UNIVERSITY OF CAPE COAST

SAFETY OF MICROMOBILITY USE AMONG CHILDREN IN SELECTED CITIES IN GHANA: PERSPECTIVES OF CHILDREN AND STAKEHOLDERS

MANUEL NII MARTEY MENSAH

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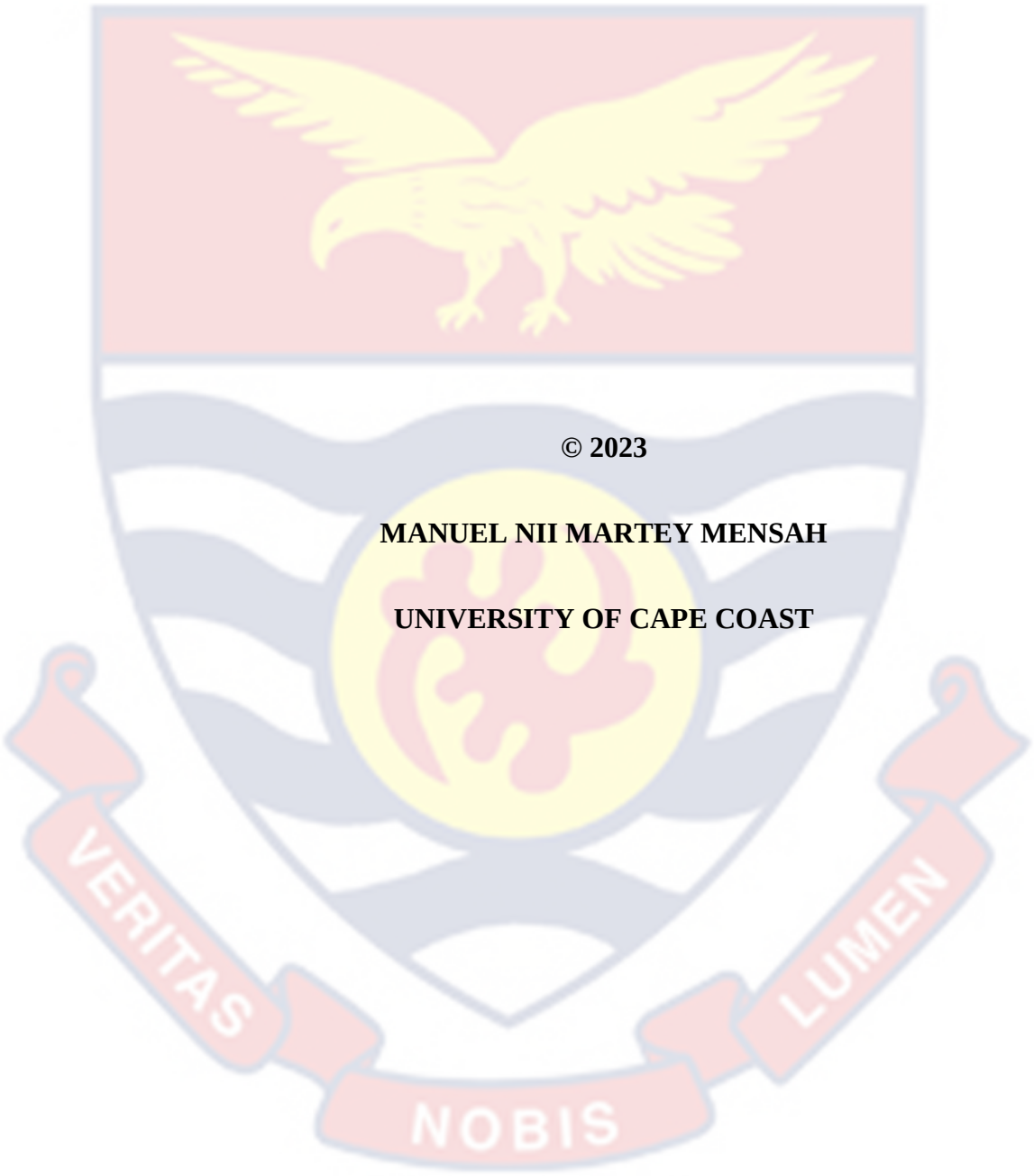

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BY

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Thesis submitted to the Department of Geography and Regional Planning,

Faculty of Social Sciences, College of Humanities and Legal Studies,

University of Cape Coast, in partial fulfilment of the requirements for the award of Master of Philosophy degree in Geography and Regional Planning

November, 2023

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature ……..…….. Date ……

Name: Manuel Nii Martey Mensah

Supervisor's Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Name of Supervisor: Dr. (Mrs.) Regina Obilie Amoako-Sakyi

Signature..... Date.....

ABSTRACT

Efforts in achieving sustainable transport were slow-paced globally until the advent of the COVID-19 which necessitated the need for cities to introduce additional safety measures to alleviate the preeminent risk of coronavirus transmission especially in crowded public transport. Micromobilities – bicycles, skates, scooters, and their various electric versions, are believed to have the potential to reduce the rate of transmission of the virus among people but most importantly could also address some key aspects of environmental, social, and economic sustainability, and enhancing human experience. The objective of this study is therefore to understand children's perception on the usefulness and safety of micromobility modes as an alternative means of transport and evaluate Ghana's preparedness in embracing the emerging mobility trends through laid down policies and regulations. Conducted in Kumasi and Cape Coast – two capital cities in Ghana, both qualitative and quantitative data were collected through interviews with 182 school children, a skating group and four key stakeholders. There were vast differences in children's perception of the usefulness of micromobility between the two cities. However, despite the disagreements on cycling being safe between riders and non-riders, there is a consensus of the riding environment being unsafe for riders. A content analysis of four of Ghana's key transport regulations and policies reveals the consideration of micromobilities as recreational modes. The study recommends that to make active travel and micromobility use attractive especially for children, there should a review of the road regulations and an implementation of the national transport policies to create a safe riding environment for children.

