CREATING WALKABLE STREETS AS A LIVEABILITY INDICATOR TO ENHANCE HEALTH AND WELL-BEING: AN ASSESSMENT OF OXFORD STREET IN OSU, ACCRA.

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A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Urban Studies in the field of Urban Management

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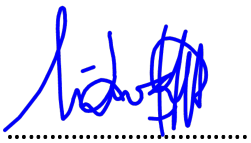
Declaration

I, Walter Semordzi, declare that this research report, except where otherwise indicated in my original research is my own unaided work. It is being submitted to the Degree of **Master of Urban Studies in the field of Urban Management** to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination to any other University.



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Abstract

Walkable streets as an element of liveability, form part of a growing global aspiration to create liveable cities. Walkable streets serve various activities, facilitate interaction and social cohesion, reduce car usage, encourage frequent walking, and impact health, safety, and security. These principles are attributes of the New Urbanism. This research report sought to assess Osu Oxford Street's walkability using selected walkable street indicators. The research method adopted was qualitative. Inquiry forms (checklists), secondary data, and literature review were the data collection tools. Findings show that the study area, Osu Oxford Street, located in Accra, Ghana, lacked some walkability elements and that pedestrians were particularly vulnerable road users due to a lack of pedestrian infrastructure. The study concluded that Osu Oxford street's walkability could be enhanced with street design guidelines. The research report recommended the need for broad stakeholder consultations to develop walkable streets, especially for existing contexts, to co-produce walkable streets that resonate with the local people and road users.

Acknowledgement

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List of Acronyms/Abbreviations

AICC	Accra International Conference Centre
AMA	Accra Metropolitan Assembly
BIGRS	Bloomberg Initiative for Global Road Safety
CBD	Central Business District
DUR	Department of Urban Roads
DVLA	Driver and Vehicle Licensing Authority
EIU	Economic Intelligence Unit
EPA	Environmental Protection Agency
EU	European Union
iRAP	International Road Assessment Programme
GHA	Ghana Highway Authority
GAMA	Greater Accra Metropolitan Area
GhBC	Ghana Building Code
GHG	GreenHouse Gas
ITE	Institute of Transportation Engineers
KKMA	Korle Klottey Municipal Area
LUSPA	Land Use and Spatial Planning Act
LMICs	Low-Middle Income Countries
MDGs	Millenium Development Goals
NRSC	National Road Safety Commission
NUA	New Urban Agenda
NGOs	Non-Governmental Organisations
OECD	Organisation for Economic Cooperation and Development
PWD	Persons with Disabilities
MTTD	Motor Transport and Traffic Department
PHC	Population and Housing Census
SoAC	State of Australian Cities
SAPs	Structural Adjustment Programmes

SDGs	Sustainable Development Goals
TAST	Transatlantic Slave Trade
UN	United Nations
UNDESA	United Nations Department of Economics and Social Affairs
WCED	World Commission on Environment and Development
WHO	World Health Organisation
WSSD	World Summit for Sustainable Development

CHAPTER ONE: INTRODUCTION

1.1 Introduction

Streets as public spaces serve varied forms of activities, including social, economic, and a variety of transport forms, such as walking, cycling, and driving, all of which can contribute to making streets lively. Streets facilitate people's interaction and serve as a focal point for a community, thus enhancing social cohesion. Streets express dynamism over time and support environmental sustainability, public health, economic activity, and cultural relevance (Global Designing Cities Initiative and National Association of City Transportation Officials, 2016).

In recent years, several studies have been conducted on the walkability of streets, identifying their impact on health and well-being and the associated features that enhance them. Some of these features include safety and security, sanitation, and context. *Context* focuses on streetscape features and how it creates a memorable experience for street users and contributes to safety and security issues. *Walkability*, as a concept, is identified as contributing to making places liveable, which is a growing interest globally (Higgs, Badland, Simons, Knibbs, and Giles-Corti, 2019). However, the result of urbanisation across the globe manifesting in an increased number of people and vehicles in cities has led to a scarcity of land resources to support human activities (Onnom, Tripathi, Nitivattananon, and Ninsawat, 2018). Increased human activities such as uncontrolled developments along pedestrian walkways have pushed pedestrians to compete with vehicles, making walking unsafe.

Vehicular traffic is a common phenomenon in Oxford Street, Osu, a suburb in Accra. The street is characterised by many activities, including businesses, banks, and restaurants. The activities attract many people who come for various activities such as buying, window shopping, leisure, other businesses, and eating. Apartments are available for temporary and permanent residence. Oxford Street, a section of Cantonments road, is a thoroughfare linking Cantonments, a neighbourhood close to Accra's central business district (CBD).

On Oxford Street, the many activities present, including, vehicular congestion and informal economic activities, may cause a challenge to walkability as a measure of health and well-being.

Yankholmes (2013) points out that residential facilities, especially on Oxford Street, have been converted into commercial properties, causing congestion and vehicular traffic, and this phenomenon is a result of poor planning. Traffic congestion increases carbon emissions, which reduces air quality and impacts climate and health, such as headaches and other underlying heart and lung diseases. Whereas many people may walk through these congested streets with ease, others, and people with underlying health conditions may find it difficult to do so.

This research assesses the walkability of Oxford Street in Osu, using specific criteria for street design by the Ghana Highway road design guidelines and the Institute of Transportation Engineers (ITE). The research was guided by four components, including *sanitation, safety and security, health and well-being,* and *context*, targeting residents, workers, and visitors.

1.2 Background

Urban liveability has become a growing interest globally in creating liveable cities (Higgs *et al*., 2019). Harvey and Aultman-Hall (2016) argue that the growing interest demands planners and geographers to define what makes a liveable streetscape. With the spate of population increase in cities and climate change, there is the need to design liveable cities that promote health and well-being, *inter alia,* through frequent walking. Liveable cities as a global priority, through the UN Sustainable Development Goals (SDGs) 3, 11, and 13 advocate for "good health and well-being, sustainable cities and communities, and climate action" (Rosa, 2017:18; United Nations [UN], 2016:16) respectively. The estimation that, by 2030, urban areas will contain 60% of the world population (United Nations, Department of Economic and Social Affairs [UNDESA], 2018) requires that we design liveable cities. One way is by designing walkable cities to enhance people's quality of life. Lowe *et al*. (2015) define a healthy and liveable neighbourhood as:

> communities that are safe, attractive, socially cohesive and inclusive, and environmentally sustainable, with affordable and diverse housing linked by convenient public transport, walking and cycling infrastructure to employment, education, public open space, local shops, health and community services, and leisure and cultural opportunities.

The core of this definition identifies the quality of life for people, and walking is a component of liveability. To achieve this quality of life necessitates an integrated approach across various public and private sectors so as to result in a liveable city.

Therefore, what can guide the realisation of a liveable city and, in turn, promote walkability? Several assessment tools are available from international organisations used to assess the liveability of cities. The Economic Intelligence Unit (EIU) and the Organisation for Economic Co-operation and Development (OECD), among many other institutions, use indicators including walkable neighbourhoods in assessments. The indicators may vary from one survey to another. However, the core objective is to provide recommendations to improve life for humanity, and walkability is one aspect of enhancing the quality of life.

1.3 Problem Statement and Rationale

The concept of walkability as an element of liveability has gained ground in many scholarly works, and its application shows largely in streets as the host/facilitator to make neighbourhoods walkable. Osu Oxford Street in Accra, Ghana is a notable street with heavy vehicular and pedestrian traffic with other associated activities. The presence of these activities may be a challenge to walkability. The presence of many people in a street space would also require key pedestrian facilities to enhance inclusion or rights to a space for all categories of persons. Health and well-being are also key outcomes of a walkable environment, and these are also enhanced by the presence of some facilities. The element of context also plays a key role in walkability. Investigations into this street space in identifying these elements mentioned above are necessary to understand how streets, in general, can be made walkable.

1.4 Aims and Objectives

The research aimed to understand how to create walkable streets to make cities liveable spaces and encourage walking to gain health benefits.

The Objectives are:

1 To understand the causes of traffic congestion on Osu Oxford street.

2 To appreciate how context contributes to enhancing safety and security and creating a sense of place on Osu Oxford street.

3 To identify the various elements that may affect health and well-being and pedestrians' convenience on Osu Oxford Street.

4 To assess how walkable a street is by using specific criteria from standards for street design.

1.5 Research Question

Main Research Question:

In what ways can Walkability in Osu Oxford Street be enhanced?

Sub –Questions:

1 What are the possible causes of vehicular traffic congestion on Osu Oxford Street?

2 How does “context” ensure safety and security and also create a sense of a street place?

3 What are the various elements that affect well-being and create convenience for pedestrians and patrons of Osu Oxford Street?

4 What assessment criteria can be used to assess the walkability of Osu Oxford Street?

1.6 Research Methods

The research approach is qualitative, and it is evaluative and descriptive. Primary data was collected using inquiry forms from the study area, which covered observations on prevailing situations in the study area. Secondary data was also used, and this included reports and guidelines for street design, including Ghana Highway Road Design guidelines and the Institute for Transportation Engineers (ITE). The report and street design guidelines aided the assessment of the study area to make well-informed recommendations.

The research strategy adopted is a case study of a single type, and it is descriptive. This strategy helped to understand the prevailing situation in the study area using observation and subsequently evaluated using two criteria for street design. The sampling technique was purposive and targeted state institutions such as the Ghana Police Service and the Driver and Vehicle Licensing Authority (DVLA) via emails.

Chapter four of this report presents a more detailed discussion of the research methods used.

1.7 Limitations and Ethical Considerations

This research's major limitation was Covid-19, where strict adherence to social distancing affected travel to the study area for observation.

Ethical considerations were the request for information from the Ghana Police Service regarding crime rates recorded in the study area and the Driver and Vehicle Licensing Authority (DVLA) for the number of vehicles registered within ten years in the study area. The study adhered to ethical requirements as specified in the Wits University ethics protocols.

1.8 Theoretical Framework

Figure 1.1 shows the broad theoretical framework which guided the review of theoretical literature. The theoretical literature covered the broad concepts of sustainability, liveability, and walkability, and these concepts are interrelated.

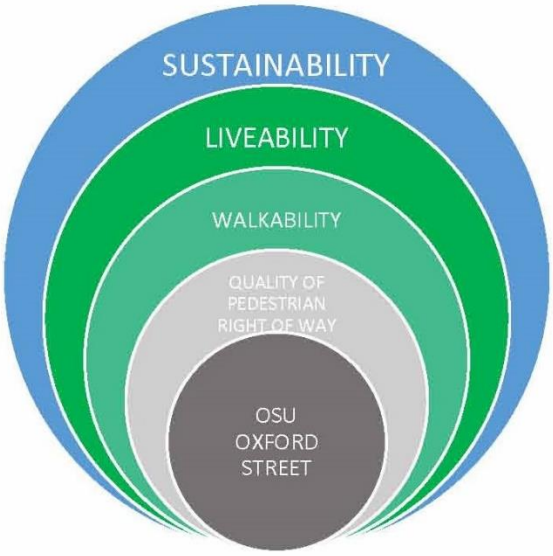

Figure 1.1: Theoretical Framework (Source: Author, 2020)

1.9 Conceptual Framework

Figure 1.2 provides the framework guiding the study, discussions, and theoretical concepts. It groups the components to be investigated in four key areas of walkability around safety and security, health and well-being, sanitation, and context. Traffic congestion is captured to identify the impacts vehicular congestion has on pedestrians. The literature review in chapter two

highlights these key elements, and how scholars have attributed them to walkability. These components also interrelate as they have similar attributes describing them.

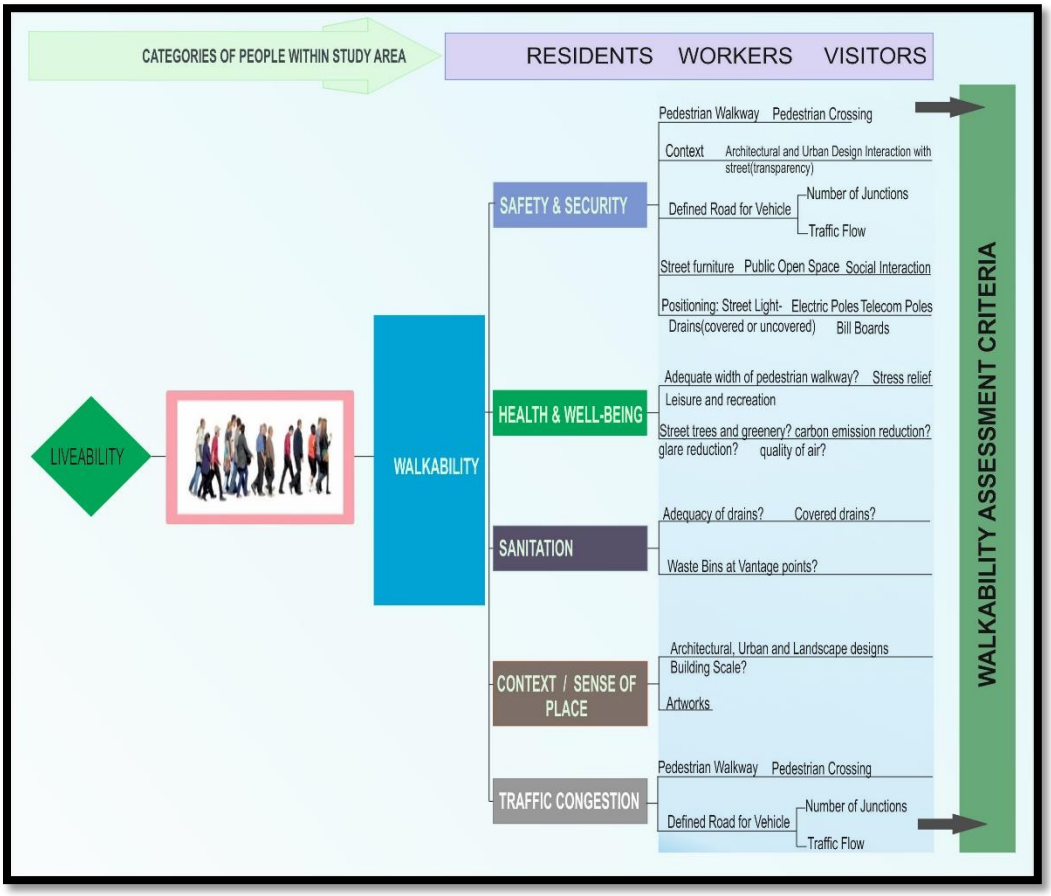

Figure 1.2: Conceptual Framework (Source: Author, 2020)

1.10 Chapter Outline of the Research Report

Chapter one introduces the research and background of the study, problem statement and rationale, aims and objectives, the research questions that guided the study, research methods, and the limitations and ethical considerations. The theoretical framework that guided the review of the literature review and the conceptual framework is also captured in chapter one. Chapter two presents the literature reviewed relating to the theoretical and empirical literature. Chapter three gives a contextual understanding of Osu Oxford Street and the various activities that transpire there. Chapter four also discusses the research methods comprising the research approach, research strategy, research instrument and data collection, research participants, ethical considerations and limitations, and challenges. Chapter five presents the findings and

analyses from the study area. Chapter six summarises the key findings and conclusion and provides a broad view of recommendations to create a walkable street.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of walkability literature and the appropriate tools for assessing a walkable street. Four key areas were highlighted. Accordingly, the chapter initially discussed theoretical concepts of sustainability and liveability as broad concepts and then homed in on scholarly discussions on walkability. The discussion on streets' walkability as a liveability indicator highlighted attributes of a walkable street, impacting the quality of life such as health, safety, and security. The theoretical discussions examine the impact of "context" in making places memorable, and finally, focused on what goes into making the quality of the pedestrian walkway. The second section will look at empirical literature to cover pedestrian-related accidents, policy, and an overview of the design guidelines employed in the study.

2.2 Theoretical Literature

2.2.1 The Concept of Sustainability

In recent years, sustainability as a concept has been a part of many discourses and has had applications in many disciplines such as planning, architecture, and business management. The discourse dates back to 1951, where there was a first report published on the environment by the International Union of Nature Conservation (IUCN). The Union sought to reconcile economy and ecology by getting inputs from governments, non-governmental organisations, and other experts. The IUCN argues that for development to be sustainable, there should be support for conserving nature rather than putting measures to hinder it. Subsequently, there have been many articles and conferences of official bodies such as the Environmental Protection Authority (EPA) of the United States, the European Union (EU), the United Nations (UN), and the World Commission on Environment and Development (WCED) (Duran, Artene, Gogan and Duran, 2015). These Conferences met to address the environmental crisis that has arisen because of the growing industrial demand for natural resources. The demand for natural resources by industry and other human activities such as forest degradation, pollution, and damage to the environment has had adverse impacts (*ibid*). Just some of these adverse impacts on the environment are climate change, poor air quality, soil erosion, and unclean water. These focused sustainability

conferences seek to enhance environmental quality and restrain global economic crises, to enhance the liveability of human habitat.

The UN General Assembly commissioned the World Commission on Environment and Development (WCED) in 1983 to address the concerns of environment and nature depletions and make proposals for long-term environmental strategies for sustainable development. The commission's report made recommendations to the UN General Assembly to consider a programme for sustainable development. The commission in its report defined sustainable development as “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development [WCED], 1987:6). The definition was a call to the world to create a liveable world for present and future generations. The commission also entreated countries to adopt measures that protect the environment from depletion, strengthen social cohesion and inclusion, and the economic welfare of all.

The World Summit for Sustainable Development (WSSD) held in Johannesburg in 2002 also identified improved health systems as one of the plans of implementation to play a pivotal role in sustainable development. Health and environmental threats to health as some of the key areas of implementation interrelates with the summit's other goals; poverty alleviation, provision of clean water and sanitation, and hunger reduction. The commitments of the WSSD under health focused on producing and using chemicals that are less harmful to health and the environment. Also, there was enhanced cooperation to mitigate air pollution in control measures and their health-related impacts. Paragraph 21a of the commitment areas under chapter three, which is about changing unsustainable patterns and consumption, focuses on improving urban air quality and health and greenhouse gas emissions (GHG) due to transport systems (World Health Organisation [WHO], 2003:15).

Dong (2017) agrees that reduced forms of transport in urban areas have public health and environmental benefits. These benefits he describes as outcomes of walkable neighbourhoods, reduced carbon emissions from vehicles, and improved urban air quality. The WSSD also notes

that efficient health systems and a healthy environment can minimise ill-health and poverty levels (WHO, 2003). If there is a reliance on biomass fuel and coal and unhealthy consumption patterns and lifestyles to degrade the environment, health will have adverse impacts. The prevalence of air pollution associated with acute respiratory infections will increase poverty levels and hamper economic development (*ibid*).

Another global agenda by the United Nations that also focused on sustainable development is the Millennium Development Goals (MDGs). This global agenda conference in the year 2000 preceding the WSSD resulted in an agreement by one hundred and ninety-one (191) countries. They adopted the Millennium Development Goals (MDGs), which had specific targets to be achieved in fifteen (15) years ending in 2015. It had eight goals with twenty-one targets (Duran *et al*., 2015). Before the MDGs expiration, other conferences were held to assess the global agenda's performance, which further resulted in the formulation of overall development objectives to take over from the MDGs. The Sustainable Development Goals (SDGs) took over as the subsequent global agenda after the Millennium Development Goals (MDGs) had expired.

The formulation of the SDGs had a scope of a broader stakeholder involvement with civil society, national and sub-governments, international agencies, non-governmental organisations, and the private sector, among other stakeholders, and also seek to build on the MDGs to bring its agenda to an end (Simon, 2016). The programme took effect on 1 January 2016 with 17 goals and 169 targets. The indicators for the goals measure the targets, and the goals are interdependent, hinging on three key objectives, environment, economic, and social. One hundred and ninety-three (193) countries, including Ghana, signed the SDGs (UN, 2016).

The SDGs seek to provide for an environment that enhances people's healthcare and well-being, and one way this can be done is through physical activity like walking, among many other approaches to prolonging the life expectancy for all. The SDGs also acknowledge, *inter alia*, climate change and the call to reduce greenhouse gas (GHG) emissions and address the adaptation to the adverse effects of climate change (*ibid*), affecting the quality of life. As part of the United Nations' task to achieve the SDGs, it recognises partnerships with local authorities to

plan cities and human settlements to increase community cohesion and personal security, producing innovation and employment (*ibid*). Planning also entails reducing urban activities that impact health through the emission of hazardous chemicals and waste into the environment, resulting in minimising the effects on the global climate system (*ibid*). The next two sections discuss the attributes of walkable streets and the role of urban areas concerning sustainability.

a. Attributes of Walkable Streets

One of the relevant areas captured in the SDGs that addresses urban issues is SDG eleven. Sustainable Development Goal eleven (SDG 11) seeks to make cities and human habitats safe, resilient, inclusive, and sustainable. These keywords, "safe, inclusive, and sustainable" elements of sustainable cities, match the same views of what some scholars have attributed to a walkable street, which makes places liveable. Higgs *et al*. (2019), Southworth (2016), Giles-Corti *et al*. (2016), Shamsuddin et al. (2012), and Jacobs (1961) describe a walkable street as one that is safe. Higgs *et al*. (2019) and Giles-Corti *et al*. (2016) also add the element of pedestrian friendliness, and Van Vliet (2008) makes the point about streets being accessible to all categories of people, which speak to inclusiveness. Simon (2016) also highlights sustainable mobility and greening, contributing to achieving sustainability's environmental objective.

Some of the targets under goal eleven (SDG 11) expand on the attributes of walkability. The SDG 11 targets encompass access to safe transport systems and roads (target 11.2), protection and safeguarding of world cultural and natural heritage facilities (target 11.4), and attending to improving air quality and locality and other waste management (target 11.6). Others include access to safe, inclusive, and accessible, green and public spaces, ensuring women and children, older adults, and persons with disabilities are not disadvantaged (target 11.7). The Sustainable Development Goals are interconnected, and Goal 11 impacts health and well-being, and climate, which are goals 3 and 13 respectively.

Health and well-being (SDG 3) have thirteen targets. Targets 3.6 and 3.9 among the thirteen targets directly connect to the streets and how safe they are to enhance health and well-being. Walking as a form of physical activity enhances health and well-being. A walkable street is a place that is safe and convenient. The two components (safety and convenience) encourage people to

walk, enhancing their health and well-being. Target 3.6 focuses on “halving the number of global deaths and injuries from road traffic accidents.” Target 3.9 seeks to “substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination” (*ibid*). Streets are places that facilitate mobility and are also prone to accidents and carbon emissions due to the use of vehicles. Therefore, targets 3.6 and 3.9 of SDG 3 focus on minimising adverse impacts on street users.

Drawing from targets 3.6 and 3.9, a place of walkable nature has measures to ensure pedestrians' safety and health. Measures such as safe crossing, reduced number of vehicles, which results in minimised carbon emissions, will encourage all categories of people, including people with underlying health conditions, persons with disabilities, older people, and children, to use pedestrian infrastructure safely. Carbon emissions can also be reduced if there is a free flow of vehicles on the streets. Accidents may be minimised if pedestrian crossings and traffic lights are present. Also, if there are clear pedestrian walkways distinct from streets, road traffic accidents can be lessened. In effect, streets will be conducive for walking if they have safety features and are free from air pollutants. Therefore, the outcome of frequent walking will be enhanced well-being, such as reduced chronic diseases like type 2 diabetes, some cancers, and cardiovascular disease, as Giles-Corti *et al*. (2016), Lowe *et al*. (2015) and Tolley, (2011) argue.

b. Roles of Urban Areas in Sustainable development

Urban areas have a role in meeting the climate challenges as this gained recognition in the Paris Agreement at COP21 of the United Nations Framework on Climate Change (Simon, 2016). Goal 13 of SDG targets measures that deal with climate change and its impacts. Urban areas have experienced rapid population growth, resulting in many urban issues such as traffic congestion, resource, and service deficits, and increased poverty levels (*ibid*). Urban residents’ quality of life is therefore affected negatively by the release of carbon emissions, which impacts climate and residents' health. In this vein, urban areas have a crucial role in mitigating the challenges that come with urbanisation. The New Urban Agenda (NUA) launched in Quito, Ecuador, in 2016, seeks to shape the global efforts to promote sustainable urbanisation and urban areas (*ibid*). It advocates for mitigation measures for climate change.

