of employment opportunities for many young people and artisans. The challenges of these inadequacies are evident in all areas of urban communities and along major transportation networks, especially during the dawn of the day^{9,12 14}.

It is discouraging that there are many safety hazards in urban squares and parking lots^{3, 9, 11}. Some of these crime and insecurity hotspots tend to be major thoroughfares where multiple criminals are concentrated and are active both late at night and early in the morning^{9, 12, 14}. Poverty is believed to be one of the indicators of urban insecurity. Traces of poverty and crime can be seen in many places in Nigeria, especially in parking lots and on the streets of Oyo State. Crimes such as armed robbery, cult activity, burglary and theft are common in Oyo state and are mostly committed by young people in the region^{21,22,23}. Urban crime is mostly committed by people living in extreme poverty due to unemployment, low living standards and high levels of illiteracy. Given the level of poverty and insecurity in Nigeria, it is surprising that few studies have documented the link between her two social phenomena in Nigeria. It is common to designate parts of Nigeria's urban areas as high-crime or high-risk areas, Ibadan in Oyo State, Ikorodu in Lagos, Ikwere in Rivers State, Warri in Delta State, etc.

From this context, it is clear that some areas have characteristics that promote or increase crime and violence^{22,23,24}.

In Oyo state, incidents of urban insecurity range from theft, organized armed robberies, kidnappings and ransom demands, assassinations, repeated break-ins and business blockades. Due to this, the security situation in Oyo state is complicated^{5, 8, 9}. Business investments, entire business organizations, or parts of their operations, production, marketing, finances, and human resources have been severely impacted, rendering investment efforts statewide ineffective^{2, 9, 10}. Poverty, food insecurity and malnutrition are evident from urban to rural areas^{10, 11}. The introduction of street lighting along city roads in Oyo state is an additional step by the state government to curb complex urban unrest. Their efforts are bearing fruit, according to the report, with evidence of a decline in crime rates and nighttime traffic accidents. Improved lighting was introduced because better lighting would increase the visibility of the crime scene. Therefore, the risk of being found at a crime scene has forced many criminals to abandon their deviant behavior^{11, 12}. Therefore, the purpose of this study is to examine the efficiency of street lighting projects as a panacea for urban safety in Oyo State's agenda.

1.2 Statement of Problem

The security situation thus, challenged by increased urban population and its attending problems; these problems which are perpetrated in urban areas include, tenure insecurity, forced eviction, youth violence and juvenile delinquency, thuggery, stealing, molestations, ritual killing, kidnapping, armed robbery and burglary.

These problems are further exacerbated by existing pervasive poverty and under employment, over stress of existing infrastructure and aggravated agitations from the marginalized [children, youth, elderly, and women].

The burgeoning urban population, coupled with existing socio-economic challenges, has strained security measures and infrastructure, contributing to a surge in criminal activities. Pervasive poverty and limited employment opportunities act as catalysts for criminal behavior, further intensifying the security crisis. The implications of this situation are profound, affecting the safety of life and property, as well as hindering overall socio-economic development. This supported the view of some researchers that life and property security are threatened by rapid urban growth^{15, 24}.

Prior research underscores the detrimental effects of rapid urbanization on security in developing countries, including Nigeria^{16,17,19}. However, a comprehensive understanding of the intricate interplay between urban growth, infrastructure stress, and security is lacking. The current gap in knowledge necessitates a focused examination of the specific challenges faced by Oyo State, with an emphasis on the inadequacies in street lighting projects as a potential contributing factor. Moreover, the security situation in Oyo state appears, or remains, to be insurmountable; with many claiming that the government at all levels is not doing enough to address the situation head-on and decisively. Others argue that the situation is getting worse^{19,21}. Political background or inclination aimed at serving the interests of a particular political deity who is dissatisfied and angry with domestic political manifestations.

However, the above discussion reveals the political character and emotional component of the argument. These equally important but competing considerations require a balanced approach. Turning off or dimming public lighting affects different sectors of society with conflicting interests, so it's important to address the complexities. Implementing these interventions requires an integrative approach involving different disciplines such as economics, criminology, urban studies, engineering and psychology. This study seeks to unravel the complexities surrounding urban security in Oyo State, Nigeria, caused by rapid urbanization and socio-economic challenges. By focusing on street lighting projects and their

impact on security, with the ultimate goal of provide actionable solutions that promote a safe living, working, and survival environment in the study area. The purpose of this study is to evaluate street lighting projects and safety challenges in urban areas of Oyo State, Nigeria.

1.3 Aim and Objectives of the Study

1.3.1 Aim of the Study

The aim of this study is to investigate the impact of street lighting on urban security systems in Oyo State, Nigeria, and to propose strategies to promote a safe environment for living, working and survival in the study area.

1.3.2 Objectives of the Study

The objectives of this study are suggested as follow to;

- i. Evaluate socio-economic characteristics of Oyo State residents and commercial drivers/parking managers
- ii. Examine the type and nature of urban security challenges in the study area
- iii. Evaluate the effectiveness of current initiatives aimed at addressing urban insecurity in the study area.
- iv. Investigate the influence of street lighting on the occurrence and frequency of crime in the study area.
- v. Analyze the challenges faced by street lighting as a crime control strategy in the study area
- vi. Suggest strategies to further mitigate urban security challenges in Oyo State

1.4 Research Questions

- i. What are the socio-economic characteristics of residents, commercial drivers and park managers in Oyo State, Nigeria?
- ii. What are the types and nature of urban security challenges in the study area?
- iii. What are the existing efforts put in place by the government to strengthen the security system in the study area?
- iv. Does street lighting in Oyo State have any impact on the incidence and rate of crime in the study area
- v. What are the challenges facing street lighting strategies as crime management within Oyo State?
- vi. What are the strategies to improve the current state of insecurity in the study area?

1.5 Significance of the Study

The purpose of the study is to investigate the impact of street lighting on urban security systems in Oyo State, Nigeria, in order to propose strategies that will promote a safe environment for living, working and survival in Oyo State, Nigeria. The study therefore investigates the effect of street lighting on the frequency and incidence of crime along major roads with street light electrification in the study area. It also analyzes the challenges facing street lighting as a crime-fighting strategy in the study area. This research work suggested to have great benefits for the general public, academia and policymakers. It brought to fore how street lighting project have enhanced community security and safety, encourage small scale enterprises through increased service rendering time and reduction of fear of uncertainty among residents and road users. It also encourage and aids state security agency response times to publicly reported incidents, thereby reducing potential service delivery of state and community security agencies criminal attacks on urban roads in Oyo State.

The reason for focusing on the evaluation of street lighting in the city security system of Oyo State, Nigeria. More than half of all crimes in Nigeria occur outdoors at night. Therefore, some of these crimes could be prevented by improving street lighting. Similarly, improved lighting is a direct means of improving visibility and surveillance. Adequate lighting can change the physical characteristics of the built environment and reduce the fear of crime and accidents after dark.

The results of this study will enable the Oyo state government to formulate and implement a modern crime prevention policy and develop policies that can address the challenges affecting street lighting systems on the streets. This makes neighborhoods safer and improves public safety. Therefore, improve the provision of services that can participate in the 24-hour economy. Increased public confidence in the Oyo state government's services to her three Senate constituencies. This study will add to our knowledge in this area and will serve as a reference for researchers and educators wishing to conduct research in areas related to this field.

1.6 Scope of the Study

This study is concerned with the evaluation of the effects of street lighting project on urban security system in Oyo State, Nigeria. It therefore focused on residents, road users and commercial drivers/park managers from three districts of the Oyo State Senate. The study was carried out in selected major roads with street light project in Ibadan metropolis, Oyo, Ogbomoso, in the state. It focused on residents (household heads), road users (passengers and pedestrians) commercial drivers/parking managers in the study area.

1.7 Study Area

This Study was carried out in Oyo, Ogbomoso and Ibadan. Short description of the area are discussed below.

1.7.1 Oyo Town

Oyo Town is one of the oldest towns in Nigeria, with a history dating back to at least the 11th century. It was once the capital of the powerful Oyo Empire, which ruled over much of what is now southwestern Nigeria for over 500 years. The town was founded by the Yoruba people, and it remains a major cultural and religious center for the Yoruba people today. The population of Oyo Town is estimated to be around 500,000 people, making it one of the largest towns in Oyo State. The majority of the population is Yoruba, although there are also significant minorities of Hausa, Igbo, and other ethnic groups. Oyo Town is located in the south-central part of Oyo State, Nigeria. It is bordered by the towns of Ogbomoso to the north, Ibadan to the south, and Iseyin to the east. The traditional ruler of Oyo Town is the Alaafin of Oyo. The Alaafin holds a position of great reverence, with a significant impact on the cultural and religious aspects of the community. The most recent Alaafin of Oyo was Oba Lamidi Olayiwola Adeyemi III, and the succession to this role is currently pending. The study area of Oyo Town is a broad term that can refer to any aspect of the town, including its history, culture, economy, or environment. However, some of the most common topics of study in Oyo Town include: The history of the Oyo Empire and its impact on the region, The Yoruba culture and traditions of Oyo Town, The economic development of Oyo Town in recent years, The environmental challenges facing Oyo Town, such as urbanization and pollution. Oyo Town is a fascinating and diverse town with a rich history and culture. It is a popular destination for tourists and scholars alike¹⁶.

1.7.2 Ogbomoso

Similarly, Ogbomoso is in the Oyo North Senatorial constituency, founded in the mid-17th century. As of the 2006 census, the population was approximately 245,000. The majority of the populations are Yoruba and prominent farmers. Located in the Yoruba land

Plateau (366 meters above sea level), in the savannah and farmlands, at the intersection of Oyo, Ilorin, Oshogbo and Ikoyi roads. Founded in the mid-17th century, it was a small outpost of the Yoruba Oyo Empire until the beginning of the Muslim Fulani conquest of Oyo in the early 19th century. After Ibadan's victory over the Fulani at Oshogbo, 32 miles (51 km) southeast in 1840, the city transferred allegiance from Oyo to Ibadan. Oyo ilorin Street is the city's main street.

Economically, Ogbomosho combines about 257 villages and prosperous towns around it under Soun's rule. Agriculture is their most important economic force. Cashew nut plantations are spread all over the country. In addition, mango plantations are spread over a wide area. Ogbomosho was once the largest cassava grower in the world. People in this country also trade and raise livestock such as goats and sheep. Ogbomosho also has a very famous veterinary hospital for livestock vaccinations. In terms of cityscape, Ogbomosho is connected by roads to major cities such as Ilorin, Osogbo and Ibadan. One of the prominent landmarks is the Central Mosque of Oja igbo, which towers above the remains of traditionally walled houses and ancient walls. Other notable landmarks include Ogbomosho Recreational Club, Oladoke Akintola Institute of Technology, Lautech College of Health Sciences, Nigerian Baptist Theological Seminary, Bowen University Teaching Hospital, LAUTECH Teaching Hospital, Heroes Arcade, and Thorne Stadium. Ogbomosho also has a mosque, several churches, real estate and commercial establishments scattered throughout the city. The Ogbomosho Recreation Club has conference rooms, an indoor gym, and a golf course. The Nigerian American Baptist Church has its headquarters and seminary in the city. The nearest airport to Ogbomosho is Ilorin Airport, about 52 kilometers away. Additionally, Oyo City is an ancient city located in Oyo State, Nigeria. It belongs to the Central Senate constituency of Oyo. Founded in the 1830s as the remnant capital of the historic Oyo Empire, it is known locally as "New Oyo" (Òyó Àtìbà) to distinguish it from

"Old Oyo" (Ọ̀yọ́), the former capital of the north abandoned as a result of the Yoruba War of Independence. Most of the inhabitants are Yoruba and their ruler is Alaafin of Oyo¹⁹. Politically, the Oyo Empire developed a sophisticated political structure for managing its territory. Scientists have not determined how long the structure existed before the Nupe invasion. After returning from exile in the early 17th century, the Oyo took on a distinctly more belligerent character. The influence of aggressive Yoruba culture is evident in the standards set for Obas (kings) and their council roles. Alaafin of Oyo was the lord of the people, but his power was not out of control. A Yoruba global cult known as Oyo Mesi and Ogboni held back Oba's power. Oyo Mesi spoke for politicians, but Ogboni spoke for the people and relied on the power of religion. Oyo Alaafin's power over Oyo Mesi and Ogboni depended on his personal character and political acumen. in the meantime¹⁹.

1.7.3 Ibadan

With a total population of 3,649,000 (as of 2021), more than 6 million people live in the metropolitan area, making it the third largest city in Nigeria after Lagos and Kano. Geographically, it is the largest city in the country. At the time of Nigeria's independence in 1960, Ibadan was the largest and most populous city in Nigeria and her second largest city in Africa after Cairo. Ibadan is located in southwestern Nigeria, 128 km (80 mi) inland northeast of Lagos and 530 km (330 mi) southwest of the federal capital Abuja¹⁷. It is an important transit point between the country's coastal and inland regions. Ibadan has been the administrative center of the Old West region since the early days of British colonial rule, and some of the city's old walls still stand. The city's main inhabitants are Yoruba, as well as various communities from other parts of the country (particularly Ibo, Hausa and Efiq)¹⁷.

Ibadan City is a major transportation hub in Nigeria with highways Lagos in the southwest, Ijebu Ode and Shagamu in the south, Abeokuta in the west, Oyo, Ogbomosho, Ofa, Ilorin, Ife, As Ekiti and Osogbo in the north is connected to Ilesha, Akure, Okene, Auchi, and other

eastern cities. The town is an important terminus of the main railway line connecting Lagos and Kano in the north of the country. Almost all major roads are two-lane roads. These roads include the Ojoo- Sango-Mokola Road, which runs in front of the University of Ibadan, the Ring Road-Orita-Challenge-New-Garage-Ways, and the recently completed Dugbe- Erelu - Jericho Road. There are various roundabouts, intersections and overpasses in the city, most recently the Mokola Overpass was built to alleviate the ongoing congestion on the city's Mokola Axis. Transportation generally includes taxis and cabs called *Micra*¹⁷. The maps of the three major cities used for this study were in appendix III.

1.8 Operational Definition of Terms

Street: In the context of this topic, the term "street" refers to a public road or thoroughfare typically lined with buildings and designed for vehicular and pedestrian traffic.

Street lighting: Street lighting refers to the illumination provided by artificial lighting fixtures installed along streets and roads. It includes the lamps, poles, and other fixtures used to provide visibility during nighttime hours.

Urban: Urban refers to areas characterized by high population density, extensive human-built infrastructure, and typically associated with cities or towns.

System: In the context of this topic, a system refers to a collection of interconnected components working together to achieve a common goal. In this case, it refers to the various elements and processes involved in urban security, including street lighting infrastructure, law enforcement, surveillance systems, and community engagement.

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Chapter Two

Literature Review

2.1 Conceptual Review

The literatures relevant to this study were reviewed under the following subsections; Street lighting, Causal link between street lighting and crime, Unemployment and urban security, Advantages and disadvantages of street lighting, Types of street lighting, Maintenance of street lights, Ways in which lighting could reduce crime and fear, Climate change and urban security, Demographic change and urban security.

2.1.1 Street Lightening

Good visibility under night conditions is one of the fundamental requirements enabling motorists to move on roadways in a safe and coordinated manner during the nighttime hours. Properly designed and maintained street lighting will produce quick, accurate, and comfortable visibility at night, which will safeguard, facilitate, and encourage both vehicular and pedestrian traffic. Street lighting is concerned with the selection and location of lighting equipment to provide improved visibility and increased safety while making the most efficient use of energy with minimum expenditure. A street light, light pole, lamppost, street lamp, light standard, or lamp standard is a raised source of light on the edge of a road or path. Similar lights may be found on a railway platform. When urban electric power distribution became ubiquitous in developed countries in the 20th century, lights for urban streets followed, or sometimes led².

Many lamps have light-sensitive photocells that activate the lamp automatically when needed, at times when there is little-to-no ambient light, such as at dusk, dawn, or at the onset of dark weather conditions. This function in older lighting systems could be performed with the aid of a solar dial. Many street light systems are being connected underground instead of wiring from one utility post to another. Street lights are an important source of public security

lighting intended to reduce crime². Street lightings are like other infrastructural facilities such as urban roads, water and gas supply to homes, telecommunication networks, electricity generation/distribution with respect to how they are managed by specialists. Street light or bulb is a post generally placed at the edge or center of a road or street or at the park or other places where there is need for public lighting. A well designed and installed street lighting system is a valuable investment because it enhances safety and security of the environment for road users at night; it can also provide social and economic benefits to the community². Lighting installation must create an unbroken and uniformly clear visibility as road users move along the road and a precise perception of people and objects within the lit areas in order to minimize night-time vehicular and/or pedestrian accidents. In the presence of street lighting, accident may occur as a result of recklessness. Studies show that night driving is more stressful to older drivers than younger ones³.

It is easy to infer that the presence of failed street light will produce same effect. The accident studies in Finland, showed that darkness predisposes younger drivers to more accidents, compared to when they are driving in the day time⁴. The outcome attributed the increase in accident partly to darkness and partly to increased blood alcohol. It was expected that the situation of driving under the conditions when street lights have failed to also predispose younger people to more accidents, it is not possible to state by how much. The Photometric goals of Street and roadway lighting are often summarized in standards and recommended practices, among which the most common are ANSI/IES American National Standard Practice for Roadway Lighting, RP-08-00(IESNA 2000); BSI Road lighting. Performance requirements, BS EN 13201-2:2003 (BSI 2003); and CIE Lighting of Roads for Motor and Pedestrian Traffic, (CIE-115-2010, CIE 2010).

A system not maintained correctly will sooner or later cease to perform its required function, leading to loss of quality. Maintenance is the work undertaken in order to keep, restore or improve every facility, i.e. every part of the system, its services and surroundings has to maintain the usefulness and value of facilities by meeting currently accepted standards⁵. This is achieved through business plans, facilities, equipment, inventory and staff. Various maintenance models have been proposed to address the problem of finding optimal inspection guidelines for failure-prone systems⁶. Maintaining a complex system like street lighting can be difficult, but it's more economical than having the system or infrastructure fail completely without maintenance. Employing an effective preventive maintenance culture for your system can significantly reduce the cost of early or overdue maintenance, while accurate maintenance actions keep your equipment running continuously and reliably⁴. Like any infrastructure, street lighting works well when first installed, but fails during operation and requires maintenance to maintain a high quality of service. Proper maintenance of infrastructure facilities can maintain some of the quality of desired effects of these systems, thus increasing their economic and structural value. In Nigeria, the government has introduced street lighting in many cities in Oyo state such as Ibadan, Oyo and Ogbomoso. This system was modeled to reflect the distribution of light on the road.

Street lighting improvements are intended to be used for many purposes, including crime prevention. Street lighting improvements are often not implemented for the explicit purpose of crime prevention, with pedestrian safety and road safety considered to be the more important goals, but to deter lurking criminals. The idea of lighting the streets may be simplistic, but prevention City centers, residential areas and other places frequented by criminals and potential victims are believed to have high crime rates⁷. Mainly he describes two perspectives on how better street lighting can prevent crime.

2.1.2 Advantages of Street Lightening

The main benefits of street lights are accident prevention and increased safety. Studies have shown that many accidents and fatalities, especially involving pedestrians, occur in the dark. Pedestrians are 3 to 6.75 times more likely to die in the dark than in the daytime. Decades ago, when car accidents were much more common, we found that street lights reduced pedestrian accidents by about 50%. Additionally, in the 1970s, illuminated intersections and interchanges tended to have fewer accidents than unlit intersections and interchanges. Lighting also reduces crime: A 2019 study suggests that good lighting reduces crime at night by 36 percent¹¹. Cities and towns take advantage of the unique position of street lamps to display decorative and commemorative banners. Many communities in the United States use streetlights as a way to raise money through streetlight banner sponsorship programs. The program was originally developed by a US-based streetlight post banner manufacturer¹².

2.1.3 Disadvantages of Street Lightening

A major criticism of street lighting is that improper use can actually cause accidents and cause light pollution.

Health and Safety

There are two optical phenomena that need to be recognized in street light installations. The loss of night vision because of the accommodation reflex of drivers' eyes is the greatest danger. As drivers emerge from an unlighted area into a pool of light from a street light their pupils quickly constrict to adjust to the brighter light, but as they leave the pool of light the dilation of their pupils to adjust to the dimmer light is much slower, so they are driving with impaired vision. As a person gets older the eye's recovery speed gets slower,

so driving time and distance under impaired vision increases. Oncoming headlights are more visible against a black background than a grey one. The contrast creates greater awareness of the oncoming vehicle. Stray voltage is also a concern in many cities. Stray voltage can accidentally electrify lampposts and has the potential to injure or kill anyone who comes into contact with the post¹³. There are also physical dangers to the posts of street lamps other than children climbing them for recreational purposes. Street light stanchions (lampposts) pose a collision risk to motorists and pedestrians, particularly those affected by poor eyesight or under the influence of alcohol. This can be reduced by designing them to break away when hit (known as frangible, collapsible, or passively safe supports), protecting them by guardrails, or marking the lower portions to increase their visibility. High winds or accumulated metal fatigue also occasionally topple street lights.

Light Pollution

Astronomy:

Light pollution can obscure stars and affect astronomy. Low-pressure sodium lamps can be used in environments near astronomical telescopes and observatories. Low-pressure sodium lamps have a lower monochromatic light intensity, which gives these lamps an advantage over other lamps such as mercury and metal halide lamps. Observatories can filter out sodium wave lengths from observations, virtually eliminating interference from nearby city lights. Turning off street lights completely reduces the amount of light reaching the sky, reduces light pollution, and increases light efficiency. Also, there are some urban areas that high pressure sodium lamp need to be used due to the high rate of crime around that area but because of astronomical telescopes and observations low- pressure sodium lamp will be used in order to carry out astronomy operations and this may increase accident and crime rate in an astronomy area.