KEY WORDS

Micromobility

Active Travel

Sustainability

E-mobility

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DEDICATIONS

To the memory of my best friend, Kofi Ameyaw Gyamfi

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List of Acronyms

BBC	British Broadcasting Corporation
CAPI	Computer-Assisted Personal Interviewing
CCMA	Cape Coast Metropolitan Assembly
COVID	Coronavirus Disease
CPESDP	Coordinated Programme of Economic and Social Development Policies
DSLR	Digital Single-Lens Reflex
DUR	Department of Urban Roads
DVLA	Driver and Vehicle Licensing Authority
GES	Ghana Education Service
GIS	Geographic Information System
GPRTU	Ghana Private Road Transport Union
GPS	Global Positioning System
GSS	Ghana Statistical Service
ISO	International Organization for Standardization
ITDP	Institute for Transportation and Development Policy
ITF	International Transport Forum
JHS	Junior High School
KML	Keyhole Markup Language

LUSPA	Land Use and Spatial Planning Authority
MMDA	Metropolitan, Municipal and District Assembly
MTTD	Motor Traffic and Transport Directorate
NASA	National Aeronautics and Space Administration
NMT	Non-Motorised Transport
NRSA	National Road Safety Authority
NRSC	National Road Safety Commission
NTP	National Transport Policy
SDG	Sustainable Development Goal
SMS	Short Message Service
TRA	Theory of Reasoned Action
UCC	University of Cape Coast
UPS	User Perception Survey
USC	University of Southern California
WHO	World Health Organisation

CHAPTER ONE

INTRODUCTION

Background of the Study

There is a prevalence of informal transport systems in many cities globally which are often deficient in terms of regularity and safety (Spencer, 2021). This development can be attributed to the gap in service provision by formal public transport operators which has led to rapid motorisation with traffic congestion in mega-cities being its causative effect (Cervero, 2000). The negative impacts of car travel are generally experienced globally and not only in the cities in which they happen hence the several attempts to deal with these negative impacts (Oeschger et al., 2020). This has resulted in some of these cities making a conscious move towards creating cities and human settlements which are safer, more inclusive, resilient, and have a more sustainable urban transportation system – an effort in line with Goal 11 of the Sustainable Development Goals (SDGs).

With this, there is a concentration on providing a sustainable transport option that offers access to safe, affordable, accessible, and reliable transport systems for all while improving road safety - notably by expanding public transport to make it inclusive of those in vulnerable situations - women, children, persons with disabilities and older persons and promoting productivity irrespective of one's sex, age, and stature. Target 11.2 of the SDG intends to ensure a proportion of the population has convenient access to public transport while ensuring that the transport option causes no harm to the environment (United Nations, n.d.). This has seen in recent times the effort by vehicle manufacturers to move towards electric vehicles which will eliminate the use of

fuel which will further lead to a reduction in carbon emissions. However, the issue of congestion and its rippling effects will still linger.

While efforts in ensuring sustainable transport seemed to be at a slow pace globally, the advent of the Coronavirus pandemic (COVID-19) necessitated the need for cities to introduce additional safety measures to alleviate the preeminent risk of coronavirus transmission especially in crowded public transport. For a virus which is easily transmitted through close contact between an infected person and another, typically within 1 metre in a crowded indoor setting where aerosols remain suspended in the air or travel farther than 1 metre (World Health Organisation, n.d.), the transport sector was one of the public places one could have easily caught the flu. The World Health Organisation (WHO) therefore provided protocols to reduce the spread of the virus some of which included ensuring that people were at least two metres apart from each other through what was known as social distancing.

Many countries and individual states hence took steps in ensuring that crowding in public transport systems were avoided. For instance, the cities of Seattle and Houston, closed many parking lots including bicycles to dissuade overcrowding (Doubleday et al., 2021). In Ghana, civil society groups and individuals called for the ban of the Trotro within this period which was strongly opposed by the Ghana Private Road Transport Union with the claim that the virus should not be the reason to shut down their operations (Ayamga, 2020; Frimpong, 2020; Ghana News Agency, 2020). Subsequently, there were directives from the government for these vehicles not to operate at full capacity by reducing the number of passengers in their vehicles to half the carrying

capacity. This was done to reduce crowding in public transportation to reduce coronavirus transmissions.

Although these restrictions limited physical outdoor activities individuals who still largely had to move resorted to personal safety and moved towards individualistic movement. For instance, in England, high rates were recorded for cycling during the COVID period than in previous years (Department of Transport, 2021b) A study conducted in the United States found that there was relatively more cycling during the lockdown periods as people used it for short trips and as a form of exercise (Doubleday et al., 2021). In New York City, people were found to be taking longer rides with Citi Bike (a bike sharing system) during the COVID-19 pandemic as alternative trip modes as they perceived cycling as a safer means for ensuring social distancing (Bernardes et al., 2020, p. 6; Trek Bicycle Corporation, 2020). In some cities, several miles of residential streets were opened for bicycle use and pedestrians to encourage outdoor physical activities and mitigate public overcrowding during the pandemic (Doubleday et al., 2021).