The Sustainable Development Goals of the United Nations, having the objective to make human habitats liveable and ensuring the needs of future generations are not compromised, are achievable through smaller interventions like safety and security from vehicles and crime and the reduction of carbon emissions into the atmosphere within communities through walkable streets. The SDGs' objectives also require an inclusive environment for all, including persons with disabilities, the elderly, and children, and this requires making places walkable, which produces liveable communities.

2.2.2 The Concept of Liveability

The Cambridge dictionary (online) defines liveability as "the degree to which a place is suitable or good for living in." The meaning suggests that residents of places should feel comfortable where they live. Places of destination should also give the impression of a pleasant environment for visitors. Residents and visitors alike should see that there is closeness to amenities, and they should feel safe. Lowe *et al*. (2015) draw on "safety, attraction, social cohesion, and environmental sustainability" as attributes of a liveable community. They state that housing should be affordable and diverse and link suitable public transport, walking, and cycling infrastructure to public open spaces, shops, and health and community services. According to Southworth (2016), liveability as a concept consists of several qualities; walkable streets, access to recreation and nature, safety, and health. These qualities characterise the quality of life of a place. In another vein, the State of Australian Cities (SoAC) defines liveability as encompassing "health, well-being, and quality of life of people who live and work in them" (SoAC, 2012:203)

Lowe *et al*. (2015) provide an ideal view of a liveable place, highlighting key features needed in place for a liveable community. Similarly, Southworth (2016) gives specifics to defining a liveable place to include walkable streets. The State of Australian Cities (2012) draws a similarity to Southworth (2016) and Lowe *et al*. (2015). They add quality of life, which is a similar phrase for liveability in other writings. They explain that the characteristics of liveable cities are "land use, built form, quality and conservation of public spaces and natural environments, the efficiency of transport networks, accessibility to work, education, health and community services, and social and recreational opportunities" (Southworth, 2016:570; Lowe *et al*., 2015:132)

Hooper, Foster, Bull, Knuiman, Christian, Timperio, Wood, Trapp, Boruff, Francis, and Strange (2020) note that liveable environments encourage health and well-being related activities and result in outcomes that are beneficial to residents. Walking serves as recreation in a liveable neighbourhood, which partially results from residents feeling safe and having a sense of community. Ghazi and Abaas (2019) point out that great streets facilitate friendship even with drivers, including other road users. Besides, an environment that has reduced car usage also encourages walking, and these attributes are principles of the New Urbanism. The New Urbanism specifically encompasses mixed-use, pedestrian orientated, compact development, and human-scaled development (*ibid*; Xu, 2017).

Therefore, the liveability of a place should characterise an environment that is safe from crime, well-integrated into nature, or green, and should be attractive and socially cohesive. Ghazi and Abaas (2019) argue that these are what make places walkable. A liveable place should also have recreation and nature, good air quality and free from pollution, walkable streets, a clean environment, and a positive impact on health. Saffuan *et al*. (2012) argue that green technology, such as solar energy to generate energy systems, daylighting systems, and the use of plants and trees through green roofs, preserve nature and reduces pollution. The appropriate use of flora, including particular types of trees and shrubs, is necessary in this regard. As elements within a liveable place, parks, and pedestrian spaces promote equity and draw together the rich and the poor (*ibid*). Hooper *et al*. (2020) recommend evaluating planning policies and developing design guidelines to produce health and well-being-related outcomes.

The definitions and arguments above all draw to a common perspective of enhancing a community's quality of life, as the State of Australian Cities (2012) puts it. A liveable community is virtually guaranteed safety, trust, friendship, good health, and proximity to access amenities and walkable streets, among others. These qualities will require urban planning, urban design, and effective urban management interventions to sustain them for the benefit of future generations.

2.2.3 The Concept of Walkability

The previous section's discourses on liveability point to the walkable street as one of the elements that make a place liveable, with streets serving many purposes such as carriageways for vehicles and pedestrians, economic activities, and sometimes being used as entertainment enclaves. Jacobs (1961:107) sees streets as a public place and a "vital organ" of a city to mean that a street's safety is a fair depiction of a city's safety. She states, "think of a city and what comes to mind? Its streets. If a city's streets look interesting, the city looks interesting; if they look dull, the city looks dull" (Jacobs, 1961:107). Jacobs (1961), therefore, implies that a street should have exciting features and safety components. By safety and security measures, she speaks to people having visual contact on the street without the users of the streets knowing it. These enhance the walkability of streets and achieves the objective of making communities liveable.

Shamsuddin, Hassan, and Bilyamin (2012:170) observe the definition of the two words, "walkability" and "walkable," and point out that they have no exact meaning, and it is regarded as a degree that something is "Walking –Friendly." They note Llewelyn-Davies' definition of walkability, depicting pedestrians' experience of convenience and safety with clearly defined and quality pedestrian walkways and vehicles. A "walking-friendly" place can be described as a place that is safe and comfortable for people, as Shamsuddin *et al*. (2012:170) presents above. They present the ideal view of encouraging people to walk. The views of Shamsuddin *et al*. (2012) and Jacobs (1961) draw on the elements of safety, pleasantness, and convenience as elements necessary to enhance walking.

In a similar vein, the State of Australian Cities [SoAC] (2012) and Southworth (2005) highlight "safety and convenience" as elements that support walking but add the element of connectivity of people from different places. Southworth (2005) further adds reasonable time and effort and visual interest when walking. McNally (2010:3,4) definition expands the elements of connectivity. He defines walkability as "various features of a community or neighbourhood that create a place that can easily be travelled without the use of an automobile." These characteristics enhance walking as physical activity due to better-designed streets, paths, and

roadways (SoAC, 2012). Besides, Higgs *et al*. (2019) and Giles-Corti *et al*. (2016) also speak to the element of "street connectivity" and add that a place of walkable nature is pedestrian-friendly. They are characterised by "housing densities, land-use mix, and high-quality pedestrian infrastructure" (see also Van Vliet, 2008). Tolley (2011) adds to the mixture of interventions like mixed-use developments, street connectivity, neighbourhood aesthetics, and micro-scale features such as street lighting, shade trees, street crossing, and walkways to enhance walking. However, Dovey and Pafka (2020) regard as less important the elements of the micro-scale features to enhance walkability. They argue that in their terms, "density, mix and access," which draws similarity with Higgs *et al*. (2019), Giles-Corti *et al*. (2016), and Tolley (2011), land use mix and street connectivity to embody the concept of walkability.

The characteristics of the descriptions of walkable streets create an environment that encourages walking as a means of transport by creating shorter and more suitable walking routes within the community to access the various facilities and services. These descriptions again come back to the New Urbanism concept, aiming to make places walkable (see Ghazi and Abaas, 2019; Xu, 2017). Dong (2017) points out that the New Urbanist approach to design can make streets prone to crime, making streets unsafe. He advises that urban planners and designers should design with cautionary concepts as a counter-measure to enhance safety in the New Urbanist approach, which makes places walkable.

Walkability contributes to promoting a sustainable environment (Kickert, 2020) and also creates a liveable place. Besides sustainable development, health, and social cohesion, Kickert (2020), Talen and Jeong (2019), and Tolley (2011) posit that walkability has been proven to improve economic importance. Walkability also presents itself in sustainable mobility, greening, among other features that come with urban planning and design to reduce the adverse effects of noise and air pollution. Sustainable mobility manifests as a result of proximity to amenities and public places, reducing car usage, and a likelihood of crime reduction (Simon, 2016). These are some of the features that make a place liveable and contribute to sustainability goals.

a. Safety and Comfort of Pedestrians

Critical walkability attributes also look at the quality of the pedestrian right of way, where pedestrians walk with convenience and feel safe (Giles-Corti *et al*., 2016; McNally, 2010; Jacobs, 1961). Van Vliet (2008) advocates for a liveable city for all ages and makes the point that a liveable city necessitates an enhanced physical environment that does not leave behind the categories of the elderly, children, and persons with disabilities in society (see also SDG 11; Southworth, 2016). The consideration for features like ramps, correctly located crossings, and adequately sized walkways, described by Dovey and Pafka (2020) as micro-scale features of the enhanced physical environment interventions which should be less regarded facilitate people's movement conveniently, especially the vulnerable groups in society.

The argument by Higgs *et al*. (2019), Giles-Corti *et al*. (2016), McNally (2010), Van Vliet (2008), and Southworth (2005) echo the perspective of Shamsuddin *et al*. (2012) of a walkable street to be safe and convenient. Adequately sized walkways for pedestrians enhance convenience in walking. If adequately sized walkways are coupled with street buffers making pedestrian paths distinct from vehicular routes and safe crossings, safety is guaranteed for all people (McNally, 2010; Southworth, 2005). McNally (2010) mentions that creating buffers using a planted strip to separate pedestrians from vehicles creates a sense of destination rather than vehicular routes. Another feature suggested is the inclusion of street furniture to create a furniture zone. McNally (2010) posits that specific guidelines and regulations need to be in place to size the width of pedestrian walkways and other features necessary to assure pedestrian safety and convenience.

b. Context

A point worthy of consideration for a pedestrian-friendly street is the scale of buildings found on a street and how they visually appeal to pedestrians in terms of artwork. Park *et al*. (2019) refer to this as imagery as urban design qualities which is “distinctive, recognisable and memorable” (Park *et al*., 2019:249 citing Ewing and Handy, 2019). They point out that imagery provides “memorability and visual richness,” which drives people to walk. A place needs not to be rebuilt, but enhancement can enrich the street to encourage people to experience a sense of the place by walking. Streets have several features that users identify with, including historical buildings,

outdoor seating areas, and signage. These features add to the visual richness and imageability of a place and should not be considered taken out but enhanced (*ibid*). Architectural and landscape designs, and not forgetting the pedestrian walkway (sidewalks), also make a street memorable in attracting people to a place. Skalicky and Čerpes (2019) describe these imagery elements as the cultural aspect of liveability attracting people to a place. Also, adequately sized walkways and rightly scaled buildings make street users feel comfortable (McNally, 2010). These may promote street vitality and cohesion within a community since people are present on the streets.

Furthermore, an ideal range of building enclosures will also make pedestrians feel comfortable. Park *et al*. (2019), however, suggest that there should be less focus on the street enclosure since it is not a reason for people to walk. They describe street enclosure to include visual definition by buildings, walls, trees, and other vertical elements *(ibid:* 244*)*. Enclosure might also lessen the amount of sunlight people will gain on the street. On the other hand, McNally (2010) suggests that proportionate human-scaled buildings as an enclosure make street users comfortable. The views of Park *et al*. (2019) looks at ensuring streets are healthy and convenient for users at all time with the idea of the benefits of sunlight. On the other hand, McNally (2010) looks at essentially street users' convenience with proportionate scaled buildings. Urban designers can merge the perspectives of Park *et al*. (2019) and McNally (2010) in the design of streetscape as part of context to create a walkable street.

Ewing, Hajrasouliha, Neckerman, Purciel-Hill, and Greene (2016) note that transparency is a street feature that enhances walkability. Transparency enables people from within a building to have visual contact with other people outside due to the sizing of window openings—transparency results in street vitality (*ibid*) and serves as a security for street users and residents (Jacobs, 1961). Similarly, Burden (2000) notes that having blank walls is unfriendly, and those with windows and entrances invite people. On the contrary, Park *et al*. (2019) argue that there should be less emphasis on transparency, which does not necessarily encourage people to walk.

Chiang, Sullivan, and Larsen (2017) mention that a walkable street should have sidewalk quality and be aesthetically pleasing (see also Stratford, Waitt, and Harada, 2020). Chiang et al. (2017:9)

identify thirteen environmental attributes of a walkable street in their discussion. They include “beautiful scenery, show window decoration, roadside painting, plantings and trees, rain shelters, and street signage.” A walkable street should be safe, convenient, friendly, accessible, aesthetically pleasing to create interest, and clean from pollution from the discussions above. The outcome of these attributes will be to encourage walking and enhanced health and well-being. There will be increased greening elements and reduced carbon emission to curtail the effects of climate change, inclusion, proper sanitation, and health and well-being, resulting in a place's liveability.

2.2.4 Quality of Pedestrian Right of Way

The quality of a pedestrian’s walkway has technical attributes, prescribing sufficient width of the walkway, the type of material used for the pavements, and accessibility by using ramps accessible by all, including persons with disabilities (Burden, 2000). It has a clear walkway and well-defined kerbs keeping vehicles on one side and pedestrians on another and the presence of the required infrastructure and services. There are sidewalks, crosswalks, and street buffers to make pedestrians feel safe from vehicles (McNally, 2010). These are attributes that add to minimising traffic congestion and enhance walkability. In the broad perspective of the liveability and sustainability concepts, walkable streets address sustainability's social, economic, and environmental aspects. The social aspect enhances cohesion, inclusion, safety and security, and health, among others. Older people and persons with disabilities find comfort using walkways (Southworth, 2005) due to technical specifications of sizing and appropriate materials, thereby enhancing inclusion. The cluster of informal economic activities along a street with its associated exciting features facilitates the distribution of goods and services and generates employment. The introduction of particular types of greenery or flora components and reduced car usage limits carbon emission and heat loads to create comfort for street users, residents, and workers in the environmental aspect.

2.2.5 Summary of Key Points from the Theoretical Concepts

Many scholars, including health experts, have attributed the benefits of enhanced health and well-being to walking. The walkability of a place as a health indicator (SoAC, 2012) is a

determinant of a liveable place and has other benefits. Walkability minimises the use of vehicles, which, in turn, reduces carbon emissions (Dong, 2017) and the adverse effects on well-being and climate change.

There is a need to design liveable cities to be sustainable, and goal eleven (11) of the sustainable development goals (SDGs) advocates for sustainable cities and communities. Cities are required in the future to provide a liveable environment for all, with access to essential services, energy, shelter, transportation, and more. The United Nations adopted the SDGs in 2015 to ensure that the world becomes a sustainable place by 2030. The New Urban Agenda (NUA) advocates for sustainability and has the SDGs as a key component. It provides global principles, policies, and provisions for planning, managing, and living in cities. These global agendas are being promoted to create a liveable world for the current and future generations.

Improved health conditions and a reduction in climate change are both goals in the United Nations 17 adopted sustainable development goals (SDGs), explicitly laid out in the third and thirteenth goals. The third goal advocates for "good health and well-being for all at all ages," contributing to sustainable development, and goal number thirteen (13) focuses on "climate action," which spearheads the integration of measures to prevent climate change within development frameworks.

The concepts of sustainability and liveability have commonalities. One way to achieve these concepts is by making communities walkable. Sustainability has a broader objective with a global perspective (Simon, 2016; Lowe *et al*., 2015). Sustainability enhances the quality of life of people. Liveability hinges on the three sustainability objectives (social, economic, and environment), addressing several components. Lowe *et al*. (2015) identify these components as safety and security, health, leisure, community cohesion, cultural opportunities, proximity to amenities, and walkability. These different components of liveability, including walkable streets, interconnect with one another. Creating walkable streets leads to enhanced health, with many people encouraged to walk for reasons such as visiting people for exercise, convenience, socialisation, and proximity to amenities like parks, shops, and health services.

The arguments from the literature above highlighted features relating to context and sanitation as components of a walkable street to impact safety and security and people's health and well-being. Safety and security, and health and well-being are the walkable streets' outcomes by creating adequate pedestrian infrastructure, sanitation infrastructure, and context. Reduced vehicular congestion and free flow of traffic reduce carbon emissions which have an environmental impact. A walkable street is achievable through a multi-dimensional approach by the various stakeholders concerned to co-produce and enhance users' quality of life of a street and the neighbourhood. If approaches to consider elements of making a place walkable, which subsequently leads to making a place liveable, sustainability's broad objectives would be achieved and contribute to meeting the sustainable development goals.

2.3 Empirical Literature

This section presents empirical literature on pedestrian safety regarding traffic-related accidents in the Accra Metropolitan Area. This section will highlight the literature's key objects that seek pedestrians' safety and other road users on the streets.

2.3.1 Pedestrian Safety Concerning Traffic-Related Accidents in Accra

Streets as spaces have facilitated transport, including walking to access public transport, shops, hospitals, and schools. However, pedestrians have suffered from traffic-related accidents in recent times. Traffic deaths in Ghana amount to 1,800 people annually, with over forty per cent being pedestrians (Accra Metropolitan Assembly, 2017). These phenomena make pedestrians vulnerable road users. In Accra, the Accra Metropolitan Assembly [AMA] (2012) noted the National Road Safety Commission (NRSC) data records that sixty-four per cent (64%) of reported traffic fatalities in 2015 were pedestrians. Between 2011 and 2015, sixty-nine percent (69%) of traffic fatalities were recorded for pedestrians. These incidences of traffic-related accidents and a lack of adequate pedestrian infrastructures such as pedestrian walkways(sidewalks) and pedestrian crossing (Accra Metropolitan Assembly, 2017; Damsere-Derry *et al*., 2019) make streets hostile to people, especially older people, children, and persons with disabilities. Zandieh, Martinez, Flacke, Jones, and Van Maarseveen (2016) mention that pedestrian infrastructure enhances walking in a neighbourhood, including vulnerable groups. Based on these statistics,

streets tend to become the most dangerous for pedestrians in Accra. Figures 2.1 and 2.2 show the deaths and injuries by road user type in the Accra Metropolitan Area (AMA) of Ghana from 2011 to 2015.

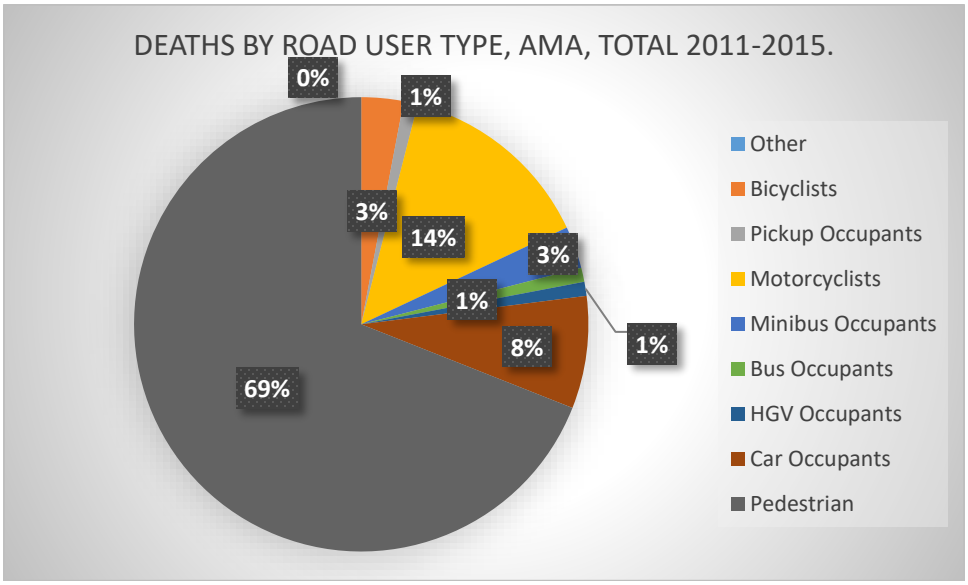

Figure 2.1: Deaths by Road User Type. (Source: Accra Metropolitan Assembly, 2017)

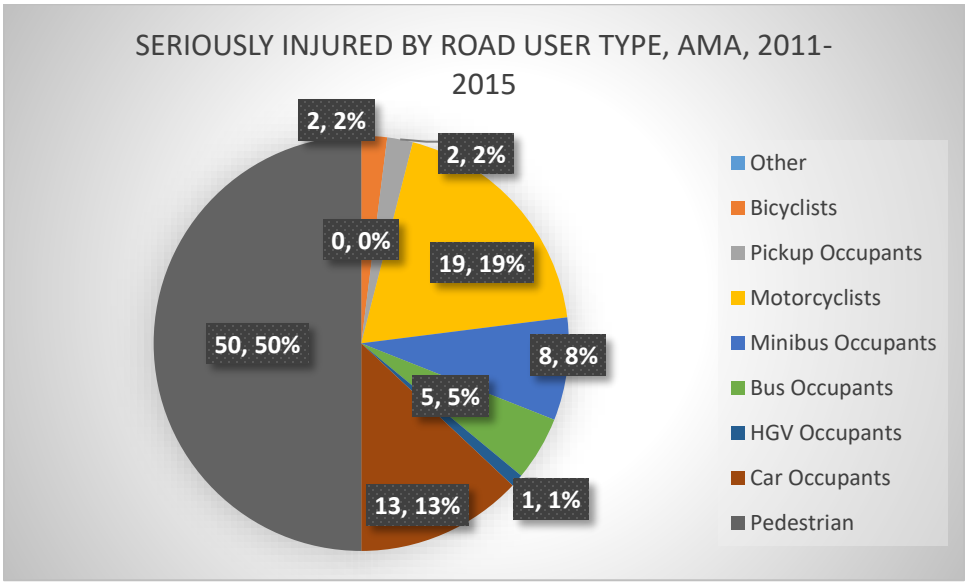

Figure 2.2: Seriously Injured by Road User Type. (Source: Accra Metropolitan Assembly, 2017)

As a measure to mitigate the incidences of traffic-related accidents on the streets of Accra, there were proposals by the Bloomberg Initiative for Global Road Safety (BIGRS) in the areas of traffic calming through street design, provision of pedestrian walkways, street lighting, pedestrian

crossing and safe islands in the middle of streets (Accra Metropolitan Assembly, 2017). These measures seek to enhance the safety of pedestrians. The Accra Metropolitan Assembly (AMA) hoped that if these mitigation measures for safety were in place, there would be pedestrian safety on Accra's streets. They would also achieve a high safety star rating of four or five stars by the International Road Assessment Programme (iRAP). The iRAP is a programme that sets out to review and rate roads based on safety levels and mode of travel. Even though a star rating may be a good thing for the AMA to look out for, the ultimate priority is the safety of pedestrians on streets within their jurisdiction, since pedestrian fatality numbers kept escalating.

In addition to the absence of traffic calming features, vehicles' speed is a contributing factor to posing a danger to pedestrians. According to the AMA, more than fifty per cent of road crashes may be due to speed. The crashes could also be due to the rise in the number of registered vehicles over the years. The dangers posed to pedestrians on streets made the Accra Metropolitan Assembly (AMA) launch a five-year pedestrian road safety plan (2018-2022) to mitigate street-related accidents to protect pedestrians and other modes of transport.

The AMA adopted five pillars of action in developing the pedestrian safety plan. They are planning, research, stakeholder engagement, preparation of plans, and launching/implementation. The key areas seek to achieve pedestrians' safety on streets at crossings, make streets walkable, manage street space for pedestrian safety, and make journeys to schools safe by improving safety around schools' entries. The others ensure pedestrians' safe speeds, rethinking the city favouring pedestrians through city planning, and engaging the public and road system designers to improve pedestrian safety and awareness (AMA, 2017). The stakeholders identified in implementing the pedestrian road safety plan include the Accra Metropolitan Assembly, the Department of Urban Roads (DUR), the Ghana Highway Authority (GHA), the Police Motor Transport and Traffic Department (MTTD), and the National Road Safety Commission (NRSC), as well as non-governmental organisations (NGOs). The AMA’s key departments include Transport, Physical planning, Health, Statistics, and City guards.

The above reveals that there may not be adequate guidelines for street design, which can enhance walkability. However, the current document that guides specifically road design is an outdated 1991 Ghana Highway Road design guide (Duah, 2016; Bartlett, 2016). Duah (2016) argues that consultants undertaking road designs for the Ministry of Roads and Highways resort to manuals from external/foreign sources such as the United States and Ugandan Road design guidelines. He compared the Ghana Highway Road design guide to other road design guides and observed some critical areas covered in other road design guides were absent in the Ghana document. Some of these deficiencies include environmental, safety, and road-user considerations. Criteria for road designs and their impact on the environment are omitted in the Ghana Road design guidelines (Duah, 2016).