Ecosystems: Streetlights can impact biodiversity and ecosystems for instance, disrupting the migration of some nocturnally migrating bird species⁶¹. In the Netherlands, Philips found that birds can get disoriented. Alternative lighting has been developed that emits only the green and blue wavelengths of the visible spectrum, corresponding to the red wavelengths of street lighting. The ramp was installed in a small test on the island of Ameland. If successful, the technology could be used on ships and offshore installations to prevent birds from being lured out to sea at night. Bats can be adversely affected by street lighting. There is evidence that red light is the least harmful. For this reason, red LED street lights have been installed in some areas to minimize nuisance to bats. A study published in Science Advances reported that street lighting in southern England had a negative impact on local insect populations¹⁵.

As this same development can also be used on the roadside especially, there are some area that bat species usually cause accident when a bird (birds) collides with the screen and the driver may loss it control and it will result in to an accident and after the accident, instead of helping the victim, they will be stealing their properties inside the vehicle.

Energy Consumption

As of 2017, 70% of all electricity in the world is generated by burning fossil fuels that cause air pollution and greenhouse gases, and around 300 million streetlights worldwide use this electricity²¹. There is also Cities are looking to use energy more efficiently, reducing street lighting power consumption by dimming lights during off-peak hours or switching to high-efficiency LED bulbs. Many communities use partial night lighting systems to turn off the lights during the quiet hours of the night. This is typically from midnight to 5pm.

2.1.4 Objectives of Street Lighting

1. Improve nighttime traffic flow by providing light beyond vehicle lighting
2. It helps drivers to orient themselves, distinguish between road geometry and obstacles, and determine their relationship with other drivers.
3. Support law enforcement protection and personal security.
4. Promotion of night business and use of public facilities, business commercial and the use of public facilities during the nighttime hours.

2.1.5 Different Types of Streetlights

Metal Halide Lamp (MH)

Metal halide is a type of HID (High Intensity Discharge) lamp. It works when an electric arc passes through a gas mixture, producing light in the process. MH is produced by combining halogens and metals. Gas mixtures typically contain mercury, xenon, or argon, and various metal halides. Additionally, the type of metal halide used helps determine the color temperature of the emitted light.

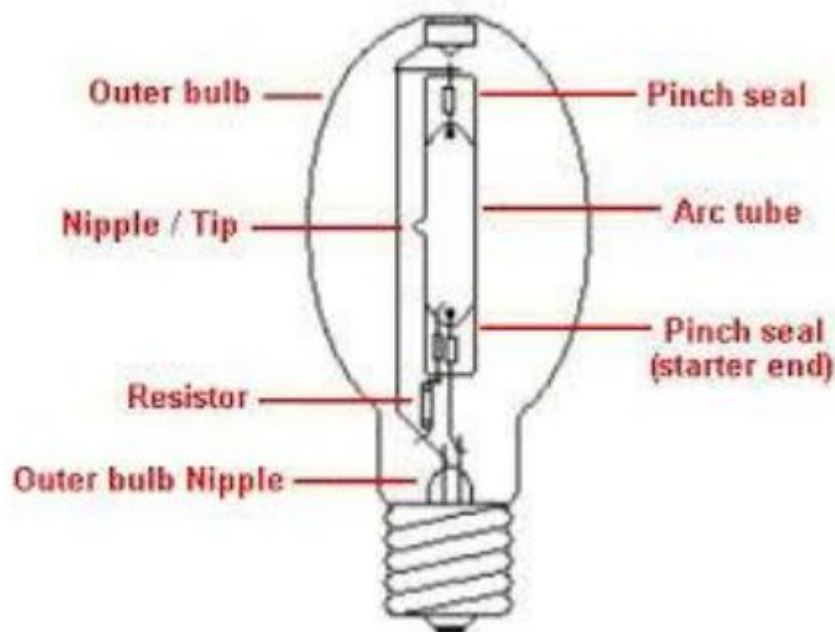


Figure 2.1: Structure of Metal Halide lamp

Figure 1 shows that the MH has two sections, the outer bulb and the inner arc tube. When the MH lamp is turned off, mercury and metal halides remain dormant and condense inside the arc tube. There are two electrodes at each end of the arc tube. When a voltage is applied to the MH lamp, current starts from one electrode and flows to the next electrode. This heats up the mercury, evaporating it and actually increasing the current. Now things are heating up and metal halides are becoming gaseous. The metal halide atoms start moving away from the arc, producing white light¹⁶. The whole process is complicated. Metal halide lamps require materials that can withstand this. Some lamps have a phosphor coating on the outer envelope to facilitate this. Metal halides have advantages and disadvantages¹⁷. Here are the pros:

For the pros

- I. Longer lamp life. Generally, Metal Halide lamps will last about 10 times longer than traditional incandescent bulbs, usually lasting for between 15,000-20,000 hours.
- II. Lot of colors which is MH lamps produce a much whiter, more "natural" light to begin with. However, with the ability to use different metal halides, MH lamps are able to come in a wide variety of colors and temperatures.
- III. Energy efficiency, when compared to incandescent and other older lighting technologies, MH lamps use less energy and have a higher luminous efficacy

For the Cons:

- IV. Warm up time, Metal Halide lamp operate need time to emit light. It require a warm up period.
- V. Cool down period. If lamp cuts out for whatever reason the lamp turn of and require a period before restart again.

High Pressure Sodium Lamp (HPS)

The most efficient member of the HID family is High-Pressure Sodium lamps where some degree of color rendition is important. Standard HPS lamp produces a golden white light

when they reach full brightness. Many recognize them as the familiar golden light from street lights, one of their principal applications¹⁷.



Figure 2.2: High Pressure Sodium Street Lights

HPS lamp operating wattage varies from nominal power depending on ballast, supply voltage, lamp voltage and luminaire design. When planning your HPS installation, it is important to consider these variables, as lamp lumen output varies with wattage. High Pressure Sodium is designed to start at ambient temperatures below -40°F . Once the arc is established, it will heat up to maximum wattage and light output at any temperature. From an efficiency point of view, outdoor high ceilings and tall pole mounting lighting systems can be very cumbersome and costly to maintain. HPS lamps have a lamp life of 24,000 hours, reducing lamp replacement frequency and lowering maintenance costs¹⁸.

High pressure sodium lamps have the following advantages:

1. The most efficient product in the HID light family, 7 times more efficient than incandescent bulbs and more than 2 times more efficient than mercury vapor
2. Warm-up time is 3-4 minutes, slightly faster than mercury and metal halide lamps.
3. Long lamp life up to 24,000 hours.

Disadvantages of high pressure sodium lamps:

1. The light produced is golden white and may not be suitable for certain applications.

2. Ballast is required.
3. After starting, it may take 5-10 minutes to reach full light output. It also requires a cool down of at least 1 minute before attacking again.

Low Pressure Sodium Lamp (LPS)

The most efficient commercial light source with up to 183 lumens per watt is the low pressure sodium (LPS) lamp. Due to its low color rendering properties, it is used only in very limited applications. The light output of LPS lamps is yellow monochromatic. This means that reds, blues, and other colors illuminated by an LPS light source will all appear as shades of gray. The lamp sizes range from 35 Watts to 180 Watts. A ballast specifically designed for LPS must be used. The range of fixtures that can use linear lamps or U-tube is limited. The LPS starts in ambient temperatures as low as -40°F and heats to maximum wattage and light output at any temperature.



Figure 2.3: Low Pressure Sodium Lamps

The main application areas for LPS lamps are both on the road and outdoors. Common applications for LPS lighting include parking lots and garages, car and rail tunnels, and street lighting. Indoor applications such as warehouses are practical when color is not an issue¹⁹.

The advantages of LPS lamps are:

1. The most energy efficient light source on the market, efficacy is 100-185 lumens per watt.
2. Average life expectancy is approximately 14,000-18,000 hours with excellent lumen maintenance.
3. Provides excellent uniformity of light distribution across all HID lamps

Disadvantages of LPS lamps are:

1. Most expensive lamp
2. Longest run time to maximum light output.
3. Wattage increases over the life of the lamp to maintain luminous efficiency (Apogee Interactive, 2020).

Light-Emitting Diode Lamps

A light emitting diode (LED) lamp is a semiconductor device that emits visible light when an electric current is passed through it, this light is not particularly bright, but in most LEDs it is monochromatic and occurs at a single wavelength. Advantages of LED lamp:

1. Lower consumption of energy
2. Has predictable and long life
3. LED colors is more accurate

According to a study, the downside of LED bulbs is that they are expensive to install and purchase, which discourages many municipalities from switching to LED bulbs. And some people just don't like the vibe they exude. Because LEDs produce directional light, it is not possible to create a spherical glow that radiates in all directions^{19,20}.

Phosphor-Converted Amber Lamp (PCA)

According to another study Phosphor converted amber is another type of LED Street light that has been used in the last few years. These featured streetlights convert blue light from phosphors into green, yellow, amber and red light. Amber is a warm shade between

yellow and orange on the color wheel and has better paint consumption compared to high pressure sodium^{20,21}. The reason is that there is almost no blue light that can sustain the night sky. The effectiveness of PCA LED is in the range of 30 to 40 lm/watts while the Color Rendering Index (CRI) was 59 which is a good light, with the use of Phosphor-Converted amber that is able to make less attracted from the insects compared to white lights.

Advantages:

1. The light pollution can be reduced.
2. Amber's LED works efficiently and is affordable rather than white light.
3. Safety is used to avoid an accident happening due to veiling luminance and disability glare.

2.1.6 Maintenance of Street Lights

Street lighting systems require ongoing maintenance and can be classified as reactive and preventive. Corrective maintenance is a direct response to problems such as lighting failures. For example, replacing a discharge lamp if it fails, or replacing the entire lighting unit after being hit by a vehicle. Preventive maintenance is the planned replacement of lighting components. For example, replace all discharge lamps in your neighborhood when they reach 85% of their expected life. In the UK, the Road Liaison Group has published a code of practice recommending specific reactive and preventive maintenance procedures²⁰. Street light maintenance is a routine activity that occurs as a seamless process, often unnoticed by the general public. In general, luminaires are always designed for a service life of 25 years. After that, it may be necessary to replace it with a new one. Over the past five years, PFI street lighting contracts have grown in popularity as a way for local governments to replace aging lighting assets. Extending the replacement intervals of light poles requires the use of aluminum or stainless steel units, while LED street lighting lasts approximately 50 years, helping reduce carbon footprint and capital replacement budgets²⁰.

Lanterns

Street lighting fixtures should be cleaned regularly, industry practice recommends that the clean the lantern bowl and the entire housing unit every three to four years. Regular cleaning ensures that your lighting unit is performing at its best and that your lantern complies with the British Standard lighting class for which it was originally installed.

Lamp

In general, there are two main strategies for replacing discharge lamps.

1. Burns until extinguished and replaced when the lamp fails completely
2. A lamp replacement program to replace street lights (lamps) in a specified area within a specified period

Please note that burning the lamp completely extinguished will extend its life, however, it is impossible to say exactly how long a lamp will last between failures, and street lighting units are unlikely to fail at the same time. As the luminous efficacy of discharge street lights decreases over their lifetime, the introduction of the 'burn-to-burn' policy may result in street lighting installations not complying with the UK standard (BS 5489)22. 3.

Test

Street lighting inventory testing should be performed by experienced lighting maintenance personnel to test, identify and investigate problems specific to lighting installations. All equipment used to test streetlight cables, utility poles, and networks in general must be calibrated and suitable for the task at hand.

Pillar of Light

Street light poles are generally made of steel and can fail suddenly. As part of the general maintenance work for lighting systems, regular structural inspections should be performed. A visual inspection should be carried out once a year and structural inspections should be carried out periodically. There are many structural testing companies (known how to properly inspect and main street lights can help keep community safe and well-lit. By being vigilant about checking for visible damage and also by inspecting electrical components, workers can ensure that the lights and pillar that hold the lights remain in good working condition. that can choose to perform physical or non-destructive type tests. This activity should be programmed separately from other planned and periodic maintenance programs²³.

2.1.7 Importance of Street Lightening

Whether it's for illuminating your surroundings or for safety reasons, it's always important to have quality street lights installed. Not to mention that without proper streetlights, finding your way in the dark becomes nearly impossible. We all know how dangerous it can be to drive at night without proper street lighting examples of risk to be facing at nights are shorter days, fatigue, compromised night vision, rush hour and impaired drivers. Diminished lighting can cause collisions at night. Poor visibility and lack of street lighting caused many deaths at night. According to annual traffic accident statistics worldwide, about 1.3 million people die in road accidents every year, which equates to about 3,287 deaths per day. These statistics are alarming in nature and it is very important to have durable, quality street lights²⁴. Undoubtedly, good street lighting not only reduces the number of accidents on the road, but also helps people with poor eyesight. These are people who have difficulty leaving their

homes at night. Solar city LED street lighting is one such solution he has. The solar LED light is equipped with a rechargeable battery and powered by a photovoltaic panel. These photovoltaic panels charge batteries during the day and power LED bulbs at night to provide optimal lighting. Too much light can also cause problems. Lighting can be adjusted individually, reducing the risk of accidents. However, before doing so, it is always important to analyze the location and typical traffic conditions. Solar LEDs are inexpensive and designed to turn on and off automatically depending on light conditions. Sensors built into the lights help analyze the light conditions of the light source. These solar lights can stay on all night and can be extended for multiple nights if needed. It can withstand strong winds. With solar LEDs, the risk of overheating is also very low. The light source is the sun, not electricity. Solar LEDs have no operating costs.

Solar LED street lights help you do your housework smoothly even at night. The lights are easy to maintain and very effective. Street lights can also cause fatalities and property damage and should not be ignored. High-quality street lights not only ensure urban safety, but also have a great impact on our living standards. There are many activities that contribute to creating vibrant, safe and sustainable spaces in cities. Lighting is part of public spaces, just like sidewalks, roads and accessibility. It is one of the main aspects of urban planning. Over the decades, the understanding, planning and design of lighting have changed. There have been many shifts in perspective, such as moving from street lighting to pedestrian-focused lighting. Today, it makes more sense to design and implement night lighting in terms of light scraping rather than illumination. To understand aspects of lighting design for urban public spaces, it is also important to understand the benefits of lighting.

Reduce Crime, Scare and beware the Criminals

People working in night shifts, students finishing up late in the night at university, happy-go-lucky walking back home after a night out are all subject to the risk of crime and violence. While there are many measures taken to ensure pedestrian safety, it is quite natural for people to feel uncomfortable if the lighting is insufficient. Well lit areas are known to reduce the chances of crime. A brightly lit park or pathway deters criminals and boosts the confidence of pedestrians.

Safety

Reduce the risks of accidents and injuries. Safety is the essential advantage of lighting. By illuminating roads, parks and other public spaces, we reduce the risks of accidents and injuries. Lighting is especially important for driving in the night. Whether driving on the motorway or in residential areas, good lighting improves visibility and minimizes the risk of accidents. With a growing number of people in urban areas opting for sustainable modes of transportation, cycling has become extremely popular. It is an added necessity to ensure that we are able to ensure the safety of cyclists. Well-lit public spaces also provide pedestrians the much needed sense of security to step out after sundown.

Beauty Street Light add Charm to the City

When planning and developing architectural or location based landmarks a key aspect to facade/landscape design is lighting. Well-designed lighting can enhance landmarks like boardwalks, promenades, sea front or lake fronts. These create beautiful ambiances and add charm to the night time facades and architectural views of the city. Bright lighting also looks very beautiful in night markets. The hustle bustle of the market complements a brightly lit street with vendors, shops and hawkers all selling their wares.

1. Elimination in night time accidents and economic loss

2. Aid to police protection and enhanced sense of personal security
3. Facilitation of smooth traffic flow
4. Promotion of business activities and the use of public interactions during the night hours.

While this service is widely available in developed countries, many areas of the developing world do not have adequate street lighting facilities due to lack of funding. Living conditions are poor due to lack of adequate lighting at night, and street crime and other accidents are commonplace²⁵. Street lighting may be a more interesting subject for politicians to gain supporters. According to residents of Oyo, this is the most controversial issue among the people, assuming a perfectly stable load pattern (kWh) in electricity consumption each day during the specified working hours. It is said that it is an important activity of local governments. During nighttime operating hours, the number of lights and power requirements remain relatively constant. The only real difference is the opening hours at night depending on the time of year. On the other hand, if you have a photovoltaic control system during dark or foggy hours, such as inland areas, the weather will change to some extent. Thus, considering the Ceylon Electricity Board (CEB) national grid, it makes the load patterns and energy levels of street lights in near-operation very predictable, including peak current draw times²⁶.

One of his ways of addressing the demand side of the problem is to save electricity through technical improvements in street lighting with the help of local governments and municipalities. According to a 2011 statistical digest published by the CEB, electricity consumed by street lighting accounts for up to 1.1% of electricity consumption in the national grid. Although the number of new street lights is increasing by 30% each year according to the 2010 Street Light Census, it is notable that many unmeasured street light

profiles indicate stable monthly operation. Increase. This strategy will be the worst during the election season. Therefore, the hypothetical bills submitted by local governments to the Department of Energy do not accurately reflect their actual load profiles. Depending on the record of billing information, both the municipality and the municipality ensure that the load profile is actually represented by having his CEB staff present to monitor the actual street lighting installation requirements. Action must be taken²⁷.

Street lighting power consumption is a significant part of total energy consumption. Therefore, the energy saving of street lights is important to the overall energy saving. Street lighting is often known to be too high. For example, when the traffic is light, the lighting level is too high and the lighting level can be reduced to save energy. On the other hand, in certain situations and for road safety reasons, it is also necessary to increase the light level in low traffic. Reducing energy consumption through the installation, control and management of modern lighting equipment has a direct impact on greenhouse gas emission levels from street lighting. Reducing greenhouse gas emissions is directly related to reducing energy consumption. Therefore, the potential savings are comparable and vice versa.

2.1.8 Ways in Which Lighting Could Reduce Crime and Fear

While it may seem obvious that proper lighting can reduce crime and anxiety, how and under what circumstances is a matter of debate? Street lights create a visible change in the built environment, but they are not a physical barrier to crime. Strategies against environmental crime are effective only if they change the behavior of the public, including potential offenders. The starting point for the entire program was therefore to examine how lighting can reduce crime. The environmental criminology literature suggests several possibilities.

Lighting reduces crime by increasing visibility

This deters potential criminals by increasing the risk of their activities being discovered or disrupted. Better lighting reduces the fear of crime because it physically improves the environment and changes the public's perception of it. People perceive bright environments to be less dangerous than dark environments²⁹. Better lighting will increase road usage and enhance nature surveillance. Changing routine activity patterns can help reduce crime by increasing the influx of potentially competent guardians. From the perpetrator's perspective, approaching other pedestrian's acts as a deterrent, this is because it increases the risk of being recognized or disrupted in the event of an attack on people or property³⁰. From a potential victim's perspective, the perceived risk and fear of crime is further reduced.

Improved visibility and increased road use will increase opportunities for informal surveillance. Pedestrian density and traffic lines, as well as surveillance, have long been recognized as important in fighting crime, as they can influence offenders' perceptions of the risk of being arrested³¹. Coupled with changes in social dynamics, the renewal of a highly visible part of the physical environment is psychologically appalling. Perpetrators credit the improved image of the place with enhanced social control, order and surveillance. We can conclude that there is a higher risk of crime on the Relit site than elsewhere, and this may influence his next behavior in two ways. First, it discourages criminals living in the area from committing crimes or expanding their activities. Second, potential criminals from outside the area are deterred from entering the area. Although crime in the Limit area is declining, crime may be shifting to other areas²⁸.

A positive image of the Lilith area's nighttime environment is shared by residents and pedestrians, and this social process nourishes itself. As the actual and perceived damage risks decrease, the area will become more accessible to more people. Changes in social composition and activity patterns within the region will reduce vulnerability to crime and reduce anxiety. Lighting builds community trust. This is a clear sign that the local government is investing in the structure of the area.

2.1.9 Causal Links between Street Lighting and Crime

It would be helpful to list ways in which better lighting could reduce crime³², as mentioned earlier, the two most popular theories focus on the deterrent effect of increased surveillance and the effect of increased community pride on informal social control.

Improved lighting encourages road use and enhances surveillance of nature. Altering daily activity patterns can help reduce crime by increasing the influx of potentially competent guardians. From a potential perpetrator's perspective, the proximity of other pedestrians has a deterrent effect, as it increases the risk of being perceived or impeded when attacking people or objects. From a potential victim's perspective, the perceived risk and fear of crime is reduced.

Improved visibility and increased road use may increase opportunities for informal surveillance. Pedestrian density and traffic patterns, as well as surveillance, have long been recognized as important in fighting crime, and they can influence would-be criminals' perceptions of their increased risk of arrest. Because there is

Updating highly visible parts of the physical environment, combined with changes in social dynamics, can act as a psychological deterrent. Potential criminals may perceive that the image of the place has been improved and that social control, order and surveillance have been strengthened³³. We can conclude that the risk of crime was higher on the Relit site than

elsewhere, and that this might influence her behavior in two ways. First, potential criminals living in the area are deterred from committing crimes or expanding their activities. Second, potential criminals from outside the area are deterred from entering the area. However, the offense may be moved from the penalty area to another location³⁴.