These significant changes in travel behaviour have enforced countries and cities to enhance access to public transport systems that are well integrated with walking and cycling paths through long-term mobility, and targeted investments to reduce crowding in public transportation (Spencer, 2021). One of such long-term mobility plans is U.K's Cycling and Walking Investment Strategy developed by the Department for Transport which aims at making cycling and walking the natural choices for shorter journeys, or as part of a longer journey (Department for Transport, 2017).

Bicycles, skates, e-skates, e-bikes, scooters, mopeds and e-scooters among many other developing forms of solo travel modes are believed to have the potential to reduce the rate of transmission of the coronavirus among people in these moments but most importantly could also address some key aspects of sustainability – environmental, social and economic sustainability, and enhancing human experience (McQueen et al., 2020; Tice, 2019). These modes are collectively known as Micromobilities and have been said to largely be at the forefront of promoting and prioritising clean and active transport in cities across the world (McQueen et al., 2020).

In a recent development, some cities are adopting the concept of shared mobility and electrification also known as shared e-mobility. In some European countries, the three main emerging e-modes are electric carsharing, e-bike sharing, and e-scooter sharing (Liao & Correia, 2020). In understanding the usage of these micromobilities, trips to and from socio-economic activities (work, shopping, and other activities) dominated trip purposes with e-scooters while e-scooter trips for leisure were secondary in a survey conducted among staff of the Arizona State University (Sanders et al., 2020). Despite the popularity of these services among lower-income groups and younger adults, Rayaprolu & Venigalla (2020) discovered that safety and budget concerns were the key propellers to deter them from these modes.

There has therefore been the need to put in place policies that promote built environments and safe roads which support the use of these modes in developed countries as is being done in some developed countries. This includes the provision of more protected bike lanes, parking infrastructure, and community outreach programmes (Rayaprolu & Venigalla, 2020).

In Ghana, micromobility has been existent but in a traditional and generic form – bicycle riding. According to the 2012 National Household survey, cycling is the second travel choice of school children in Ghana (Ghana Statistical Service, 2013). In recent years, other modes of micromobility have emerged in Accra, but are being used frequently by the logistics industry for delivery of goods such as food, drugs, and packages. For instance, in Ghana, Shaq Express, a logistics company, has included a fleet of electric bicycles to its operations (Maxwell Akalaare Adombila, 2022). While the personal use of micromobility is on the low, skates, scooters and skateboards are emerging and used by the youth, which is becoming a more common sight on the street. The likelihood of school-going children to adopt these micromobility modes as means to school, brings to fore issues of safety and regulations confronting its usage, despite the benefits they contribute, as a result of the questionable availability of a built environment and road safety policies to support their use in Ghana.

Statement of the Problem

As a fast-spreading mobility alternative in cities across Europe, United States and Asia, micromobility is gradually gaining grounds in Africa, specifically Ghana. However, a report by the International Transport Forum (ITF) on Safe Micromobility showed that between May 2018 and October 2019, e-scooter related deaths in cities operating micromobility modes mostly involved vehicles (Corporate Partnership Board, 2020). Globally, children and young adults constitute the micromobility casualty majority since about half of all shared-micromobility users are younger than 34 years (Heineke et al., 2020).

With children and young adults constituting the larger micromobility user population globally, the propensity of children of school-going age in Ghana to use some of these micromobility modes. However, they will have to compete with other road users such as pedestrians, car drivers, tricyclists, and truck drivers as a result of a built environment which does not factor in the use of these modes by not providing the necessary multimodality support such as dedicated lanes.

From prior observation, given that the Ghanaian culture readily welcomes foreign culture, the influx of micromobility and its use by children is imminent. The dearth of knowledge and information on micromobility use in Ghana, questions the safety of these micromobility modes giving the built environment and the readiness of the policy environment. Given the popularity of the bicycle in Ghana among the various micromobility modes such as skates, e-bikes, mopeds, the study uses the bicycle as a proxy to ask the following.

Research Questions

1. Do children's perception of the safe use of bicycles influence their perception on other micromobility modes in Kumasi and Cape Coast?
2. Will children’s perception on the usefulness of bicycles influence their use of other micromobility modes on the road in Kumasi and Cape Coast?
3. Are there policies and regulations in place for the possible influx of micromobility modes use by children and their safety?

Objectives of the Study

This research aims at understanding children's perception on the safety of micromobility modals and the willingness and preparedness of stakeholders in accepting micromobilities on the roads.

Specifically, the study seeks to:

1. Explore children's knowledge and recognition of micromobility modes in Kumasi and Cape Coast.
2. Establish children's perceived usefulness of micromobility modes in shared spaces in Kumasi and Cape Coast using bicycles as a proxy.
3. Examine children's perceived safety of micromobility use in shared spaces in Kumasi and Cape Coast using bicycles as a proxy.
4. Explore Ghana's policies and regulations that have been developed by transport governing institutions on the possible influx of micromobility modes in urban spaces.