Regarding safety and other road-user consideration, Duah (2016) points out that urbanisation has resulted in high traffic volumes, and therefore requires a need to design roads that handle high levels of traffic and traffic conflicts. Besides, there are deficiencies regarding specifications for intersections. He finds these aspects absent in the Ghana Highway road design guide compared to other road design guides.

Besides road design guidelines, urban planning plays a crucial role in creating walkable places. Yankholmes (2013) argues that urban planning contributes to making places liveable, productive, and inclusive. The view held by Yankholmes (2013) of the impact of urban planning may enhance walkability, as the element of inclusion is worth considering in making places walkable. Streetscape design guidelines, coupled with urban planning, inform Architects and Urban Designers' design processes to create memorable spaces in the urban space. If planning laws and road design guidelines are revised to include streetscape designs focused on making places walkable, it will contribute to liveable places.

2.4 Street Design Guidelines

2.4.1 Ghana Road Design Guidelines

The Ghana road design guide document provides standards on any particular class of road in Ghana. The guide has three objectives: to ensure the safety and comfort of road users, arrive at

the economic design, and maintain uniformity in alignments, drainage, and other road facilities (GHA, 1991). Besides the safety and comfort objective of the document, not so much focus has been made on the attributes of walkability as explained in the theoretical literature. A review of this design guide into a comprehensive street design guidelines of current standards and requirements is necessary.

The road design guide serves institutions like the Ghana Highway Authority (GHA), the Department of Urban Roads (DUR), and the Department of Feeder Roads (*ibid*). Despite some inadequacies regarding walkability in this design guide, this study will apply the provisions in the Ghana Highway road design guide and complement it with the Institute of Transportation Engineers (ITE) report on designing walkable urban thoroughfare.

2.4.2 Institute of Transportation Engineers Report on Street Design Guidelines

The Institute of Transportation Engineers (ITE) is an international educational and scientific association of transportation professionals, including transportation engineers, planners, consultants, educators, and researchers (ITE, 2010). They are responsible for meeting mobility and safety needs. Their report for street design focuses on providing guidelines to enhance walkable urban design thoroughfare. The application of the ITE report primarily centres on the existing context, which requires enhancement. However, the report can be used in creating new contexts (*ibid*).

The ITE report's objective mostly emphasises the provision of design parameters and criteria for specific thoroughfare elements such as pedestrian infrastructure and carriageway, which meet the needs of walkability, alongside stakeholder, community, and environmental requirements (*ibid*).

One of the ITE principles focuses on accommodating pedestrians, cyclists, and motor vehicles by creating clearly defined routes. The ITE also describes walkable neighbourhoods' characteristics to have, among other things building entries to front directly onto walkways (sidewalks) without vehicular parking between entries and right of way. Besides, buildings, landscapes, and thoroughfare design should be at a pedestrian scale (see also McNally [2010] as discussed in section 2.4 above) where pedestrians can appreciate urban design features and details while

promenading at street level. Walkable streets should also support activities generated by adjacent contexts such as mobility, safety, access, and place-making functions of the right of way. Lastly, the ITE recommends that a walkable neighborhood has compact development patterns and densities by creating relatively small blocks to provide safety (*ibid*). These recommendations draw a similarity with the theoretical discussions on the new urbanism, which is pro walkable neighbourhoods and less tolerant for vehicles.

In summary, the Institute of Transportation Engineers guidelines provides for safety and convenient facilities for pedestrians, attractive streetside, sufficient pedestrian walkway width, successful integration of transit facilities, and speed management. These provisions for street design are pedestrian-centered and enhance walkability.

2.5 Policy Context Regarding Road safety and Spatial Planning

In Ghana, there are policies guiding road safety, transport, and spatial planning. However, there are no policies regarding walking and cycling in Ghana (Peprah, Owusu-Sekyere, and Amoah, 2018). This section presents the National Road Safety Policy and the Land Use and Spatial Planning Act and their connection with creating walkable streets.

2.5.1 National Road Safety Policy of Ghana

The National Road Safety Policy covers policy statements on drivers, vehicles, roads, and intermediate means of transport. The policy document was developed in the context of Ghana's National Transport Policy Document in three areas. Two of these relate to firstly, non-motorised transport such as cycling. Secondly, the health and safety of communities and users of all transportation modes (Ministry of Transport [MoT], undated). The establishment in charge of road safety in Ghana is the National Road Safety Commission (NRSC) of the Ministry of Transport.

In some sections, the policy calls for removing hawkers, immobilised vehicles, other obstacles from the streets, strengthening existing legislation on road safety and driver training. Others are increased funding for road safety programmes, a collaboration between various stakeholders, and ensuring that vehicle assembling, modification, usage, operation, and maintenance conform to international standards (*ibid*). These measures are intended to ensure safety on roads. The

policy, however, fails to address the concept of walkability attributes in the area of social cohesion and safety. The presence of economic activities along walkable routes facilitates social cohesion and interaction, and security. This intervention will require purposely integrating such spaces into a streetscape.

2.5.2 Land Use and Spatial Planning Act

The Land Use and Spatial Planning Act (LUSPA) of 2016 is an Act to revise and consolidate the laws on land use and spatial planning, provide for sustainable development of land and human settlements through a decentralised planning system, ensure judicious use of land to improve quality of life, promote health and safety in respect of human settlements and to regulate national, regional, district and local spatial planning, and generally to provide for spatial aspects of socio-economic development and related matters. The Act applies to public institutions responsible for human settlement, spatial planning, and land use.

In creating walkable communities, spatial planning is critical to allocate adequate space for a thoroughfare such as the travelled way (highways), the streetside, context, and intersection distances. One of the areas guided by this Act is the protection of open spaces and public parks from being encroached by physical developments. The Act also guides buildings' form and height, tree preservation, landscape or tree planting requirements, and preservation of buildings with cultural heritage and historical structures. Also, it guides in the size and orientation of buildings, accessibility, drainage systems, public utilities, and floor area ratios. Regarding unauthorised developments on public rights of space, the Act prohibits these developments (*ibid*). The provision of adequate spaces for walkable areas within a thoroughfare comes under the provisions of this Act. Just like the previous section on the National Road safety policy, this Act also fails to address some of the attributes of walkability.

2.6 Regulations Guiding Building Development as a Part of Street Context

Regulations guide buildings as part of the street context to ensure they meet specific standards. This section presents regulations guiding building development in Ghana.

2.6.1 Ghana Building Code

The Ghana Building Code (GhBC) contains regulations that guide various departments, metropolitan, municipal, and district assemblies, private and public bodies, and building construction. It outlines a set of minimum regulations designed to ensure public safety regarding structural efficiency, fire hazards, and buildings' health aspects. The code makes provision for professionals in the built environment to use their discretions in applying the choice of materials and methods of design and construction, so far as the basic requirements provided meet standards (Ghana Standards Authority [GSA], 2018).

The code covers aspects of administrative regulations, development control rules, general building requirements, stipulations regarding structural loads and design, materials, building services, measures to ensure workers' safety and the public during construction, and rules for the erection of signages and outdoor display structures (*ibid*). The provisions in this code are relevant for context as one of the components of walkability.

2.6.2 National Building Regulations

Similar to the Ghana Building Code (GhBC), Ghana's national building regulations (Legislative Instrument [LI] 1630) provides guidelines for building construction, setbacks, and choice of materials of construction, among other things. This document guides the various departments, metropolitan, municipal, and district assemblies, private and public bodies in constructing buildings. Built environment professions applying these regulations ensure that they work within the provisions of the law.

2.7 Summary of Key Points from the Literature Review

The reviewed literature highlights some key points for the concepts as outlined earlier in detail in Figure 1.1. In summary, the elements of walkability to be considered when designing walkable streets include health and well-being, safety and security, context or sense of place, and sanitation. The element of traffic congestion identifies the impacts of carbon emissions on the environment and well-being which is essential to walkability. These key points identified as elements of walkability impact on the pedestrian; walking, reduced carbon emissions, presence of trees impact on health, visibility from within and outside of a building, as well as the presence

of people enhances safety and security of pedestrians. Context and sanitation on the other hand create a sense of place with people having memorable experiences of street space. A sense of place comprises activity, the physical setting, and the meaning attributed to a place (Marczbani, 2020). Walkability, therefore, is not focused on just sidewalks but the elements that enhance the urban space regarding environmental quality, access and use of urban space, and social activities as Bahendwa (2017) argues. Figure 2.3 illustrates the summary of the key points which are considerations for creating walkable streets. The elements indicated do not imply making up the full composition of the elements of liveability, however, they form a key part of walkable streets which is an aspect of liveability.

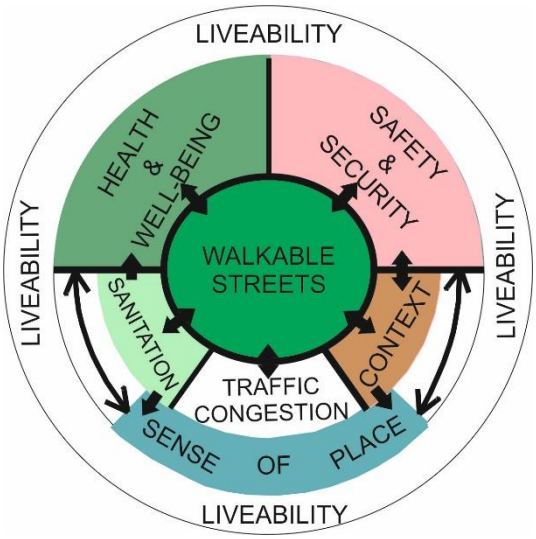

Figure 2.3: Summary of Key Points for a Walkable Street (Source: Author, 2021)

2.8 Conclusion

This chapter reviewed the literature on walkability concepts and how it relates to the concepts of liveability and sustainability. The key features of a walkable street, micro or macro, were identified in the discourse. The chapter also highlighted empirical literature on pedestrian safety relating to pedestrian-related accidents in the Accra Metropolitan Area. It was followed by street design guidelines, policies, and regulations guiding spatial planning and development. The summary of the key points from the literature review resulted in a diagram in figure 2.3 showing their interrelatedness. The benefits of these key points on pedestrians were highlighted in the theoretical literature.

The next chapter explores the study area in identifying the nature and character of Osu Oxford Street.

CHAPTER THREE: BACKGROUND TO THE STUDY AREA- OSU OXFORD STREET IN OSU, ACCRA, GHANA.

3.1 Introduction

This chapter presents the background of Osu Oxford Street in Osu, also known as the "Danish Osu or Christiansborg" (Yankholmes, 2013), located in Accra, the capital of Ghana. The chapter presents the evolution of the street name and presenting itself as more or less a "synecdoche" over the actual name. The chapter further describes the various distinct features that characterise this vibrant street, which affect walkability.

3.2 Background of Osu

Osu is the Korle Klottey Municipal Area (KKMA) seat, part of the Greater Accra Metropolitan Area (GAMA) in the Greater Accra region of Ghana. Korle Klottey Municipality is a newly formed municipal district carved out from the Accra Metropolitan Area (AMA).

The population and housing census (PHC) held in 2010 recorded 121,723 people (Ghana Statistical Service, 2012). The projected population for the municipality for 2020 is 152,452 people, revealing an annual population growth rate of approximately 2.5%. Women constitute 51.1% of the total population (Ghana Statistical Service, 2020). The population of adults (18years and older) makes up approximately 69.5% of the municipality's total population (*ibid*). Figures 3.1 and 3.2 show the population by sex and age category of the KKMA.

Korle Klottey Municipality occupies a land area of 11.9km^2, with a population density of 12,901/km^2 (*ibid*). The Gulf of Guinea borders the southernmost part, with the Ring road as another boundary. Figure 3.3 shows the extent of the Korle-Klottey Municipal Area (KKMA) with the study area located within it.

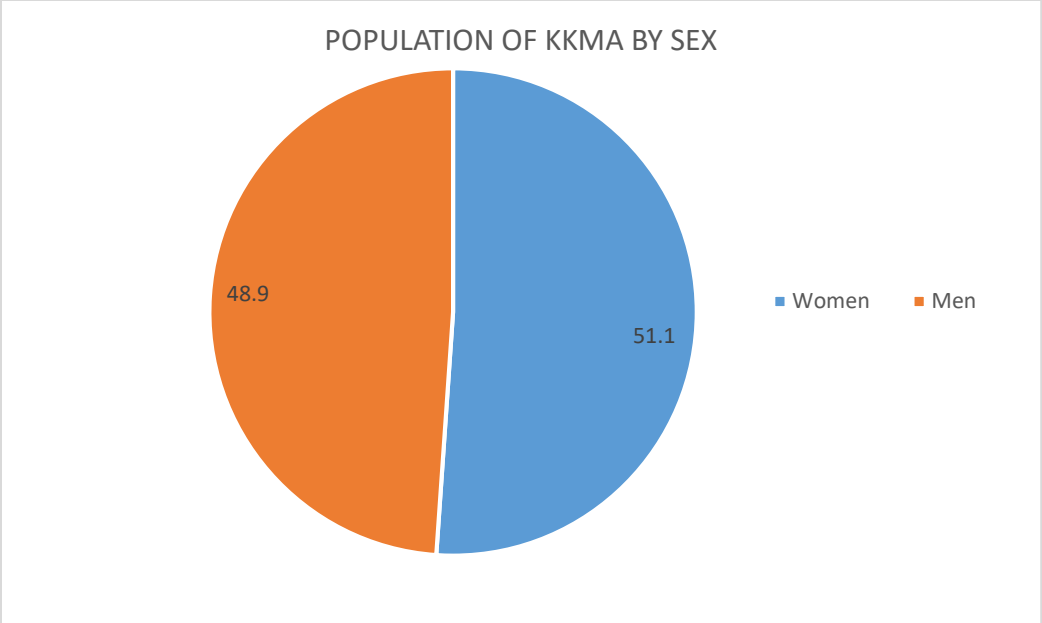

Figure 3.1: Population of KKMA by Sex (Source: Generated by Author, 2020)

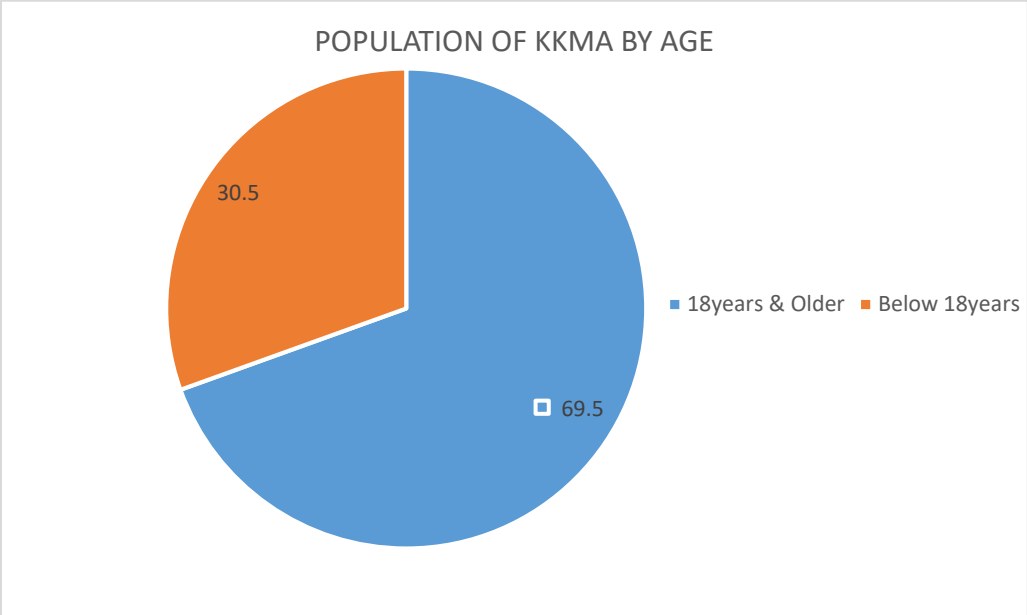

Figure 3.2: Population of KKMA by Age Category (Source: Generated by Author, 2020)

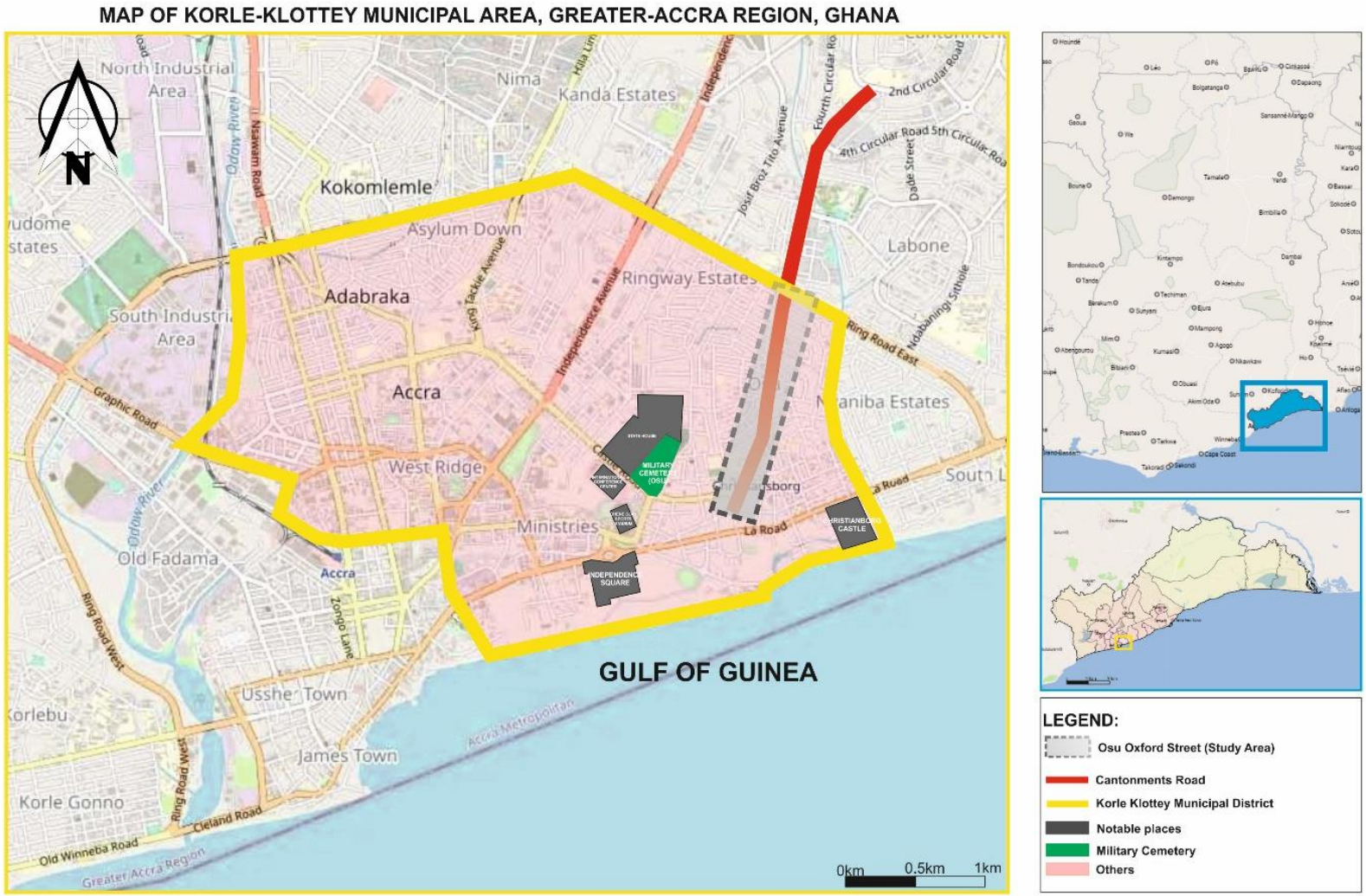

Figure 3.3: Study Area- Osu Oxford Street (Source: Adapted from Google Maps, 2020)

Osu, a former slave route, has a historic edifice, Christiansborg castle. The Danish traders built this historic edifice to facilitate trade activities with locals, including the transatlantic slave trade (Yankholmes, 2013; Grant and Yankson, 2003). As it was, the edifice changed hands from the Danes-Norwegians to the Portuguese, the Akwamus, the British, and subsequently served as a seat of the Ghana government until 2012. Yankholmes (2013) points out that Osu inclines to large-scale tourism because of its cultural heritage assets such as the Christiansborg Castle, the slave routes, among other historical relics. These relics, if enhanced, will, to an extent, boost tourism, which may call for an improvement in basic infrastructure. Urban planning can also play an impactful role in ensuring tourism enclaves are "liveable, economically productive, and socially inclusive" (Yankholmes, 2013:267).

Osu is mostly a residential neighbourhood but has transformed into a commercial district, evolving from a small fishing village to a colonial port town. The Osu neighbourhood's spatial plan was developed by the colonial and post-independence town and urban planning for the city. Its evolution was also affected by transnationalism and globalisation (Quayson, 2014). Quayson (2014) speaks to the different groups of foreigners, such as Brazilians, the Danish, the British, among other Europeans who have had influences in the area. The high-intensity commercial outlook of Osu as it manifest today is the result of the early 1980s structural adjustment programmes (SAPs), which facilitated a rapid and sustained expansion of the economy of Accra and saw the emergence of several foreign businesses in Osu (*ibid*; Grant and Yankson, 2003). The deregulation of public transport, leading to increased use of transport operators, including informal vehicle operators of mini-buses usually called "trotro" in Ghana, and mass transit buses, is one of the impacts of the SAPs (Grant and Yankson, 2003:70).

Quayson (2014) describes Osu as one of the vibrant and globalised commercial enclaves in Accra. Grant and Yankson (2003) point out that Oxford Street's international outlook, located in Osu, draws much patronage from foreigners and the middle-income class alike who visit the city. Osu's food court is one of the points of interest to the many middle class in Accra (Grant and Yankson, 2003).

Osu neighbourhood has a mix of residential buildings, hotel apartments, formal economic activities, and informal ones. This mix of economic activities and establishments is both locally and internationally owned. The vicinity of Osu has an active nightlife. Grant and Yankson (2003) argue that Osu Oxford Street has contributed to the increase in economic activities, some of which are informal. The informal economic activities in the neighbourhood, including street vendors, are either stationary or mobile. These informal activities and vehicular parking spaces in front of shops along the street have taken over pedestrian routes, narrowing them. Another common phenomenon is the high volumes of vehicular traffic in this most vibrant street in the municipality and the city of Accra. Photos 3.1 to 3.4 show Osu Oxford Street with some of the prevailing activities. Photos 3.1 and 3.2 were taken during the Covid-19 lockdown periods in 2020, where streets were not busy. Photos 3.3 and 3.4 are two years earlier.

Photo 3.1: Shopping Mall, Oxford Street, Osu. (Photo by Walter Ashong, 2020)

Photo 3.2: On-street Economic Activities, Oxford Street, Osu. (Photo by Walter Ashong, 2020)

Photo 3.3: Billboards and Informal Economic Activities, Oxford Street, Osu, 2018 (Source: TripAdvisor, accessed 8 August 2020)

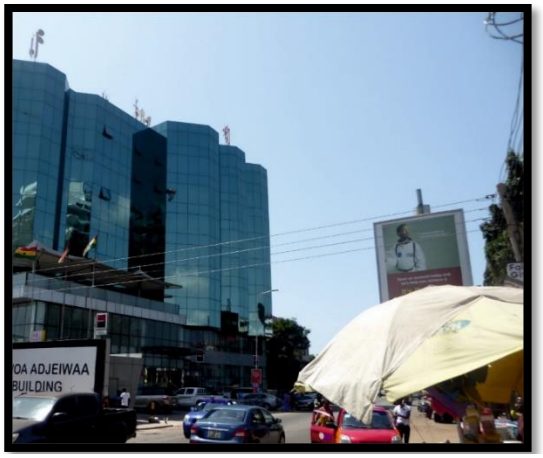

Photo 3.4: Frontage Parking, Oxford Street, Osu, 2018 (Source: TripAdvisor, accessed 8 August 2020)

3.3 Tourism Strengths of Osu as a Contributing Factor to the Busy Oxford Street

Osu is situated close to historical places such as the Christiansborg Castle (see photo 3.5). Besides Christiansborg Castle, the community's strategic location is close to other tourism destination points of interest, such as cultural heritage sites, dark tourism sites, and slavery heritage sites (Yankholmes, 2013), which draws many tourists to the community. Yankholmes and Akyeampong (2010), relate dark tourism to sites with a history of death and tragedy. The Christianborg Castle, which facilitated the slave trade, and the military cemetery are some examples. Yankholmes (2013:269) states that the Osu community has several of the relics of the transatlantic slave trade (TAST), including “tamarind tree-lined Danish alley, slave market and the Danish mulattos.” The community's tourism strengths contribute to the high number of tourist arrivals to the community, in turn contributing to high demands for accommodation and other services like travel and tour agencies, making it one of the most vibrant places at night.