Lighting can increase community trust. This is a clear sign that the local government is investing in the structure of the area. This balance previously neglected emotions and stimulates the overall “feel good” factor. It may also facilitate informal social control and intervention by residents to prevent crime and riots. You can reduce the fear of crime. It is also possible that improved street lighting could increase the likelihood of crime under certain circumstances. As a result, more potential victims and potential perpetrators can congregate in the same physical space. Greater visibility of potential victims allows potential criminals to better assess their own vulnerabilities and attractiveness.

Increased social activity outside the home may increase the number of vacant homes that may become victims of burglaries. Enhanced lighting can make it easier for criminals to commit crimes and escape. The effects of lighting improvements can also interact with other environmental improvements, such as CCTV cameras and lock improvements. Improved street lighting has different effects on different types of crime (such as property violence) and can also have different effects on daytime and nighttime crimes. Although more research is needed on the dose-response relationship between lighting and crime, and the effects at different boundary conditions, the focus of this report is that the existing evidence suggests that improved street lighting leads to a reduction in crime. Whether or not it is suggested. Therefore, it is important to produce comparable summary measures of effect sizes in each study. The main measure of effect size used here is the change in crime counts in the relit (test) area compared to the change in crime counts in comparable controlled areas³⁵.

2.2 Theoretical Framework

This section of the literature review describes the theory underlying this study. Several theories have been used by various researchers to study the factors that influence street lighting projects and crime. According to these theories, crime is influenced and shaped by social and cultural contexts. Proponents of this theory postulate that knowledge is collaborative and contextual³².

2.2.1 Rational Choice Theory (RCT)

The first opportunistic theory covered is the Rational Choice Theory which works on the assumption that the offender has a purposeful behavior designed to benefit the offender in some way. This entails making decisions amongst alternatives. Crimes are purposive acts as they are committed with intention of benefiting the offender, offenders try to make the best decisions they can, offender decision – making varies considerably with the nature of crime, involvement decision are quite different from those relating to the commission of a specific criminal act, involvement decisions comprise three steps that is initiation, habituation and distance and even decisions involves a sequence of choices made of each stage of the criminal act such as preparation, target selection, commission of the act, escape and aftermath⁶⁷. Research has found out that the perceived costs of crime, specifically the perceived certainty of formal sanctions and arrest, heavily influence the cognitive decision making process of offending rather than street lighting system acting as a physical barrier to crime. It works on the hypothesis that by altering offender, resident's attitude and behavior will result in crime deterrence effects since research has shown that an increase in street lighting can lead to increased street usage and an increase in community cohesion⁶⁰. The limitations of rational choice theory stem from its assumption that crime is a means, and that

it is not an expressive crime, such as vandalism or pleasure driving, or a moral, emotional, or pathological motive. It doesn't explain the rational motives. These crimes are less likely to be subject to reasonable consideration and therefore less likely to be deterred by increased street lighting. This therefore indicates that a more comprehensive theory is needed to explain how street lighting alters criminal behavior.

One such theory is the Daily Activities Theory, which focuses on prevention techniques applied in targeted areas with high crime rates, also known as 'hot spots'. Everyday activity theory attracts crime because it is solved theoretically or empirically, but it has considerable applicability and therefore fits centrally in situational prevention. On the other hand, some argue that the everyday activities theory does not adequately consider the role of motivated offenders in the absence of competent guardians and the context of criminal opportunities covered by appropriate targets. This is not true. Because, even for a city as big as London, London is one of the most industrialized and advanced cities in the world, using the most modern street lighting systems in its streets all over the world.

The application of Rational Choice Theory (RCT) to the assessment of street lighting on the urban security system in Oyo State, Nigeria, provides valuable insights into how individuals make decisions regarding criminal activities in well-lit urban environments. Rational Choice Theory, often associated with economists and criminologists, posits that individuals are rational actors who weigh the costs and benefits of their actions before making choices. When applied to the assessment of street lighting and urban security, several key aspects become evident:

Perceived Costs and Benefits: Rational Choice Theory suggests that individuals engage in criminal activities when they perceive the benefits to outweigh the costs. In well-lit urban environments, the costs of engaging in criminal behavior are increased due to the

higher likelihood of being observed or apprehended. Street lighting, therefore, acts as a deterrent by increasing the perceived costs of criminal actions⁶⁰.

Situational Factors: Rational Choice Theory emphasizes situational factors that influence decision-making. Adequate street lighting alters the situational factors by improving visibility. Potential offenders are less likely to engage in criminal acts when they can be easily observed, increasing the perceived risks associated with crime (Felson, 2006).

Target Selection: Criminals typically choose targets that offer the highest benefits with the lowest perceived risks. Improved street lighting reduces the appeal of poorly lit areas as potential targets, as they increase the perceived risks associated with criminal activities. Criminals are more likely to target areas with poor lighting where they believe they can evade detection⁶⁰.

Deterrence and Crime Reduction: The application of Rational Choice Theory suggests that well-designed street lighting can deter potential offenders, making them reconsider their actions due to the increased perceived risks. This, in turn, can lead to a reduction in criminal activities within well-lit urban areas⁶⁰.

Routine Activities: Rational Choice Theory is closely related to the Routine Activities Theory, which suggests that crimes occur when a motivated offender encounters a suitable target in the absence of a capable guardian. Adequate street lighting transforms the environment by increasing the presence of potential guardians and capable natural surveillance⁶⁰.

In the context of Oyo State, Nigeria, applying Rational Choice Theory to the assessment of street lighting on urban security would involve examining how well-lit areas affect individuals' perceptions of the risks and benefits associated with criminal activities. It would also entail studying how improved street lighting influences the choices potential offenders make in selecting targets for criminal acts.

Overall, the application of Rational Choice Theory helps in understanding how well-designed street lighting impacts the decision-making process of potential offenders and contributes to reducing crime in urban environments. Studies and assessments conducted within Oyo State can shed light on the specific ways in which improved street lighting affects rational choices related to criminal behavior in the local context.

2.2.2 Daily Activity Theory

The everyday activity theory is the theory of criminal cases, this differs from most criminological theories, which focus on explaining why some people commit crimes, i.e., what motivates them to commit crimes, rather than how crimes happen. This difference may seem trivial at first, but it has important implications for crime investigation and prevention. Daily activity theory suggests that the organization of daily activities in society creates opportunities for crime³⁷. The everyday activity theory is the theory of criminal cases. This differs from most criminological theories, which focus on explaining why some people commit crimes, i.e., what motivates them to commit crimes, rather than how crimes happen. This distinction may seem trivial at first, but it has important implications for crime investigation and prevention. These routine actions can make crime easier and less risky, or they can make crime harder and more risky.

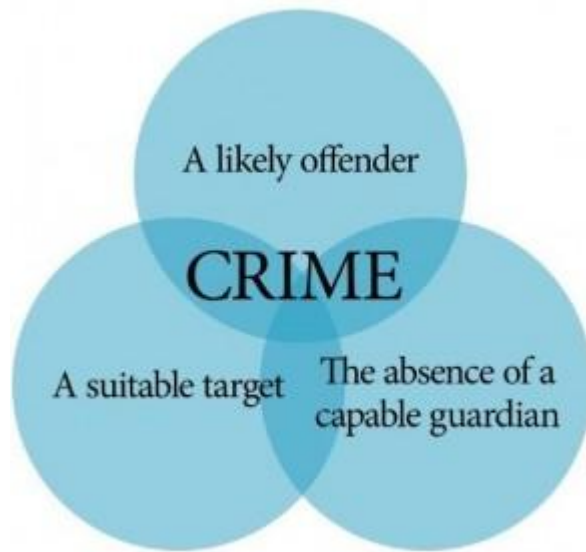


Figure 2.4: Routine Activities Theory

Source⁴¹

Likelihoods vary by time, space, and person, and so are the odds of a crime. Research based on daily activity theory therefore commonly explores the different opportunity structures that fuel crime. Prevention strategies based on daily activity theory attempt to modify these opportunity structures to prevent criminal incidents. Daily activity theory was originally used to explain changes in criminal tendencies over time. It has become more and more widely used to understand and prevent crime problems. Researchers have used a variety of methods to test hypotheses derived from theory. Since its inception, this theory has been closely associated with a body of theories and perspectives known as environmental criminology that focus on the importance of opportunity in determining the temporal and spatial distribution of crime.

Environmental criminology, especially the theory of everyday activities, has very practical implications for prevention. Practitioners have therefore applied daily activity theory to

inform policing practices and prevention strategies. This research paper provides an overview of the development of everyday activity theory.

An overview of theoretical research; Complementary Perspectives and Current Applications

In 1979, a researcher questioned why urban crime rates rose in the 1960s, despite what is commonly believed to be a contributing factor to violent crime⁴¹. Economic conditions were bad, but generally improved during this period. A study proposed thinking of crime as an event that occurs at a specific place and time and involves specific people and objects⁴¹the concept that a criminal case converges in time and space due to the interplay of specific elements has been a fundamental aspect of criminological theory. Clarke and Newman's (2006) argument, in particular, emphasizes the pivotal role played by these minimal elements in creating opportunities for criminal activities. These elements can be described as the key ingredients that, when combined, set the stage for criminal acts to occur. Let's delve deeper into each of these elements and explore their significance in the context of crime convergence.

(1) Criminals who intend to commit crimes: The first element in this framework highlights the importance of the presence of individuals with criminal intent. Criminals are individuals who have the intention or inclination to commit unlawful acts. Their intentions may vary from theft and assault to more serious offenses like burglary or even violent crimes. Without individuals harboring such intentions, the opportunity for criminal activities is significantly reduced. In essence, criminals provide the driving force behind criminal convergence, as their actions stem from a motivation to engage in unlawful behavior.

(2) Suitable targets: The second element involves the presence of suitable targets for criminal activities. These targets can encompass a wide range of entities, including individuals, property, or assets. Criminals select targets based on factors such as perceived value, ease of access, and the potential for successful criminal endeavors. Suitable targets are those that

align with the criminal's objectives and offer the potential for material or psychological gain. The presence of these targets is crucial in creating opportunities for crime, as they represent the focal point of a criminal's intentions.

(3) Absence of a guardian who can prevent crime: The third element underscores the absence of a guardian or a protective presence that can deter or prevent criminal activities. A guardian, in this context, can be an individual, an entity, or even a security system that has the capacity to thwart criminal intentions. Guardians serve as deterrents to potential criminals by increasing the perceived risks and reducing the perceived rewards associated with committing a crime. The absence of effective guardianship creates an environment where criminal convergence becomes more likely. In other words, when there are no effective deterrents in place, the other elements, including the presence of criminals and suitable targets, are more likely to converge, leading to criminal activities.

The framework proposed by Clarke and Newman highlights the interconnectedness of these minimal elements in shaping the convergence of a criminal case in time and space. It underscores the importance of understanding how the presence of criminals, suitable targets, and the absence of guardians interact to create opportunities for criminal activities. This understanding has significant implications for crime prevention strategies, as it suggests that interventions should focus on disrupting this convergence by targeting one or more of these critical elements. By doing so, it becomes possible to reduce the opportunities for criminal acts and enhance urban security.

The absence of any one of these three elements, they argued, is sufficient to prevent crime from occurring. Building on the theory of human ecology, it was argued that structural changes in social patterns of everyday activity affect the potential for temporal and spatial convergence of these three necessary factors, thereby Suggested that it could affect the crime

rate. As people's day-to-day activities change, so do the temporal and spatial coincidences of motivated unaccompanied offenders and targets. In other words, the chances of committing a crime, and thus the pattern of crime, are a function of a society's routine patterns of activity. A study found that crime rates increased after World War II because the daily activities of society began to move away from the home, and that motivational offenders He argued that it was because the possibility of seeking space increased. Routine activities that take place at or near the home tend to provide greater guardianship for both individuals and their property and lower the risk of encountering potential criminals. When people are away from home to engage in routine activities, they are more likely to encounter potential criminals in the absence of parents. In addition, their belongings are left unprotected in their homes, increasing opportunities for crime⁴¹.

One of his greatest contributions to everyday activity theory is the notion that opportunities for crime are not evenly distributed in society. Also, they are not infinite. Instead, there are a limited number of available targets that perpetrators find attractive/appropriate. It was proposed that fitness is a function of at least four properties of the target; Value, Inertia, Visibility, Access, or VIVA. All else being equal, a repeatedly featured person or product exhibits the following characteristics:

Material or symbolic value perceived by the perpetrator

Size and weight to allow illegal handling, physically visible to potential criminals, and the perpetrator will have access. These social trends have expanded the range of suitable targets and increased the likelihood of crime. As the supply of small consumer goods continued to grow, so did the number of suitable targets, increasing the number of criminal opportunities available. Since its inception, daily activity theory has evolved to more precisely identify the factors necessary for the occurrence of criminal events and the factors that might prevent

them. Those who prevent crime are categorized by who or what they monitor, such as offenders, targets, and locations, and are now collectively known as controllers. Handlers are individuals who exercise informal social control to prevent potential offenders from committing crimes. A manager's main concern is how the workplace works. Eck (2003) presented a broader version of this theory of daily activities as the crime triangle (see Figure



5).

Figure 2.5: The Crime Triangle

Source⁵⁶

The inner triangle represents the elements necessary for the crime to be committed.

A motivated criminal and a suitable target must be in the same place at the same time. The outer triangle represents potential administrators (guardians, supervisors, administrators), who must be absent or powerless in order for the crime to be carried out. The presence of a competent person in charge can prevent criminal cases. Controllers are described in more detail. A study showed that guardians, caregivers, and administrators were most likely to successfully control crime. Individuals' propensity to prevent crime by monitoring targets, perpetrators, and locations has been found to vary according to their level of responsibility⁴¹.

The concept of different levels of responsibility is a fundamental framework for understanding the various roles and obligations individuals or groups may have within a

given context. In this case, four distinct levels of responsibility are outlined, each pertaining to a different category of individuals. Let's delve into each of these levels and explore the implications and contexts in which they are relevant:

Individuals such as owners, family members, and friends: At the first level, we find individuals who bear a high degree of personal responsibility. This category includes individuals who have direct ownership or a significant stake in a particular entity or endeavor. This group might encompass business owners, entrepreneurs, or individuals who are personally invested in a project. Their responsibilities extend to ensuring the success, sustainability, and ethical conduct of the venture. Moreover, family members and close friends may also fall into this category, especially when they are actively involved in the enterprise.

Assigned. B. Employees with specific responsibilities: The second level of responsibility pertains to employees who are specifically assigned and tasked with well-defined responsibilities. These individuals have clear roles and functions within an organization or project. They are expected to execute their duties with precision and adherence to organizational objectives. For example, in a business setting, this category may include managers, supervisors, or employees with specialized roles such as sales, marketing, or finance.

Diffusion, e.g. B. Employees assigned general responsibilities: The third level of responsibility encompasses employees who are assigned more general and broad responsibilities. While they may not have specialized roles like those in the second category, they play a significant part in the overall functioning of an organization. These individuals are typically responsible for a range of tasks that contribute to the smooth operation of the enterprise. This category may include administrative staff, support personnel, or employees with multifaceted roles that adapt to the evolving needs of the organization.

Common, e.g. B. Foreigners and other nationals: The fourth level of responsibility includes individuals who are not directly connected to the ownership or management of an entity but may still bear a level of responsibility. This category extends to external stakeholders, such as foreign nationals, customers, or the general public. While they do not have specific roles within the organization, their actions and choices can influence the entity in various ways. For example, customers have the power to influence a company's reputation through reviews and purchasing decisions. Similarly, the actions of foreigners in a host country may impact social and economic dynamics.

In conclusion, these four levels of responsibility provide a structured framework for understanding the diverse roles and obligations of individuals within different contexts. Recognizing these levels is essential for effective management, organizational dynamics, and understanding the broader impact of individuals and groups on businesses, projects, or communities. It highlights the importance of clarity in defining roles and responsibilities, as well as the potential influence of external stakeholders.

An administrator who has a closer relationship with a potential criminal, target, or location is more likely to have successful control and prevent crime. The more responsibility shifts from the personal to the general, the less likely crime is to be prevented. For example, store owners are much more likely to control and prevent shoplifting in their stores than strangers who rarely visit their stores. Residents are more likely to prevent crime on their own block than on the block they commute to. Suitable target characteristics are extended to apply to products that are often victims of theft. It has been suggested that a relatively small number of featured products accounted for the bulk of the total theft. He claims that popular products have six key characteristics that make them easier targets for thieves. Specifically, the crime focuses on desired products that are concealable, removable, affordable, valuable, fun and disposable.

In summary, the daily activity theory is the theory of criminal cases. The theory of everyday activity is fundamentally different from other crime theories. Prior to the advent of everyday activity theory, nearly all criminological theories focused solely on the factors that drive criminals to commit crimes, such as the biological, sociological, and economic conditions that might induce an individual to commit crime. Conversely, the theory of everyday activities focuses on a set of factors that overlap in time and space and create criminal opportunities and, in turn, criminal incidents. Conventional crime theories are about how crimes occur in one place (which doesn't happen elsewhere) at a certain time (which doesn't happen elsewhere), and at a certain destination (which doesn't happen elsewhere). However, daily activity theory cannot explain why some people commit crimes are not someone else. It is important to note that the daily activity theory suggests that crime may increase or decrease while the number of offenders stays the same. Instead, the availability of suitable targets may increase, the availability and effectiveness of controllers may decrease, the day-to-day operations of the company may change, and these factors may converge in time and space. The idea that perpetrators only contribute to crime has theoretical and practical implications. First, it turns out that a theory that focuses solely on criminal factors alone is not sufficient to explain the patterns and trends of crime, nor is it sufficient to explain only the supply of motivated criminals. Second, it presents a much wider range of prevention options³⁷.

Moreover, changes in society's daily activity patterns that affect the likelihood that these factors will converge spatially and temporally can also prevent crime without directly affecting the supply of motivated offenders. Considering these policy implications, researchers derive and investigate various testable hypotheses from everyday activity theories.

2.2.3 Social Control Theory

The social control approach to understanding crime is one of the three main sociological perspectives in contemporary criminology. Control theorists believe that conformity to society's rules arises through socialization and is maintained through attachment to people and organizations such as family, friends, school, and work. In other words, crime and delinquency occur when the bonds between individuals and society are weakened or broken. As social ties grow, so does the cost of individual crime⁴⁴. The impact of social control theory on actual crime-fighting policy is less impressive. Social control theory does not support the expansion of the criminal justice system. They do not advocate increased police force or lengthy incarceration to combat crime. Instead, they advocate policies aimed at building stronger ties between individuals and societies⁴⁵. The first task of control theorists is to identify the key components of social attachment. The second challenge is to define what society means identifying the individuals and organizations that are important in regulating delinquency and criminal behavior. In addition, guidelines were provided for evaluating security programs {take risk based approach, define your requirement, etc.}. The intellectual underpinnings of social control theory can be found in the 17th-century writings of Thomas Hobbes. In his famous book *Leviathan* Hobbes, he outlined many basic assumptions about human nature and the origin of civil society. Hobbes believed that humans naturally pursue personal interests, regardless of the rights and interests of others. External restraints, crime in the state of nature is a rational choice, and all against all wars" naturally follows, and everyone's life is wicked, poor, and brutal, short becomes a thing. Fortunately, according to Hobbes, a second option appears for those who can calculate the costs and benefits of their actions. They can maintain a state of war, or they can set up legal systems and governments empowered to punish those who resort to violence and fraud to advance their private interests. Confronted with the choice of war or peace, rational people choose to submit to state power in exchange for the security of their bodies and property. Hobbes' crime

theory is a choice theory. People consider the costs and benefits of crime and act accordingly. High criminal charges are collected by the state, and the state has the power to take away the life, liberty, and property of its citizens. The content of the criminal law is irrelevant. There is consensus that the use of force and fraud for private gain is illegal. Crime is real. It's not a question of definition. It is not a social structure that changes with time and place. As we have seen, social control theory embraces choice and consent. No special need or desire compels a person to commit criminal acts. Everyone shares the belief that the core of criminal law is legitimacy. However, control theory refutes Hobbes's view (which is still widely believed among economists and political scientists today) that the great price of crime is state-imposed punishment. We may reject this view based on consensus assumptions (and facts). Everyone agrees that theft, robbery, and murder are crimes. As a result, victims and witnesses report crimes to stakeholders, and perpetrators embarrass and embarrass those they know. According to Social Control Theory, Shame and Consequent Punishment Are Very Important

The application of Social Control Theory to the assessment of street lighting on the urban security system in Oyo State, Nigeria, provides valuable insights into how the presence of well-designed street lighting can influence social behaviors, including criminal activities and community perceptions of safety. Social Control Theory, often associated with scholars like Travis Hirschi, suggests that individuals are naturally inclined toward deviant or criminal behavior, and society's control mechanisms are what prevent them from engaging in such behavior. When applied to the assessment of street lighting and urban security, several key aspects become apparent:

Informal Social Control: Street lighting acts as an informal social control mechanism. It provides surveillance opportunities for community members who may be more willing to use public spaces when they are well-lit. This presence of "guardians" within the community can

deter potential wrongdoers⁶¹. Enhanced Community Cohesion: Well-lit public spaces encourage people to gather and interact, fostering a sense of community and social bonds. The increased presence of law-abiding citizens in well-lit areas can further deter criminal activity, as these potential guardians collectively contribute to community safety.

Preventing Delinquency: Social Control Theory emphasizes the importance of strong social bonds and attachment to conventional society. Adequate street lighting contributes to the development of a sense of community, attachment to shared public spaces, and a feeling of belonging. These factors make individuals less likely to engage in delinquent or criminal behavior. Opportunity Reduction: Social Control Theory also suggests that crimes occur when opportunities are available and potential offenders perceive a lack of control. Well-lit streets reduce the opportunity for crimes by increasing the perceived risk for potential offenders⁶¹.