Justification of the Study

Micromobility as a theme has been understudied in Ghana because of its novelty. As an emerging trend, this study will contribute to the knowledge on micromobilities in Ghana and contribute to a foundation for future research in Africa. By this, this study will contribute to available literature. In the area of policy formulation, it is going to serve as a steppingstone for planners and policy makers in ensuring target 11.2 of the Sustainable Development Goals is achieved.

Limitations and Delimitations of the Study

As a result of the COVID-19 pandemic, there was less time spent with child respondents hence the inability to implore further on responses.

Organisation of the study

The study is divided into five chapters. The first chapter presents the research subject, describes the research challenge, and outlines the study's objectives. The second chapter examines relevant literature on micromobility and bicycle use, perceptions of safety and usefulness and policies developed by stakeholders to ensure safety of micromobility users. The methodology of the study is covered in Chapter Three. It defines the research topic, how the research will be conducted, and the methodologies to be used to gather, analyse, and present results. The fourth chapter covers the study's findings and discussion. A summary of the study, conclusions and recommendations based on the study's findings are presented in Chapter Five.

CHAPTER TWO

LITERATURE REVIEW

This chapter discusses in-depth the various concepts underlying this research. Taking into consideration previous studies which lay the basis for these concepts as well as uncover critical facts in understanding the concept of Micromobility. It will assess existing models and theories and their relevance to this study. This will give direction to this study and assist in understanding this emerging trend in transport.

Definition of Micromobility

The term micromobility, as coined by Horace Dediu (2019), has no standard definition because of the multiple criteria by which scholars tend to classify which mode qualifies as a micromobility. In defining micromobility, Horace (2019) believes that it must contain three characteristics – Personal Mobility; A function of the human being; and Metrics.

With personal mobility he said micromobilities main use is to move its occupant. By this, he means that while it provides maximum mobility freedom, it should also leave no trace of itself such that no emissions can be attributed to the mode. Hence, its minimality in what he describes as thermal and lifecycle carbon footprints.

Secondly, micromobility as a function of the human being takes into consideration three multiplicities - the amount of power, human dimension, and capability. By this, Dediu (2019) looks at how much power a human (cyclist) can produce to move - which is averagely between 50 to 60 watts from cycling (Bruce, 2018). With regards to the human dimension, he takes into

consideration the average maximum width and length of humans, and in terms of capability, he considers the walking speed of humans. He proposes that micromobility modes should have about the walking speed or a little above that.

Lastly, Horace (2019) believes there should be a limit in the metrics (weight) of a micromobility mode. To him, more weight is equivalent to the use of more energy, cost, materials, production, wear-and-tear, isolation, size, land, emissions, speed, danger, and more exclusion. Considering the average mass of a person as 62kg and factoring in clothing and personal accessories which may add to the mass of a person in transit, Dediu (2019) rounds the total weight of a person to about 100kg. He therefore proposes that in defining micromobility, a vehicle's weight should be no more than five times that of the human weight. Hence, a proposed weight of 500kg for micromobility modes. A minimalism in weight, he believes, is also minimality in other things such reduced collision impact.

Considering all these factors, micromobility is therefore defined by Dediu (2019a) as "the ability of movement through minimalistic means." This definition, in its simplistic nature, unfortunately does not convey much of what exactly micromobility is.

Various literature defines the term micromobility by factoring the variables - gross vehicle weight, carrying capacity, operation mode, maximum speeds, traveling distances, among others (Zarif et al., 2019). However, for the purpose of this study, micromobility is defined as the various docked and dockless, small and lightweight vehicles purposely designed for single person

use which are either humanly or electrically powered and have a maximum speed of 25km/h.

These will therefore include, but not limited to, bicycles, hoverboards, golf carts, solo wheels, scooters, electric scooters (e-scooters), e-bikes, skateboards, electric pedal assisted (pedelec) bicycles, roller skates, etc (Institute for Transportation and Development Policy (ITDP), 2019).

Sustainable Transportation

Sustainable Transportation also known as Green Transport refers to the reduction or total elimination of carbon emissions by use of energy-efficient and affordable modes of transport including electric and alternative vehicles (Office of Energy Efficiency & Renewable Energy, n.d.). It however goes beyond just the elimination or reduction of carbon emissions but inculcates the improvement of livelihoods of people through affordable access while promoting equity within and between successive generations (Neste, n.d.).

Sustainable Transport is unfortunately not an outstanding SDG but is embedded in some of the SDGs as targets. These include Target 3.6 on increased Road Safety, SDG 7.3 on Energy Efficiency, SDG 8 on decent work and economic growth, SDG 9.1 on resilient infrastructure, SDG 11.2 access to transport and expanded public transport, and SDG 12.c on ending fossil fuel subsidies and SDG 14 on oceans, seas, and marine resources (Department of Economic and Social Affairs, n.d.; Slocat Partnerships, n.d.). Transport being at the heart of the SDGs is believed to be crucial in achieving the above stated SDGs directly. However, the disintegration of transport goals across some SDGs has led to an approach of bringing in multiple stakeholders who act independently resulting

in a failed approach to clearly define the objectives of sustainable mobility and providing a framework for it which will inform measures in scaling and financing actions to transform mobility (Mohieldin & Vandycke, 2017). Hence, Mohieldin & Vandycke (2017) believe there is the need to carve out Sustainable Transportation as a distinct SDG and pursue their targets simultaneously to achieve the desired outcome.