Photo 3.5: Osu Castle (Photo by Barbara Ayeley Mills-Tettey, 2018)

3.4 The Character of the Study Area: Osu Oxford Street

Osu Oxford Street is a section of Cantonments road which runs through Osu to Cantonments, a planned high-income residential area. According to Quayson (2014), Oxford Street has become a space that facilitates social interaction in various forms, such as pedestrian-pedestrian interaction, pedestrian-vehicular, vehicular-vehicular, and pedestrian-mobile vendors' interactions, among others. These varied forms of interactions may be adversarial in verbal exchanges because road users, including pedestrians, vendors, and drivers, may claim a right of way at a particular point in time.

Quayson (2014:17) identifies these street interactions as a critical aspect of what he terms as the "intersection of spatiality and spectatoriality," which is common regarding Accra's street life. He draws from Henry Lefebvre's notion of spatial practice (1992) that there are two forms of spatial practice common on Accra's streets. The first is how one negotiates a road using a zebra crossing (crosswalk), and the second involves rules that govern altercations on the streets of Accra. Other

forms of interaction are when a pedestrian also stops to purchase an item from either an itinerary or a stationary vendor. Osu Oxford Street's commercial character housing the various formal and informal economic activities, including financial institutions, restaurants, brings about varied experiences in a single space (street), where one will either be an observer of an event or a participant.

The name Oxford Street is not documented in any official map of Accra. However, it has gained dominance over the actual name “Cantonment Road.” According to Quayson (2014), two out of six pictures representing Accra's city in an international newspaper as a desirable destination are Osu Oxford Street. Quayson (2014) notes that the New York Times published these pictures as depicting Accra, making it the fourth most attractive destination out of forty-six places in the world surveyed in 2013.

Quayson (2014:10) describes Oxford Street as an “improvisation and chimerical projection of popular desire.” He points out that Osu Oxford Street's popularity heightened after exiled Ghanaians returned from parts of the world following the end of military rule and the start of multi-party democracy in 1992. Most of the returnees came from London. The street's appealing nature was because it had what he describes as “situational advantages” such as restaurants, pubs, hotels, shops, and places that facilitate social gatherings attracted most of the returned exiles. Quayson’s (2014) use of the phrase “situational advantages” can be likened to Grant and Yankson’s (2003) view of Osu Oxford Street as having distinct features. These distinct features have a modern outlook of economic and leisure activities that draw many people who live nearby, especially middle-class people. The name “Oxford Street” in Osu may have been adopted from the known Oxford Street in London, United Kingdom, because of the similarity it draws with the one in London as one of the busiest shopping streets (see photos 3.6 and 6.7). The outlook presented in photos 3.6 and 3.7 may look different, but they draw similarities in their forms of activities. The origin of the name, however, is not fully known (Quayson, 2014).

Photo 3.6: A Section of Oxford Street, Osu, 2018
(Photo from Tripadvisor, accessed 8 August 2020)

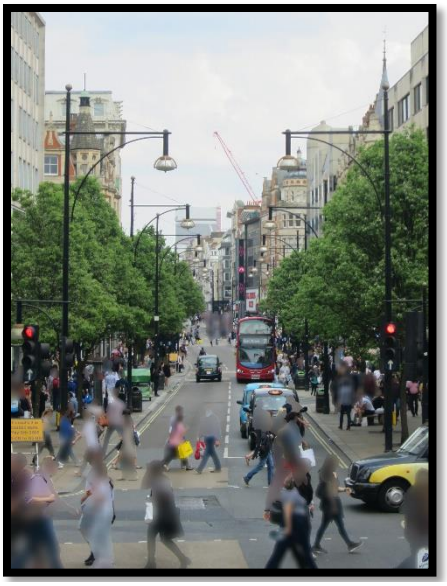

Photo 3.7: A Section of Oxford Street, London. 2016
Photo from Wikipedia, accessed 8 August 2020)

On Osu Oxford Street, one may experience the variance in prices of goods. On the main street, on the one hand, Quayson (2014) argues that there are stationary and itinerant vendors, who have no price tags for their goods, and prices of goods may be cheaper, and customers can bargain the prices further downwards. On the other hand, shops have products with fixed price tags, and restaurants have priced menus. Whereas the shops and restaurants and other related economic activities may target the middle-income group, the stationary and itinerant vendors satisfy the low-income bracket (*ibid*). The "space" Oxford Street hence becomes a place that welcomes different categories of people, ranging from low-income earners to high-income earners and foreigners alike.

3.5 Identifying the Extent of Osu Oxford Street

The extent of Osu Oxford Street may not be clearly defined. Quayson (2014), however, identifies Oxford Street to start from "Mark Cofie House" from the 3rd Kuku Close to the Danquah Circle to the North on the Ring Road East (886m). For this study, I will identify Oxford Street to start from the intersection of Basel Street and Salem Avenue to the Danquah Circle on the Ring Road East. The intersection at Basel Street and Salem Avenue to Danquah Circle on the Ring Road East has an approximate length of 1.64km (1640m). This distance represents approximately forty-eight

per cent (48.4%) of the Cantonments Road. The Cantonments Road itself stretches from the Junctions of Basel Street and Salem Avenue through the Danquah Circle and the Cantonments Round-about to the 2nd Circular Road to the North (3.40km). Figure 3.4 shows the extent of the study area.

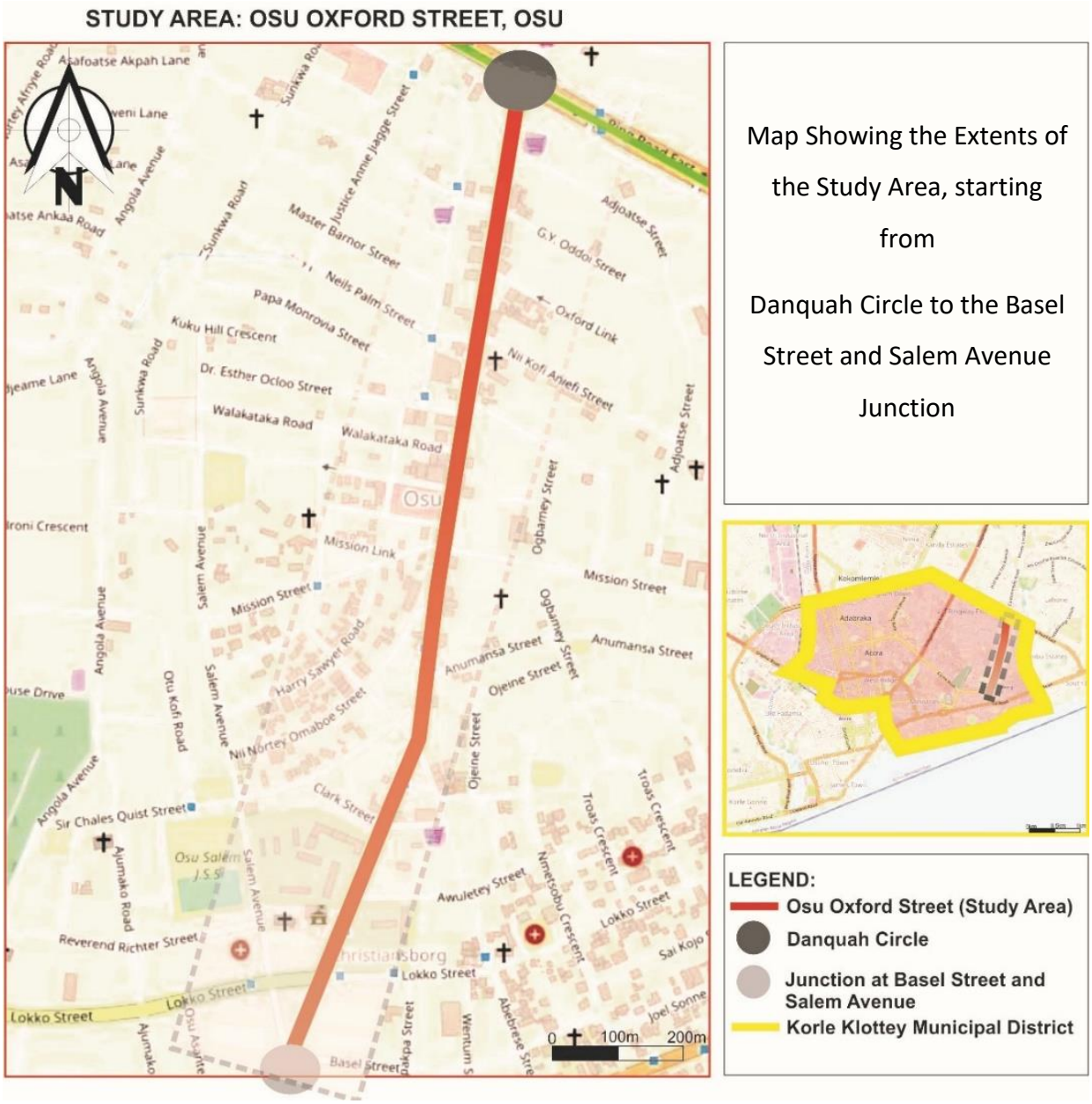

Figure 3.4: Osu Oxford Street (Source: Adapted from Google Maps, 2020)

The photographs below (Photos 3.8, 3.9, and 3.10) are close to Danquah Circle, which is on Oxford Street's north side. Photo 3.11 shows the other end of Oxford Street, located at Basel Street and Salem Avenue's Junctions.

Photo 3.8: View towards Danquah Circle (Photo by Victor, 2020)

Photo 3.9: Koala Supermarket at Danquah Circle (Photo by Walter Ashong, 2020)

Photo 3.10: A Multi-Storey Mixed-Use Facility at Danquah Circle (Photo by Walter Ashong, 2020)

Photo 3.11: Basel Street and Salem Avenue Intersection (Photo by Walter Ashong, 2020)

The Cantonments area was one of the ruling class's residential neighbourhoods during the colonial period (Quayson, 2014). Other prestigious neighbourhoods to the Cantonments area include Nyaniba Estate, Ridge, Ringway estate, and Kanda. Quayson (2014) notes that Oxford Street draws patronage from these adjoining areas. Other notable places that have proximity to Oxford Street include public buildings such as the Independence Square, the Accra Sports Stadium, the Accra International Conference Centre (AICC), the State House, the Parliament House, and the government Ministries. These are approximately within 3 kilometres from Oxford Street. The government Ministries area is a hub for the head offices of all government institutions.

As presented above, the narrative, coupled with the maps, shows that the street serves as a thoroughfare all day long to other places, making it a twenty-four-hour hub for commercial and leisure activities (*ibid*), and this is done either by vehicular transport or walking.

3.6 Activities and Features on Osu Oxford Street Affecting Walkability:

A myriad of activities characterise Oxford Street. On entering Danquah Circle street, one may find specialised shops, supermarkets, telecommunication offices, banks, restaurants, shopping malls, and street vendors (mobile or stationary). The specialised shops range from computers and

accessories, mobile phones, electronics, jewelry, clothing, and fabric shops. Others are internet cafes, hotels and hotel apartments, forex bureaus, and ice cream parlours. Other areas with proximity to the street are nightclubs, pubs, dance venues, food courts, embassies, and high commissions. Figure 3.5 shows the spots of the various economic activities along Osu Oxford Street. The various economic activities are represented in different colours in circles dotted along Oxford Street.

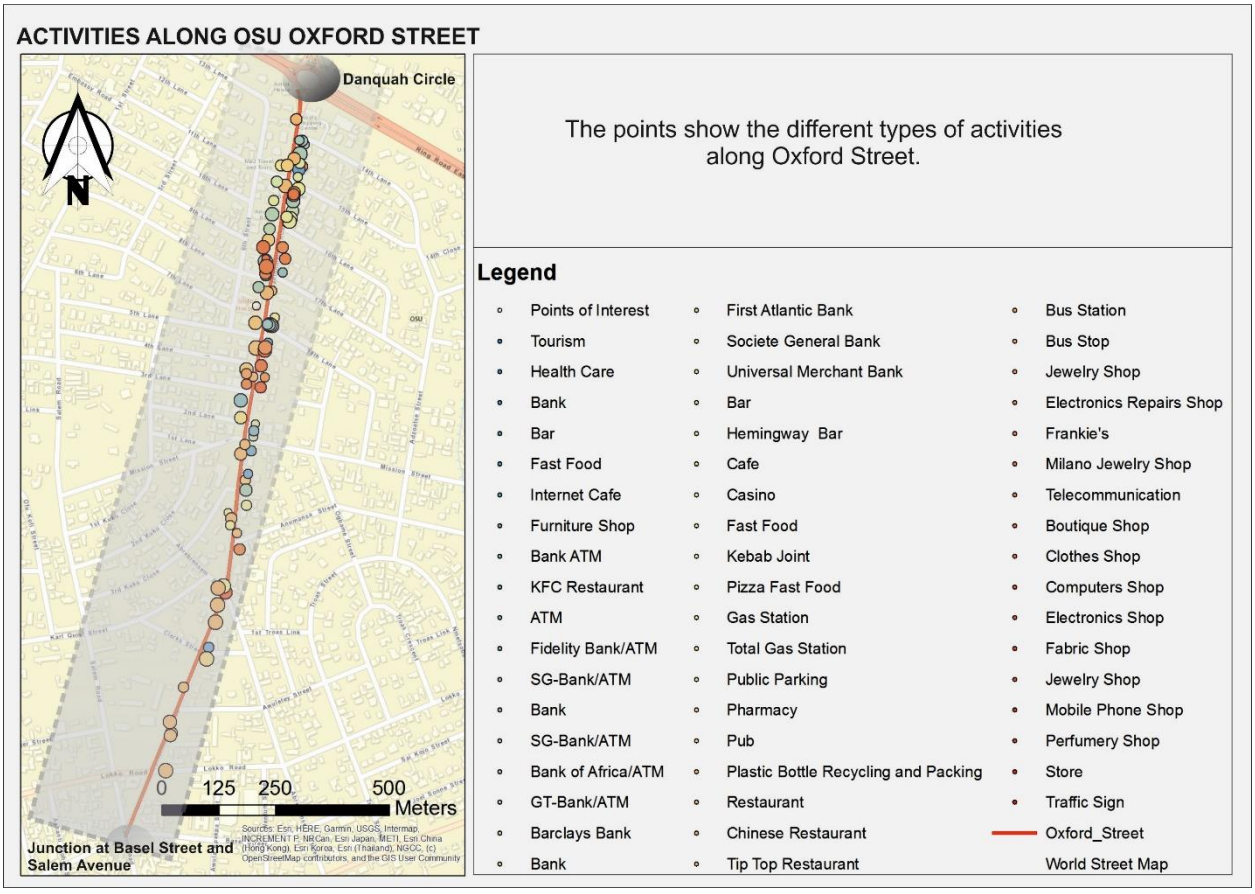

Figure 3.5: Map Showing the Different Activities along Oxford Street (Source: Adapted from ArcMap Version 10.5, 2020)

Giant advertisement billboards also characterise the street. The mix of street vendor businesses (mobile and stationary) such as coconut sellers, roasted plantain with groundnut sellers, fried rice sellers, sewn clothing, bread, and phone sellers are present on the street. (see photos 3.12 and 3.13).

Photo 3.12: Bread Seller (Photo by Walter Ashong, 2020)

Photo 3.13: Phone Seller (Photo by Walter Ashong, 2020)

These different street vendors found on pedestrian walking routes force pedestrians to walk in a "zigzag" manner. Quayson (2014) admits that the pedestrians' zigzag walking is not due to a narrow pedestrian walkway, but because of the development of the commercial activities, which resulted in extension works of commercial buildings along the street. These developments by commercial buildings narrow pedestrian walkways. In some cases, the rear side of vehicles jut into walkways and narrow them, forcing pedestrians to walk in competition with vehicles.

3.7 Conclusion

Osu has a strong potential for tourism and economic activities. The neighbourhood's transnational character due to its historical antecedents and the strategic proximity to notable places is a strength that can be tapped to enhance development. However, as presented, the narrative indicates the lack of enforcement of planning laws, effective urban management, and urbanisation have yielded in informal developments encroaching into pedestrian walkways, forcing pedestrians to compete with vehicles. The term "informal development" in this context refers to developments in unauthorised spaces denying other people the right of access in the study area. Walkability on Osu Oxford Street can be enhanced if pedestrian walkways are clearly defined and made sufficient for convenience. Walkability can also be better if there is adequate pedestrian infrastructure provided to enhance the safety of pedestrians. These measures of enhancing walkability, if implemented, may encourage more people to take the delight of walking for shopping and also appreciate sightseeing of the historical facilities present in the

neighbourhood. The chapter also highlighted the activities on Osu Oxford Street and the various forms of interactions that one may experience in that space. The need to improve pedestrian infrastructure can be detailed in streetscape design guidelines for built environment professionals and other implementing state agencies.

This chapter looked at the background of Osu in the Korle Klottey Municipal Area (KKMA) in the Greater Accra Metropolitan Area of Ghana. The next chapter looks at the analysis of the research methods employed in the fieldwork for this study.

CHAPTER FOUR: INVESTIGATING WALKABILITY OF OXFORD STREET, OSU, ACCRA.

4.1 Introduction

This chapter gives an overview of the research methods employed in assessing the walkability of Osu Oxford Street.

4.2 Research Methods

Research methods involve the systematic approach and processes adopted in gathering data to analyse to uncover new information or create a better understanding of a topic. It is also understood as "an organised, systematic, data-based, critical, objective, scientific inquiry or investigation into a specific problem or issue to find solutions to it or clarify it" (Cavana *et al*., 2001:5). Research methods show the path through which a researcher formulates a problem and objective by presenting results from the data obtained during the study period.

In doing this research, I conducted a study in the study area by observation, reviewed literature, collected and analysed data. I went on further to expand on these observations and compared them with existing literature to provide answers to research questions conceived from the beginning of the research. This approach falls within the context of the Research Methods definition. In essence, the explanations provided were based on collected facts, measurements, and observations rather than reasoning alone. Schwardt (2007) argues that the research method follows a systematic philosophy of how the research investigation is carried out and developed to completion. This study explored the assessment of walkable streets as a liveability indicator to enhance health and well-being using specific criteria.

4.3 Research Approach

Creswell (2003) points out that research can be approached using three different techniques, and it relies on the kind of research. It comprises quantitative, qualitative, and mixed-method approaches. Quantitative research uses statistical methods to draw relationships between variables. The qualitative approach provides insights into the experiences and opinions of participants to address a research objective. On the other hand, the mixed research approach entails the combination of both quantitative and qualitative research.

I adopted a qualitative approach in this research to understand the reason for some movement patterns, crossing, and other developments in the study area by clarifying the problem. DeFranzo (2011) points out that this approach helps to understand underlying reasons, views, and motivations by clarifying the problem. It also provides a roadmap to develop ideas and hypotheses for potential quantitative research. In this research, there was a non-numerical collection of data, even though I did some form of measurements to compare with existing data, it did not amount to quantitative data analysis. My insatiable curiosity about the research topic and questions allowed for a thorough qualitative means to guide the research aim and questions towards a conclusion. Mack *et al*. (2005) indicate that qualitative research is a system of investigation that attempts to discover solutions to the research question(s) by following a structure of the examination and responding to the research question.

Besides, scholarships have mentioned that qualitative approaches are subject to human experience instead of quantitative judgement. These human experiences described may have drawbacks to qualitative research as there may be some form of bias. However, this is dependent on the researcher's skills and knowledge base. This qualitative research approach offered me the study area's perspective, using observation to gather data and guided by the conceptual framework to answer the research questions.

4.4 Research Strategy

Authors such as Saunders *et al*. (2009) and Yin (2003) indicate that even though many research strategies exist, there are significant differences among them. Thus the best thought would be to choose the most helpful strategy for specific research. The various research strategies comprise grounded theory, survey, action research, case study, archival research, ethnography, and cross-sectional studies (Easterby-Smith *et al*., 2008; Saunders *et al*., 2009). In this study, I employed the case study strategy as the ideal research strategy among these different strategies. The strategy adopted is a single type of case study, and it is descriptive. A checklist guided by the conceptual framework guided to document prevailing situations and subsequently evaluated using two street design criteria. The strategy helped to understand the study area. Chetty (1996) posits that this strategy brings to the fore understanding of a study area by measuring and

recording behaviour which was done in a live setting. According to Yin (2003:13) case study is “an empirical review that examines a modern phenomenon in a real-life setting.” The explanation by Collis and Hussey (2009) likewise showed some characteristics of the case study strategy. The case study area could accommodate different research techniques including interviewing by random sampling of pedestrians to gain in-depth knowledge regarding a specific phenomenon in a specific context. However, the covid-19 restrictions in the year 2020, and ethics protocols did not allow for that technique. Observations were employed instead.

4.5 Research Instrument and Data Collection

An aspect of data collection for research work includes studies on reviewed literature. In this study, I did a study on scholarly works on the concepts of sustainability, liveability, and walkability as a form of secondary data collection. This approach helped understand the fundamental concepts surrounding the topic and measured some fieldwork observations that served as an essential tool for primary data collection. Some key points I conceived at the onset to search for relevant literature were identified and summarised as my conceptual framework illustrated in figure 2.3 as elements of walkability. These key points also helped to develop my Inquiry List form for the fieldwork to observe and collect relevant data. The following literature describes observation as a tool in detail; Marshall and Rossman (1999) define observation as an orderly account of events, behaviours, and artifacts in the social setting chosen for the study. Observations help a researcher use the five senses to describe prevailing situations by providing a “written photograph” of the condition under study (Erlandson, Harris, Skipper and Allen, 1993). Demunck and Sobo (1998) point out that anthropologists use participant observation as the primary fieldwork method. Fieldwork entails keenly looking, improving memory, informal interviewing, capturing thorough field notes, and perhaps most importantly, patience (DeWalt and DeWalt, 2002). Participant observation allows researchers to validate definitions of terms that participants employ in interviews. They can observe events that informants may be unable or unwilling to share. Some of these events could be impolitic, ill-mannered, or insensitive. They also note situations informants have provided in interviews, thus drawing their attention to inconsistencies in the description provided by those informants (Marshall & Rossman, 1995).

DeWalt and DeWalt (2002: 92) believe that the research design goal using participant observation is to fully comprehend the events under study to be as objective and accurate as possible constraints of the method. They suggest participant observation to give credence to the study and better comprehend the context and phenomenon under study. In designing a research study and determining whether to use observation as a data collection method, one may consider the types of research questions, the study area, and the availability of opportunities in the study area for observation. Scholars argue that there should be a target participant representation in the study area and the strategies adopted to record and analyse data, which puts much credence with using additional strategies such as interviewing document analysis, or surveys, questionnaires, or other more quantitative methods used with observation. However, the covid-19 restrictions did not allow for these strategies, as the target participants and in this case, pedestrians and businesses in the study area could not be interviewed. Participant observation, therefore, provides a guide to answer descriptive research questions, build theory, or generate or test hypotheses (Dewalt and Dewalt, 2002).