Fear of Crime Reduction: Social Control Theory recognizes the fear of crime as a significant social concern. Adequate street lighting addresses this concern by reducing the fear of crime among residents. This, in turn, encourages more people to use public spaces, engage in community activities, and take an active role in securing their environment. In the context of Oyo State, Nigeria, applying Social Control Theory to the assessment of street lighting on urban security would involve conducting studies that evaluate the impact of improved street lighting on crime rates, community cohesion, and residents' feelings of safety. It would also involve examining the relationship between well-lit public spaces and community engagement.

The application of Social Control Theory helps in understanding how street lighting serves as a vital element of the urban security system, influencing behavior, and contributing to the creation of safer and more cohesive communities. Studies and assessments conducted within

Oyo State would shed light on the specific ways in which improved street lighting can enhance social control and reduce crime in the local context.

2.2.4 Similarities and Differences between Social Control Theories and other Crime Theories

The underlying assumptions of social control theory are in many respects the assumptions of classical crime theory, the theory that has been told to us under names such as deterrence theory and rational choice theory. Is similar to the difference between them is often a difference in intonation. Deterrence theory states that the key to fighting crime is the speed, severity, and certainty of punishment imposed by the legal system. Rational choice theory focuses on the costs and benefits of crime. Regulation theorists recognize the importance of punishment, but ignore it in the legal system, questioning its role in crime regulation. They do the same with criminal profits. That is, we ignore crime on the grounds that the benefits of crime are the same as the benefits of non-crime⁵⁰. The assumptions of control theory contrast markedly with those of other sociological explanations of crime. Cultural deviance and social learning theories assume that there is no innate ability to commit crimes. In their view, all human behavior, whether criminal or conformist, is the product of a combination of social influences. Colleagues influence individuals, as do families and, more generally, the dominant culture. A person will commit a crime if the collective influence leads him or her to commit a crime in a particular instance. Without these influences, crime would not occur. Perpetrators are therefore conformers, even though they do not follow the rules of the ruling society.

The stress theory (sometimes called the anomie theory) holds that individuals inherently tend to follow cultural defaults, but can be driven into crime if social structures do not provide legitimate opportunities for success. I'm assuming. These theorists emphasize the

influence of the American Dream. The American Dream often (too often, according to scholars) creates desires and aspirations that cannot be fulfilled within the bounds of the law. These sociological perspectives have proven popular and adaptable. They continue to form the basis of criticism of social control theory⁵¹.

Security System

A literature review of the meaning and assessment of street lighting and urban security systems highlights important aspects of urban security and the role of street lighting within this context. In essence, a "security system" in urban areas encompasses a comprehensive set of measures, technologies, and practices aimed at ensuring the safety and well-being of residents and public spaces. It involves various components, including surveillance cameras, access control, alarm systems, and street lighting, all working together to deter criminal activities and respond to security incidents.

One vital component of urban security systems is street lighting. Adequate street lighting is crucial as it can effectively deter criminal activities, reduce fear of crime among residents, and create safer public spaces. Studies show that well-designed street lighting contributes significantly to the overall security of urban areas. By increasing visibility and promoting a sense of safety, improved street lighting not only reduces crime rates but also enhances community perceptions of safety⁴³.

To assess the efficacy of street lighting, researchers employ various methodologies. These methodologies include crime mapping, surveys, and statistical analyses to evaluate the impact of lighting systems on urban security. Research consistently demonstrates that improved street lighting leads to a reduction in crime rates, increased feelings of safety within the community, and a rise in the use of public spaces during nighttime⁴².

Furthermore, technological advances have played a significant role in enhancing urban security systems. Innovative technologies, such as smart lighting and surveillance systems, are increasingly integrated into urban security infrastructure. These technological advancements, including the use of the Internet of Things (IoT) and Artificial Intelligence (AI), have improved the efficiency of urban security systems by providing real-time data and enabling automated responses to security threats⁴¹.

Urban security systems are crucial for ensuring the safety and well-being of city residents. Street lighting, as an integral component, plays a vital role in creating safer urban environments. Its effectiveness is assessed through various methods, and research consistently demonstrates the positive impact of improved street lighting on crime rates and community perceptions. Additionally, the integration of advanced technologies continues to enhance the efficiency and effectiveness of urban security systems, further improving the quality of life in urban areas.

The Role of Street Lighting in Urban Security:

Urban security, with its multifaceted approach, has emerged as a critical concern for cities around the world. In the constant evolution of this intricate web of systems and measures, one element stands out as a paramount contributor to fostering safer environments – street lighting. Its significance in the overall urban security matrix cannot be overstated, and for a good reason.

Within the complex tapestry of urban security, the role of street lighting is both central and multifaceted. It's not a mere coincidence that well-planned and appropriately installed street lighting is at the forefront of this endeavor. Its impact goes far beyond the act of merely

illuminating the physical environment; it extends into the realms of deterrence and surveillance, making urban spaces more secure and less susceptible to criminal activities.

Picture a city after nightfall, where the streets come alive with a gentle glow. Adequate street lighting serves as a sentinel, casting a watchful eye over the city's nooks and crannies. It deters criminal activities by its mere presence. Criminals often rely on the cloak of darkness to carry out their deeds unnoticed. However, well-lit streets and public spaces send a powerful message to potential wrongdoers – that their actions will be exposed under the watchful eyes of the public and surveillance systems. This psychological barrier alone makes them think twice before committing unlawful acts⁴¹. In this manner, street lighting becomes a cornerstone of crime prevention, contributing significantly to safer urban environments.

However, the role of street lighting in urban security transcends mere deterrence. It significantly reduces the fear of crime among urban residents. This fear, often referred to as the "dark figure" of crime, can be as debilitating to the community's well-being as crime itself (Garofalo, 1981). People are less likely to venture outdoors when they perceive the environment as unsafe, especially during nighttime. Adequate street lighting acts as a catalyst in changing these perceptions.

Well-lit streets are not just bright; they are beacons of security. They provide a visual assurance that public spaces are well-monitored, and potential risks are minimized. This sense of security is invaluable not only to residents but also to businesses. It encourages economic activities in urban areas during evening hours⁴⁴. Safer streets mean increased foot traffic, which, in turn, leads to better business opportunities, thus enhancing the vitality of urban areas.

Research confirms the holistic impact of well-designed street lighting on urban security⁴³. Crime rates are notably lower in well-illuminated areas, as criminals are less likely to strike when they feel exposed. Moreover, the increased visibility offered by adequate lighting allows witnesses to provide more accurate descriptions and information to law enforcement agencies, making it easier to apprehend criminals⁴⁵. In this way, street lighting plays a pivotal role not only in deterring crime but also in aiding law enforcement efforts.

Incorporating these findings into urban planning and security strategies is vital for fostering safer cities and enhancing the overall quality of life for urban residents⁴⁶. The synergy between researchers, urban planners, and local authorities is pivotal in harnessing the full potential of well-designed street lighting as a beacon of security and community prosperity. Together, they work towards illuminating the path to safer, more vibrant urban environments.

Adequate street lighting can best be likened to a vigilant sentinel, unwaveringly standing guard over the urban realm. It surpasses the mere act of illuminating streets and public spaces; it assumes the role of a formidable deterrent against criminal intentions. It sends a clear and resounding message to potential wrongdoers – any illicit activities they might contemplate will be unveiled under the unwavering gaze of both the public and surveillance systems. Criminals often thrive in the cloak of darkness, where their actions are concealed from the watchful eyes of passersby and law enforcement³⁶. However, well-illuminated streets and public spaces disrupt this shadowy refuge, creating an environment where potential wrongdoers are compelled to second-guess their unlawful inclinations.

This powerful psychological barrier serves as the cornerstone of crime prevention, contributing significantly to safer urban environments. When streets and public spaces are well-lit, they act as a natural deterrent to criminal activities. Criminals are less likely to operate in areas where they feel exposed and their actions could be readily observed. The

mere presence of illumination alters the risk-reward calculus for potential wrongdoers, making them think twice before committing unlawful acts. As a result, well-planned street lighting becomes an integral component of crime prevention, helping to reduce criminal activities in urban areas.

However, the impact of street lighting on urban security is multidimensional, extending beyond the realm of deterrence. Beyond the mere provision of visibility, it fosters a heightened sense of safety and security among urban residents. Well-lit streets minimize the obscurity that could otherwise give rise to feelings of vulnerability and unease. This reassurance is particularly crucial during nighttime hours when visibility is naturally reduced. When people feel safer in their urban environment, they are more likely to engage in public spaces and contribute to the active, positive life of the city.

Picture a well-lit cityscape after dark, where the glow of streetlights transforms the urban landscape into a welcoming and secure space. Residents and visitors alike can traverse the city streets without the constant worry of potential dangers lurking in the shadows. This enhanced sense of safety encourages people to utilize public spaces, engaging in various activities, whether it's a leisurely stroll, shopping, dining, or simply enjoying the city's vibrant nightlife. The streets become more than just conduits for transportation; they become hubs of social interaction, commerce, and recreation.

This heightened activity in well-illuminated urban spaces serves not only to foster a vibrant atmosphere but also to bolster economic activities. It creates opportunities for businesses to thrive during evening hours, contributing to the overall prosperity of the city. As such, well-designed street lighting doesn't just make urban areas safer; it actively enhances the quality of life for urban residents and bolsters the city's economic vitality⁴¹.

The impact of street lighting extends far beyond what meets the eye. It is a multifaceted contributor to urban security and well-being, combining the roles of sentinel, deterrent, and facilitator of vibrant urban life. It stands as a testament to the power of thoughtful urban planning and design in creating safer, more engaging, and prosperous urban environments.

Studies conducted by eminent researchers have consistently underscored the pivotal role of adequate street lighting in reducing criminal activities. Notably, extensive research on this subject provides compelling evidence of how well-designed street lighting serves as a formidable deterrent to potential wrongdoers. Their findings illuminate the significant impact that proper street lighting can have on urban security³⁹.

In essence, well-designed street lighting acts as a guardian of urban safety, creating an environment where residents and visitors can move about with a heightened sense of security and minimal trepidation. Potential wrongdoers are confronted with the stark reality that their actions are less likely to go unnoticed or unrecorded. This awareness significantly alters their risk assessment and, in many cases, dissuades them from engaging in criminal activities within well-illuminated areas.

Clarke and Newman's research highlights that the psychological barrier created by adequate street lighting goes beyond simply providing visibility. It extends into the realm of perception and reassurance. When urban environments are well-lit, they signal to residents and visitors that the community cares about their safety. This sense of security fosters trust and encourages people to engage in public spaces without the constant fear of crime.

Moreover, the impact of proper street lighting isn't limited to just the physical environment; it carries a profound psychological effect. It imbues urban spaces with a welcoming atmosphere,

inviting people to participate in social activities, patronize local businesses, and enjoy the city's amenities without the burden of excessive anxiety.

Thus, studies like those conducted by Clarke and Newman illuminate the multi-faceted impact of well-designed street lighting on urban security. Beyond its practical function of providing visibility, it functions as a guardian, instilling a sense of security among urban residents and visitors, and ultimately fostering safer and more vibrant urban environments³³. The evidence is clear: adequate street lighting is a vital component in the urban security arsenal.

It is abundantly clear that street lighting transcends its basic function of providing light. It is a linchpin of urban security, acting as both a deterrent to criminal activities and a beacon of safety. Beyond the numbers and statistics, it's about creating an environment where people can live, work, and enjoy their lives without the undue burden of fear. In this urban symphony, street lighting plays a pivotal note, harmonizing with other security measures to create safer, more vibrant urban spaces.

Street lighting, as research elucidates, exerts a pervasive influence that extends well beyond the mere thwarting of criminal intent. In fact, its impact delves into a realm where it holds the power to significantly diminish the pervasive fear of crime that often engulfs urban residents. This fear, frequently referred to as the "dark figure" of crime, is no less debilitating to a community's well-being than the actual commission of crimes themselves²⁹. When individuals perceive their environment as unsafe, particularly during the nighttime, they are less likely to venture outdoors, thereby imposing a severe limitation on their lives and restricting the vibrancy of the urban realm. Adequate street lighting emerges as a dynamic catalyst, capable of reshaping these perceptions.

Well-lit streets are, in essence, beacons of safety and security. They provide visual confirmation that public spaces are under a vigilant watch, where potential risks are mitigated. This heightened sense of security proves invaluable not only to residents but also to businesses. It creates an environment conducive to economic activities in urban areas during the evening hours⁴⁹. When the streets are well-illuminated, businesses can thrive, and people are more willing to patronize them without fear or hesitation.

Studies underscore that well-constructed street lighting, bearing in mind aspects such as design and placement, offers a holistic enhancement to the overall security of urban areas. It achieves this by boosting visibility, but it does much more. The very presence of adequate lighting promotes a sense of security among residents, which in turn fuels a more active and vibrant urban life. Well-lit streets are akin to open arms welcoming residents and visitors alike to embrace the cityscape with a feeling of confidence and assurance⁴².

The tangible impact of this enhanced security and safety is a noticeable drop in crime rates within well-illuminated areas. Criminals are discernibly less likely to strike when they feel exposed and vulnerable in the presence of light⁴⁸. In this respect, street lighting acts as a formidable deterrent, discouraging criminal activities by its sheer presence. Beyond deterrence, it serves as an active accomplice in crime prevention, as the increased visibility it provides enables potential witnesses to respond effectively.

The increased visibility is of paramount importance, as it allows witnesses to provide law enforcement agencies with more accurate descriptions and information about crimes, thus significantly enhancing the chances of apprehending criminals⁴⁸. A well-lit environment, in essence, creates a strong support network of both deterrence and immediate response to criminal activity.

In summation, the influence of street lighting transcends the mere provision of light. It redefines urban security by transforming the perception of safety, enabling economic activities, and reducing crime rates. Its profound impact reverberates throughout urban landscapes, where well-lit streets lay the foundation for an environment that fosters safety, security, and vibrant community life.

To understand the significant role of street lighting in urban security, researchers employ various methodologies. They create crime maps to visualize the relationship between crime and lighting conditions, conduct surveys to gauge community perceptions, and perform statistical analyses to quantify the impact of lighting on crime rates⁴⁷. The research consistently demonstrates that improved street lighting leads to a reduction in crime rates, increased feelings of safety within the community, and a rise in the use of public spaces during nighttime.

The role of street lighting in urban security is unquestionably vital. It is a powerful deterrent against criminal activities, alleviates the fear of crime among urban residents, and fosters a safer and more vibrant community. Adequate street lighting is the beacon of security in the urban landscape, casting light on crime prevention and nurturing an environment where everyone can move about confidently, day or night. It is a cornerstone in the realm of urban security systems, contributing significantly to the well-being of urban areas.

The Effectiveness of Street Lighting Efficacy in Urban Security:

The assessment of street lighting's effectiveness represents a pivotal undertaking in the realm of urban security. This multifaceted evaluation revolves around the intricate study of how lighting systems wield a substantial impact on crime rates, the public's perceptions of safety,

and the utilization of public spaces during the night. In essence, it seeks to unravel the multifaceted influence of well-designed street lighting systems.

In the pursuit of this assessment, researchers employ an array of methodologies, and each plays an essential role in illuminating the profound impact of street lighting. Through meticulous examination, researchers shed light on the intricate web of connections that shape urban safety and security.

One of the most intriguing and effective methodologies used in the assessment of street lighting efficacy is crime mapping. This technique harnesses the power of geographic information systems (GIS) to visualize the intricate spatial relationship between lighting conditions and crime incidents⁴⁶. It's akin to unveiling an urban jigsaw puzzle where each piece represents a vital clue to the overall picture of urban security. By superimposing crime data onto maps adorned with detailed street lighting configurations, researchers are provided with a unique lens through which they can analyze urban safety.

The findings unearthed through crime mapping studies often tell a compelling narrative. It's a narrative that highlights the undeniable correlation between well-illuminated areas and a significant decrease in criminal activities. In these regions, the cloak of darkness is lifted, revealing a deterrent to criminal endeavors. The visible presence of street lighting acts as a formidable guardian of urban safety, discouraging criminal activities by mere virtue of its illumination. It sends a strong message that criminal actions will not go unnoticed, making potential wrongdoers think twice before engaging in unlawful acts.

Conversely, poorly lit areas take on a contrasting allure. Inadequate illumination can turn these areas into attractive targets for criminal endeavors, as darkness shrouds their actions

and minimizes the risk of being observed or identified. It underscores the critical importance of robust street lighting in deterring criminal behavior.

As a result, the mapping of crime incidents and the study of the spatial relationship between crime and lighting conditions furnish a comprehensive view of street lighting's impact. It's a testament to the power of illumination in urban security, where well-designed street lighting emerges as a significant deterrent, reshaping the urban landscape to create safer, more secure environments.

Surveys are another invaluable tool in the assessment of street lighting efficacy. They involve collecting the perceptions and sentiments of urban residents regarding their safety, especially during nighttime. The mere presence of quality street lighting has a profound impact on how communities perceive their own security. Research consistently demonstrates that residents living in well-lit areas feel safer, more secure, and more inclined to utilize public spaces during the evening hours. The increase in perceived safety is a testament to the efficacy of improved street lighting in reducing the fear of crime, often considered a dark figure lurking beneath the surface of reported criminal activities⁴⁸. Moreover, residents' willingness to engage with their communities after dark fosters a vibrant urban environment and stimulates local economic activities⁵⁸.

Statistical analyses serve as the quantitative backbone of assessments on street lighting efficacy. By comparing crime rates in well-illuminated areas with those in poorly lit counterparts, researchers can measure the impact of lighting on crime reduction. These analyses not only validate the findings from crime mapping and surveys but also provide concrete figures and probabilities. They enable researchers to confidently state that improved street lighting systems significantly contribute to the reduction in crime rates, thereby enhancing urban security⁴¹.

The compelling body of evidence from numerous studies resoundingly affirms the profound and versatile impact of improved street lighting. This seemingly unassuming element in the urban landscape serves as a mighty tool within the arsenal of urban security, replete with the power to deter criminal activities, diminish the fear of crime, and inspire communities to reclaim their public spaces during the night. The profound efficacy of well-designed street lighting systems is no longer a subject of debate; it's an established fact, illuminated by a plethora of rigorous methodologies and compelling findings.

Researchers, armed with their tools and methodologies, have painted a vivid picture of the multifaceted influence of adequate street lighting. As they delve into their investigations, their work invariably points to the same undeniable conclusion: well-illuminated urban areas exhibit lower crime rates, reduced fear of crime, and a resurgence of vitality in public spaces.

This knowledge, backed by empirical data and meticulously conducted research, is not a mere academic pursuit. It has real-world implications that extend far beyond research papers and data charts. The incorporation of this knowledge into the realm of urban planning and security strategies is not just advisable; it is essential for fostering the creation of safer cities and the enhancement of the overall quality of life for urban residents⁵⁰.

In the intricate tapestry of urban planning and security, well-designed street lighting emerges as a fundamental thread. It's woven into the very fabric of the urban landscape, and its radiance exerts a profound influence. The urban planner, armed with the knowledge of the power of illumination, has a potent tool to enhance safety and livability. In partnership with local authorities and researchers, they can harness the full potential of street lighting to illuminate the path toward safer, more secure urban environments.

This collaborative effort, where researchers provide insights, urban planners translate those insights into action, and local authorities lend their support, creates a synergy that is pivotal in unlocking the transformative potential of well-designed street lighting. As a beacon of security and community prosperity, street lighting plays a central role in enhancing the urban experience, ensuring that cities not only survive but thrive in a world where safety and quality of life are paramount.

The effectiveness of street lighting efficacy in urban security is a topic of substantial importance, as it directly impacts the safety and well-being of urban residents and visitors. To understand its significance, it's crucial to delve into the multifaceted dimensions of this effectiveness and how it contributes to the broader landscape of urban security.

At its core, the effectiveness of street lighting in urban security revolves around its capacity to deter criminal activities, enhance public perceptions of safety, and encourage the utilization of public spaces during nighttime. This concept extends well beyond the mere act of illuminating streets; it encompasses a more comprehensive influence on urban environments.

One of the most intriguing methodologies used in assessing street lighting efficacy is crime mapping, a technique that leverages geographic information systems (GIS). This methodology involves overlaying crime data onto maps with street lighting configurations. The findings of such studies often reveal a compelling narrative – areas with improved street lighting tend to experience a significant decrease in criminal activities, whereas poorly lit areas become attractive targets for criminal endeavors. The empirical evidence derived from this approach clearly demonstrates the direct link between adequate street lighting and reduced crime rates.

Beyond its impact on crime, the effectiveness of street lighting extends into the psychological realm. Research findings emphasize that well-lit streets reduce the fear of crime among urban residents. The fear of crime, often referred to as the "dark figure" of crime, can be as debilitating to the community's well-being as crime itself. When people perceive the environment as unsafe, especially during nighttime, they are less likely to venture outdoors, leading to a significant reduction in community engagement and social activities. Adequate street lighting acts as a catalyst in changing these perceptions, thereby encouraging more people to utilize public spaces and participate in the life of the city.

Moreover, well-lit streets promote a sense of safety and security among residents and visitors alike. They provide a visual assurance that public spaces are well-monitored and that potential risks are minimized. This assurance is particularly valuable during nighttime hours when visibility is naturally reduced. When people feel safer in their urban environment, they are more likely to venture out, patronize local businesses, attend social events, and contribute to the active, positive life of the city. This, in turn, promotes economic activities in urban areas during evening hours, fostering a vibrant and prosperous community⁴⁴.

In conclusion, the effectiveness of street lighting efficacy in urban security is multi-dimensional and profound. It extends beyond mere visibility and illuminates the broader aspects of security, perception, and community engagement. Incorporating this knowledge into urban planning and security strategies is essential for fostering safer cities and improving the overall quality of life for urban residents. This synergy between research, urban planning, and local authorities is pivotal in harnessing the full potential of well-designed street lighting as a beacon of security and community prosperity.