However, this concept of having a transport system with a long-term perspective on sustainability brings to fore a range of mobility trends to achieve the global sustainability goals. These include shared mobility, smart mobility, and active mobility. While these three concepts are interconnected, active mobility is the main focus of the study. While the use of e-scooters and s-pedelec may not be considered active forms of travel, the study uses cycling as a proxy in understanding children's perception towards micromobility modes. Hence, it is prudent that active mobility is discussed in this concept.

Active Mobility

Active mobility refers to any form of movement that requires the use of physical activity through non-motorised means (Larouche, 2018). Walking and cycling are the popular forms of active travel. Also in this are rowing, skating, running and kick scooters which also require the use of human energy to propel mobility. Aside it being time-consuming and inconvenient for travelling long distances and considering the geographic and climatic barriers (Rietveld & Daniel, 2004), the benefits of active mobility range from public health, environmental and economic (Larouche, 2018).

Influential Factors of Travel Mode Choice

For one to make use of an innovation, product or idea, certain factors come into play. Literature suggests that the choice of bicycle as an alternative travel mode takes a special process and that it is important to understand the acceptance or rejection motives of these mode choices as alternatives (Fernández-Heredia et al., 2016). For instance, Eash (1999) states that a change in walking distances and accessibility of adjacent trip destinations by new non-motorised facilities such as pedestrian paths and dedicated cycling lanes, influences an increase or decrease in either walking or cycling trips. Comparing cyclists' trips against motorists' trips, Sisson & Tudor-Locke (2008) identified that distance played a significant role in determining the mode choice of cyclists and motorists which confirms Eash's (1999) study.

Some other variables identified in literature but specifically related to the use of bicycle include the personal characteristics, the urban environment and users' perception. Fernández-Heredia et al. (2016) opine that bicycle users tend to choose from a large pool of variables rather than a limited usual number of variables. They therefore largely categorise some of these variables into five for bicycles and other micromobility modes, these include – the users' characteristics, trip characteristics, environmental context, facilities, and subjective perceptions. Some literatures do believe that the most important influencers on a child's decision to use active modes of travel are the distance to their schools and built and social environments (Mah et al., 2017).

Acheampong (2017) on the other hand believes that these variables can be classified into four broad classes – psychological/cognitive factors, individual sociodemographic factors, physical (built) environment factors and

natural environmental factors. User's characteristics or individual sociodemographic factors are the diverse backgrounds that can be described using demographic categories. The sociodemographic plays a vital role in understanding the physical activity patterns, especially in relation to active commuting, of various societal groups within a defined environment which poses different challenges and opportunities for different people (Kemperman & Timmerman, 2009). In Amoako-Sakyi's (2016) study on school path walkability she states that the personal characteristics of people influences their perception of the environment they found themselves. Some of the personal characteristics vital in discussing active travel are age, sex, income, car ownership and use and bicycle ownership.

Age and Active Travel

To understand issues related to journeys people take, it is important to consider the age of respondents (Amoako-Sakyi, 2016). Though there is limited scientific literature on when a child learns how to ride a bicycle, it is said that the average age for a child to learn is between 5 and 7 years (OutdoorGearsHub, n.d.). In the UK, it is reported that 46 per cent of children between 5 and 16 years were engaged in active travel to school in 2021 (Department of Transport, 2021a).

However, people between the ages of 18 and 45 were identified as taking advantage of cycling in societies where the cycling culture was in its emerging phase (Fernández-Heredia et al., 2016). Literature also found that middle-aged persons were found to be attracted to electronic bicycles (e-bike) although they had good access to cars and were licensed drivers (Mercat, 2013; Hiselius & Svenssona, 2014 as cited in (Haustein & Møller, 2016a). This also confirmed

Fietsberaad's (2013 as cited in (Haustein & Møller, 2016a) study where he found middle-aged people as being about 10 per cent of e-bike owners. Also, in understanding the contributing factors of cycle crashes as a result of using a portable electronic device in Netherlands, age played a significant role as it was found that teen cyclists were said to be 1.7 times higher at crash risks than that of young adult cyclists and twice as high as that of middle-aged and older adult cyclists (Goldenbeld et al., 2012).

Sex and Active Travel

With regards to sex, the disparity in cycling between both sexes – male and females, is significantly evident (Aldred et al., 2016; Amoako-Sakyi, 2011). In most cases, male users doubled female users (Ghana Statistical Service, 2013) and this could be attributed to factors such as female risk aversions and other cultural and societal perceptions and norms which dictate different activities expected of males and females to naturally perform which in most cases inhibit females from partaking in certain activities which to a greater extent influence their mobility (Adom-Asamoah et al., 2020; Anabire, 2021; Pochet & Cusset, 1999; Prati, 2018). For instance, Amoako-Sakyi (2011) revealed the fear of being barren accounted significantly for the lower ridership of bicycles among females. Within the traditional fabric of Ghanaian societies where childbirth is considered particularly important, females will not want to engage in activities that will supposedly render them barren.

Income/Living Standards and Active Travel

According to Fernández-Heredia et al. (2016), bike use is much intensive among people with income above the mean. Findings from previous studies in Ghana and the African sub-region, however, do contradict this claim.