Regarding document analysis which focuses on a systematic procedure for reviewing or evaluating documents, including both printed and electronic, I looked at some literature that was mostly derived online to help understand standards required for street designs and this guided me in assessing street walkability. Corbin and Strauss (2008) mention that the electronic document is computer-based and internet-transmitted materials, similar to other analytical methods in qualitative research. Document analysis, therefore, requires an examination and interpretation of data to bring out the meaning and develop empirical knowledge (see also Rapley, 2007). Also, there are records of texts and images without a researcher's intervention. This discussion does not include other mute or trace evidence, such as cultural artifacts.

Document analysis is usually combined with other qualitative research methods to triangulate, combining methodologies with studying the same phenomenon (Denzin, 1970: 291). In triangulation, the qualitative researcher draws on multiple sources of evidence with a minimum of two to find common ground and substantiate using varied data and approaches. In my findings

and analysis chapter, I compared my observations with other scholarships to explain further the implication of some of my findings to share common views with existing literature.

Eisner (1991) notes that triangulating data makes the researcher attempts to provide evidence that shares standard views and breeds credibility. It examines information collected through different methods, enabling the researcher to corroborate findings across data sets to reduce potential biases in one study. According to Patton (1990), triangulation allows the researcher to guard against the indictment of a study's findings to be simply an artifact of a single method, a single source, or a single investigator's bias. I used document analysis as a way to corroborate my findings to ensure the validity of the study.

This study employed a checklist (inquiry forms) to record the prevailing situation under themes and document analysis for verification. Also, there was the assessment of physical measurements taken from the site for their adequacy using street design guidelines. Data collected were compared with standards and theories from documents surrounding walkable streets to determine if the prevailing situation needs improvement through recommendations to contribute to sustainability objectives. The empirical data helped to understand the various concepts and their impact on the quality of life. Other data cover grey literature from technical data for street design from technical documents such as the Ghana Highway Authority Road Design guidelines, the Institute for Transportation Engineers guidelines for streetscape design, and other relevant publications on street design. The grey literature helped assess the prevailing situation on the ground to make well-informed recommendations.

Researchers have noted that the limitations of using observations and document analysis as a tool for data collection include, among others, human bias and a research agenda. DeWalt and DeWalt (2002) observe that male and female researchers have access to different information, access to different persons, locations, and knowledge bodies. In document analysis, documents are made available for some reason other than research, which usually gives less sufficient detail to answer a research question. Yin (1994) observed that access to documents might be purposely blocked, and an incomplete collection of documents suggests "biased selectivity" (Yin, 1994). Organisational policies also serve as an impediment to make available documents for research.

These positions held by DeWalt (2002) and Yin (1994) may not be the case in my instance, however, I could not get the data requested from my target institutions upon several follow-ups and calls by my research assistants. Covid-19 had an immense impact on so many things impacting the activities of state institutions. The researcher however ensured that the applicable data essential for this study was well captured in the request for information letter to the target institutions. See appendices “E” and “F” for sample requests for information letters.

4.6 Research participants

I identified my Research Participants through purposive sampling with the aid of my conceptual framework drawing from the key points I derived from the literature review. These Research Participants are directly or indirectly involved in street safety. The purposive sampling technique adopted, targeted state institutions, including the Ghana Police Service and the Driver and Vehicle Licensing Authority (DVLA), to request information via emails. I used the purposive sampling approach to ensure quality in my data collection to develop an informed opinion, which is an attribute of qualitative research. Purposive sampling is essential so that the chosen participants can contribute valuable and credible data to the research. Mack *et al*. (2005) defined purposeful sampling as a strategy of selecting who is best among participants to address the research question. In this research, requests for information were sent to target institutions to provide specific information to aid the research work. Also, I used a research assistant to help gather data from the study area. The research assistant became necessary due to the Covid-19 pandemic, which made countries close their borders. To make things easier, I prepared a semi-structured checklist that guided the work of the research assistants. A consent form between the principal researcher and the research assistant was signed (see appendix B for sample signed copy of the consent form; see also appendix C for sample Checklist [Inquiry Form] used to gather data).

4.7 Ethical Considerations

The ethical considerations in this regard were the request for information from the Ghana Police Service regarding crime rates and vehicle-related accidents recorded in the study area and the

Driver and Vehicle Licensing Authority (DVLA) for the number of vehicles registered within ten years in the study area.

This study's primary consideration was to research ethically by letting the target institutions know the purpose for requesting the information. Whereas some covert instances of observation methods might be appropriate, these situations are few and uncertain. Dewalt, Dewalt, and Wayland (1998) recommend that the researcher should make field notes openly to give the impression of collecting data for research purposes. Researchers in meeting the target members for the first time should notify them of their presence and share adequate information about the research topic. The prior notification will rest questions about the research and the researcher's presence, implying that one is continually introducing oneself as a researcher. The target institutional heads were informed about the research purpose and nature, and sufficient information was shared on the subject matter.

Another ethical responsibility was to preserve the participants' anonymity in the final write-up and field notes to prevent their identification, should the field notes be subpoenaed for inspection. The study did not include individual identities in the report for easy identification of the participants. The report generally referred to institutional sources, especially from reports generated. Photographs that captured persons in the study area were blurred to distort identity.

Conclusively, the study adhered to ethical requirements as specified in the Wits University ethics protocols. During the fieldwork, the researcher made it clear to all respondents that their participation in the research was voluntary. They should be comfortable at any point in withdrawing their participation. There was clarity in the request for an information letter (see appendices D, E, and F) and the signed consent form for data collection in the field.

4.8 Limitations and Challenges

The major limitation of this research was Covid-19, where there was strict adherence to social distancing. Covid-19 was a world pandemic that made countries close their borders, and as a result, I was unable to travel to the study area. The study area also did not have many activities present, being formal and informal economic activities, as there was a Covid-19 pandemic. As mentioned in section 4.6, I used a research assistant instead. Time was a significant constraint in

the research because of the timeline required to complete the work and submit it to the school of Architecture and Planning (SoAP). There were delays in the response rate from the respondents for the specific data requested. Out of the three target institutions, one responded via a telephone call, the unavailability of the data requested. The follow-ups made via in-person, emails, and telephone calls impacted the travel costs. However, some amount of data from reports published online aided to achieve the deadline for submission.

4.9 Conclusion

This chapter discussed the research methods employed for data collection to answer the research questions. The study employed inquiry forms and document analysis for data gathering. Participants were chosen through the purposive sampling technique, considering ethical concerns before, during, and after the data collection period. The research was, however, conducted with some limitations and challenges but appropriately managed by the researcher. The next chapter presents the findings from the fieldwork and the analysis.

CHAPTER FIVE: RESEARCH FINDINGS AND ANALYSIS

5.1 Introduction

This chapter presents the fieldwork findings in four key areas: *safety and security, health and well-being, sanitation, and context*. As explained in the Research methods chapter, the findings were collected from primary sources using inquiry forms with the help of a research assistant to gather data from the study area. Findings from secondary data cover pedestrian-related accident reports from the National Road Safety Commission (NRSC) and the Accra Metropolitan Assembly. The four key areas' findings will be captured under four themes to answer the main research questions and sub-questions. The key thematic areas to cover are *the causes of vehicular traffic congestion* and *the role of context in enhancing safety and security and creating a sense of place*. The other sections will include *the elements that affect pedestrian well-being* and *Osu Oxford Street's assessment using specific walkable streets criteria*.

5.2 Causes of Vehicular Traffic Congestion on Osu Oxford Street

Scholars have argued that car-dependent cities will not be sustainable in the future due to the cost of energy, fuel availability, congestion, pollution, and other environmental impacts (Singh, 2016). Walking regarded as the oldest form of transport (*ibid*) and sustainable mobility will be preferred. The element of traffic congestion by vehicles poses danger to pedestrians as they emit carbon which affects walkability benefits such as health and wellbeing, and longevity of life. Drawing from the literature review, SDG 3 targets 3.6 and 3.9 focuses on reducing adverse impacts of air pollution on street users. Reducing traffic congestion may be a way to reduce carbon emissions in the street space.

This section seeks to understand the possible causes of vehicular traffic congestion on Osu Oxford street. There may be many factors that contribute to vehicular traffic congestions on Osu Oxford Street; however, with observation as a tool and ArcMap version 10.5 aid, five causes of vehicular congestion were identified. These range from pedestrians' attitudes crossing a street, the absence of a clearly defined pedestrian walkway, the presence of informal economic activities, the number of intersections (junctions), and the thoroughfare nature of Oxford Street.

a. Attitudes of Pedestrians Crossing Street

Observations made show that pedestrians crossed from anywhere across the street, which made drivers honk at pedestrians while slowing down to prevent a knockdown. The inadequate pedestrian infrastructure, such as crosswalks, may have contributed to the haphazard crossing by the pedestrians. Only two crosswalks were found on the street's whole stretch (1.6km [1640m]). Besides, pedestrians did not use the two crosswalks in the study area but crossed from anywhere on the street. Pedestrians crossing from anywhere on the street could be because of fewer crosswalks, and they are also distanced apart from highly pedestrian concentrated areas. Another reason could also be that pedestrians did not see the need to use crosswalks. The pedestrians' haphazard crossing made drivers of both commercial and private vehicles seem impatient for the pedestrians to cross. Quayson (2014) indicated that impatience from drivers and pedestrians alike results in altercations. Pedestrians identified crossing the streets during the observations included middle-aged men and women, and children. Vulnerable persons such as persons with disabilities who are either ambulant disabled or wheel-chair bound, and the aged were absent during the period of observation. Ramps as part of street infrastructure were not seen anywhere on the street to make plying the streets convenient for these groups of persons, which would have been of great assistance. Photos 5.1 and 5.2 show the two pedestrian crosswalks on Osu Oxford Street.

Photo 5.1: Pedestrian Crosswalk near SSNIT Trust Hospital (Photo by Walter Ashong, 2020)

Photo 5.2: Pedestrian Crosswalk near Osu Presby Church (Photo by Walter Ashong, 2020)

Also, pedestrians walking alongside vehicles on the street due to the absence of a clearly defined walkway (sidewalks) made drivers drive with caution and also stop abruptly at a sudden crossing of a pedestrian. This phenomenon slows down vehicular traffic and may increase carbon emission levels in the atmosphere affecting the health of pedestrians and impacts the environment (Singh, 2016).

The only pedestrian walkway identified was about a 10-metre paved walkway in length on opposite sides of that street section. Pedestrians did not have any option but to walk on the shoulders of the carriageway of vehicles who honk at them at the least "zigzagged" movement. This phenomenon may inconvenience pedestrians as they walked alongside the popular commercial vehicles known as "trotro" and private cars. Some motorcycle riders also rode alongside pedestrian routes close to moving vehicles. On the other hand, the slowdown of vehicles may allow for some social interaction between pedestrians and vehicles as Quayson (2014) described in his writing, which is a feature of walkability. Bahendwa (2017) also views the concept of shared space to not focus on limiting traffic, but eliminate traffic engineering and traffic signs to facilitate maneuvering in that single space. He bases his argument on findings that car drivers are aware of and integrated into the pedestrian realm, with both street users safe. In another perspective, the cautious nature of driving even though to some extent ensures pedestrian safety, the continuous occurrence of this phenomenon stresses drivers en route to their various destinations affecting their productivity even at work. Figure 5.1 shows the walking routes of pedestrians along the street. Photos 5.3, 5.4, and 5.5 give a pictorial view of how pedestrians ply the street.

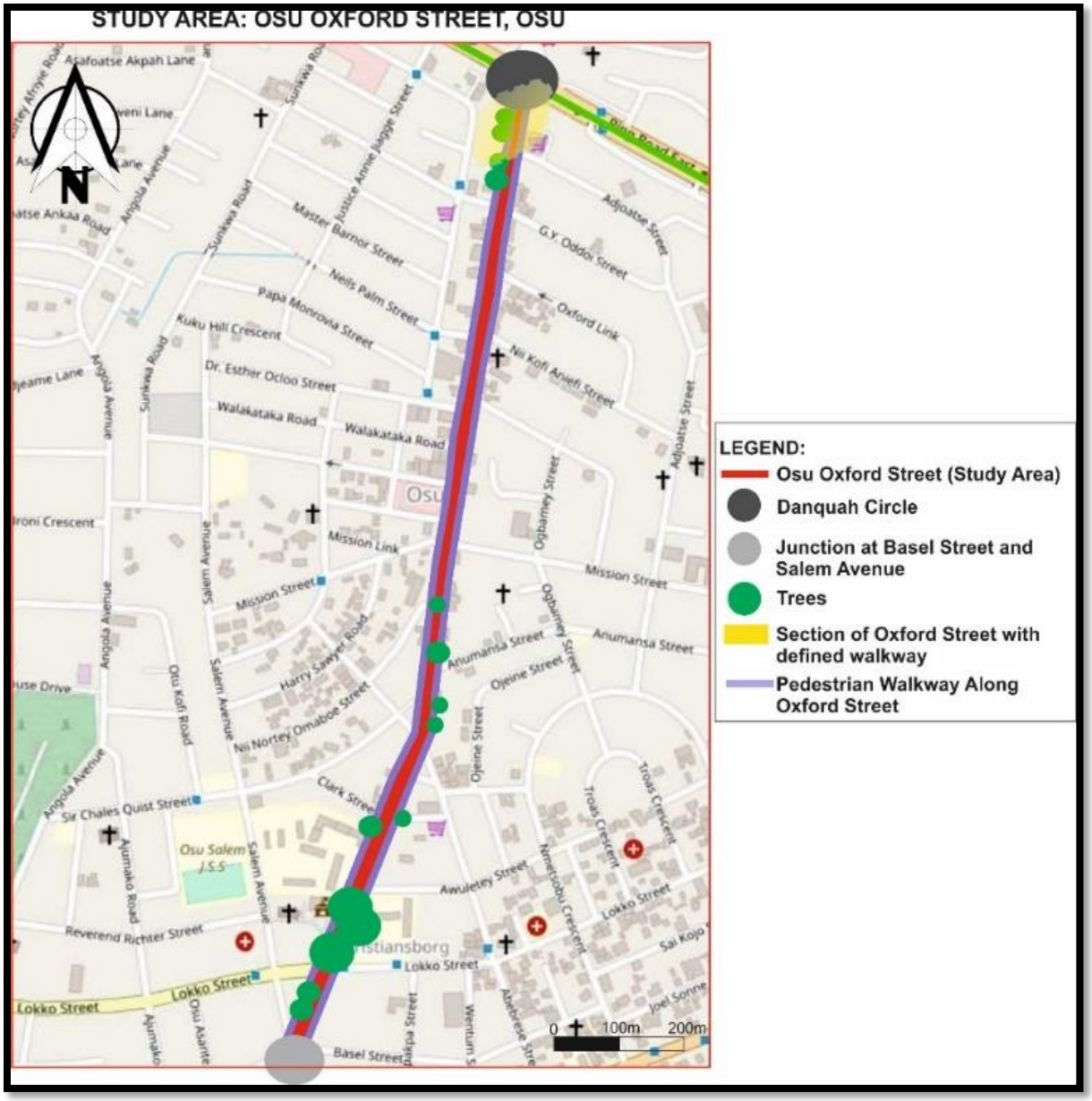

Figure 5.1: Map of Osu Oxford Street Showing Walking Routes (Source: Author's Adapted Copy from Google Maps, 2020)

Photo 5.3: Pedestrian Walkway along Street (Photo by Walter Ashong, 2020)

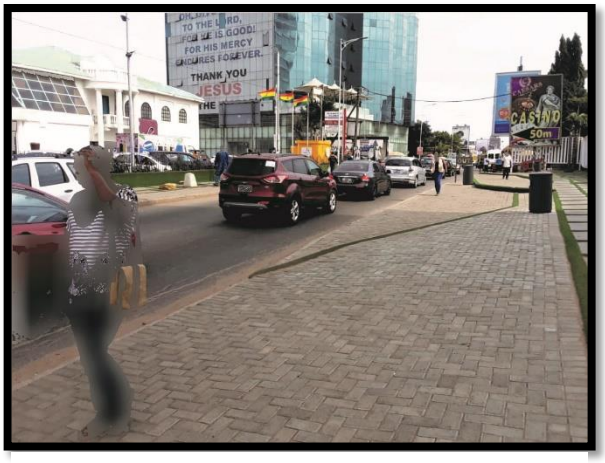

Photo 5.4: Section of Street with defined Walkway (Photo by Walter Ashong)

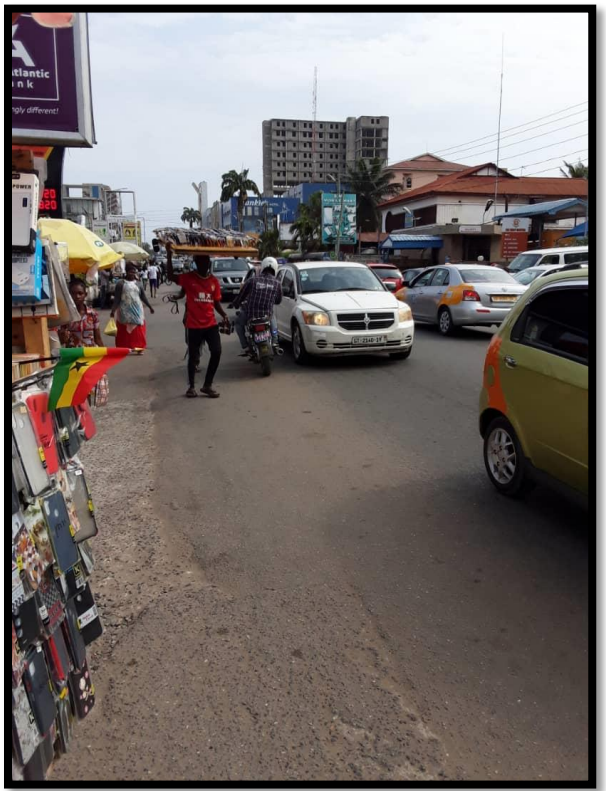

Photo 5.5: Pedestrian and Motorcycle Rider on Shoulders of Carriageway (Photograph by Walter Ashong, 2020)

b. Presence of Informal Economic Activities along Pedestrian Routes

The presence of activities including the informal enhances walkability (Singh, 2016). Gehl (2010) describes this phenomenon among others as eyes on the street which improves safety (see Jacobs, 1963), and they are important for city planning. He argues that walkable streets should

be unhampered and convenient with walking distances to destinations and also with visually pleasing views at eye level. However, unmanaged urban growth such as informal developments can be considered an obstacle to sustainable urban development (Khalil, 2010). Walking is connected to sustainable urban development due to the environment, economic and social benefits (Bahendwa, 2017). Therefore, if pedestrians are denied convenience in this right of way, the concept of walkability may be defeated and hence unsustainable urban development.

The presence of informal economic activities along Oxford Street may also have a bearing on vehicular congestion. Observations made include informal economic activities that may be mobile or itinerant, narrowed pedestrian routes. Pedestrians had no choice but to walk alongside vehicles on the road shoulders. The varied informal economic activities include stationary and mobile vendors, with stationary vendors comprising coconut sellers, food vendors, clothing, mobile phones and accessories, and fruits. On the other hand, mobile vendors include, among others, artworks, ice-cream sellers, and mobile phones and accessories. Pedestrians stopped to purchase some items, and others slowed down as they window-shopped while walking on the road's shoulders. The presence of these diverse groups, coupled with drivers and passengers alike, facilitates street interactions on Osu Oxford Street. This observation is similar to Quayson (2014) view of Osu Oxford Street characterising a spatial practice that involves varied forms of interaction between pedestrians and stationary vendors and moving vehicles. These may have a likely impact on vehicular traffic slowdown.

Photo 5.6: Nature of Stationary and Mobile Informal Economic Activities on Oxford Street, 2018 (Source: TripAdvisor, accessed 8 August 2020)

The Informal economic activities described in this case are described as the local elements found in the study area not preconceived as interventions to cater for such activities. The presence of these to some extent enhances walkability in the social and economic aspects but also obstructs movement pushing pedestrians to walk alongside vehicles causing traffic congestion. In addition, these informal actors identified in the study area cannot be disassociated from walking, however, with Singh (2016) view of unhampered walkable routes, addressing orderliness and convenience is necessary for pedestrians. Informal economic activities will then have to be well integrated into the street space along walkable routes rather than isolate them, hence achieving the economic and social aspect of sustainability. Walking in the study area has not been exploited adequately, and this is evident in the prioritisation of vehicular routes resulting in the growth of road traffic.

c. Number of Intersections on Oxford Street

In using ArcGIS (version 10.5), the number of Intersections (junctions) on Oxford Street counted was *s*eventeen. Out of these intersections, five of them, starting from the Salem/Basel intersection to Mark Coffie house, were within a relatively less busy Oxford Street section. The intersection distances from the Salem/Basel intersection to Mark Coffie House have an average distance of 160 metres (m) (intersection distances: 143m, 280, 142m, 116m, and 117m). The remaining twelve intersections found in Osu Oxford Street's busier section start from Mark Coffie house close to Papaye Restaurant to Danquah Circle in North. The average intersection distance is 72m (intersection distances: 103m, 9.93, 33.9m, 60.7m, 66.3m, 59.5m, 111m, 106m, 110m, 102m, 90.8m). The intersection distance is the measure of distance from one intersection to the other. The Institute of Transportation Engineers (ITE) recommends a desirable intersection distance of 122 metres and 200 metres (maximum). The average intersection distance of the busier section falls short of the desirable distance by ITE. The considerable number of vehicles intersecting on the 1.64km stretch of the street at the seventeen points on Osu Oxford Street may contribute to the intense traffic situation. Vehicles may have to slow down to allow others from adjoining routes to enter. Others may be unwilling to let other vehicles into the main road. The phenomena of vehicular-vehicular interaction at intersections may result in altercations since a driver, either commercial or private, may want to claim a right of way at a point in time.

The intersection distances may be too close, causing drivers to be fatigued with other drivers' frequency joining from other streets. Besides causing traffic slowdown, more vehicles may increase high levels of carbon emission, causing harm to health and having adverse impacts on climate.

d. Nature of Parking Spaces

Another form of observation made was the nature of parking spaces at the frontage of buildings. Oxford Street has many parking spaces in front of properties, with the vehicles parked at right-angle to the host buildings. Figure 5.2 shows areas along Oxford Street with parking.