Technological Advances in Urban Security Systems:

In today's rapidly evolving urban landscape, the demand for enhanced security systems has prompted a shift toward adopting cutting-edge technologies. The integration of smart lighting and advanced surveillance systems, bolstered by innovations like the Internet of Things (IoT) and Artificial Intelligence (AI), has revolutionized urban security infrastructure. This transformation doesn't merely represent a leap in technological prowess but an evolution in how we safeguard our urban environments.

Smart lighting, for instance, represents a beacon of change. Traditional lighting systems, though essential for visibility, pale in comparison to the capabilities of their intelligent counterparts. Smart lighting harnesses the potential of IoT, allowing individual lights to be connected and controlled remotely through a central network. These systems respond to environmental cues, such as ambient light levels or motion, dynamically adjusting their intensity. This not only results in energy savings but also ensures that areas are consistently well-lit. Illuminated urban spaces, in turn, act as an essential deterrent to criminal activities⁴⁸. Criminals are less likely to target areas illuminated by smart lighting, which can provide a sense of safety for residents and visitors alike.

Furthermore, the power of AI in urban security systems cannot be overstated. AI, particularly when paired with surveillance systems, has the potential to transform urban security by delivering real-time insights and automated responses to security threats. Sophisticated algorithms can analyze video feeds and other data sources to detect anomalies or identify patterns indicative of potential security concerns. AI can, for example, distinguish between normal urban activity and unusual behavior that might signal criminal intent⁴⁷. This proactive approach to urban security significantly reduces response times and enhances the overall effectiveness of security measures.

IoT technology serves as the linchpin for many of these advances. It empowers different urban security components, such as surveillance cameras, lighting systems, and access control, to communicate and coordinate seamlessly. This interconnectivity provides real-time data that can be leveraged to make informed decisions and respond to evolving security situations.

Incorporating these technological advancements into urban security systems is a dynamic process that necessitates a collaborative effort among technology developers, urban planners, and law enforcement agencies. As the foundation of secure and well-illuminated urban spaces, these systems promise not only to deter criminal activities but also to provide a sense of security for residents and visitors.

In the ever-evolving landscape of urban security, technological advancements have emerged as a powerful force, reshaping the very foundations of how cities protect their residents and assets. The infusion of cutting-edge technologies has propelled urban security systems into a new era, one marked by unprecedented efficiency and effectiveness.

Among the most notable technological strides in the realm of urban security systems are the integration of smart lighting and sophisticated surveillance systems. The synergistic marriage of these innovations forms a linchpin of urban safety. Smart lighting systems utilize advanced sensors and control mechanisms to optimize illumination, adapting to real-time conditions. These systems are not mere bulbs; they are dynamic entities that respond to environmental cues. As daylight wanes or weather conditions change, they adjust their brightness, ensuring that the urban landscape remains well-lit and safe. The integration of such systems not only enhances the visibility of public spaces but also contributes to substantial energy savings, making it a sustainable choice.

Simultaneously, urban areas are witnessing a revolution in surveillance systems. These systems have transcended traditional closed-circuit television (CCTV) setups, evolving into smart, interconnected networks. High-definition cameras, linked via the Internet of Things (IoT), have become ubiquitous. These cameras serve as vigilant sentinels, recording every movement and incident. The transformation doesn't stop at just capturing data. Artificial Intelligence (AI) takes center stage here, as it is employed to analyze the immense volumes of visual data in real-time.

The adoption of IoT and AI introduces a paradigm shift in urban security. Sensors, cameras, and other devices communicate seamlessly through interconnected networks. This interconnectedness provides real-time data that is the lifeblood of modern urban security. The IoT is the pulse of the city, providing instant insights into conditions and events. If a streetlight falters or a disturbance occurs, the system responds autonomously. It's not just about capturing footage; it's about deciphering it intelligently. AI algorithms scan video feeds, identifying patterns and anomalies. Suspicious behaviors are flagged, and automated responses are initiated.

For example, if an unauthorized individual enters a restricted area, the system immediately detects the intrusion and can trigger a range of responses. It may sound an alarm, alert security personnel, or even change the lighting pattern to spotlight the intruder, all without human intervention. This real-time, automated decision-making is a game-changer in urban security.

Furthermore, the integration of these technologies extends beyond mere crime prevention. They contribute to disaster management, traffic control, and even urban planning. For instance, in the event of a natural disaster, these systems can reroute traffic, send alerts to residents, and help emergency services coordinate their response effectively.

The efficiency and intelligence brought by IoT and AI have ushered in a new era of urban security. These technological marvels provide an immediate response to threats, mitigating risks, and reducing response times. Residents, businesses, and city officials benefit from increased safety, more sustainable urban environments, and optimized urban functions.

In conclusion, the integration of technological advances like smart lighting and surveillance systems, fueled by IoT and AI, marks a paradigm shift in urban security. These technologies have ushered in an era where cities can proactively respond to security threats, optimize energy usage, and improve the overall quality of urban life. As these innovations continue to evolve, the future of urban security holds promise for even greater efficiency and safety.

2.3 Review of Empirical Studies

A preliminary literature review indicates that previous work has mainly focused on understanding and modeling specific types of constraints, such as: Examples: street lighting technology, crime, etc. Limited progress has been made in comprehensively discussing other road safety systems. Different approaches are recommended for modeling and constraint solving.

2.3.1 Poverty and Urban Security

Researchers in the field of crime and security therefore continue to seek further avenues to better understand these issues. Security experts, therefore, have responded to public concerns and pressure from international organizations with a certain standard to create a safe environment in the form of sustainable, inclusive cities, government spending every effort is made to create a sense of security to justify an increase in Smart cities and emerging resilient niche cities⁵¹. Scientists have pinpointed poverty as the root cause of

insecurity. Many places in Nigeria, especially the study area of Southern Calabar Municipality, show traces of poverty and crime. Crimes such as armed robbery, cult activities, robbery and theft are common phenomena in the study area and are mainly committed by young people in the area⁵². The report also shows that crime in big cities is largely committed by people living in extreme poverty due to unemployment, low living standards and high levels of illiteracy. Given the level of poverty and insecurity in Nigeria, it is surprising that few studies have documented the link between her two social phenomena in Nigeria. It is common to designate parts of Nigeria's metropolitan areas as high-crime or high-risk areas.

Ikorodu in Lagos, Ikwerre in Rivers State, Warri in Delta State, etc., from this context, it is clear that some areas have characteristics that promote or increase crime and violence. People are defined as poor when their standard of living, measured in terms of income or consumption, is below the poverty line, which is also the criterion that separates the poor from the rich⁵³. Poverty is the lack of basic material needs and income. It is a generalized state of deprivation that includes specific inferiority complexes, isolation, physical weakness, vulnerability, powerlessness and humiliation. The poor are those who cannot maintain a decent income, stable work, property, or healthy living conditions. Poverty is a social condition that leads young people to crime⁵⁴. Poor people become involved in crime because of relative poverty and desperate need. The poor and unemployed in Nigeria rely on crime as a means of subsistence. Poor young people are involved in armed robbery, fraud, and kidnapping and election violence. Poverty is one of the reasons why young people in today's society turn to criminal activity. Studies show that lack of basic needs poses a major threat to life security. Crime rates are higher for those who do not have the means to meet their basic needs. In other words,

2.3.2 Unemployment and Urban Security

Unemployment is a global phenomenon in which a nation's eligible workforce withdraws from national service. Not only is this a serious economic problem, but it also has social consequences that directly or indirectly affect nearly every country and every person. It is also a harbinger of the wave of crime, ongoing youth unrest and unstable socio-economic structures plaguing some countries. The recent riots in the Middle East and North Africa, as well as the 2011 riots in the UK, and several others, may have been caused by rising unemployment rates in these countries. The world, especially developing countries like Nigeria, are currently facing major employment problems and widespread decent work deficits, a trend that could increase the spread of poverty. Unemployment has pushed many Nigerians into various activities that threaten the country's security.

In some cases, young university graduates have been arrested for being involved in certain crimes. Most of these criminal school graduates attribute their involvement in these crimes to domestic unemployment. For example, a news magazine cover story (September 26, 2011) was titled "The Prowling Graduate Student Bandit." Most of the college robbers interviewed said they did it because there was no job, the report said. Furthermore, due to the collapse of infrastructure, such as electricity and the well-maintained road network that the government should provide, small and medium-sized enterprises that provide employment opportunities for the unemployed are rapidly declining. Many artisans such as cabinet makers, welders, aluminum window makers and tailors who cannot afford a generator are currently out of work. Many Nigerian youths are desperate and have started riding multi-purpose motorcycles, while others are engaged in street vending just to keep themselves physically and mentally fit. Unlucky people like the late Tunisian Mohamed Bouazizi have had their goods confiscated for violating anti-hawk laws.

The whole world knows what happened after that because so many countries still do not know peace. Especially because globalization plays a role in ensuring that peace spreads across borders. In addition, the banking sector, one of the largest employers of workers, has recently been forced to cut jobs due to the country's banking reforms, which has increased the number of unemployed. The situation continues, as the recent acquisition of Intercontinental Bank by Access Bank and Oceanic Bank laid off even more bankers. The rising unemployment rate in Nigeria is believed to be due to the country's deteriorating security situation. Most young people who drop out of school end up unemployed in their own countries due to lack of policies.

2.3.3 Climate Change and Urban Security

Climate change is widely regarded as humanity's greatest contemporary challenge. Thirty years after the Intergovernmental Panel on Climate Change (IPCC 1990) published its First Assessment Report in 1990, an exceptional growth in interdisciplinary research has progressively been able to demonstrate that the climate is changing, that anthropogenic emissions are the dominant cause of this change, and that both natural and human systems are impacted by climate change in complex ways⁴⁸. Against the backdrop of the gradual maturing of the research field, additional contributions of this special issue offer new perspectives on the developments of the field at large. Specifically, some scholars shared insights from other climate change research fields and highlight how climate–conflict research can benefit from interdisciplinary collaboration, integration of diverse methods and lines of evidence, and iterative engagement between scientists, practitioners, and policymakers. Another scholar also discussed whether the focus and central tenets of research have changed as the literature has evolved from the original thesis of Malthus through the neo Malthusian emphasis on environmental scarcities to the contemporary climate security discourse. He said that while

the stakes now appear to be higher, little has changed in substance, and the debate continues to be dominated by wary pessimists and complacent optimists⁶⁰. Finally, the difference between the current research focus and broader concerns in the political community highlights a critical lack of knowledge about effective policy responses to the challenge of climate change, particularly with respect to peace building and internal conflict⁶⁰.

2.3.4 Demographic Change and Urban Security

In many developing countries, especially in sub-Saharan Africa, there is a rapid migration of population from rural areas to urban centers, a process known as urbanization⁶¹. This rapid urbanization in sub-Saharan Africa is taking place against the backdrop of: The impact of macroeconomic stability and growth in many countries on the continent⁶². Another comment on Africa's macroeconomic growth in recent decades noted that "a minority of elites are disproportionately benefiting, leaving the poor and the unemployed behind." Current growth is neither inclusive nor democratic. Unregulated informal economic activity is prevalent in African urban areas, both in terms of the number of informal workers and the goods and services provided by the informal economy. Against the backdrop of economic growth and urbanization, urban crime is on the rise in Africa, largely due to weak government institutions and limited infrastructure and services, such as the police⁶³. Regarding rapid urbanization and its link to urban safety and security, he said: "The sprawl of urban space is actually hindering the ability of national and local governments to secure cities and provide basic social infrastructure such as health, education, and water and sanitation facilities"⁶⁴. At the same time, the unplanned nature of cities not only overwhelms basic infrastructure and services, but also state police⁶⁵. The link between development and

crime has received considerable theoretical and empirical attention in developed countries from the early 19th century through the 20th century⁶⁵.

2.3.5 Income Level and Insecurity

Anti-social behavior by young people poses a major challenge to the well-being of people in Nigeria and the world at large. A researcher studied juvenile criminal behavior and concluded that low parental income was one of the causes of criminal behavior and insecurity in Nigeria⁷³. Given the above issues and other global and regional trends, many researchers agree that the basis for juvenile criminal behavior is the type of home in which the child was raised. If you live in a single-parent household instead of a two-parent household, it becomes more difficult financially to raise a child on your own, making parenting more difficult. Single-parent families are often financially weaker than two-parent families. These unfortunate economic conditions can lure young people into crime-ridden, chaotic areas. Low parental income is also closely related to juvenile delinquency. It can also be argued that low income directly influences and influences the criminal behavior perpetrated by those interested in this practice⁶². Crime is caused by society even though it does not bring any benefits to society, yet crime is a manifestation of poor organization in society, and moreover, socioeconomic status and low income are the reasons why children drop out of school⁵⁹.

They used average real and salary payments per employed worker, unemployment rates, and unemployment compensation to estimate "opportunity wages." Opportunity wages are based on the rational decision assumption that cheap, legal ways to earn wages should reduce crime because the opportunity cost of crime is higher. They also measured real income per capita to reduce the likelihood that wage increases would have a positive impact on property crime, as theft may increase in these high-wage areas. Finally, they decomposed the model into secretarial wages, taking into account the potential for high-skilled jobs to displace low-skilled workers, which could influence crime.

2.4 Conceptual Model

The conceptual framework schematizes the relationship between two variables in this study with street lighting strategy considered as the independent variable and the dependent variable being the manipulated crime control measure. Therefore, it is believed that improved street lighting strategies through the use of photovoltaic or power energy lighting systems can effectively contribute to urban safety in specific areas. The chart below shows how improving street lighting strategies through the use of efficient lighting systems can have a deterrent effect on crime. Oyo state will benefit from the introduction of solar and electric energy lighting systems along the roads, as well as improved city safety management techniques such as police patrol, surveillance, information gathering, and the arrest and prosecution of criminal suspects of road crime rates will decrease.

2.5 Synthesis of Gaps Identified

While some benefits of street lighting have been cited, including improved psychological outcomes for urban residents and reduced overall crime rates, it is important to consider effective and realistic lighting limits. On the one hand, light pollution is a major concern for city planners. Residents want to minimize obstructions when viewing the night sky. At the same time, residents want to keep their homes safe and said endless lighting is not the solution. Exploring the links between lighting and safety and aesthetic demands for urban dwellers in Oyo State has been understudied and offers opportunities for further research themes. The environmental impact of city lights is also worth considering. The human ability to extend activity into the night through light directly affects animals whose active period begins at sunset. In a study of the bat species *R. hipposideros*, typical urban light significantly disrupted the timing of bat activity and typical migratory patterns, which could cause bats to miss feeding windows, indicating that the bat species' concluded that it could

lead to extinction^{11,68}. Just an example. Extrapolating these results to other nocturnal species is not unreasonable, but risks serious ecological disruption though. Although, we cannot condemn the use of street lighting due to the above negative effect that street lighting contributes to animal living in our environment. That is, security for human live and their environment is very important than to condemn street lighting because of birds.

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Chapter Three

Methodology

This chapter describes the study design, study population, sample size, data collection methods and analysis.

3.2 Data Types and Sources

This research incorporates both primary and secondary data. Primary data, obtained through structured questionnaires, provides insights into respondents' socioeconomic profiles, urban safety challenges in Oyo State, ongoing initiatives suggested to address urban unrest, and the impact of street lighting on crime incidence. Additionally, it captures crime rates, challenges associated with street lighting in Oyo, and strategies for alleviating security concerns in urban areas. Respondents' perceptions regarding urban safety issues and street lighting projects are also gathered. On the other hand, secondary data encompasses the population statistics of the study area and community boundaries within the existing Senate constituencies of the state.

Table 3.1: Research Log-frame

Objectives	Types of Data	Objectively Verifiable Indicators (OVI)	Sources of Data and Instruments	Method of Data Analysis
Evaluate socioeconomics characteristics of resident and commercial driver/park manager in the study area	Socioeconomic Characteristic s	Age and Gender of resident and commercial driver/pack manager Highest Education Qualification; Occupational Status	Questionnaire Survey	Data was analyzed using table frequency count, and simple percentage
Examine the type and nature of urban security challenge	Primary	Types of urban security: Theft, Vandalisation of infrastructure, armed robbery, Kidnapping etc	Respondents: Questionnaire Administration	The response options of the questionnaire were allocated score as follows SA=4, A = 3, D=2 SD=1: As the case may be. A Criterion mean for the study is 2.50 and above
Assess existing efforts to curb urban insecurity in the study area	Primary data Existing efforts to curb urban insecurity	Streets with street light, Police and Amotekun security patrols, Motor Pack lightings system gated community, community policing e.g. (Vigilante, O.P.C)	Respondents: Questionnaire Administration	Data will be computed using 4-likeert scale SA=4, A = 3, D=2 SD=1: As the case may be. A Criterion mean for the study is 2.50 and above while 50% is the cut off for percentage.
Examine the impact of street lighting on the incidence and rate of crime.	Residents Perception of street light infrastructure	Frequency of crime incidence: the fit armed robbery, kidnapping, Vandalization of street light, (ii) Severity of incidence	Respondents: Questionnaire Administration	This Section will be analyzed using cross tabulation ANOVA. So that mean score will be determined or content Analysis of key information interview (Kii)
Challenges facing street	Residents perception of	Poor technology, Vandalization of	Respondents:	Data will be computed using 4-likeert scale

lighting as a strategy in crime management in the study area	Street light infrastructure	street light appraisal installation and maintenance	social and	Questionnaire Administration	SA=4, A = 3, D=2 SD=1: As the case may be. A Criterion mean for the study is 2.50 and above while 50% is the cut off for percentage.
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Source: Author's Proposition, 2023

3.3 Sample Population and Size

The drivers and road users in the three (3) senatorial districts in Oyo state are to form the target population for this study.

The Sample Size is calculated using Taro Yamane formula¹.

$$n = \frac{N}{1 + Ne^2}$$

Where n = sample size

N = population size

Reliability level i.e.=0.05

Or; e = level of precision always set the value of 0.05

$$n = \frac{4,056,798}{1+(4,056798)(0.05)^2}$$

$$n = 396.7$$

$$n = 400$$

This study will draw respondents from the drivers and other road users plying the selected roads in Oyo State (see Table 3.2).

Table 3.2. Roads with Street Light projects and the Selected Roads for the Study

S/N	Senatoria	Cities	Areas with Street-light Project	Selected Roads	No of respondents
1	Oyo South	Ibadan	Ojoo to Sango; Sango to Mokola; Mokola to Dugbe; Dugbe to Oke-Ado; Oke-Ado to Molete; Challenge to High Court; High Court to Akinyemi; Akinyemi to One-Ten; One-Ten to Iyaganku; Iyaganku to Alesinloye; Alesinloye to Eleyele; Eleyele to Sango; Beere market to Total garden; Total garden to Secretariat; Secretariat to Awolowo; Awolowo to Bodija; Bodija to UI; UI to Ojoo; Ojoo to Iwo road; Iwo road to Idiape; Idiape to Gate market	Ojoo to Sango Beere Market to Total Garden Challenge to High Court	111 111 112
				Total	334
2	Oyo Central	Oyo Town	Folatyre to Owode; Owode to Old national park; Idi Igba to Ilora; Owode to Akesan market; Akesan to Palace; Palace to Oke –Ebo; Oke-Olola to Agupopo; Akesan to Akinmonrin; Oke – Apo to Mobolaje; Idigedu to Sabo	Folatyre to Owode Akesan to Palace Idi Igba to Ilora	14 14 14
				Total	42

3	Oyo North	Ogbomo so	Hamama Area to Aduin junction; Aduin Junction to Nurudeen pry school; Orita Naira to Startlight junction; Startlight hospital to under G; Under G to LAUTECH; LAUTECH second gate to Stadium; Katangu to Nurudeen Pry School; Odeloba to IsaleOra Junction; Isaleora Junction to Owode Police station; Owode Police Station to Ile Iwe junction; Ile IweJunction to Ogbegun Area; Ogbegun area to Kere; Orita Naira to Masifa Idi Araba; Idi Araba to Ojagbo; Ojagbo to OkeElerin; Sekoni to Takie Junction; Takie Junction to OjaAkande; OjaAkande to High School; Takie Junction To OkeBebi; OkeBebi to Ikose; Agboyin to OkeElerin; Takie Junction to Olomi Area	Takie Junction to Olomi Area LAUTECH second gate to Stadium Ogbegun area to Kere Total	8 8 8 24
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Source: Author's Fieldwork, 2023

Table 3.3: Size of the Respondents

S/N	Senatorial Districts	Cities	Population	Population	Sample Size
			2006	2023	
1	Oyo South Senatorial District	Ibadan	3,383,000	3,383,001.7	334
2	Oyo Central Senatorial District	Oyo Town	428,798	428,799.7	42
3	Oyo North Senatorial District	Ogbomosh	245,000	245,001.7	24
		o			
		Total	4,056,798	4,056,803.1	400

Source: Author's Proposition, 2023; NPC 2006 Population Figure

3.4 Study Area

Oyo State was created in 1976 from what was then the western region and takes its name from the ancient Oyo empire. The state has three Senatorial districts: Oyo South, Oyo Central, and Oyo North. Located in central-western Nigeria, Oyo State covers a total area of 28,454 square kilometers and is bordered by Ogun State to the south, Kwara State to the north, and parts of Ogun State and the Republic of Benin to the west. It is located in the east of Osun State. The Yoruba, along with other residents and foreigners, make up the majority of the population of Oyo State. Oyo State is he one of the most visited states in the country. Major tourist attractions in the state include Old Oyo National Park, Agodi Botanical Gardens, Lake Add Away, Mapo Hall, University of Ibadan Zoo, Ido Cenotaph and Trans Wonderland Amusement Park, all within the state³.