This is supported by data from the Ghana Living Standards Survey 2017 where the estimated income of urban households in Ghana is 76.6 per cent of the total national income with rural areas having 23.4 per cent (GSS, 2019). However, bicycles are second most used means of transport in rural areas after walking which is a sharp contrast to the situation in urban areas where it is one of the least used means of transport to work (Ghana Statistical Service, 2013). In a society where wealth is defined by the worth of material items one owns and lifestyle lived, the low adoption rate of bicycles has been attributed to the negative image the population holds of cycling, which many perceive as an inferior alternative to motorized transport despite the many benefits of cycling (Acheampong & Siiba, 2018). Hence, people are most likely to change their means of transport as their income changes and for children, there is a positive correlation between a change in parents' income and their access to faster and safer transit modes to school (Amoako-Sakyi, 2016). Similarly, active travel among children is higher among low-income neighbourhoods than in high-income neighbourhoods (Amoako-Sakyi, 2016; Larsen et al., 2009). This is because of the ability of parents in high-income neighbourhoods to own cars and afford to drop off their children at school (Fernández-Heredia et al., 2016).

Ethnicity and Bicycle Use

Previous studies have made use of ethnicity to understand the cycling behaviour of people. In Ghana, studies have shown that people from the northern part have a different cycling culture than those in the southern part. While cycling in the south is mostly for purposes of pleasure, it served as a strong economical complement for those in the north (Grieco et al., 1994). From their comparative study of Nima and Jamestown, Grieco et al. (1994) found that

while parents from Nima encouraged their children to ride bicycles, the parents from Jamestown were strict about their children riding bicycles. Hence, children from Jamestown who rode bicycles mostly did so defying the authority of their parents and hence were seen as deviants in effect, making cycling in this context equivalent to hooliganism. This goes further to explain the influence of parenting on children's mode choice.

Parental Influence on Active Travel

To understand children's travel behaviour, it is important to understand the influence of parents as they function as the permission givers (Amoako-Sakyi, 2016). Parents as the final decision makers of their children's travel behaviour can have a positive or negative impact on the physical activity of their children and their decision plays a role in how children travel to school (Mah et al., 2017). McMillan (2005) conceptual framework on elementary-aged child's travel behaviour is of the assumption that parental decision on a child's final trip to school is an intervening causal variable of a child's travel behaviour as parents make travel decisions for their children up to a certain age. Some factors which influence parents' decisions include parents' educational level, perception of the built environment and income (Amoako-Sakyi, 2016; Larsen et al., 2009). Parental concerns about children's safety are one of the reasons that can be attributed to a child's mode of travel to school. Studies indicate that parents' concerns were influenced by their perceptions of security rather than traffic safety (Mah et al., 2017; Nevelsteen et al., 2012) and this is contrary to other studies where children's traffic safety were paramount in parents' decision on children's travel choice rather than being harmed by a stranger (Hillman et al., 1990; Timperio et al., 2006). Although understudied, the living

arrangements of a child influences his or her travel mode to school. Studies have found out that children who lived with only one of their parents were much engaged in active travel to school (Fulton et al., 2005; Timperio et al., 2006).

Perception as a Mode Choice Influencer

Perceived usefulness and perceived ease of use are two theoretical constructs which come to play in the acceptance or rejection of a technology (Acheampong, 2017). When people believe a product or service will improve their productivity at the workplace, the concept of perceived usefulness is brought to play. However, should it be perceived as useful but too difficult to use, they may reject it. Hence, for a product to be adopted, it should be able to enhance life and require minimal effort to use (Acheampong, 2017; Davis Jr., 1985). In active travel, the use of these two constructs informs the cycling behaviour of the people who may use it or reject it.

For instance, in 1819, the Laufsmaschine had become increasingly popular in London, but one thing led to the quick decline of the running machine – fears of the safety of the rider and the pedestrian public, as riders preferred to operate their vehicles on the smooth pavements which served pedestrians and not on the rough roads. These fears led to the quick ban of the vehicle in several municipalities (Townsend, 2016). Although they found the Laufsmaschine useful, they had difficulty in using it because the Laufsmaschine in its original design was without brakes or pedals until the 1860s when it got its first pedals, gears, and cranks – and required the use of the feet to move it or stop it (Townsend, 2016) Within three months of introducing e-scooters in Oslo, over 16,000 e-scooter trips were made each day (Fearnley & Johnsson, 2019 cited in Fearnley, 2020) showing how useful the e-scooters were for them. The

perception on the safety of bicycles is based on two main things – traffic safety and safety from crime.

Environmental and Media Influence

Among the many things that influence a child's development and their decisions, the environment in which a child interacts and the source of information a child is exposed to via the media are key factors. This is because a child picks up habits, socialises, and learns problem-solving skills among other development skills through interaction with people and things in its environment. Aside the family and society a child interacts with, the media is also a medium through which children pick up behaviours by observing and imitating (Clark, n.d.; United States Environmental Protection Agency, 2022).

According to the United Nations International Children's Emergency Fund (UNICEF) (2022), children are spending more time online than ever before and exposed to numerous opportunities. These opportunities most often come with serious risks such as becoming naturally irritated, criminals, drug use addicts, aggressive and being unsatisfactory in educational progress (Barevadia, 2014). Although there is scarce literature on the role of the media in influencing travel mode choices, the media is one of the means children are exposed to with regards to the use of micromobility modes.