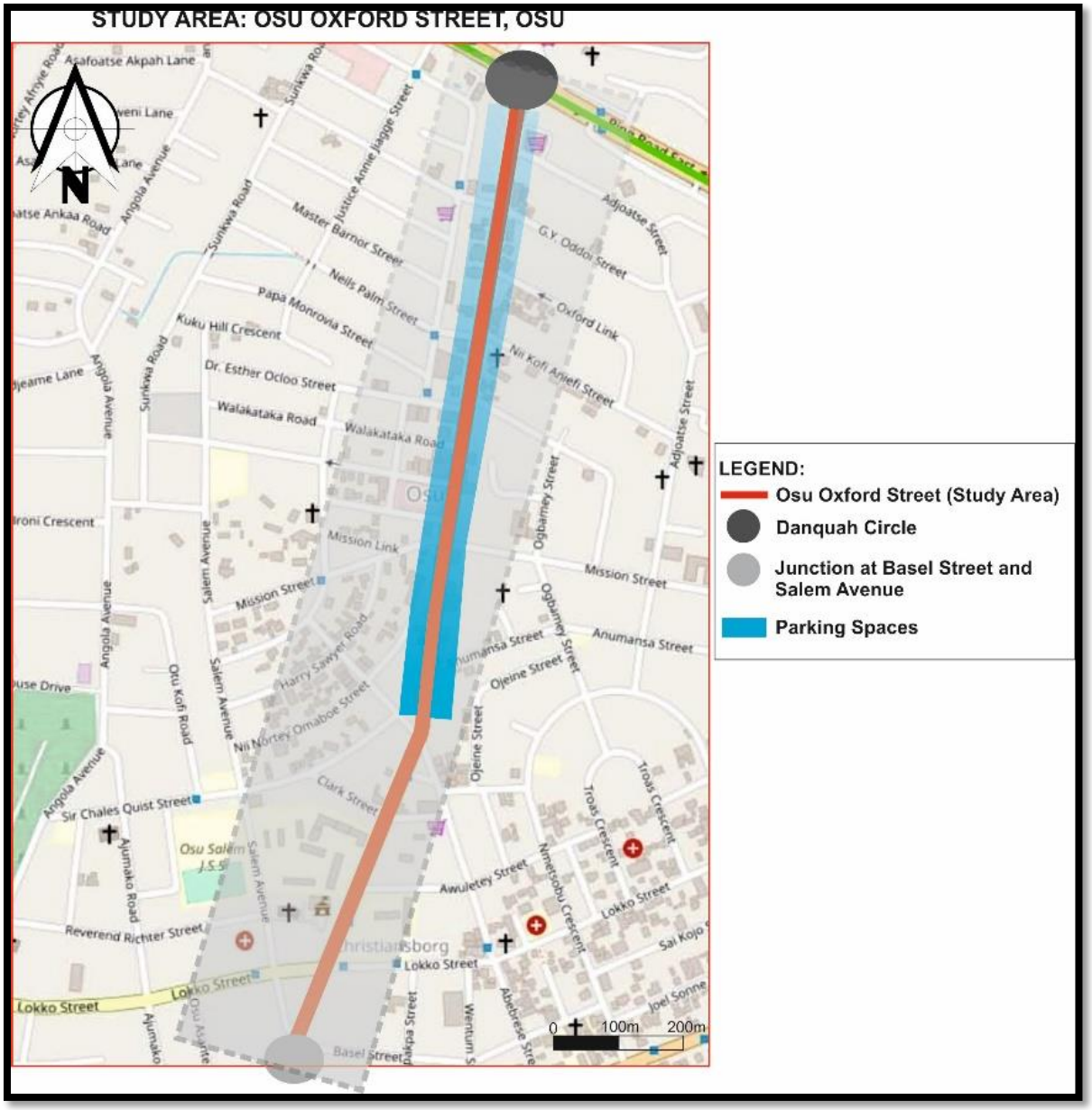

Figure 5.2: Map of Osu Oxford Street Showing Parking Spaces (Source: Author's Adapted Copy from Google Maps, 2020)

When a vehicle is about to retreat, oncoming vehicles on the main street are stopped to allow for vehicles to reverse onto the main street and leave. This scenario occurs along many spots contributing to a compounding slowdown of vehicles, causing congestion (see photos 5.7 and 5.8). In some cases, the rear side of vehicles jut into walkways and narrow them, forcing pedestrians to walk in competition with vehicles. Vehicles would have to drive cautiously, and this may slow down traffic flow.

Photo 5.7: Parking Spaces Infront of a Restaurant (Papaye) (Photo by Lincoln Nyarko, 2020)

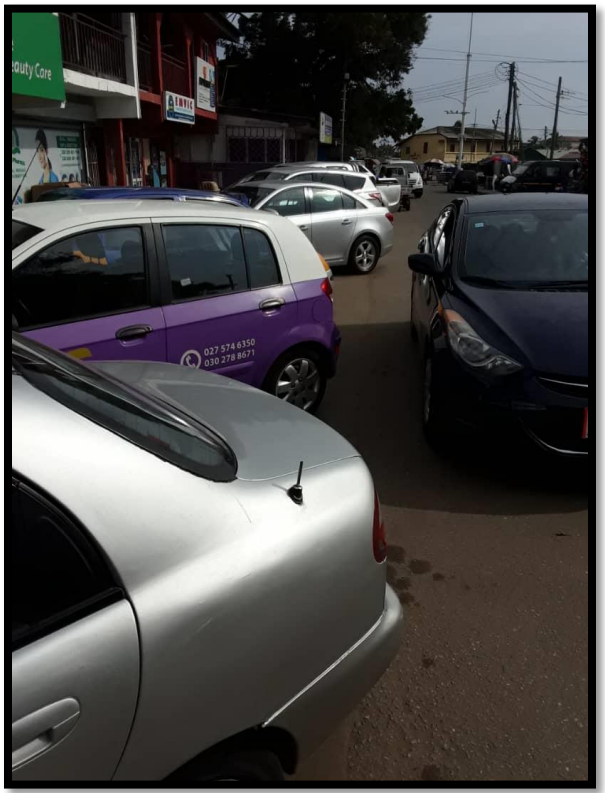

Photo 5.8: Parking Spaces at Frontage of Shops (Photo by Lincoln Nyarko, 2020)

Quayson (2014) also explains that expansion works to the frontage of buildings along the street may have narrowed spaces for car parking. The result is the effect of reversing onto the street and causing traffic congestion. These expansion works may be due to a lack of enforcement or a

lack of proper guidelines for developments along commercial streets like Oxford Street. It is also a typical urban planning crisis and a drive for local entrepreneurialism (Quayson, 2014).

Grant and Yankson (2003) point out that if these developments, which are typical of the Osu neighbourhood and Accra in general, are unchecked, it will undermine sustainable urban development. They refer to uncoordinated developments that eat into spaces demarcated for passageways, open spaces, and other functional spaces to undermine sustainable urban development.

e. Thoroughfare Nature of Street

The thoroughfare nature of Oxford may also be a reason for traffic congestion. Many vehicles ply through this single space, using it as a throughway to other destinations. Others come through to shop, and the workers and residents living there also use this single space. Data from the Driver and Vehicle Licensing Authority indicate that there has been a high number of vehicle registrations over the years. In 2018, there were 93,135 newly registered vehicles, which may cause vehicular traffic congestion in the various parts of Accra, with Osu Oxford Street having its fair share. Figure 5.3 shows the number of newly registered vehicles from 2016 to 2018, with cars recording the highest registration.

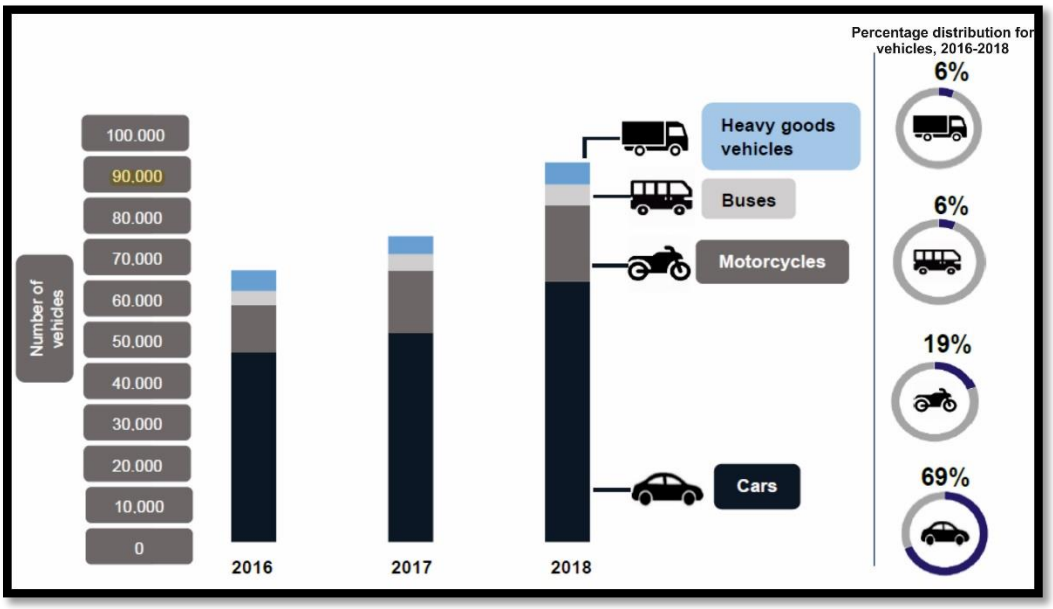

Figure 5.3: Number of Newly Registered Vehicles in the Greater Accra Region, 2016-2018 (Source: Accra Metropolitan Assembly, undated)

5.3 Role of Context in Ensuring Safety and Security, and Sense of a Place in a Street Space

This section presents findings of elements that make up the context of Osu Oxford Street. The discussion will highlight how the role of context ensures pedestrian safety and security and creates a sense of place.

a. Architectural Buildings and Scale

Aesthetically pleasing architectural pieces tend to create a sense of place and draw memories into people's minds, which may cause people to visit a place. The presence of aesthetically pleasing architectural designs may depict a vibrant city to make it exciting. Jacobs (1961) identifies making streets attractive since it is a reflection of an exciting city. Marczbani, Awad, and Rezaei (2020) describe a sense of place to comprise of activity, physical setting, or backdrop setting and meaning. Activity goes with land uses, pedestrian flow, behaviour, noise, and vehicle flow. Physical setting includes townscape, built, landscape, and furniture. Meaning encompasses the element of legibility, cultural association, perceived functions, and attractions among others. According to Singh (2016), imageability which can equate to a sense of place ensures quality resulting from distinctiveness, recognition, and memorability. These physical elements and their arrangement capture attention, evoke feelings and create a lasting impression. The key identifiers include people, parks, outdoor sitting areas, landscape features, and buildings with identifiers.

Observation made regarding context captured some unique architectural buildings in the study area. These buildings, such as hotels, office blocks, banks, shopping malls, food cafes, and apartment blocks, affect the street's visual appeal. See photos 5.9 and 5.10 below of some architectural buildings.

Furthermore, the building scale for these architectural buildings identified primarily includes two-storey to fourteen-storey buildings, with the most predominant ones being two storeys, which are at pedestrian scales. A mix of building heights may have to be considered through urban planning and design interventions to create exciting scenery on the streetscape at a pedestrian scale. A structured interview could have ascertained from the different categories of people on Osu Oxford Street if architectural buildings and their scale creates a sense of place.

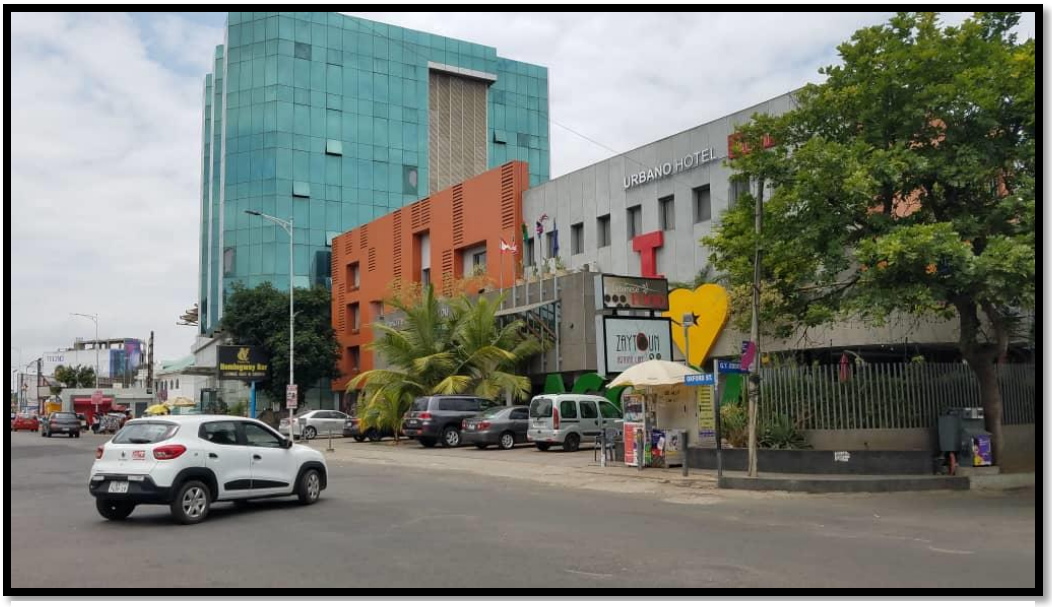

Photo 5.9: Picture of Hotel and an Office Block (in glass) (Photo by Lincoln Nyarko, 2020)

Photo 5.10: An Apartment Block on Oxford Street (Photo by Lincoln Nyarko, 2020)

b. The Use of Transparent Glass

The use of transparent glass on the ground floor of buildings gives one a sense of security in a street space. Observations made during the fieldwork show that most buildings along the street had openings visible through transparent glasses. One could see what activities were ongoing inside a building, and vice versa, hence a two-way visual contact. Jacobs (1961) describes this as "eyes on the street" that provides a level of security on the streets in neighbourhoods, which makes people plying those spaces have a feel of safety and security. Photos 5.11 and 5.12 show some buildings with the ground floors having transparent glasses.

Photo 5.11: The Use of Transparent Glass on the Ground Floor of an Office Block (Photo by Lincoln Nyarko, 2020)

Photo 5.12: The use of Transparent Glass on the Ground Floor of KFC Restaurant (Photo by Lincoln Nyarko, 2020)

c. Artworks and Landscape

Artworks and decorative landscapes were absent from the study area. Trees identified were few and sparsely distributed along the street and were mostly found in properties where some had their branches stretched onto pedestrian walking routes. In looking out for street trees, the focus was on landscape components that grow along roadsides and pavements. The trees identified in the study area may not be classified as street trees; however, they formed part of the streetscape. The absence of street trees tends to take out a natural ambience and beauty from the street space. Chiang *et al*. (2017:9) identify plantings and trees to make places aesthetically pleasing. The assertion of Chiang *et al*. (2017) validates Abass *et al*. (2019) findings of green infrastructure to make urban areas beautiful. Besides the aesthetic part, trees and greenery in general function to reduce heat loads and carbon emission contributing to the environment objective of sustainability.

Regarding artworks, none was identified in the study area. However, economic activities dealt with the sales of artworks alongside the street, targeting mostly tourists who patronise Osu Oxford Street (see photo 5.13).

In this study, there were no interviews conducted to ascertain from patrons of Osu Oxford Street if artworks and decorative landscape, and street trees, could create a sense of place. Figure 5.13 shows a tabletop stationary street vendor dealing in the sale of artworks.

Photo 5.13: Stationary Street Vendor in Artworks
(Photo by Lincoln Nyarko, 2020)

d. Street Lights

Other forms of security that can enhance walkability at night include street lights, and even during the day, its alignment could be pleasing to the eyes. Several street lights were identified, but some had malfunctioned. Street lights may be deemed micro-scale features forming part of a streetscape but an essential security feature in the evenings. It also provides liveliness in a place for people. It was not clear what caused the malfunctioning of the street lights. However, an efficient maintenance system would be needed to ensure defective street lights, especially in vibrant streets like Osu Oxford Street, are always working. Also, there were visible electricity lines as part of the streetscape, creating visual chaos in the street's skyline. The electric lines run

in a disorganised manner along and across the street. Photos 5.14 and 5.15 show pictures of electricity cables running across the skyline of the streetscape. The pictures also show misalignments of the electricity poles.

Photo 5.14: Electrical Lines Running Across Street (Photo by Lincoln Nyarko, 2020)

Photo 5.15: Electrical Lines Running Along Street (Photo by Lincoln Nyarko, 2020)

In addressing the issues of disorganised electrical lines in the streetscape, two arguments come to play; the electrical engineer may argue that overhead cable lines are cheaper to maintain, whereas an urban designer will see these as ugly. A preferable one by the urban designer is to hide them underground and create service points that may be more expensive. The objective, in this case, will look at an organised streetscape that is aesthetically pleasing for a good context.

e. Billboards and Signages

On Osu Oxford Street, giant billboards and other signages were seen along the street but were found in a disorganised way, occupying some pedestrian routes, narrowing them. The bases of some of these giant billboards, as observed, served as storage areas for the tables of stationary street vendors when they closed business for the day. The disorganised positioning of these many billboards and signages may cause visual chaos, which is a drawback to the streetscape's liveliness. Chiang *et al*. (2017) mention that billboards and signages form part of a street context, and they add to the liveliness of a street. Billboards and signages are of enormous benefit to

patrons of a place as people are informed of new products and directed to their destinations. Photos 5.16, 5.17, and 5.18 show pictorial views of giant billboards on Osu Oxford Street.

Photo 5.16: Giant Billboard on Pedestrian Route, and Serving as Storage area (Photo by Lincoln Nyarko, 2020)

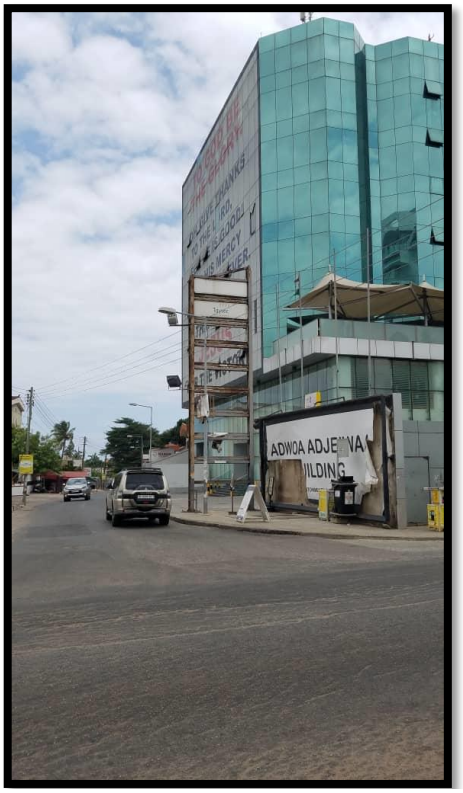

Photo 5.17: Giant Signage on Pedestrian Route (Photo by Lincoln Nyarko, 2020)

Photo 5.18: View of Streetscape Showing Giant and Small Billboards on Pedestrian Route (Photo by Lincoln Nyarko, 2020)

f. Other Micro-Scale Features

Observations made in the study area identified the absence of pedestrian walkways, public open spaces, and uncovered drains at some street sections. These features within the eye level of pedestrians form part of the street context. Zandieh *et al.* (2016) describe them as micro-scale features of a walkable street that enhances pedestrian safety. Also, a delineated pedestrian walkway with the proper use of pavements adds to a street's beauty. Osu Oxford Street had no delineated walkways at the time of the fieldwork. Another feature found to be inadequate was a pedestrian crossing. There were two pedestrian crossings identified. Painted pedestrian markings also beautify a street.

In the study area, there were gutters covered and uncovered in some sections of the street. In the busier Oxford section, gutters were covered, and the less busy sections had some parts of the gutters uncovered. Some of the cover slabs for sections of the gutters were defective. (See photos 5.19 and 5.20)

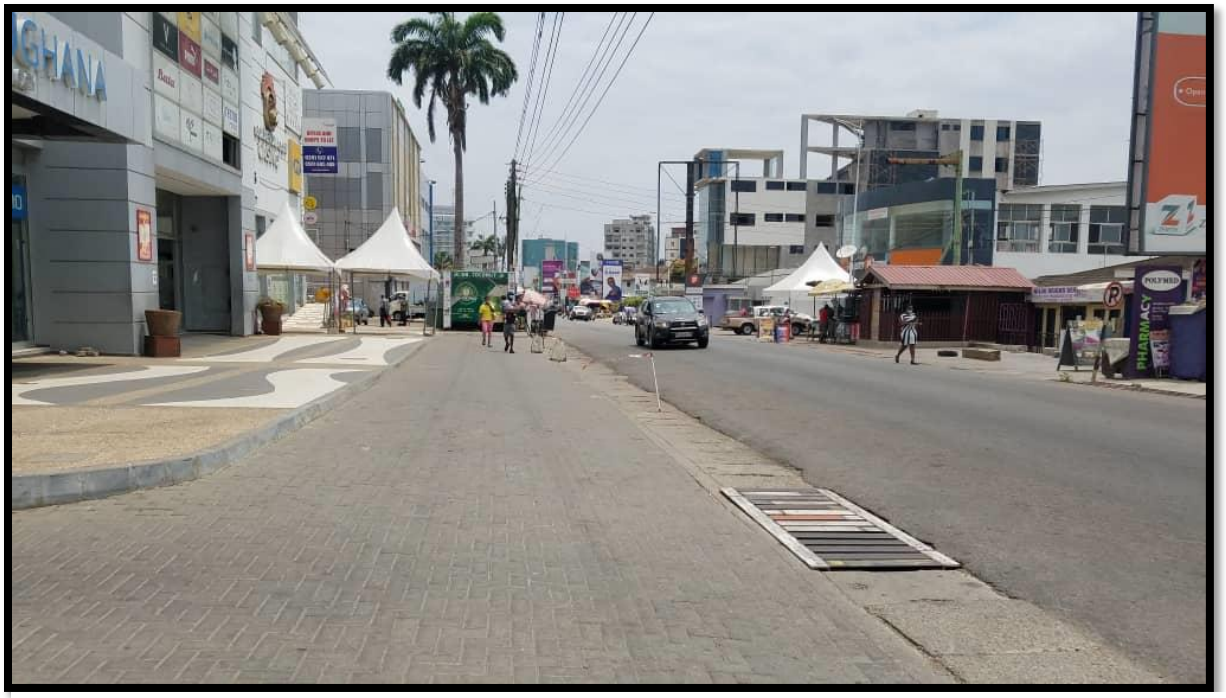

Photo 5.19: Covered Gutters at a Section of Oxford Street (Photo by Lincoln Nyarko, 2020)

Photo 5.20: Uncovered Gutter at a Section of Oxford Street (Photo by Walter Ashong, 2020)

Regarding the elements of context presented above, clear guidelines may need to be in place for streetscape development to ensure safety and security are maintained and enhance street

aesthetics to create a sense of place. The next section will present findings that can affect pedestrians' well-being and convenience on Osu Oxford Street.

5.4 Elements that may Affect Well-Being and Convenience of Pedestrians.

Physical inactivity affects health and well-being (Giles-Corti *et al*., 2016; Tolley, 2011), and if pedestrians do not have the required infrastructure, they would be vulnerable to injuries and fatalities. Accidents are classified as a health concern by the World Health Organisation (WHO). The United Nations SDGs also classify accidents as a health issue that needs intervention (SDG3 Target 3.6). Target 3.6 speaks to halving the number of global deaths and injuries from road traffic accidents by 2020. They state that African countries have the most severe accident-related accidents in the world. This section will cover observations made from the fieldwork under health and well-being and present secondary data regarding pedestrian-related accidents.

a. Street Trees

Street trees were not identified during the fieldwork. However, part of the trees' branches from properties stretched onto the streets, providing some form of shade. The less busy section located in the south of the study area had more trees clustered together than the busier section in the northern part of the study area, which had relatively fewer distributed trees. Figure 5.4 shows the tree distribution along Oxford Street in Osu.