The selection of the study area was random and focused on three cities, namely Ibadan, Ogbomosho, and Oyo. These cities were chosen due to their distinction of having the highest concentration of streetlights within the Senate constituencies of Oyo State. Furthermore, the presence of numerous parking lots in these urban areas, equipped with the current Parking

Management System (PMS) approved by the Oyo state government, is anticipated to contribute significantly to fulfilling the research objectives.

Ibadan is the capital and most populous city in Nigeria's Oyo state. With a total population of 3,383,000 in 2006, 4 of her metropolitan area is home to more than 6 million people, making her the third largest city in Nigeria after Lagos and Kano. Geographically, it is the largest city in the country. At the time of Nigeria's independence in 1960, Ibadan was the largest and most populous city in Nigeria and her second largest city in Africa after Cairo. Ibadan is located in southwestern Nigeria, 128 km (80 miles) inland northeast of Lagos and 530 km (330 miles) southwest of the federal capital Abuja. It is an important transit point between the country's coastal and inland areas. Ibadan has been the administrative center of the Old West since the early days of British colonial rule, and some of the city's old walls still stand. The city's main inhabitants are the Yoruba and various communities from other parts of the country (especially Igbo, Hausa and Efiq)⁴.

The selection of the study area was random and focused on three cities, namely Ibadan, Ogbomoso, and Oyo. These cities were chosen due to their distinction of having the highest concentration of streetlights within the Senate constituencies of Oyo State. Furthermore, the presence of numerous parking lots in these urban areas, equipped with the current Parking Management System (PMS) approved by the Oyo state government, is anticipated to contribute significantly to fulfilling the research objectives.⁵.

In addition, Oyo City is an ancient capital located in Oyo State, Nigeria, with a total population of 428,798 in 2006. The city is part of the Oyo Central Senate constituency. Founded in the 1830s as the remnant capital of the historic Oyo Empire, it is known locally as 'New Oyo' (Òyó Àtìbà) to distinguish it from 'Old Oyo' (Òyó), the former northern capital, abandoned as a result of the Yoruba War of Independence. Most of the inhabitants are Yoruba and its ruler is Alafin of Oyo.

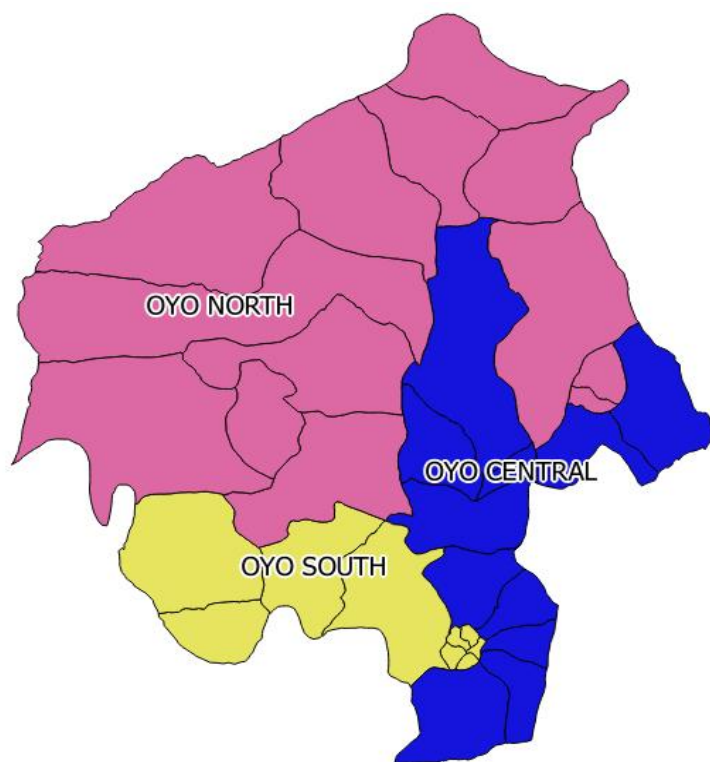


Figure 3.1: Map of Oyo State Showing the Three Senatorial Districts

Source³

Do Not Copy, Lead City University, Nigeria

3.5 Method of Data Collection

This study embraced the use of random sampling techniques in which case the following sampling procedures were employed in data collection. The entire senatorial districts of the state were selected. Within these senatorial districts, one major town and were adopted from where some of the major roads were randomly selected (see Table 3.3). In administering the questionnaires, drivers, park managers and other motorist were the primary focus. However, where the park managers are not available, others staffs in the park was sampled. The determination of drivers was subjected to random systematic approach where the first motorist was chosen at random and every other motorist was chosen until the number of questionnaires allotted to the locality was exhausted.

Table 3.3: Number of Questionnaires to be administered on selected roads

S/ N	Cities	Selected Roads	Residents	Commerc ial Driver	Park Management	Population
1	Ibadan	Ojoo to Mokola	50	31	30	111
		UI to Beere	48	34	29	111
		Ojo to Iwo road	55	32	25	112
		Total	152	97	84	334
2	Oyo Town	Idigedu to Sabo	7	4	3	14
		Oke-Olola to Agupopo	6	4	4	14
		Akesan to Akinmonrin	8	5	1	14
		Total	21	13	8	42
3	Ogbom oso	Under G to LAUTECH				8
		Isaleora Junction to Owode Police station	5	2	1	8

Ojagbo to OkeElerin	3	3	2	8
Total				24

Source: Author's Proposition, 2023 Road in Major Towns purposively sampled

3.6 Measuring Variables

The variables used in this study are called objectively verifiable indicators

(OVI), including:

I. Socioeconomic Characteristics of Residents and Commercial Drivers/Parking Managers:

These variables are recorded as nominal (gender), ordinal (age, education), and interval (income, years of driving experience).

ii. Measurement the nature and characteristics of the city's security challenges:

It contains seven items measured on a four-Likert scale. The scoring method is based on:

Strongly agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, and strongly disagree (SD) = 1

3.7 Methods of Data Analysis

Socioeconomic Characteristics of Residents and Commercial Drivers/Parking Managers

The study used cross-tabulation tables to analyze the socioeconomic characteristics of the respondents. Characteristics (gender, age, education level, and years of driving experience) were analyzed using descriptive and statistical means. Frequency counts are used to analyze some data.

Types and nature of urban security challenges:

This section was analyzed using the descriptive statistics table. Percentages and means are used to calculate the intercept.

Existing efforts to curb urban insecurity:

Existing efforts to curb urban anxiety in Oyo State were analyzed using a 4-Likert scale to determine if there were spatial differences. However, observable variation was subjected to a descriptive chi-square test to confirm significance.

Impact of street lighting on crime frequency and incidence

The purpose of this section was to investigate the impact of street lighting on crime frequency and incidence in Oyo State. This section was analyzed using four Likert scales: very low impact (VLI) -1, no impact (NI) -2, low impact (LI) -3, high impact tested by multiple regression (HI)-4. Oyo Street Lighting Challenges: This section was analyzed using simple percentages.

$P = f/N \times 100$ where:

P = percentage;

F = frequency to be converted to percent.

N = number of frequencies

Strategies to mitigate urban security challenges in Oyo state. Data were collected from fieldwork and will be analyze using inferential statistical tools. This were answered using frequency counts, mean and standard deviation. The mean used for decision making was 2.5, Mean scores from 2.5 and above was accepted while scores below 2.5 was rejected. Four points Likert scale were used in rating the responses of the respondents as follows: Strongly Agree (SA) 4 points, Agree (A) 3 points, Disagree (D) 2 points and Strongly Disagree (SD) 1 point.

Endnotes

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Chapter Four

Results and Discussion of Findings

This chapter presents details of the research findings, analysis, interpretation, and discussion. Data were collected from residents, road users, and commercial drivers/parking managers in the three Senate constituencies of Oyo State, Nigeria. This study investigates the impact of street lighting on the urban security system in Oyo state, Nigeria, and proposes strategies to promote a safe environment for living, working and survival in the study area. To obtain the data for this study, a research tool called 'Street Lighting Evaluation in Urban Security Systems in Oyo State' was used. 400 copies of the "Street Lighting Evaluation of Urban Security Systems in Oyo State" were produced and distributed to residents, road users and commercial drivers/parking managers in his three Senate constituencies in Oyo State, Nigeria. It was 397 of the surveys were returned. Meanwhile, 378 copies were validated for analysis. As a result, the response rate was 94.5%.

This chapter considered the analysis of the social economic characteristics of the respondents. Research questions were all answered using mean decision of 2.5 and chi-square statistical tool.

4.2 Presentation of Research Questions

Research Question One: What is the socioeconomic characteristics of resident and commercial driver/park manager of the study area?

Table 4.1: Socioeconomics characteristics of resident and commercial driver/park manager of the respondents

Variable	City	Description	%	X ²	P-Value			
Gender	Ibadan	Male	84.0	1.595	0.450			
		Female	89.0					
	Oyo	Male	10.0					
		Female	7.3					
	Ogbomosho	Male	5.9					
		Female	3.7					
	Age	Ibadan	<35yrs			96.7	29.768	0.000
			36- 45yrs			85.9		
			46-55yrs			87.5		
			56-65yrs			62.9		
>65yrs			68.4					
Oyo		<35yrs	3.3					
		36- 45yrs	7.8					
		46-55yrs	7.5					
		56-65yrs	28.6					
		>65yrs	15.8					
Ogbomosho	<35yrs	0.0						

		36- 45yrs	6.3		
		46-55yrs	5.0		
		56-65yrs	8.6		
		>65yrs	15.8		
Marital Status	Ibadan	Single	84.4	183.051	0.000
		Married	96.4		
		Divorced/Separated	10.0		
		Widowed	7.7		
	Oyo	Single	12.5		
		Married	2.4		
		Divorced/Separated	50.0		
		Widow	53.8		
	Ogbomosho	Single	3.1		
		Married	1.6		
		Divorced/Separated	40.0		
		Widow	38.5		
Religion		Traditional	88.4	4.325	0.364
		Islam	82.4		
	Ibadan	Chrstianity	89.6		
		Traditional	7.0		
	Oyo	Islam	11.9		
		Chrstianity	5.6		
	Ogbomosho	Traditional	4.7		
		Islam	5.7		

		Chrstianity	4.8		
Tribe	Ibadan	Yoruba	86.0	4.468	0.614
		Hausa	80.0		
		Igbo	90.2		
		Others	78.9		
	Oyo	Yoruba	9.3		
		Hausa	12.0		
		Igbo	6.1		
		Others	12.3		
	Ogbomosho	Yoruba	4.7		
		Hausa	8.0		
		Igbo	3.7		
		Others	8.8		
Educational Qualification of Respondents	Ibadan	Primary	81.0	6.332	0.787
		SSCE	80.9		
		NCE/OND	89.7		
		HND/BSc.	90.9		
		Higher Degree	81.1		
	Oyo	Primary	14.3		
		SSCE	12.2		
		NCE/OND	6.2		
		HND/BSc.	5.5		
		Higher Degree	10.8		
	Ogbomosho	Primary	4.8		
		SSCE	7.0		
		NCE/OND	4.1		
		HND/BSc.	3.6		
		Higher Degree	8.1		

Daily income of respondents			1.018	0.985
	Ibadan	#1,000	85.4	
		#1,001- #2,000	86.3	
		#2,001- #3,000	85.7	
		#3,000	82.9	
	Oyo	#1,000	9.7	
		#1,001- #2,000	8.8	
		#2,001- #3,000	7.1	
		#3,000	11.4	
	Ogbomosho	#1,000	4.9	
		#1,001- #2,000	4.9	
		#2,001- #3,000	7.1	
		#3,000	5.7	
Where does crime usually occur?			5.274	0.72
	Ibadan	Area with non-functioning street lighting.	92.2	
		Areas with street lighting.	83.3	
	Oyo	Area with non-functioning street lighting.	11.1	
		Areas with street lighting.	3.3	
	Ogbomosho	Area with non-functioning street lighting.	5.6	
		Areas with street lighting.	4.4	
Occupation of respondents			56.731	0.000
	Ibadan	Residents	89.0	
		Drivers	83.8	

	Park Managements	11.1
	Passengers	40.0
Oyo	Residents	7.6
	Drivers	9.5
	Park Managements	55.6
	Passengers	20.0
Ogbomosho	Residents	3.4
	Drivers	6.8
	Park Managements	33.3
	Passengers	4.0

Source: Fieldwork, 2023

Table 4.1 shows the socioeconomics characteristics of the participant of the study. The table is divided into various variables, and for each variable, there is information related to the city (Ibadan, Oyo, and Ogbomosho), a description of the characteristic, the percentage of respondents falling into that category, the X² value, and the P-value. Gender: The data shows the distribution of male and female respondents in different cities. For example, in Ibadan, 84% of respondents are male, and 89% are female. Age: It provides the age distribution of respondents in different cities, categorized into age groups. For instance, in Ibadan, the majority (96.7%) of respondents are below 35 years old, while only 29.768% of respondents in Oyo fall into the same age group. Marital Status: This variable shows the marital status of respondents in different cities. In Ibadan, a significant percentage of respondents are married (96.4%), while in Oyo, there is a higher percentage of divorced/separated individuals (50.0%). Religion: It presents the religious affiliation of respondents. For example, in Ibadan, the majority are Christians (89.6%), followed by Islam (82.4%). Ogbomosho has a more diverse religious distribution. Tribe: This variable highlights the ethnic background of respondents, with Yoruba being the dominant tribe in all cities. Educational Qualification: It demonstrates the educational background of respondents. In Ibadan, the majority have NCE/OND (89.7%)

or HND/BSc. (90.9%) qualifications. Daily Income: This shows the daily income range of respondents in different cities. For instance, in Ibadan, a substantial percentage earn between #1,001 and #2,000. Where Crime Occurs: This variable indicates where respondents believe crimes usually occur. In Ibadan, the majority associate crime with areas having non-functioning street lighting (92.2%). Occupation: It reveals the occupation of respondents. In Ibadan, most respondents are residents (89.0%), while in Oyo, there is a higher proportion of park managements (55.6%).

Research Question Two: What are the types and nature of urban security challenges in Oyo State?

Table 4.2: Types and nature of urban security challenges in Oyo State (N = 378)

S/ N	Items	Strongly Agreed (%)	Agreed (%)	Disagreed (%)	Strongly Disagreed (%)	Mean (X)	Remark
1	vandalization of street light and other infrastructure,	239 (63.23)	121 (32.01)	11 (2.91)	7 (1.85)	3.57	Strongly Agreed
2	Robbery	249 (65.87)	111 (29.37)	5 (1.59)	13 (3.17)	3.58	Strongly Agreed
3	house and store breakings.	148 (39.15)	205 (29.37)	6 (1.59)	19 (5.03)	3.28	Agreed
4	theft/stealing,	225 (59.52%)	139 (36.77)	9 (2.38)	5 (1.32)	3.54	Strongly Agreed
5	grievous hurt and	225	90	40 (10.58)	23 (6.08)	3.37	Agreed

	wounding,	(59.52)	(23.81)				
6	murder,	185	102	46 (12.17)	45 (11.90)	3.13	Agreed
		(48.94)	(26.98)				
7	Rape	200	100	52 (13.76)	26 (6.88)	3.25	Agreed
		(52.91)	(26.46)				
Average Overall Mean						3.39	

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 4.2 above shows the result of the Types and nature of urban security challenges in Oyo State with total respondents of 378. The table revealed that the respondents generally agreed to most of the items with an average overall mean of $\bar{x} = 3.39$.

The table presents the respondents' attitudes towards various urban security challenges. The items are rated on a scale from "Strongly Agreed" to "Strongly Disagreed," and the corresponding percentages of respondents falling into these categories are provided.

It's evident that the majority of respondents "Strongly Agreed" or "Agreed" with most of the items, resulting in an average overall mean of 3.39.

Notably, the most concerning security challenges in the area, as indicated by the highest "Strongly Agreed" percentages, include the vandalization of street lights and other infrastructure (63.23%), robbery (65.87%), theft/stealing (59.52%), and grievous hurt and wounding (59.52%). These challenges received strong consensus from the respondents, reflecting their significant concern.

While "Agreed" responses were also notable for house and store breakings (39.15%), murder (48.94%), and rape (52.91%), these issues didn't receive as strong consensus as the aforementioned challenges but still represented noteworthy areas of concern.

The findings highlight that urban security challenges, particularly vandalism, robbery, and theft, are a pressing issue in the area, and measures to address these concerns should be a priority. Overall, the average mean of 3.39 reflects a notable level of agreement among the respondents regarding the severity of these security challenges.

Research Question Three: What are the existing efforts put in place by government to strengthen security system in the study area?

Table 4.3: Existing efforts put in place by government to strengthen security system in Oyo State (N = 378)

S/ N	Items	Strongly Agreed (%)	Agreed (%)	Disagreed (%)	Strongly Disagreed (%)	Mean (X)	Remark
1	There are street lightings within my streets	249 (65.87)	111 (29.37)	5 (1.32)	13 (2.44)	3.58	Strongly Agreed
2	Police and Amotekun security patrols within the streets and motor park enhanced security especially at night	230 (60.85)	140 (37.04)	2 (0.53)	6 (1.59)	3.57	Strongly Agreed
3	Streets and motor park lightings system are reinforced by solar lighting system	210 (55.56)	144 (37.04)	11 (0.53)	13 (3.44)	3.46	Agreed
4	All terminal stations within Oyo state have well-lit street lightings system in place	191 (50.53)	154 (40.74)	15 (3.97)	18 (4.76)	3.37	Agreed
5	Organize neighborhood safety by the residents of	211 (55.82)	124 (32.80)	19 (5.03)	24 (6.35)	3.38	Agreed

Oyo State							
6	Installation of adequate security systems like CCTV on road prone to crime	111 (29.37)	224 (59.26)	6 (1.59)	37 (9.79)	3.08	Agreed
7	Collaborations between informal policing groups and the Nigeria Police Force to guarantee better security for residents of Oyo State	251 (66.40)	114 (30.16)	6 (1.59)	7 (1.85)	3.61	Strongly Agreed
8	Creating a cleaner neighbourhood cutting of overgrown trees, bushes and hedges, run-down buildings, abandoned vehicles and litter everywhere	231 (61.11)	124 (32.80)	15 (3.97)	8 (2.12)	3.53	Strongly Agreed
Average Overall Mean						3.45	

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 4.3 above sought to investigate the existing efforts put in place by government to strengthen security system in Oyo State. The table generally revealed that majority of the

respondents strongly agreed to the items with overall average mean of 3.45. The items that were strongly agreed to were: there are street lightings within my streets (x= 3.58, 65.87%); Police and Amotekun security patrols within the streets and motor park enhanced security especially at night (x= 3.57, 60.85%); Collaborations between informal policing groups and the Nigeria Police Force to guarantee better security for residents of Oyo State (x= 3.61, 66.40%); and creating a cleaner neighborhood – cutting of overgrown trees, bushes and hedges, run-down buildings, abandoned vehicles and litter everywhere (x= 3.53, 61.11%). Other items on the table further revealed that the respondents agreed to the items: Streets and motor park lightings system are reinforced by solar lighting system (x= 3.46, 55.56%); All terminal stations within Oyo state have well-lit street lightings system in place (x= 3.37, 50.53%); Organize neighborhood safety by the residents of Oyo State (x = 3.38, 55.82%); and Installation of adequate security systems like CCTV on road prone to crime (x=3.08, 59.26%).

Research Question Four: Does street lighting in Oyo State have any impact on the incidence and rate of crime in the study area?

Table 4.4: Impact of street lighting on the incidence and rate of crime in Oyo (N = 378)

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	200 (52.91)	135 (35.71)	19 (5.03)	24 (5.03)	3.35	Low Impact

assaults, vandalism and

gang of youths at night

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 above shows the result of impact of street lighting on the incidence and rate of crime in Oyo with an average overall mean of 3.55. The table generally reveals that the respondents agreed to most of the items on the table have very high impact. The items with the highest degree of impact are: they are afraid of going out in the night due to darkness (x=3.65, 71.69%); lighting reduces crime by improving visibility (x= 3.72, 74.34%); aid in police protection and enhanced sense of personal security (x=3.60, 66.4%), improve traffic flow at night by providing light, beyond that provided by vehicle lights (x= 3.64, 71.9%). In addition, the respondents of the study agreed that prevent road accident during night time (x=3.55, 69.21%) and that street lighting encourage residents to spend more time on their shops or in their front yards in the evenings and thus increase informal surveillance (x= 3.75, 76.73%). The items with the low impact were that street light promote business and commercial activities during the night time hours (x= 3.49, 58.57%); improved lighting deters potential criminals by increasing the risk that they will be seen or recognized when committing crimes (x= 3.18, 42.86%) and that street light improvement reduce threatening behavior, physical assaults, sexual assaults, vandalism and gang of youths at night (x = 3.35, 52.91%).