Challenges, Regulations and Policies of Micromobility Use

As an emerging travel alternative, micromobilities have been seen as a menace or a growing crisis due to its unprecedented growth and speed in cities. When Bird introduced the first docked e-scooter services in Santa Monica, its popularity bloomed unprecedentedly leading to a high demand and high market

penetration - an indication of the benefits of social welfare and consumer utility (Fearnley, 2020). But did the regulation of micromobilities start in this era?

The Laufsmachine ubiquity had enveloped London in 1819 where it is said that about a thousand were being used which quickly led to a ban of the invention by Drais. Though concerns of rider and pedestrian public safety was the reason for the ban, there is scanty literature on the gross negative impact of the Laufsmachine which informed the ban (Townsend, 2016). Since then, micromobility has seen three eras which have already been discussed, and in and each of these eras has been confronted with challenges based on regulations and policies of which they will be discussed in subsequent paragraphs.

The proposal to have 20,000 white bikes per year to be used as dockless public bicycles and left around the city for free use in Amsterdam, Netherlands by Luud Schimmelpennink was also met with opposition. In 1995, the first docked bicycle system was established in Portsmouth and Copenhagen both of which used required a card and coin system to unlock bicycles in both cities. The White Paper Plan and the Rack Locking Technologies were confronted with challenges and had to be discontinued. The discontinuation of these systems was not an issue of safety as was the situation in London in 1819, but rather a matter of operational cost. For instance, the rack locking technology rolled out in Portsmouth and Copenhagen required that users paid a one-time fee rather than a pay-per-use. This meant that the cities were to subsidise the cost of use which were not profitable because the revenue generated did not meet the costs of operating such a system – which included provision, repair, and maintenance of fleet, paying of staff to manage the system full time.

The second era was a blend of the first and second versions of the first era. Just as was the issue with the White Paper Plan, the second era saw twenty times increment in the number of bicycles than that of all the docked bicycle systems combined. They were seen as intrusive as they began to be parked on sidewalks which inhibited pedestrians their right of way. This led to the coinage of the term Bicycle Pollution.

To avoid repeating the same mistakes of the second era, cities in Europe and the United States of America, rejected this approach of a dockless system as they did not have much infrastructure in terms of sidewalks for parking or storage and a lack of consultation with stakeholders, mainly the ride-share operators. Most of the start-ups operating and offering these services also began to provide bicycles which were of inferior quality, lacked comfort and effective gearing and above all, had a general underperformance. According to Dediu, (2019b) most users did not care about these issues if they were able to attain movement.

In 2018, Norway made a legal amendment that required that e-scooters just like other electric modes, met some requirements of a maximum speed and were to be treated like that of a bicycle. This meant that users could ride on bicycle lanes and on the roads without safety gears such as helmets. This also required them to be dockless making them accessible to people of all ages and use on pedestrian walks and pavements. Following the leeway of this amendment, Oslo had seven e-scooter operators in operation, with a total of 5000 e-scooters being provided by only two of the service providers (Fearnley & Johnsson, 2019 as cited in Fearnley, 2020). Since then, the municipality of Oslo has been unable to regulate the operations of these e-scooter market. There

has been a call on the central government to act and empower the city councils to regulate them.

Deighton-Smith (2018) opines that the need to regulate the micromobility industry should focus on externalities and consumer protection. Fearnley (2020) on the other side mentions market failure, usage of public space and societal goals as the focus in the regulation of the e-scooter. Though they both differently define these variables, they both are of the opinion that the usage of micromobilities and its users needed to be regulated. By these, they considered issues arising from the invasion of micromobility modes in cities notably indiscriminate parking of bikes in public spaces which impede pedestrian movement and the issue of bicycle pollution, safety of micromobilities modes which include making sure these modes met required operational standards and its users were well educated on its use. Some scholars have argued that rider education is needed most specially to highlight the risks of inexperienced cyclists and make them familiar with the local regulations (Bordenkircher and O'Neill 2018 as cited in Deighton-Smith, 2018) just as is done with drivers.

Some national and city authorities as seen in London, Tianjin and Singapore have put in place legislations to deal with some of these issues. These legislations include regulating the number of fleets an operator can have within an area, a geofencing and time system to deal with poor parking, an ISO standard to which bikes must conform, a system for reporting damaged or unsafe bikes, as well as a reporting system in respect of any deaths or injuries. In dealing with the influx of e-scooter and the menace it comes with, two Norwegian cities – Stavanger and Trondheim, banned the use of e-scooters

while they prepared a legal framework for their operations regarding them as commercial operations just as any other economic activity (Fearnley, 2020). In Denmark, as part of the regulations for safe use of the e-scooters, there is an age limit for use of which the rider must be accompanied. It is also specific about alcohol level while using the e-scooter, conformance with Machinery Directive requirements.

Various African countries also have policies in place for the use of non-motorised transport. This review investigates some national or city policies of Ethiopia, Kenya, and Rwanda – three countries which have in recent times given the use of bicycles a satisfactory level of consideration in their transport strategy.