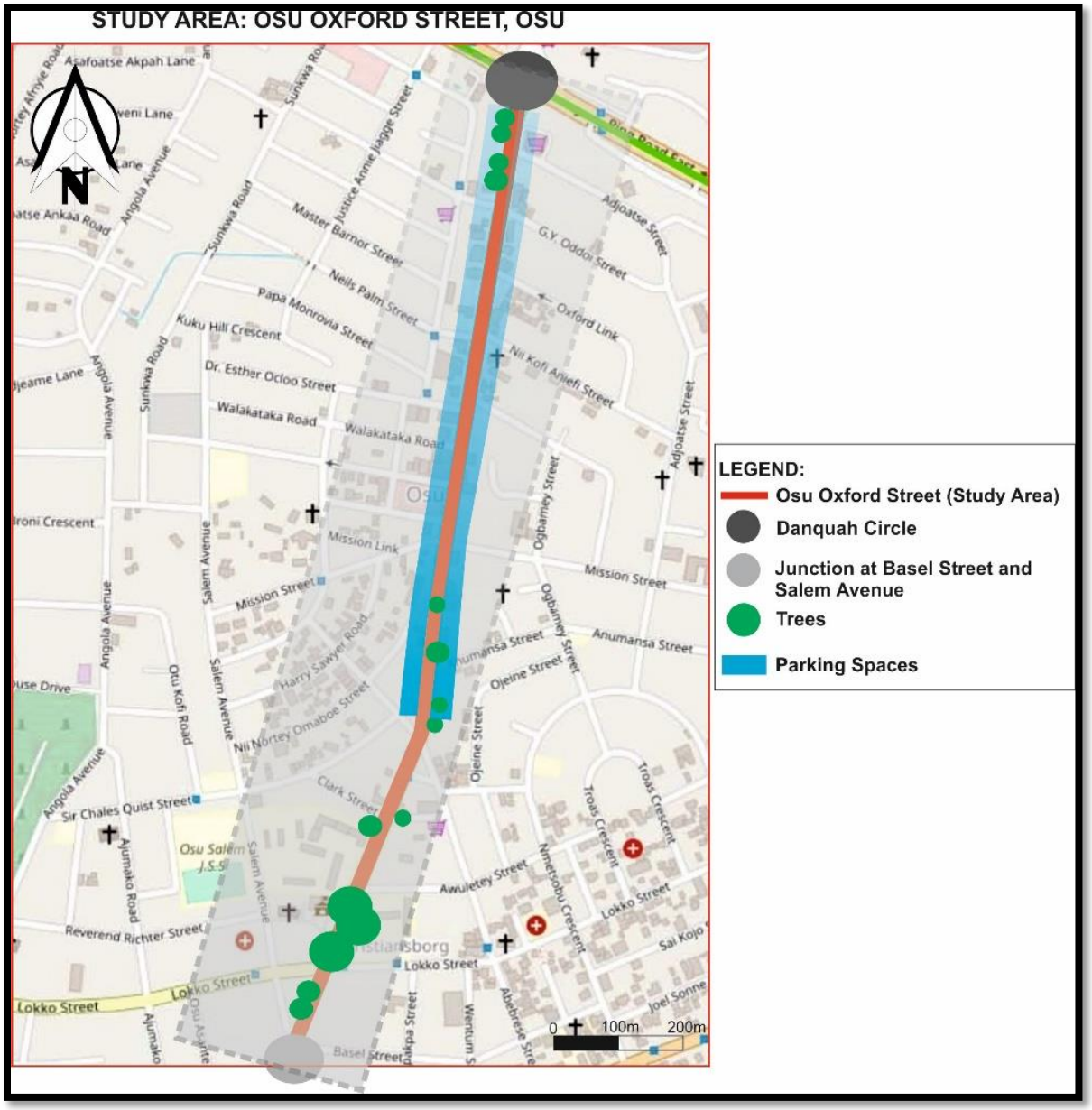

Figure 5.4: Trees and Parking Areas along Oxford Street (Source: Author's Adapted Copy from Google Maps, 2020)

Many studies have argued that the relationship between street trees and health and well-being are less established. Salmond et al. (2016) mention that trees and their net impact on health and well-being are thinly related. Similarly, Sarajevs (2011) points out that air pollution reduction due to street trees and the relationship with respiratory diseases and related deaths is less related. Abass *et al*. (2019), Salmond et al. (2016), and Sarajevs (2011) note that trees have relevance in cooling the environment by mitigating urban heat during the day, which has a potential of increased heat stress levels in urban residents, including pedestrians. Street trees buffer noise

levels in areas that are noise-filled, especially with vehicular congestion. Noise levels are regarded as a nuisance and may irritate people.

The presence of street trees absorbs air pollution and serves as a habitat for nature. Specific types of tree species effectively reduce air pollutants like dust, gaseous substances, and smoke (Salmond et al., 2016). Trees release oxygen through the process of photosynthesis, where plants prepare food through their leaves. Research indicates that trees' presence reduces blood pressure, slows down heart rates, and reduces stress levels (*ibid*). Despite the indication that there is a low correlation between street trees and health, it has other positive impacts, as mentioned above, enhancing people's comfort levels while walking as a physical activity to impact their well-being positively. The absence of street trees on Osu Oxford Street may be due to a lack of urban planning and design interventions. Specific types of street trees are needed to ensure trees' benefits to lessen heat stress and air pollution and increase oxygen levels in the atmosphere.

b. Carbon Emissions

Observations made in the study area identified the occurrence of carbon emissions from passing vehicles. This phenomenon occurs in the presence of pedestrians, stationary and itinerant vendors, and passengers and drivers alike on Osu Oxford Street. Osu Oxford Street has high volumes of vehicular traffic, causing increased carbon emissions levels, negatively affecting air quality. Other studies have mentioned the wear of tyres and brake linings affecting air quality. Giles Corti *et al*. (2016) mention that a significant air pollution source in high-income countries and Low-middle income countries (LMICs) is motor vehicle traffic exposure. Older cars, typically in LMICs, generate higher emissions (Giles Corti *et al*., 2016). These emissions can reach people within a 300 metre radius (*ibid*), making emissions from road transport a health threat. Besides, the contribution of 75% of global carbon dioxide emissions through road traffic indirectly affects health through climate change pathways (*ibid*). The happenings pose threats to residents, workers, tourists as well as vehicle occupants on the streets.

The observation made regarding carbon emissions from vehicles on Osu Oxford Street may be due to old and poorly maintained vehicles. It may also be due to the rapid increase in the fleet of

second-hand vehicles on Accra streets (see figure 5.3 above on the number of newly registered vehicles in the Greater Accra Region). Sustainable modes of transport, like walking, may be worth focusing on to reduce the effects of carbon emissions.

Several interventions may be looked at to reduce Osu Oxford Street's traffic situation, such as the reduction of the number of intersections and converting some into open spaces with greeneries. The presence of greeneries can also reduce the number of pollutants in the atmosphere. The construction of multi-storey car parks at key locations for visitors and workers can minimise the number of vehicles present on the street. In a way, this measure will force people who hitherto would not take any form of exercise to walk to gain the needed health benefits. Walking, therefore, becomes a sustainable mode of transport to affect health positively.

c. Public Open Spaces

Studies have shown that loneliness and isolation are associated with mental health and adverse health behaviour, such as physical inactivity and smoking (Giles Corti *et al*., 2016:2916). A way to mitigate this health challenge is to create open spaces to facilitate social interaction and cohesion to have subsequent health benefits (*ibid*). Public open spaces are valuable spaces that facilitate physical activity engagement (Badland *et al*., 2010). In the study area, there were no large public open spaces. Street seating furniture was also absent. Photo 5.21 is an elevated open seating terrace identified in front of a coffee shop. Besides this coffee shop, several pubs serve as meeting points for people who come to Osu to linger and interact.

Photo 5.21: Elevated Seating Area in front of a Coffee Shop (Photo by Lincoln Nyarko, 2020)

There were no views from the public to ascertain the need for public spaces. However, studies have indicated that public open spaces facilitate social interaction and cohesion, which may alleviate loneliness and isolation as a mental health problem.

d. Pedestrian Infrastructure

On Osu Oxford Street, there was no defined pedestrian walkway, which made pedestrians walked alongside vehicles. Two pedestrian crosswalks were identified but far apart. These occurrences are generally a safety concern and also inconvenienced pedestrians.

There was no data specific to the study area regarding pedestrian-related accidents. However, data from the reports of the National Road Safety Commission (NRSC) and Accra Metropolitan Area (undated) places pedestrians as the most vulnerable road users (NRSC of Ministry of Transport, 2017) since they are the most susceptible to severe injuries or death. Over 40 per cent of traffic deaths annually in Ghana are pedestrian-related, resulting from inadequate or absence of pedestrian infrastructure (Damsere-Derry et al., 2019; Accra Metropolitan Assembly, 2017).

In 2016, pedestrians accounted for a little less than forty per cent (39.5%) of fatalities, followed by motorcycles (20.9%) and then bus occupants (17.5%) (NRSC of Ministry of Transport, 2017). For the periods of 2010-2016, pedestrians constituted forty-one per cent (41%) of fatalities by road user class type in Ghana. Similarly, records from the nature and consequences of road traffic crashes indicate that “pedestrian hit” is the most recorded crash type in the Greater Accra region. Furthermore, 2016 recorded close to sixty per cent (59.9%) of fatalities for a pedestrian hit. 28.6 per cent of injuries for the same pedestrian hit. This data was out of eleven different crash types, including “head-on,” “rear end,” “right angle,” and “animal hits,” among others. Meanwhile, out of the whole crash statistics, a pedestrian hit was the second highest with 24% after rear-end hit, which had 34.4% (NRSC of Ministry of Transport, 2017). Table 1 shows the category of road user class injured or killed in the Accra Metropolitan Area (AMA) in 2016, with pedestrians recording the highest.

Table 1: Category of People Killed or Injured in Road Accidents in 2016 in the AMA

Road User Class	Casualty Severity			Total
	Fatal	Serious	Slight	
Pedestrian	**79**	**229**	**155**	**463**
Car	10	62	199	271
HGV	1	4	16	21
Bus/Minibus	5	43	144	192
Motor Cycle	7	95	102	204
Pickup	6	23	29	58
Bicycle	3	11	6	20
Other	0	2	2	4
Total	111	469	653	1233

Source: National Road Safety Commission Road Crashes Statistics Report (2017)

The Accra Metropolitan Assembly road safety report (2016-2018) indicates that the vulnerable users, including pedestrians, cyclists, and motorcyclists, made up 84% of road deaths in 2018 (AMA, undated). One way to halve pedestrian fatalities and injury incidences is to provide adequate pedestrian infrastructure on streets to enhance walkability. Figures 5.6 and 5.7 show the deaths and injuries by road user types from 2016 to 2018.

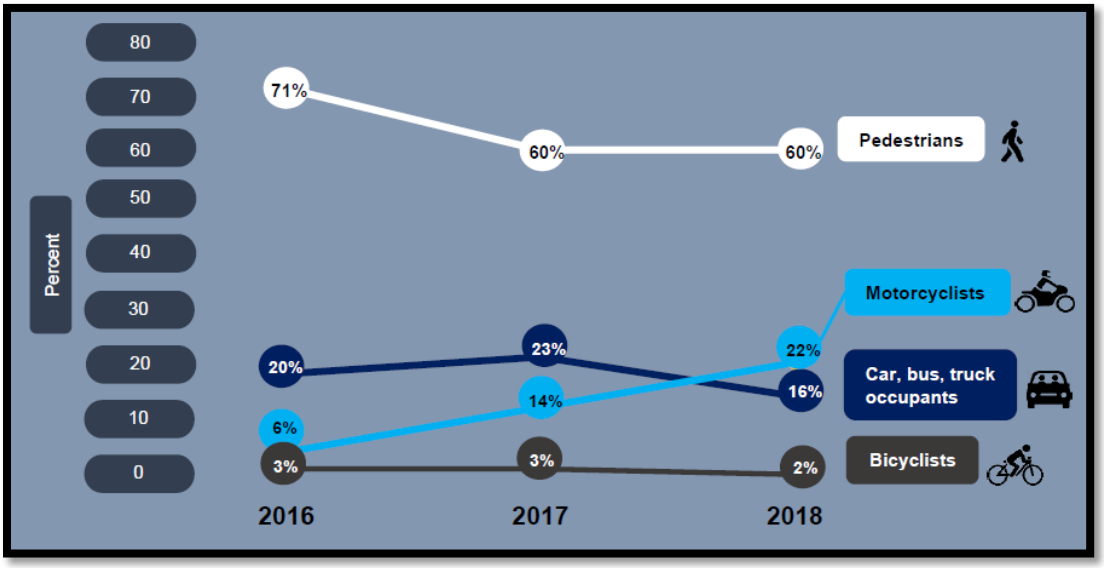

Figure 5.5: Deaths by Road User Type (Source: Accra Metropolitan Assembly, undated)

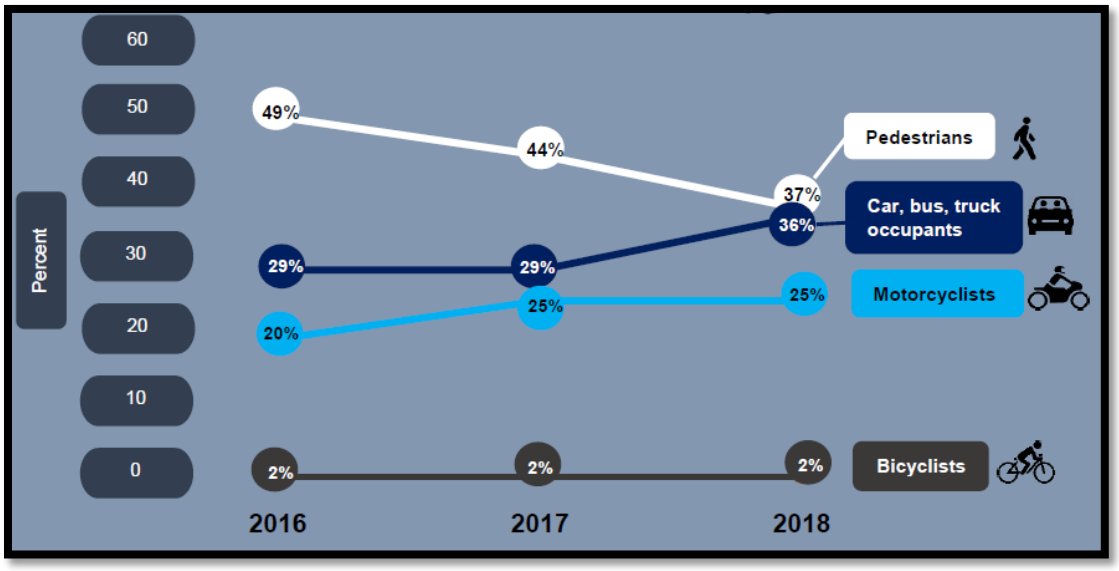

Figure 5.6: Serious Injuries by Road User Type (Source: Accra Metropolitan Assembly, undated)

5.5 Assessment of the Walkability of Osu Oxford Street Using Guidelines from the Ghana Highway Road Design Guidelines and the Institute of Transportation Engineers

This section presents criteria used in assessing Osu Oxford Street to ascertain how it can enhance walkability. The assessment will be guided by two street design guidelines of the existing context.

There are several streetscape design guidelines focused on the components of walkability. However, this section will refer to road and streetscape design guidelines in the Ghana Highway Road design guidelines and the Institute of Transportation Engineers (ITE). The Ghana Highway road design guidelines contain established standards to govern all roads' design, including town roads such as the Osu Oxford Street. The Institute of Transportation Engineers (ITE), on the other hand, is an international educational and scientific association of transportation professionals focused on meeting mobility and safety needs. Both design guidelines focus on safety for pedestrians. The ITE adds the element of public open space and context zones to enhance pedestrian convenience and security.

The assessment criteria will encompass four key areas; *streetside, travelled way, context*, and *intersections*. The "streetside" comprises the width of the pedestrian walkway (sidewalk), frontage zone, and furnishing zone, which includes planting strip, street furniture (seating), trash

bins, utility services, and speed limit signages, among others. The “travelled way” consists of the pedestrian infrastructure to include refuge islands, crosswalks, ramps, and guard rails, the carriageway for vehicles, gutters, and transit stops. The “context” will include architectural, urban design, and landscape elements such as block lengths, building scale, and enclosure. The “intersection” will focus on intersection distances.

5.5.1 Streetside Zone Guidelines:

The ITE describes the streetside as the portion of the thoroughfare that accommodates non-vehicular activities such as walking and transaction of the street’s business and social activities. It extends from the edge of the property to the face of a kerb.

a. Pedestrian Walkway

The pedestrian walkway is a section of the streetside that allows for walking. Guidelines from the Ghana Highway road design guidelines and the Institute of Transportation Engineers specify some minimum measurements for pedestrian walkway width based on the number of people. GHA road design guidelines provide specific measurements for the width of a pedestrian walkway. The pedestrian width provided caters for two to four pedestrians with considerations made for cyclists. The ITE also makes specifications that provide a minimum of 1.825 metres width for the pedestrian walkway, which caters for four pedestrians. The ITE also provides precise specifications for pedestrian walkways (sidewalks) to have kerb ramps. This infrastructure enables persons with disabilities who are either wheelchair-bound or ambulant disabled to easily use pedestrian walkways or crosswalks. This facility increases accessibility to all vulnerable groups of people. Osu Oxford Street does not have defined pedestrian walkways and ramps.

b. Frontage Zone

The frontage zone is the space between the pedestrian walkway and the edge of the property line along the street, usually meant to buffer pedestrians from window shoppers and doorways. It may also contain street furniture, private signages and can be used for street cafes. The Ghana Highway design guidelines (1991) do not make provisions for a frontage zone. The ITE provides a minimum of 760mm (2ft) and 450mm (1.5ft), where there are space constraints of space. The ITE guidelines provide setbacks, including the frontage zone, the pedestrian walkway, and the

furnishing zone. The national building regulations of Ghana provide for building setbacks. The study area did not have clearly defined zones, but a clear setback space in front of buildings allowed for parking spaces—the setback measures from the building line to the edge of road kerbs.

c. Furnishing Zone

The furnishing zone is an area of the pedestrian walkway that serves as a safety buffer between pedestrians and vehicles. It contains landscape, public signages, trash cans, and utilities, among others. The Ghana Highway road design guidelines make provision for a 2-4 metre space, whereas the ITE provides a minimum of 1.2metres. The ITE guidelines for the furnishing zone make provision for the planting of trees in tree wells. The furnishing zone was absent in the study area. Observations in the study area saw the haphazard positioning of signages, billboards, utility poles, and trash bins resulting from the absence of a furnishing zone.

5.5.2 Travelled Way

This section will cover vehicular routes, pedestrian crossing (crosswalks), median strip, guard rails, and ramps.

The Ghana Highway road design guidelines and the ITE specify a provision of a median strip. The ITE, however, makes it optional for streets. The median strip serves as a refuge space in the middle of a street for pedestrians crossing from one end to another. The study area did not have a median strip. Another critical pedestrian infrastructure to ensure enhanced accessibility is the provision of ramps, whether on median strips at a pedestrian crossing or on pedestrian walkways. This essential pedestrian infrastructure was absent. The Ghana highway road design guidelines did not have a provision for that. However, Persons with Disabilities (PWD) Act 715 of Ghana passed in 2006 makes provision for persons with a disability, including ramps in public spaces. This Act essentially calls for an amendment of the Ghana Highway road design guidelines. The ITE guidelines, on the other hand, make provision for ramps on the streets. Both design guidelines provide for the introduction of a pedestrian crossing in street designs.

Regarding pedestrian crosswalks, the study area had two spaced with a distance of approximately 984 metres. The pedestrian crosswalk spacing recommended by the ITE is between 60 metres

and 90 metres and is located at intersections. The current number of pedestrian crosswalk spacing, therefore, falls short of standard provisions.

The measurement for the width of the carriageway for Osu Oxford Street is approximately 10 metres. Compared with the Ghana Highway road design guidelines, provisions can be made for defined pedestrian walkways on both sides of the street. The Ghana Highway road design guidelines specify a minimum of 6 metres to 6.5 metres for regular two-way traffic; however, if space for streets is constrained, 5.5 metres is recommended. On the other hand, the ITE recommends a 7.3 metres width of the carriageway for two-way traffic.

5.5.3 Context:

a. Block Length and Enclosure

The Ghana Highway road guidelines did not make provision for the block lengths since it is strictly focused only on vehicular routes and sections of the streetside. The ITE, however, specifies a block length of a minimum of 60 metres to a maximum of 200 metres. The building enclosure recommended should have a scale of 1:3 or 1:2. The scale is the height to width ratio, or in other words, the height of a building (storeys) to the width of the vehicular route (road). The study area has, on average, building scales of 1:1.7 to 1:0.24. The 1:1.7 is the least scaled building having a single storey level with a roof, and the 1:0.24 is the highest enclosed scaled building with 14-storeys. The highest scaled building in the study area does not fall within the provisions by the ITE. The dominating scaled buildings, which are two storeys, also do not fall within the ITE provisions. They have a scale of 1:1.1.

Regarding this provision, the scale may not be relevant. However, a mix of high-density buildings with low-density buildings to create an exciting streetscape along Osu Oxford Street may need consideration. This view of the irrelevance of scale relates to the views held by Park *et al*. (2019) that there should be less focus on the street enclosure.

b. Public Spaces

The Ghana highway road design guidelines do not make provisions for public open spaces. The ITE recommends the provision of public open spaces, which could be within walkable distances. Public Open spaces were not along Osu Oxford Street.

c. Intersections

With intersection design considerations, the Ghana Highway road design guidelines did not indicate specifications for intersection distances. The ITE, on the other hand, recommends a 200 metre maximum and 121 metres desirable. In the study area, the intersection distances range from 9.93 metres (least) to 280 metres (longest). The average intersection distance for the less busy section is 159.6metres. The average for the more busy section is approximately 71 metres. See table 2 below for the intersection distances on Osu Oxford Street.

Table 2: Intersection distances on Osu Oxford Street

STREET SECTIONS	LESS BUSY SECTION (Salem/Basel Intersection to Mark Coffie House) (M)	BUSIER SECTION (Mark Coffie House to Danquah Circle) (M)		
INTERSECTION DISTANCES (M)	143	103	66.3	106
	280	9.93	59.5	110
	142	33.9	22	102
	116	60.7	111	90.8
	117			
AVERAGE(M)	159.6	71.09		

Source: Author's Measurement taken from ArcGIS (ArcMap) Version 10.5 (2020)

The above table shows that the longest intersection distance for the busier Oxford section did not meet the ITE's minimum and desirable intersection distance. The closeness of these intersections may be a reason for traffic congestion on Osu Oxford Street.

Tables 3, 4, 5, and 6 show a summary of Osu Oxford Street's assessment using criteria from the Ghana Highway design guidelines and the Institute of Transportation Engineers.

Table 3: Assessment of Osu Oxford Street Using *Streetside* Criteria for Street Design from GHA and ITE.

KEY : ◯ - YES X - NO				
CRITERIA	GHANA HIGHWAY ROAD DESIGN GUIDELINES	INSTITUTE OF TRANSPORTATION ENGINEERS (ITE)	OBSERVATIONS AT STUDY AREA	REMARKS
STREETSIDE:				
Pedestrian Walkway (Sidewalk)	◯	◯	X	Pedestrian walkway required
Furnishing Zone: Planting Strip Street Furniture Trash Bins Utility Poles etc.	◯	◯	X	Furnishing zone required(all elements as street furniture are required to be in the furnishing zone)
Frontage Zone	X	◯	X	Should be considered
Setbacks (distance from buildings to edge of roads	X	◯	◯	The National Building regulations provide for building setbacks

Source: Author (2020)

Table 4: Assessment of Osu Oxford Street Using *Travelled Way* Criteria for Street Design from GHA and ITE (Travelled Way).

KEY : ◯ - YES X - NO				
CRITERIA	GHANA HIGHWAY ROAD DESIGN GUIDELINES	INSTITUTE OF TRANSPORTATION ENGINEERS (ITE)	OBSERVATIONS AT STUDY AREA	REMARKS
TRAVELLED WAY (MAIN ROAD FOR VEHICLES)				
Median Strip	◯	◯	X	May be required at some sections of the street
Ramps (PWD access ways)	X	◯	X	PWD ramps required per PWD Act
Gutter	◯	◯	◯	Needs improvement, especially for sections that are uncovered
Pedestrian Crossing (Crosswalk)	◯	◯	TWO IDENTIFIED	Sufficient needed on the street for convenient pedestrian crossing
Bus Bays	◯	◯	TWO IDENTIFIED	Additional Bus bays may be considered
Width of Road or Carriageway	◯	◯	◯	ADEQUATE: Can be redesigned to make room for a defined pedestrian walkway
On-Street Parking	X	◯	X	May be considered, or multi-storey car parks could be sited at key locations
Road Signs	◯	◯	◯	Needs to be placed in the furnishing zone

Source: Author (2020)

Table 5: Assessment of Osu Oxford Street Using *Context* Criteria for Street Design from GHA and ITE (Context).

KEY : ◯ - YES X - NO				
CRITERIA	GHANA HIGHWAY ROAD DESIGN GUIDELINES	INSTITUTE OF TRANSPORTATION ENGINEERS (ITE)	OBSERVATIONS AT STUDY AREA	REMARKS
CONTEXT				
Block Length	X	◯	Measurement not taken	Specified minimum Block length required
Enclosure (scale)	X	◯	The scale of the building range from 1-storey to 14-storeys	The scale on Oxford Street may not require consideration. However, a mix of different scales to create interest may be considered
Open Spaces	X	◯	X	The street may require some Open space(s). Identifying them within reach of pedestrians is key to walkability (accessibility).