Research Question Five: 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	P
Poor funding of security sector				28.312	0.000
	Ibadan	Yes	88.1		
		No	50.0		
	Oyo	Yes	7.7		
		No	30.8		
	Ogbomosho	Yes	4.3		
		No	19.2		
Corruption				21.640	0.000
	Ibadan	Yes	88.6		
		No	63.0		
	Oyo	Yes	7.5		
		No	21.7		
	Ogbomosho	Yes	3.9		
		No	15.2		
Power failure				3.062	0.016
	Ibadan	Yes	87.6		
		No	80.8		

	Oyo	Yes	7.8		
		No	12.5		
	Ogbomosho	Yes	4.7		
		No	6.7		
Poor maintenance				1.487	0.040
	Ibadan	Yes	86.6		
		No	81.4		
	Oyo	Yes	8.6		
		No	11.6		
	Ogbomosho	Yes	4.8		
		No	7.0		
Lack of good maintenance of damaged cable, poles, e.t.c.				1.495.	0.034
	Ibadan	Yes	83.6		
		No	88.1		
	Oyo	Yes	10.5		
		No	7.5		
	Ogbomosho	Yes	5.9		
		No	4.4		
Vandalization of existing street lighting equipments by thugs				4.903	0.016
	Ibadan	Yes	82.1		
		No	90.3		
	Oyo	Yes	11.2		
		No	6.5		
	Ogbomosho	Yes	6.7		
		No	3.2		
The electrical cables are stolen by thieves				0.742	0.690
	Ibadan	Yes	84.3		
		No	87.3		
	Oyo	Yes	9.7		
		No	8.5		

	Ogbomosho	Yes	5.9		
		No	4.2		
Using counterfeit imported street light apparatus				6.639	0.36
	Ibadan	Yes	88.2		
		No	77.6		
	Oyo	Yes	7.5		
		No	14.3		
	Ogbomosho	Yes	4.3		
		No	8.2		
Low efficiency of street light bulbs				0.998	0.607
	Ibadan	Yes	86.2		
		No	84.0		
	Oyo	Yes	9.3		
		No	9.2		
	Ogbomosho	Yes	4.5		
		No	6.9		

Table 4.5 above depicts the challenges facing street lighting strategies as crime management within Oyo State. Poor Funding of Security Sector: The first challenge examined is the poor funding of the security sector. This challenge is identified as a significant concern in all three cities under study. In Ibadan, a substantial 88.1% of respondents perceive poor funding as a problem. In comparison, the percentages in Oyo and Ogbomosho are considerably lower, standing at 7.7% and 4.3%, respectively. The statistical analysis, reflected in the X² value of 28.312 and a very low p-value of 0.000, underscores a strong association between the city and the perception of poor funding. This suggests that the perception of poor funding varies significantly across the cities.

Corruption: Another major challenge highlighted by the respondents is corruption. In Ibadan, a staggering 88.6% of participants see corruption as a significant challenge. However, in Oyo and Ogbomosho, the percentages are notably lower, at 7.5% and 3.9%, respectively. The statistical analysis indicates a substantial association between the city and the perception of

corruption, with an X² value of 21.640 and a p-value of 0.000. This implies that there are significant differences in the perception of corruption across the cities.

Power Failure: The data shows that power failure is perceived as a challenge, although the variation in perception across cities is not as pronounced as with the previous challenges. In Ibadan, a substantial 87.6% of respondents identify power failure as a problem. In contrast, the percentages in Oyo (7.8%) and Ogbomosho (4.7%) are relatively lower. The X² value of 3.062 is associated with a moderately low p-value of 0.016, indicating some level of city-dependent variation in the perception of power failure.

Poor Maintenance: The challenge of poor maintenance is recognized in all cities. In Ibadan, 86.6% of respondents acknowledge poor maintenance as a significant issue, while the percentages in Oyo (8.6%) and Ogbomosho (4.8%) are comparatively lower. The X² value of 1.487 is associated with a p-value of 0.040, indicating a relatively lower degree of city-dependent variation in the perception of poor maintenance.

Lack of Good Maintenance of Damaged Cable, Poles, etc.: Similar to poor maintenance, the challenge of the lack of good maintenance of damaged cable, poles, etc., is recognized across cities. In Ibadan, 83.6% of respondents see it as an issue, whereas the percentages in Oyo (10.5%) and Ogbomosho (5.9%) are relatively lower. The X² value of 1.495 is associated with a p-value of 0.034, indicating some variation across cities in the perception of this challenge.

Vandalization of Existing Street Lighting Equipment by Thugs: This challenge exhibits moderate variation across cities. In Ibadan, 82.1% of respondents perceive vandalism by thugs as a problem, while in Oyo and Ogbomosho, the percentages are 11.2% and 6.7%, respectively. The X² value of 4.903 is associated with a p-value of 0.016, indicating a moderate level of city-dependent variation in the perception of this challenge.

Theft of Electrical Cables: The theft of electrical cables is viewed as a challenge by a considerable percentage of respondents in all cities, although the variation in perception across cities is minimal. The X² value of 0.742 is associated with a p-value of 0.690, indicating minimal city-dependent variation in the perception of this challenge.

Use of Counterfeit Imported Street Light Apparatus: The challenge of using counterfeit imported street light apparatus is more prominent in Ibadan, with 88.2% of respondents perceiving it as an issue. In Oyo and Ogbomosho, the percentages are notably lower, at 7.5% and 4.3%, respectively. The X² value of 6.639 suggests some city-based differences in perception, with a p-value of 0.36.

Low Efficiency of Street Light Bulbs: Low efficiency of street light bulbs is recognized in all cities. In Ibadan, 86.2% of respondents identify it as a challenge, while the percentages in Oyo and Ogbomosho are 9.3% and 4.5%, respectively. The X² value of 0.998 is associated with a p-value of 0.607, indicating little city-dependent variation in the perception of low efficiency.

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

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

S/	Items	Strongly	Agreed	Disagreed	Strongly	Mean	Remark
N		Agreed	(%)	(%)	Disagreed	(X)	
		(%)			(%)		
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

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	210 (55.56)	144 (38.10)	11 (2.91)	13 (3.44)	3.46	Agree

	possible solutions align with societal values and norms.							
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 above sought to reveal the strategies to improve the current state of insecurity in Oyo State. In this study, the findings shows an overall average mean of 3.57 indicating that majority of the respondents strongly agreed to most of the statements. According to the table, the strategies to improve the current state of insecurity in Oyo State are: provide brighter street lights powered by either solar or generator ($x = 3.69$, 74.07%), provide uninterrupted street lighting systems in place streets ($x=3.54$, 58.2%); Make provision for police and rapid response to crime incidence ($x= 3.72$, 76.72%); frequently maintain and replaces bad bulbs of street lights along streets ($x= 3.68$, 71.69%); Refurbish and provision of security conscious urban infrastructure and social amenities ($x= 3.58$, 65.87%); factor in safety principles when designing and planning urban areas this may be achieved through promotion of human surveillance in public spaces ($x= 3.57$, 60.85%); increase crime and violence prevention campaigns so as to sensitize vulnerable groups on security issues($x= 3.55$, 69.31%) and; avoid crime hotspots as well as desolated areas at particular times of the day especially those parts of the city that may be desolated ($x = 3.75$, 76.72%).

4.3 Discussion of Findings

This study explored the influence of street lighting on the urban security system in Oyo State, Nigeria, and proposed strategies to enhance a secure environment for residing, working, and surviving in the study area. Six research agendas were formulated for this investigation.

The initial survey question addressed the socioeconomic characteristics of residents and individuals involved in commercial driving or parking management within the study area. The survey exhibited a predominant presence of respondents without specifying gender (71.16%). This suggests that the outcomes of the study display a gender bias, as active

participation in the study was not fully represented by both sexes. Consideration of gender becomes relevant when examining risky driving behaviors, where research indicates a tendency for men to take more risks than women in such behaviors. Additionally, literature suggests that men are more prone to traffic accidents resulting from rule violations, such as exceeding speed limits and driving under the influence, whereas women are more likely to be involved in accidents due to poor judgment.

The survey was primarily characterized by respondents aged 31 to 40 (52.91%). In various countries, older individuals are associated with criminal activities. Another researcher partially supported this study by finding that individuals aged 20-40 were more involved in crime compared to those under 20 or over 45.

The survey results reveal a high proportion of respondents with educational qualifications: SSCE (30.42%), NCE/OND (25.66%), HND/BSC (14.55%), and degree (9.79%), totaling approximately 81.42%. Education plays a crucial role in enabling respondents to comprehend security-related issues. This suggests that a majority of road users in Oyo State possess diverse educational qualifications, assuming their ability to conceptualize and respond decisively to security management issues. This finding contradicts the conclusions of some researchers who argue that higher education contributes to success by providing greater knowledge and modern management skills. Another study supports this by asserting that lower educational attainment increases the likelihood of unemployment, advocating for improved literacy levels through free and compulsory youth education programs, including vocational and apprenticeship initiatives.

The survey results indicate that a significant proportion of respondents earn 1000 Naira (48.94%) daily, highlighting the low income of road users in Oyo State. It can be inferred that low income directly impacts criminal behavior among those engaged in such

activities. This assertion is substantiated by research suggesting that individuals from economically disadvantaged backgrounds are more predisposed to exhibit antisocial behavior compared to those from more privileged backgrounds^{4,6,9}. A researcher conducted an examination of youth crime, concluding that low parental income contributes to crime and insecurity in Nigeria. In light of the aforementioned issues and broader global and regional trends, consensus among researchers suggests that the foundation of juvenile criminal behavior is rooted in the nature of the household in which the child was raised. Poverty hinders urban dwellers from providing support to their families and accessing city services, leading the economically disadvantaged to resort to crime as a survival strategy.

Survey results reveal that the majority of crimes occur in urban areas (76.19%). This aligns with findings from researchers who assert that the industrial revolution in Britain modernized the urban environment, serving as the economic engine. However, the historical consequence of such development in human settlement has been an increase in crime and violence, as the unemployed struggle to survive in the competitive urban landscape. With contemporary cities experiencing heightened urbanization, crime and violence emerge as pressing issues demanding the attention of city planners. Discussing the link between rapid urbanization and urban safety and security, one author contends that the expansion of urban space adversely affects the capacity of central and local governments to secure cities and provide fundamental social infrastructure like health, education, water, and sanitation. This phenomenon has led to the proliferation of slums and ghettos, overwhelming the already deteriorating urban infrastructure and exacerbating security and crime challenges.

In Oyo state, 75.40% of 285 respondents were victims of nighttime crimes, while 24.60% (93 respondents) were non-victims. This indicates that the majority of Oyo road users have experienced one or two types of crime during the night. The presence of street lights might

result in accidents due to malfunction. Studies suggest that driving at night is more stressful for older drivers compared to younger drivers. It can be inferred that the presence of malfunctioning street lights would produce a similar effect. Accident studies in Finland indicate that young drivers are more prone to accidents in the dark than when driving during the day²¹. The second survey question was about the nature and nature of urban security challenges in Oyo State.

The survey question aimed to elucidate the nature of urban security challenges in the surveyed area. Survey results indicate that urban security challenges in the study area encompass vandalism of street lights and other infrastructure, robbery, home and business burglary, burglary/theft, serious bodily injury, murder, and rape ($x=3.57$, 63.23%). This aligns with the paper titled 'Analyzing the distribution of crime in Oyo state (Nigeria) using principal component analysis (PCA),' which identifies crimes in Oyo state as robbery, kidnapping, home and shop burglary, burglary/theft, serious injury, and assault. Researchers have consistently reported that these crimes also encompass murder, rape, and assault. The study further provides averages of 56 homicides, 152 armed robberies, 12 suicides, 541 aggravated assault/injury, 1,196 assaults, 392 burglaries/thefts, 263 store robberies, and 263 home robberies. It highlights 544 cases of burglary, 1385 cases of theft/theft, and 99 cases of rape/immorality. Other offenses include assault, kidnapping, fraud/fraud, illegal possession, arson, trespassing, forgery, child theft, and unnatural crimes.

The findings suggest a high likelihood of encountering robbery or thuggery on the street or in a parking lot at night ($x=3.28$, 39.15%). This conclusion is supported by a researcher who noted, "Crimes such as vandalism of street lights and other infrastructure, burglary, home and business burglaries, armed robbery, cult activities, burglary, and theft are prevalent in the study area at 5 am ($x=3.25$, 52.91%)." Another scientist corroborates these

findings, emphasizing that public parking lots and industrial areas are typically deserted at certain times, especially at night, making them highly dangerous and attractive locations for criminal activities¹⁸. In addition, another author found that tall, bare walls and buildings not facing active roads promoted crime¹⁹.

Research question 3 pertains to the governmental initiatives aimed at fortifying security systems in the study area. This specific research question sought to examine the current measures implemented by the government to bolster the security system in Oyo State. The overall findings indicated that a majority of respondents strongly endorsed the outlined measures, yielding an average mean of 3.45.

The study disclosed the presence of street lighting in Oyo State streets. Security patrols conducted by the police and Amotekun in the streets and motor parks of Oyo State were identified as enhancing security, particularly during nighttime. Additionally, collaborative efforts between informal policing groups were acknowledged. The Nigeria Police Force was perceived to guarantee improved security for Oyo State residents. Measures such as maintaining a cleaner neighborhood through the removal of overgrown trees, bushes, hedges, run-down buildings, abandoned vehicles, and litter were reported. Furthermore, the street and motor park lighting systems were reinforced by solar lighting. Well-lit street lighting systems were observed at all terminal stations within Oyo State. Residents of Oyo State actively engaged in organizing neighborhood safety initiatives. The installation of adequate security systems, such as CCTV cameras on roads prone to crime, was also emphasized.

The prevalent viewpoint among the majority of respondents is that the efficacy of the existing street lighting strategy in the security profession will influence the overall management of

security and crime within Oyo State. This perspective finds support from academics who advocate that, considering a security standpoint, professionals should contemplate the installation of video surveillance equipment on roads and streetlights. Additionally, they should explore cost-effective procurement opportunities and adhere to consumer expectations for reasonable prices, similar to other street light installations within terminals.

Oyo State has recently witnessed an unprecedented level of insecurity, leading to threats to national security becoming a prominent concern for the government. This situation prompted a substantial allocation of security funds to address the security issue. To mitigate the crime rate, the federal government enacted the Anti-Terrorism Act in 2011. This involved the installation of computer surveillance cameras (CCTV) in various parts of Oyo State, an enhancement of crime surveillance and investigations, the reinforcement of nationwide physical security measures to deter potential attacks, the provision of security facilities to strengthen security agencies, and the initiation of efforts to criminalize wrongdoers by developing and disseminating safety tips through mass media channels^{7,18,19}.

Security is a prerequisite for rapid socio-economic development, usually in urban areas that produce the highest gross domestic product in a particular region. As a result, increasing crime rates in cities have been recognized and residents have taken steps to keep their buildings, roads and neighborhoods safe. Some of these practices are unsustainable, deny core principles of urban planning and design, and represent assumptions about law enforcement that may not always be accurate. These include the assumption that Eyes on the Street always reduces crime. The assumption that leaky roads always reduce crime, the assumption that high population densities always reduce crime, the assumption that mixed-use development always reduces crime, the belief that CCTV will always reduce crime, and there is the belief that better street lighting will always reduce crime. It has been argued that

lawyers need to think about criminological evidence, local conditions, and theories of environmental criminology and not make assumptions⁴.

Research question four was on impact of street lighting on the incidence and rate of crime in Oyo. The purpose of the survey questions was to explore the impact of street lighting on crime frequency and incidence in Oyo. Analysis results show that street lighting has a significant impact on crime frequency and incidence in Oyo. These results indicate that respondents in this study are afraid to go out at night because of darkness ($x=3.65$, 71.69%). This is partially backed up by a study in which one researcher installed temporary lighting in her 40 boroughs of New York City and found that outdoor crime at night decreased by 36%. The test area has a high crime rate, especially violent crime, and the study found that only 21% of public housing residents felt safe walking in their neighborhood at night, compared to 50% during the day. Decrease in lighting related crime. The conspicuous nature of temporary light poles and associated generators may have contributed to the reduction rather than the lighting effect. It is also unclear whether day time crime decreased at the same time²⁶. Furthermore, the results of this study showed that lighting reduces crime by improving visibility ($x= 3.72$, 74.34%). Darkness creates a sense of anonymity,²⁶ and the fear of being caught may not be strong enough to activate behavioral inhibition systems that deter cheating. Survey questions found that “street lights help protect police and increase personal safety ($x=3.60$, 66.4%)”. This reduction is especially valuable in high crime areas, as it is clear that improved street lighting can reduce crime, and improved lighting can reduce crime at anytime of the day or night. This indicates that improved lighting can not only provide a situational deterrent to crime, but also increase community cohesion and pride, which in turn can increase residents' willingness to intervene in crime and cooperate with the police¹³. Improved lighting also lets potential criminals know that the area no longer provides an easy opportunity for crime^{15,18,20}. Furthermore, respondents to this survey agreed that street lights

prevent traffic accidents at night ($x=3.55$, 69.21%). Street lighting increases informal surveillance as residents spend more time in shops and front yards in the evening ($x=3.75$, 76.73%), and improved street lighting reduces night time intimidation, physical and sexual assault, vandalism, and youth gangs ($x = 3.35$, 52.91%).

Research question five was on the challenges facing street lighting strategies as crime management within Oyo State. The results showed that a majority of respondents agreed with all items in this category, indicating that the state's street lighting strategy faces a range of problems. The results show that poor cash flow is also part of the problem facing street lighting in Oyo State. This is supported by research already conducted, which suggests that lack of funding and reluctance of authorities to fight crime are further obstacles⁵¹.

Lack of maintenance such as damaged cables and utility poles is another challenge faced by 219 (57.94%) street lights in Oyo State. This is endorsed by one author who states that if a system is not properly maintained, it will sooner or later fail to perform the required functions, leading to poor quality¹¹. Maintenance is the work undertaken in order to keep, restore or improve every facility, i.e. every part of the system, its services and surroundings to a currently acceptable standard and to sustain the utility and value of the facility¹¹. The government of Oyo State needs to be aware that maintaining a complex system such as street light may be difficult but it is more economical to do so than allowing the system or infrastructure to fail completely before giving attention to it. Like other infrastructural facilities, street light works well at the beginning of installation but suffers breakdown during operation, and thus requires maintenance in order to sustain the high quality of service¹².

According to this present study, other challenges facing street lighting strategies as crime management within Oyo State include corruption, power failure, poor management, vandalism of existing street lighting equipment by thugs, the electrical cables are stolen by thieves, using counterfeit imported street light apparatus and low efficiency of street light

bulbs. The adoption of challenges facing street lighting strategy on management of crime activities can be considered as strategic in so far as these activities can impact security chains and security structures and can in particular create value from intangibles in security activities¹⁶.

Research question six was on the strategies to improve the current state of insecurity in Oyo. The purpose of this survey question was to explore strategies to improve Oyo's current insecurity. This resulted in an overall average score of 3.57. The study also found that one of the strategies to improve the current insecurity in Oyo State is to install bright street lights using solar power or generators ($x=3.69$, 74.07%). Street lighting is widely recognized as a powerful crime reduction tool and as such has become a popular way to invest in environmental design ^{24,16,21}. Studies in the fields of criminology, public health, and urban planning suggest that improved lighting tends to be welcomed by residents, reduces fear of crime, and increases perceptions of community safety^{12, 15}. Increased lighting makes the area more conspicuous and less attractive to potential criminals¹⁶. Also, according to the results of this study, installing uninterrupted street lighting systems on local roads ($x=3.54$, 58.2%) is another strategy to improve insecurity in Oyo state. Street lighting reduces the incidence of crime and personal harassment and reduces people's fear of becoming victims. This is consistent with the findings of some researchers who wrote that adding lighting to communities tends to improve public safety⁵. The results also indicate that the government should dispatch police and respond to crime quickly ($x= 3.72$, 76.72%). The security system in Nigeria is considered to be very poorly manned and equipped. Security guards are inadequately trained and underpaid. As a result, they lack the expertise needed to meet modern security challenges²². Researchers claim that Nigeria has a police population ratio of 1.450, which is below UN standards²³. This means that Nigeria as a country is fully quasi-policed, perhaps explaining the inability of the police to deal effectively with crime and

security challenges²³. Frequent maintenance and replacement of broken bulbs in street lights along roads (x= 3.68, 71.69%). A properly designed and installed street lighting system is a valuable investment as it increases the safety of road users at night. It can also bring social and economic benefits to the community. This is partly supported by researchers who have found that good maintenance of infrastructure facilities can somehow maintain the desired functional qualities of these systems, thus increasing their economic and structural value¹². Rehabilitation and provision of safe urban infrastructure and social facilities (x= 3.58, 65.87%). Consider safety principles in urban design and planning. This can be achieved by promoting human surveillance in public spaces (x= 3.57, 60.85%). Analyzes show that crime and violence have an even greater impact on urban functioning. Therefore, the planning, design and management of urban areas should consider the impact of urban security and insecurity²⁴. Strengthen crime and violence prevention campaigns to increase safety awareness among vulnerable groups (x=3.55, 69.31%). Around the world, people are driving development efforts, and community participation has become main-stream. With community participation in crime prevention in rural and urban Nigeria, security issues will become a concern for all. The participation of community members (who are bound by shared values and social or friendship ties) has a positive effect on crime prevention and control²⁵. Avoid hotspots and deserted areas at certain times of the day, especially parts of the city that may be deserted (x = 3.75, 76.72%). Previous studies have found that crime hotspots tend to be associated with increased ambient brightness rather than decreased brightness^{6,18,20}. Street lighting has increased public confidence, perceptions of personal safety at night, and pedestrian traffic on roads and sidewalks²¹. When the city of Atlanta installed new street lights in high-crime areas, the number of robberies decreased²¹

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Chapter Five

Conclusion

5.1 Summary of Findings

This study delves into the influence of street lighting on the urban security system in Oyo State, Nigeria, proposing strategies to cultivate a secure environment for residents, workers, and overall survival in the study area. The specific research objectives encompass an assessment of the socioeconomic characteristics of residents and commercial drivers/parking managers in Oyo State, an exploration of the nature of urban safety challenges in the study area, an evaluation of existing efforts to mitigate urban security challenges, an investigation into the impact of street lighting on crime incidence and rates, an analysis of the challenges faced by street lighting as a crime control strategy, and the proposal of strategies to further mitigate urban safety challenges in Oyo State.