Source: Author (2020)

Table 6: Assessment of Osu Oxford Street Using *Intersections* Criteria for Street Design from GHA and ITE (Intersections).

KEY : ◯ - YES X - NO				
CRITERIA	GHANA HIGHWAY ROAD DESIGN GUIDELINES	INSTITUTE OF TRANSPORTATION ENGINEERS (ITE)	OBSERVATIONS AT STUDY AREA	REMARKS
INTERSECTION				
Intersection Distance	X Distance is not stated, but it recommends Intersection distances should be far apart to avoid vehicular congestion.	◯ Recommends a desirable intersection distance of 121meters and a maximum of 200meters	160m(less busy section) 73m (more busy section)	Street requires reconsideration for intersection distances

Source: Author (2020)

In summary, table 3 indicates a clear picture of the absence of streetside on Osu Oxford Street, thereby resulting in pedestrians having no option other than to walk on the shoulders of the travelled way as vehicles. The absence of a furnishing zone is evidence of the haphazard positioning of street furniture, which is a drawback to the street's visual appeal, forming part of the street context.

The travelled way for vehicles in Table 4 shows that vehicular infrastructure is in place but would require, to some extent, some improvements. There should be provision for adequate pedestrian crossing, signages, bus bays, and covered gutters. The minimum width for carriageway for constrained land could be considered to create a space for a pedestrian walkway distinct from vehicles. Osu Oxford Street lacked a median strip, which may be considered necessary at some point on some street sections. The absence of ramps, a critical pedestrian infrastructure for accessibility to the vulnerable, especially persons with disabilities who are wheelchair-bound and ambulant disabled, needs consideration as per the PWD Act of 2006.

The context of Osu Oxford Street regarding scale, building height, and length may require guidelines from the Ghana building code, the national building regulations, and the planning laws. The placement of street furniture may also require some guidelines to create exciting scenery on the streetscape.

The intersections on Osu Oxford Street may need a review as the many intersections could be one reason for the vehicular traffic congestion on Oxford Street. Some of these intersections could be closed up and converted into public open spaces with greenery (landscape) and artworks.

5.6 Conclusion

This chapter presented data from primary and secondary sources for analysis under four key areas that impact walkable streets to enhance health and well-being. The chapter attempted to answer the research questions regarding impacts of vehicular traffic on pedestrians, how context as a feature of a walkable street contributes to the safety and security of a neighbourhood and a sense of place. Also, the elements of the street that may affect health and well-being were discussed. Figure 6.1 in the conclusion chapter summarises the four key areas in the conceptual framework that impact walkable streets to enhance health and well-being and also contributes the perspectives of the concepts of liveability and sustainability in a single diagram.

Finally, there was an assessment of the walkability of Osu Oxford Street using two criteria. The next chapter will present the conclusions drawn from the entire discussion and present recommendations necessary to develop walkable streets and neighbourhoods to focus on sustainability's broad objectives.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The previous chapter concluded on the elements of a walkable street and their impact on health and well-being. Figure 6.1, in this chapter, shows a summary of the elements and their interrelatedness. This chapter concludes the report with a summary of key findings guided by the conceptual framework and the research questions. The final section of this chapter will be recommendations.

6.2 Summary of Key Findings Responding to Research Questions

The first sub-question guiding this research addresses the *causes of vehicular traffic* on Osu Oxford Street. As explained in the research methods chapter, findings using observation reveal that pedestrians' haphazard crossing may be a contributing factor to vehicular traffic congestion. The reason could be that pedestrians crossed from anywhere on the street without using the provided pedestrian crosswalk. Also, pedestrian infrastructure was inadequate. In another vein, pedestrians may lack education on the relevance of using pedestrian crosswalks. The second cause may be the varied forms of informal economic activities along the street, comprising both stationary and itinerant. The forms of interactions with informal economic activities with moving vehicles and pedestrians were considered a cause for vehicular traffic congestion. Thirdly, the number of intersections may also be a reason for congestion, as many intersections were closely spaced. The fourth cause also highlighted the nature of parking as the rear side of vehicles held the streets' edge. As vehicles at various parking spots retreat onto the street, traffic slows. The final cause of vehicular traffic touched on the thoroughfare of Osu Oxford Street. One reason also added to this cause was the high volumes of vehicle registration over the years. Secondary data from the Driver and Vehicle Licensing Authority regarding the number of vehicles registered from 2016 to 2018 was presented to support this view.

The second sub-question guiding this research identifies the role of *context* in ensuring safety and security and creating a sense of place. In this section, Architectural buildings, the scale of architectural buildings, giant billboards, street trees, artworks, and decorative landscape features were identified to form a street context that creates a sense of place. Street lights and other

micro-scale features like a pedestrian crosswalk delineated walkways and covered drains may also add beauty to street space. Regarding safety and security, transparent glass use on the ground floor of buildings was identified to enhance pedestrians' security. Everyone, both within and outside a building, could see one another. The delineation of a pedestrian walkway, accessibility ramps, covered gutters, and crosswalk markings could also enhance pedestrian safety.

The third sub-question guiding this research identifies elements that affect pedestrians' *well-being, convenience, and other road users*. The elements of carbon emission, absence of street trees, public open spaces, and pedestrian infrastructure affect health and well-being. In the case of street trees, it was revealed that the relationship between street trees and health is weakly established. However, it has other positive impacts, like reducing air pollutants and increases oxygen levels in the atmosphere via photosynthesis. Street trees also buffer noise levels and reduce heat loads. They have positive effects on blood pressure, slow down heart rates, and reduce stress levels. Pedestrian infrastructure also provides safe walking routes for pedestrians to be protected from vehicle-related accidents. Reports regarding road crashes indicate that pedestrians are the most vulnerable road user types. Another observation made was the absence of public open spaces within the study area. Public open spaces reduce loneliness and isolation, which are associated with mental health and unhealthy behaviour. The creation of public open spaces facilitates social interaction and cohesion, which is a health need.

The final sub-question guiding this research focused on *walkability assessment criteria* for Osu Oxford Street. Two criteria were used, the Ghana highway road design guidelines and a report of the Institute of Transportation Engineers. The assessment criteria focused on four key areas, streetside, travelled way, context, and intersections. These four key areas in their absence in a street space would result in chaos and other uncontrolled developments for the presence of varied groups of street users, including pedestrians, vehicular, and residents. Safety is one of the core principles guiding the development of the components of a street. The assessment using these components brings to the fore whether the street is walkable. The assessment concluded that Osu Oxford Street lacked a clearly defined streetside, which provides for pedestrian

infrastructure. Travelled way and context required enhancement, and intersection distances needs on Osu Oxford street require reconsideration.

In addressing the main research question, specific guidelines are required to design walkable streets. These guidelines should focus on health and well-being, climate action, and sustainable cities and communities. The process to enhance walkability is interrelated among many guiding concepts, including the objectives of sustainability. In addressing the social aspect, the focus should be on creating public open spaces with seating and artwork. A clearly defined walkway for pedestrians' convenience will enhance social cohesion and interaction.

Regarding the economic objective of sustainability, there should be an integration of informal economic activities along the street in vendor spaces. The integration can be done through urban design and planning interventions; however, they should not encroach on pedestrian walkways. This intervention also addresses the element of inclusion.

There should be planting of street trees and other landscape features as part of the streetscape regarding the environment objective. All these interventions are achievable if there are clear guidelines articulated in a street design document highlighting specifications covering streetside, travelled way, context, and intersection designs.

6.3 Research Conclusion

The research set out to assess Osu Oxford Street's walkability using specific criteria for street design within the contexts of safety and security, health and well-being, sanitation, and context. Figure 6.1 below summarises the four key areas in the conceptual framework that impact walkable streets to enhance health and well-being. The figure also shows the interrelatedness of the elements that make up walkable streets. These five key areas discussed in the literature review contributes to making liveable places and subsequently meets sustainability objectives. The literature review also highlighted walkable neighbourhoods as part of the new urbanism, with safety and security as a key concern to be addressed through cautious approaches to planning.

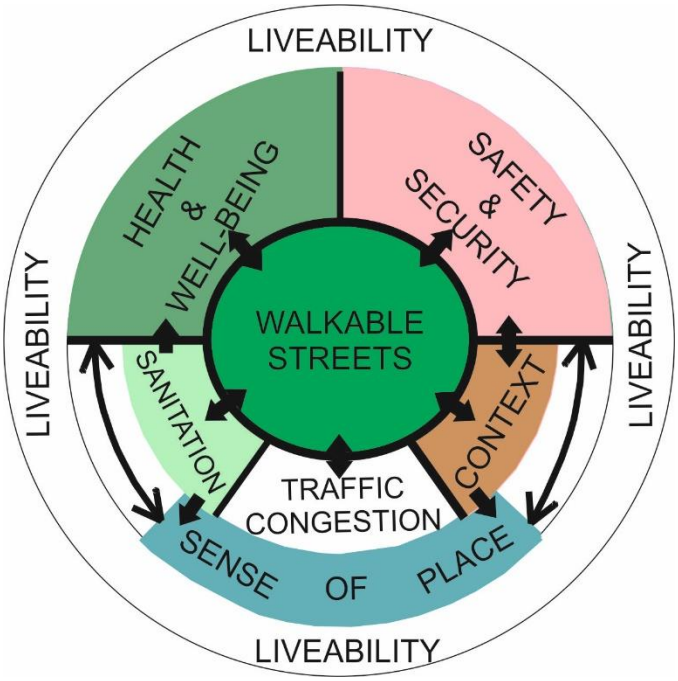

Figure 6.1: Summary of the Elements of Walkable Street and their Interrelatedness (Source: Author, 2020)

The assessment was conducted in four key areas, *street side, context, travelled way*, and *intersection distances*. The impact of traffic congestion on the environment, well-being, and safety was discussed. The assessment revealed that streetside, open spaces, and accessibility infrastructure were absent. Findings also reveal that pedestrians were vulnerable road users in the Greater Accra Region due to insufficient pedestrian infrastructure. Given the findings mentioned, there is a need to develop street design guidelines to incorporate these elements to enhance the walkability of streets in Ghana. The next two sections discuss further research areas and recommendations that may guide developing a comprehensive street design guideline document for Ghana implementable at the Local Government (LG) level.

6.4 Areas for Further Research

This research's scope was on assessing a street's walkability using specific criteria. Air quality and noise levels were identified to impact health and well-being. However, data on air quality and noise levels were not gathered to compare with standards. Therefore, other areas to consider for further research include assessing air quality and noise levels and their impact on urban residents' health and well-being in a highly motorized and pedestrianized street in a mix of residential and commercial settings.

6.5 Recommendations

This research highlights elements of a walkable street using specific criteria. The Ghana Highway road design guidelines lacked context as a component of a walkable street. Other features regarding accessibility were also absent; however, the person with disabilities Act, 2006 Act 715 of Ghana provides for persons with disabilities access to all public spaces and buildings. This section makes recommendations that may guide the development of street design guidelines focused on enhancing walkability.

Firstly, there should be a document specifically for street design that guides built environment professionals. The document should outline detailed specifications for context, which should look at building scale and enclosure. The guideline should also emphasise making architectural buildings create interest and employ transparent glass on buildings' ground floors. Secondly, specific streetside guidelines, public open spaces, and other planning laws for appropriate parking systems like multi-storey car parks at key locations would enhance walkability. There should be specifications on specific types of trees and other vegetation covers with special abilities like mitigating carbon emissions. Furthermore, guidelines should be made to position giant billboards, electricity poles, street lights, and electricity cables to focus on aesthetics. There should also be guidelines for intersection distances, especially for streets that are thoroughfares.

There are many street design guidelines in many parts of the world, including Australia and South Africa. Besides the Institute of Transportation Engineers report, reference can be made on street design guidelines of the city of Johannesburg in South Africa. The Global Street Design Guide by the Global Designing Cities Initiative (GDCI), a National Association of City Transportation Officials (NACTO) with membership in many cities in the world, has clear street design guidelines. Some of these cities are Montreal, Toronto, and Vancouver, all in Canada. The others are Puebla in Mexico and the United States of America.

Finally, the guideline document should emphasise cooperation, participation, and co-production. In creating a walkable street in an existing context, people may be affected, and land may be scarce. Land ownership is an aspect that requires careful consideration in planning. In adopting cooperation, participation in coproducing requires a multi-stakeholder approach. This approach

should include traditional chiefs, landowners, key community members, and residents, shop owners, built environment professionals, state agencies, and identifiable vulnerable groups who may be affected. This approach will ensure there is the inclusion of all to coproduce a product that will resonate with people.

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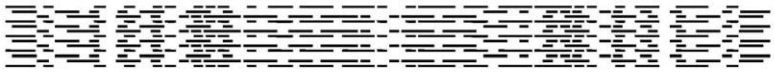
Appendices

Appendix A: Ethics Clearance Certificate



SCHOOL OF ARCHITECTURE AND PLANNING
HUMAN RESEARCH ETHICS COMMITTEE

SCHOOL OF ARCHITECTURE PLANNING

CLEARANCE CERTIFICATE
PROTOCOL NUMBER: SOAP084/06/2020

PROJECT TITLE:	CONCEPTUALIZING LIVEABILITY USING THE HEALTH LENS TO INFORM AND INFLUENCE POLICY- THE CASE OF ACCRA.
INVESTIGATOR/S:	Semordzi Walter (Student No:1897387)
SCHOOL:	Architecture and Planning
DEGREE PROGRAMME:	Master of Urban Studies (**MUS UM**)
DATE CONSIDERED:	05 August 2020
EXPIRY DATE:	05 August 2021
DECISION OF THE COMMITTEE:	Approved

CHAIRPERSON _____
(Dr Brian Boshoff)

DATE: Signed under lockdown: 10.8.20

cc: Supervisor/s: Brian Boshoff

DECLARATION OF INVESTIGATORS
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to endure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.

School of Architecture & Planning
University of the Witwatersrand
Private Bag 3 Wits 2050
Johannesburg South Africa
www.wits.ac.za

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Signature **Date**

SCHOOL OF ARCHITECTURE & PLANNING

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Appendix B: Consent Form

CONSENT FORM

Title of Project:
Creating Walkable Streets as a Liveability Indicator to Enhance Health and Well-Being: An Assessment of Oxford Street in Osu, Accra.

Name of Researcher: **Walter Semordzi**

I Jonas Agyemang agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

I agree that my participation will remain anonymous	(YES)	NO
I agree that the researcher may use anonymous quotes in his/her research report	(YES)	NO
I agree that the information I provide may be used anonymously after this project ended, for academic purposes by other researchers, subject to their own ethics clearance being obtained.	(YES)	NO
I agree to take photographs and take inventory of all items in the Inquiry form provided	(YES)	NO

……
Jonas Agyemang
16 June 2020

……..
Walter Semordzi
16 June 2020

Appendix C: Inquiry Form (Checklist)

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

INQUIRY FORM

(Checklist)

Title of Project: **Creating Walkable Streets as a Liveability Indicator to Enhance Health and Well-Being: An Assessment of Oxford Street in Osu, Accra.**

A. Safety and Security:

1. Do you have a sense of safety walking along the Street with other pedestrians?
2. Are you inconvenienced by the way the commercial car drivers ("trotro" and any other) drive on the Street?
3. Are you inconvenienced by the way the private car drivers drive on Street?
4. Have you observed any crosswalks (zebra crossing) along the stretch?
5. Do people use the zebra crossing or they cross from anywhere?
6. Try to cross at crosswalks (zebra crossing) - describe the observation of the behaviour of drivers of oncoming vehicles.
7. Observe people crossing the Street and take photographs (is it safe for them?)
8. Do you feel or have visual contact with people in the buildings along the Street?
9. What makes you have visual contact with people in the building along the Street? – have they used transparent glass or opaque glass?
10. Have you identified street lights along the stretch?
11. Are there open drains of covered drains present on the Street?
12. Do you think the open drain present makes it unsafe for people?
13. How about Utility poles, billboards and signage? (take photographs)

B. Health and Well-Being:

1. Have you identified any trees (locate trees on the map along the Street) - take photographs and state the number.
2. Do you have a feeling of "relief or inconvenience" walking on the Street?
3. Do you have a sense of adequacy of the pedestrian walkway?-
4. Measure the width of the pedestrian walkway-
5. Have you observed any form of emissions from vehicles?
6. Are there buildings with glazing on the stretch? – take photographs
7. Do you have a sense of glare from the glazing of building along the Street, causing discomfort?
8. Do you have a feel of quality air present as a result of carbon emissions, the stench from gutter among others?
9. Have you identified any public space allowing for people to have leisure?- note on the map- take photographs
10. Any Street furniture identified?- note on map

C. Sanitation:

1. Are there waste bins present on the Street?- take photographs
2. Do you find drains along the Street adequate?
3. Does it allow for a natural flow of water or they are choked?

D. Context:

1. How do you describe the streetscape?- aesthetically pleasing?
    a. Are there interesting architectural pieces?
    b. Do you find the streetscape aesthetically pleasing? – Take photographs
2. Have you identified any artwork along the stretch? – take photographs
3. Have you identified any form of a soft landscape?
    a. Is it interesting?
    b. Is it poorly kept?
4. How do you feel about the building scale, i.e. Height (one-storey, two-storey)?
5. Which is the predominant building height along the stretch? (One-storey, two-storey, etc.)

Other observations to be noted:

1. Identify parking spaces along Street - take photographs
2. Note the number on junctions and identify on map (ArcMap)
3. Identify ramps and note on the map
4. Identify the various activities along the Street (e.g. banks, restaurants, shops etc.)
5. Photographs of moving vehicles and note the time(do this after every 3-hours)
6. General observations of moving people using photographs and if possible do a video recording
7. Length of Street (to be determined using ArcMap)
8. Inventory of Motorbike users?- Photographs
9. Inventory of Cyclist users? - Photographs
10. Number of Container shops along Street (identify them on map) - take photographs of activities on Street.
11. Note container shops on the edge of the pedestrian walkway - take photographs
12. Travel time by foot from one of the Street to the other - (undertake a walk during different times of the day- 3 times min).
13. Was Walking Pleasant along the Street- your self-Assessment?
14. Travel time by vehicle from one end of the Street to the other – Do same as item 19.
15. Check the speed of the vehicle you are sitting in and note the travel time.
16. Any Identified Traffic Lights?

Measurements:

1. Width of Walkway- identify the number of persons conveniently walking on pedestrian walking (take a photograph)
2. Width of Road
3. A setback of buildings to curb along the Street
4. Determine the effective driveway when a car is parked (single-carriage?)

Sourcing for Information:

1. Number of crimes recorded on the Street for the past 10-20years?- Ghana Police Service
2. Number of Vehicles registered per year for the past 10 years?- Driver and Vehicle Licensing Authority
3. Any traffic-related fatality on the Street?- Ghana Police Service
4. The population of Osu?
5. Map of Osu? (ArcMap)

Appendix D: Request for Information Letter (DVLA)

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

The Chief Executive Officer
Driver and Vehicle Licensing
Authority Head Office
Cantonment, Accra, Ghana

10 June 2020

Dear Sir/Madam,

Request for Data on Number of Vehicles Registered Between 2010 and 2020

My name is Walter Semordzi and I am a Masters student in Urban Studies in the field of Urban Management at the University of the Witwatersrand, Johannesburg. As part of my studies, I have to undertake a research project, and I am investigating "Creating Walkable Streets as a Liveability Indicator to Enhance Health and Well-Being: An Assessment of Oxford Street in Osu, Accra" under the supervision of Dr. Brian Boshoff. The aim of the research project is to develop recommendations to guide city planners, built environment professionals, and developers to make cities liveable spaces, by means of encouraging walking to gain health benefits, as well as improve the safety and security of the street.

As part of this project, I would like to request for some data with regards to the number of vehicles registered for the past ten (10) years starting from January 2010 - January 2020 for my analysis.

There will be no personal costs to you if you assist in this project. You will not receive any direct benefits from the assistance but there are no disadvantages or penalties if you do not choose to assist or decline from providing me with data. The data provided will be used purposely for this research. The research will not include your name as the provider of the data but reference will be made to the institution as the source.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. This study will be written up as research report. The data collected from this research project will be stored in my external drive. If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical) telephone +27(0) 11717 1408, email hrec-medical.researchoffice@wits.ac.za

Yours sincerely,

Walter, Semordzi

Researcher:
Walter Semordzi, 1897387@students.wits.ac.za

Supervisor:
Dr Brian Boshoff, Email brian.boshoff@wits.ac.za, Tel. 011 717 7708, Fax. 011 717 7649,

Appendix E: Request for Information Letter (Ghana Police Service, MTTD)

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Director General-MTTD
Ghana Police Headquarters
Ring Road East, Cantonment,
Accra

16 June, 2020

Dear Sir/Madam,

Request for Information: Vehicle Related Accident and Fatalities on Osu Oxford Street, Accra.

My name is Walter Semordzi and I am a Masters student in Urban Studies in the field of Urban Management at the University of the Witwatersrand, Johannesburg. As part of my studies, I have to undertake a research project, and I am investigating "Creating Walkable Streets as a Liveability Indicator to Enhance Health and Well-Being: An Assessment of Oxford Street in Osu, Accra" under the supervision of Dr. Brian Boshoff. The aim of the research project is to develop recommendations to guide city planners, built environment professionals, and developers to make cities liveable spaces, by means of encouraging walking to gain health benefits, as well as improve the safety and security of the street.

As part of this project, I would like to request for some data with regards to the number of vehicle related accidents and fatalities recorded in the past ten (10) years on the Oxford Street for my analysis.

There will be no personal costs to you if you assist in this project. You will not receive any direct benefits from participation but there are no disadvantages or penalties if you do not choose to assist or decline from providing me with data. The data provided will be used purposely for this research. The research will not include your name as the provider of the data but reference will be made to the institution as the source.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. This study will be written up as research report. The data collected from this research project will be stored in my external drive and kept under password. If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical) telephone +27(0) 11717 1408, email hrec-medical.researchoffice@wits.ac.za

Yours sincerely,

Walter, Semordzi

Researcher:
Walter Semordzi, 1897387@students.wits.ac.za

Supervisor:
Dr Brian Boshoff, Email brian.boshoff@wits.ac.za, Tel. 011 717 7708, Fax. 011 717 7649,

Appendix F: Request for Information Letter (Ghana Police Service, CID)

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Director General-CID
Ghana Police Service, Headquarters
Ring Road East, Cantonments
Accra

10 June, 2020

Dear Sir/Madam,

Request for Information: Crime Related Incidents on Osu Oxford Street, Accra.

My name is Walter Semordzi and I am a Masters student in Urban Studies in the field of Urban Management at the University of the Witwatersrand, Johannesburg. As part of my studies, I have to undertake a research project, and I am investigating "Creating Walkable Streets as a Liveability Indicator to Enhance Health and Well-Being: An Assessment of Oxford Street in Osu, Accra" under the supervision of Dr. Brian Boshoff. The aim of the research project is to develop recommendations to guide city planners, built environment professionals, and developers to make cities liveable spaces, by means of encouraging walking to gain health benefits, as well as improve the safety and security of the street.

As part of this project, I would like to request for data with regards to the number of crime related incidents recorded in the past ten (10) years on the Oxford Street for my analysis.

There will be no personal costs to you if you assist in this project. You will not receive any direct benefits from participation but there are no disadvantages or penalties if you do not choose to assist or decline from providing me with data. The data provided will be used purposely for this research. The research will not include your name as the provider of the data but reference will be made to the institution as the source.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. This study will be written up as research report. The data collected from this research project will be stored in my external drive and kept under password. If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical) telephone +27(0) 11717 1408, email hrec-medical.researchoffice@wits.ac.za

Yours sincerely,

Walter, Semordzi

Researcher:
Walter Semordzi, 1897387@students.wits.ac.za

Supervisor:
Dr Brian Boshoff, Email brian.boshoff@wits.ac.za, Tel. 011 717 7708, Fax. 011 717 7649,