To address these objectives, the study formulates six research questions aligned with its purpose. Chapter Two engages with relevant literature, drawing on foundational frameworks such as Rational Choice Theory (RCT), Daily Activity Theory, and Social Control Theory.

Employing a descriptive research design, the study thoroughly explores and describes the attitudes, views, opinions, and behavioral patterns of people. The study population comprises drivers and road users across Oyo State's three Senatorial constituencies, with the sample size determined using the Taro Yamane formula. Interviews with drivers and other road users on selected roads within Oyo State constitute the data collection process.

Random sampling techniques and methods are employed, encompassing all of the state's Senatorial constituencies. Major cities and some significant roads within these Senatorial districts are randomly selected for participation. Utilizing a questionnaire titled "Evaluation of Street Lighting in Urban Security Systems in Oyo State," the study collects

information from respondents. Data analysis involves descriptive and inferential statistical methods, including means, frequencies, and percentages, to address the research questions.

The survey results reveal that a significant portion of respondents earns 1000 Naira daily (48.94%), indicating a low income among road users in Oyo State. This reduced income directly influences criminal activities carried out by individuals involved in such behaviors. The acquired results indicate that in Oyo State, with $x=288$, 76.19% of urban areas exhibit higher crime rates than rural areas. This suggests a pronounced urbanization trend in Oyo State, particularly in cities like Ibadan, Oyo, and Ogbomoso, as people migrate to urban centers in search of improved living conditions and services. The accelerated urbanization in Oyo State correlates with an escalating crime rate.

The urban security challenges in Oyo State encompass various types, including vandalism of street lights and other infrastructure, burglary, home and business break-ins, theft, serious injuries, and incidents of murder and rape. Consequently, there is an increased likelihood of encountering robbery or thuggery on the street or in parking lots at night. The results also indicate instances where survey respondents were shot dead by criminals on the streets at night, particularly prevalent in the streets of Oyo State. This highlights significant safety concerns regarding nighttime travel in urban areas of Oyo State.

Existing initiatives aimed at addressing urban instability in Oyo State include the provision of street lighting within streets ($X=3.58$, 65.87%). Additionally, security patrols conducted by the police and Amotekun security personnel on streets and parking lots contribute to enhanced security, particularly during nighttime. Parking lots equipped with street lighting systems, especially at night, are also part of ongoing efforts to improve safety. Collaborative efforts between informal police groups and the Nigerian police further ensure better security for residents.

The study revealed challenges with street lighting in Oyo State, including insufficient funding for the security sector, corruption, power outages, inadequate management, vandalism of existing street lighting equipment by thugs, theft of electrical cables, the use of duplicated imported street light equipment, substandard street light bulbs, and inadequate maintenance of damaged cables, poles, etc.

To address urban security issues in Oyo State, the study employed several strategies. These include implementing brighter street lights powered by solar or generators, ensuring the continuous operation of street lighting systems on streets, facilitating police presence and rapid response to crime incidents, regularly maintaining and replacing broken street light bulbs along streets, and incorporating safety principles into the design and planning of urban areas.

5.2 Conclusion

To propose solutions for fostering a secure living, working, and survival environment in Oyo State, this study effectively examined the impact of street lighting on the urban security system in Oyo State, Nigeria. The research highlighted that the accelerated urbanization in Oyo State has amplified the demand for critical infrastructure such as street lights, and the inadequately managed urbanization has posed a threat to the state's security.

Given that a majority of respondents (48.94%) reported earning N1000 or less, it can be inferred that the upsurge in crime in Oyo state, adversely affecting socio-economic activities, can be attributed to poverty. The research findings indicate that the entirety of streets in the capital, Oyo State, lacked uniform lighting, exposing individuals to vulnerability, particularly at night.

The primary challenges related to national road lighting include insufficient funding for safety measures, equipment depreciation, unreliable electricity supply, inadequate

management of street lighting, vandalism of existing street lighting equipment by troublemakers, unauthorized electrical connections, utilization of counterfeit street lamp assemblies, substandard quality of street lamp bulbs, and deficient maintenance of bulbs and support structures.

Notably, the study suggests that the Oyo State Government has actively addressed security issues in the capital region by implementing street lights on roads, supporting the lighting framework for roads and parking lots with solar lighting systems, organizing neighborhood welfare, establishing adequate security frameworks such as CCTV on the streets to mitigate the risk of abuse, and coordinating security measures between the police and other authorities. Importantly, this form of street lighting enhances visibility in the immediate vicinity, facilitating the movement of law-abiding citizens either positively, proactively, or unavoidably, while exposing criminals to a more observable public.

5.3 Recommendations

Based on the study's findings, the following recommendations are proposed:

1. Implement systemic security measures in urban planning and zoning initiatives.
2. Incorporate street lighting considerations in the planning and design of urban by relevant government agencies and states across the country.
3. Undertake the rehabilitation and enhancement of security-conscious urban infrastructure and social services, including street lighting, in urban centers in Oyo State.
4. Increase policing levels in public places and hotspots, particularly during late-night hours when street lighting is insufficient, by law enforcement agencies.

5. Enhance crime and violence prevention campaigns in Oyo State through collaborative efforts by civil society and relevant agencies, aiming to raise awareness among vulnerable groups about security issues.
6. Government agencies responsible for street light maintenance should promptly replace damaged cables, poles, etc., in all urban centers in Oyo State to prevent nighttime crimes.
7. The state government is encouraged to install brighter street lights powered by solar or generator sources.
8. Law enforcement, especially the police, should acknowledge the importance of prioritizing security information, engaging in capacity building to meet standards, and adopting modern technology, such as street lighting and CCTV, to combat insecurity in Oyo State, Nigeria.

5.4 Contribution to Knowledge

The assessment of street lighting on urban security systems contributes to knowledge in several ways:

Understanding the relationship

By conducting a comprehensive assessment, researchers can uncover the complex relationship between street lighting and urban security. This knowledge helps identify the factors that contribute to increased or decreased security in different lighting scenarios.

Identifying best practices

Through field observations, data analysis, and stakeholder interviews, researchers can identify best practices in street lighting design and implementation that enhance urban

security. This knowledge can inform urban planning policies and lighting standards to create safer urban environments.

Quantifying impact

By analyzing crime data and perceptions of safety, researchers can quantify the impact of street lighting on urban security. Understanding the magnitude of this impact allows policymakers and practitioners to prioritize investments in street lighting infrastructure accordingly.

Addressing gaps in existing knowledge

The assessment of street lighting on urban security helps bridge gaps in existing knowledge by providing empirical evidence and insights. Researchers can identify areas that require further investigation and contribute to the body of literature in this field.

Informing decision-making

The findings from such assessments can guide decision-making processes for urban planners, city officials, lighting designers, and law enforcement agencies. Evidence-based recommendations on street lighting strategies can lead to more effective and targeted interventions in improving urban security.

Enhancing public awareness

The assessment of street lighting on urban security can raise public awareness about the importance of well-designed and efficiently maintained street lighting systems. Dissemination of research findings can empower communities to advocate for improved lighting infrastructure and urban safety measures.

Overall, the assessment of street lighting on urban security contributes to knowledge by providing a deeper understanding of the impact of lighting on urban safety, informing policy making and practice, and empowering communities to actively engage in enhancing their own security.

5.5 Suggestions for Further Studies

On the basis of these findings, the following studies are proposed for further research:

1. The Impact of Improved Street Lighting on Crime Reduction in Nigeria
The Impact of Street Light on the Rural Security System In Oyo State

Do Not Copy, Lead City University, Nigeria

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Appendix I

Questionnaire

**Department of Urban and Regional Planning
Faculty of Environmental Design and Management
Lead City University, Ibadan**

Assessment of Street Lighting on Urban Security System in Oyo State

Dear Respondents,

I am an Environmental Management student conducting a study entitled “The impact of street lighting on urban security system in Oyo state, Nigeria”. The information you provide will be kept confidential and is for educational purposes only. This study is open to all and is free of charge.

Thanks in advance.

Oyelami Yakubu ADESINA

Section A: Socio-Economics Characteristics of Resident And Commercial Driver/Park Manager In Oyo State

Instruction: Please fill this questionnaire as accurately as possible by putting a tick (✓) to indicate the correct answer.

1. Gender (i). Male (ii). Female
2. Age (i). <35 Yrs (ii). 36 - 45 Yrs (iii). 46 - 55 Yrs (iv). 56 – 65 Yrs (v). >65 Yrs
3. Marital Status (i). Single (ii). Married (iii). Divorced/Separated (IV).

4. Religion (I) Traditionalist (ii) Muslim (iii) Christian
5. Tribe (i) Yoruba (ii) Hausa (iii) Igbo (iv) Others _____
6. Educational Qualification (i). Primary (ii). SSCE (iii). NCE/OND (IV). HND/B.Sc.
(v). Degree (IV). Others (specify) _____
7. How much do you earn daily? (I). #1000 (ii)#1001- #2000 (iii). #2001-#3000
(IV). > #3000 (v). Specify _____
8. Where does crime usually occur? (i). Area with functioning street lighting (ii).
Area with non-functioning street lighting
9. What is your occupation (i). Driver (ii). Bus Conductor (iii). Park Manager System
Worker (IV). Others (Specify) _____
10. Have you ever been a victim of crime within your streets at night? (i) Yes (ii) No

Section B: Types and Nature of Urban Security Challenges in Oyo State

Instruction: Please tick (✓) as appropriate.

To what extent do you agree with the following statements? Strongly Disagree (SD) -1,

Disagree (D)-2, Agreed (A)-3, Strongly Agree (SA) - 4

SN	Statement	SA	A	D	SD
i.	Types of urban security challenge within this area include vandalization of street light and other infrastructure, robbery, house and store breakings, theft/stealing, grievous hurt and wounding, murder, rape				
ii.	Receiving reports about peoples' business having been broken into makes me very worried				
iii.	There are high chances of being attacked or mugged by thugs along the streets and motor park at night				
iv.	Being shot by criminals along the streets at night is common within streets of Oyo State				
v.	Being assaulted by criminals along the streets at night is a common criminal act				
vi.	There are particular street I would avoid to use while walking alone at nights in Oyo state because of kidnappings				
vii.	Most of the offences within motor parks and streets are very common between 7pm to 5am each time it happen				

Section C: Existing Efforts to Curb Urban Insecurity In Oyo State

Instruction: Please tick (✓) as appropriate.

To what extent do you agree with the following statements? Strongly Disagree (SD) -1, Disagree (D)-2, Agreed (A)-3, Strongly Agree (SA) - 4

SN	Statement	SA	A	D	SD
i.	There are street lightings within my streets				
ii.	Police and Amotekun security patrols within the streets and motor park enhanced security especially at night				
iii.	Streets and motor park lightings system are reinforced by solar lighting system				
iv.	All terminal stations within Oyo state have well-lit street lightings system in place				
v.	Organize neighborhood safety by the residents of Oyo State				
vi.	Installation of adequate security systems like CCTV on road prone to crime				
vii.	Collaborations between informal policing groups and the Nigeria Police Force to guarantee better security for residents of Oyo State				
viii.	Creating a cleaner neighborhood – cutting of overgrown trees, bushes and hedges, run-down buildings, abandoned vehicles and litter everywhere				

Section D: Impact Of Street Lighting On The Incidence And Rate Of Crime

Instruction: Please tick (✓) as appropriate.

To what extent do you agree with the following statements? Very Low Impact (VLI) -1, No Impact(NI)-2Low Impact (LI) -3, High Impact (HI) - 4

SN	Statement(Street light)	HI	LI	NI	VLI
i.	they are afraid of going out in the night due to darkness				
ii.	promote of business and commerce activities during the nighttime hours.				
iii.	lighting reduces crime by improving visibility.				
iv.	aid in police protection and enhanced sense of personal security				
v.	improve traffic flow at night by providing light, beyond that provided by vehicle lights				
vi.	prevent road accident during night time				
vii.	Improved lighting deters potential criminals by increasing the risk that they will be seen or recognized when committing crimes.				
viii.	Encourage residents to spend more time on their stoops or in their front yards in the evenings and thus increase informal surveillance.				
ix.	improvement reduce threatening behavior, physical assaults, sexual assaults, vandalism and gang of youths at night				

Section E: Challenges Facing Street Lighting In Oyo State

Instruction: Please tick (✓) as appropriate.

S/N	Items	Yes	No
i.	Poor funding of security sector		
ii.	Corruption		
iii.	Power failure		
iv.	Poor management		
v.	Lack of good maintenance of damaged cables, poles etc.		
vi.	Vandalisation of existing street lighting equipment by thugs		
vii.	The electrical cables are stolen by thieves		
viii.	Using counterfeit imported street light apparatus		
ix.	Low efficiency of street light bulbs		

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Section F: Strategies To Mitigate Urban Security Challenges In Oyo State

Instruction: Please tick (✓) as appropriate.

To what extent do you agree with the following statements? Strongly Disagree (SD) -1,

Disagree (D)-2, Agreed (A)-3, Strongly Agree (SA) - 4

S/N	Statement	SA	A	D	SD
<i>"In order to mitigate urban security challenges in Oyo State government should"</i>					
1.	provide brighter street lights powered by either solar or generator				
2.	provide uninterrupted street lighting systems in place streets				
3.	Make provision for police and rapid response to crime incidence				
4.	frequently maintain and replaces bad bulbs of street lights along streets				
5.	Refurbish and provision of security conscious urban infrastructure and social amenities				
6.	factor in safety principles when designing and planning urban areas this may be achieved through promotion of human surveillance in public spaces				
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.				

8.	increase crime and violence prevention campaigns so as to sensitise vulnerable groups on security issues				
8.	involve in community policing such as neighborhood watch as well as reporting any cases that involve crime and violence				
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				

Appendix III

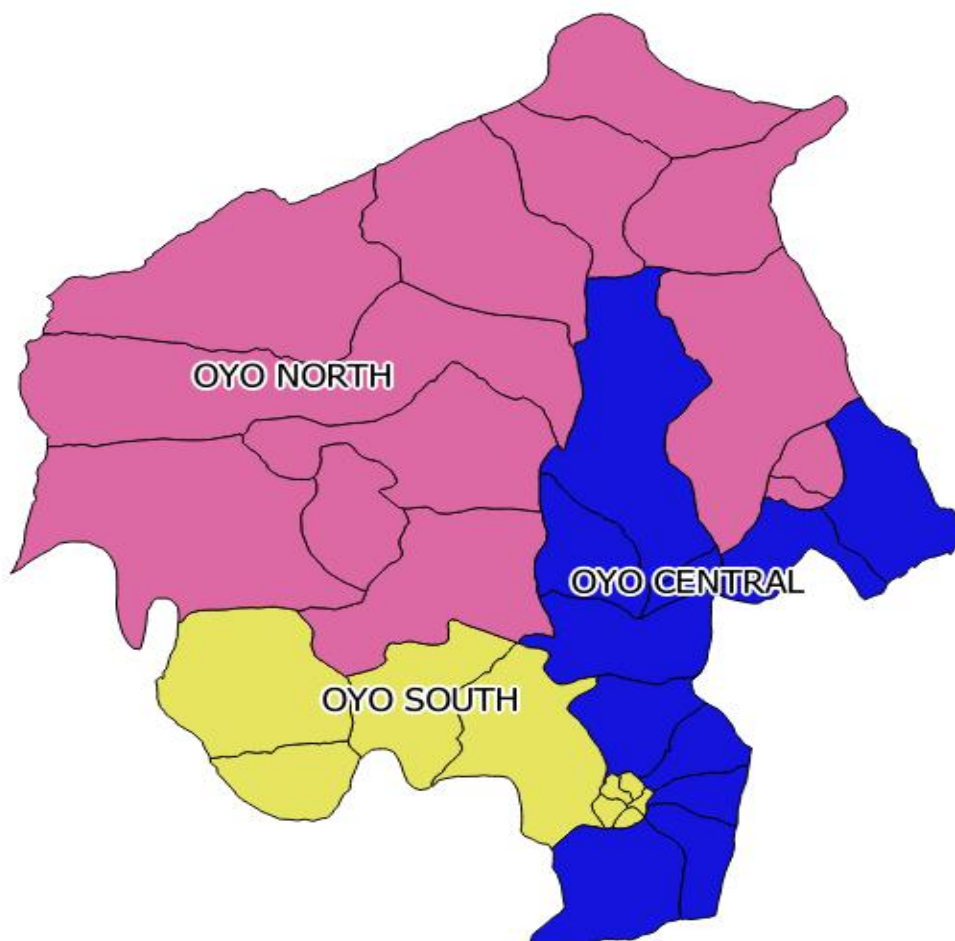


Figure 1.1: Map of Oyo State showing the three Senatorial Districts

Source¹⁸

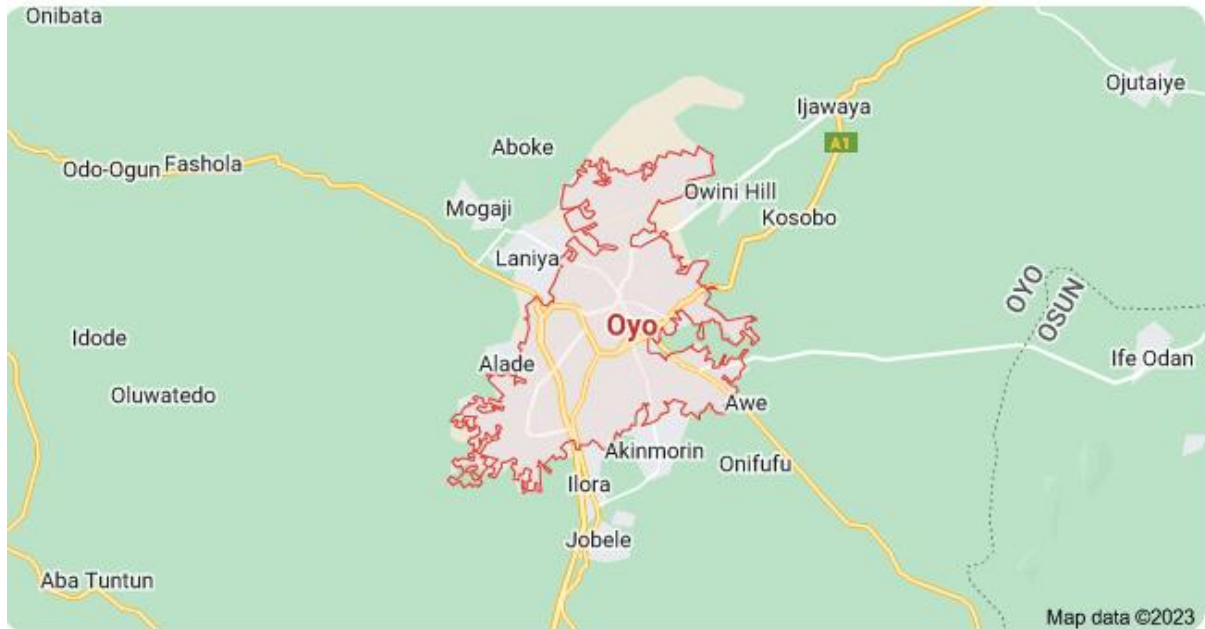


Figure 1.2: Map of Oyo Town

Figure 1.1: Map of Ibadan





Figure 1.1: Map of Ogbomosho

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Bio-data

Name: Oyelami Yakubu ADESINA

Address: No 44, ObadaIfelodun, Olojuoro Road, Olomi, Ibadan, Oyo State

Telephone Number: 08077351536

Date of Birth: 15th March, 1986

Sex: Male

Marital Status: Married

L.G.A.: Oluyole

State of Origin: Oyo State

Nationality: Nigeria

Objectives

To contribute effectively and efficiently in achieving the strategic target of the organization, sustainable development and international relation.

Educational Background with Dates

- ❖ Lead City University, Toll Gate, Ibadan. (In view) 2021 – till date
- ❖ The Polytechnic, Ibadan 2015 – 2016
- ❖ The Polytechnic, Ibadan 2012 – 2013
- ❖ Ibadan City Academy, Eleta Ibadan. 1999 – 2005
- ❖ I.M.G School 1, Eleta, Ibadan. 2003 – 1999

Qualifications with Dates

Master of Science (In View)

On Environmental Design and Management

Higher National Diploma (HND) 2016

On Estate Management and Valuation

National Diploma (ND) 2013

On Estate Management 2005

Senior Secondary School Testimonial

Senior School Certificate Examination (NECO) 2013

Senior School Certificate Examination (WAEC) 2009

National Youth Service Corps 2018

Seminar Attended with Dates

Mandatory Continuing Professional Development Seminar (MCPD) Oct. 2015

Organizer: The Nigeria Institution of Estate Surveyors and Valuers

Theme: Relevance of Feasibility and Viability Appraisal to Property
Investment Decision Making

Mandatory Continuing Professional Development Seminar (MCPD) Nov. 2016

Organiser: The Nigeria Institution of Estate Surveyors and Valuers

Theme: Real Estate Investment Potential for Wealth Creation in a
Stringent Economy

46th Annual Conference Unity 2016

Organiser: The Nigeria Institution of Estate Surveyors and Valuers

Theme: City Grow: Issues and Challenges of Urban Sustainability in Nigeria

Working Experience

❖ Viable Land Exalts Limited

Post Held: Managing Director

Hobbies

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Signature

Date

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The University Compliance Certification

This is to certify that the thesis written by the author Yakubu Adesina OYELAMI with matriculation number LCU/PG/002184 in the Department of Urban and Regional Planning, Faculty of Environmental Design and Management of the Lead City University, Ibadan, Oyo State is in full compliance with the approved university format and style of thesis.

Signature

Date

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