Ethiopia has a 10-year non-motorised transport strategy (2020 – 2029) with the aim of improving walking and cycling activities. The strategy acknowledges the need to provide infrastructure to improve cycling and walking. Notable in the strategy is the capturing of bicycle rental operations in Ethiopia. In its goal to increase the mode share of walking and cycling, it expects to invest in high quality walking and cycling facilities. Over the 10-year period, the target is to ensure that 60 per cent of the country's modal share are non-motorised forms of transport. It also targets 50 per cent of cyclists being women. The strategy also targets to reduce pedestrian and cyclist fatalities by 20 per cent of 2019's casualties. To encourage bicycle sharing among users and encourage private entrepreneurship, the strategy lists a number of actions notable among them are pricing structures to incentivise short trips to maximise cycle trips per day; a docking system with GPS to locate in real time the location of bicycles to also help in the redistribution of bicycles across stations. The

policy states that stations should be placed at frequent intervals, serving public transport hubs and other facilities to aid in the provision of last mile options. The strategy also provides guidelines for operation of these systems including user and business registration and how they can be funded.

Ethiopia's strategy while encouraging bike sharing also seeks to safeguard the operations of local bike rentals. Hence it encourages the local authorities to provide designated street space for cycle stands and user information such as rental facilities on maps. To increase access to high-quality bicycles, the strategy calls for the removal of the 20 per cent import tariffs on bicycles to access which are viewed as luxury goods.

The Nairobi City County's policy on NMTs is broken into four thematic areas – Mobility and Accessibility, Safety and Security, Amenities, and Education and Public Awareness. Key factors among these policies are the aim to provide a cohesive network of cycle lanes, improve the number of repair shops and stores, reorient the mindset of citizens to view NMTs as not a mode for the poor. By so doing, Nairobi's City County is adopting a long-term development plan which encourages a compact transport urban environment. It is also adopting a zero-tolerance approach in the encroachment of NMT facilities. Enforcing traffic laws on both NMT and motorised transport users is also one of the ways it aims to improve the safe use of NMTs. Some of these laws include that bicycles have proper reflectors on them as well as being in good mechanical conditions. To deal with the issue of bicycle congestions, theft and illegal activities, the city county plans to register all bike operators to avoid over-supply of bicycles into the system.

Rwanda's Transport Sector Strategic Plan gives attention to NMTs in Priority Area 5: Green Economy where it targets to implement sustainable and eco-friendly transports to facilitate economic transformation. By so doing, it aims to improve walking and cycling by planning, designing, and maintaining bikeways and walkways for urban road network. Providing adequate bicycle parking facilities and integrate walking facilities with public transits so that walking and public transit (including bus, taxi, and even air transport) work well together.

The policies above make no mention of micromobility. The definition of NMTs and active travel were restricted to cycling and walking. Unlike Rwanda's policy which has NMT as a priority or theme, Ethiopia's and Kenya's policies were NMT focused hence the policies dealt with issues and strategies concerning NMTs in depth. In Ghana, two policies and regulations are in place to ensure best road use practices. The regulations include the Ghana Highway Code and The Road Traffic Regulations (L.I. 2180); while the policies include the National Road Safety Policy and the National Transport Policy. The next paragraphs contain an overview of these policies and regulations.

Ghana Highway Code

The Ghana Highway Code was promulgated in 1974 when Ghana moved from left hand traffic system to the right-hand driving making it the oldest implemented existing document with regards to road transport. The need to ensure a readjustment of the new traffic system by all road users saw it become the official state-recognised and most widely patronised book for motorists in Ghana. Its major objective was to avoid road accidents by teaching road users how to drive, ride or walk safely on the roads (Ministry of Roads & Transport, 1974). Hence, being a standard of behaviour to all

road users. The rationale behind the Code was the attainment of road safety by the strict compliance of its provisions by motorists and pedestrians. The code has been identified to be used by the Ghana Education Service (GES) for teaching its pupils on road safety, as a required document for driving schools for training of learner drivers, practising drivers, the police, and pedestrians (Nsiah-Achampong et al., 2020).

Road Traffic Regulations (Legislative Instrument 2180)

The Road Traffic Regulation 2012 (L.I. 2180) is an amendment of the Road Traffic Act 683. Enacted by Parliament, it became effective on July 5, 2012, (Driver and Vehicle Licensing Authority, 2017; Ghana Police Service, n.d.-b). The regulations' objective is to ensure that service delivery and road safety are improved if complied with by vehicle owners and motorists. Most importantly it looks at individual and collective contributions towards reduction in road crashes and casualty (Driver and Vehicle Licensing Authority, 2017).

National Transport Policy

The National Transport Policy (NTP) was given cabinet approval in August 2020 as a review of the NTP 2008. This policy is to serve as a policy framework for all institutions, departments, and members of the transport sector. While it largely looks at using transport as a driver of sustainable and positive growth of the national economy, some of its major objectives are to create a link between transport planning and land use planning especially at the urban level; work towards the attainment of urban transportation reforms; and create competent transport authorities equipped to plan and regulate transport services (Government of Ghana, 2020). It is designed to meet the Global and Regional agenda of the Sustainable Development Goals, African Union's Agenda 2063 and the Coordinated Programme of Economic and Social Development Policies (CPESDP).

National Road Safety Policy

Established in 2008 as a revision of the National Road Safety Strategy 1999 by the then Ministry of Transport and Communications, the National Road Safety Policy was to be developed to due to the lack of coordination of road safety activities. It was designed specifically for the then National Road Safety Commission (now Authority) and other collaborative stakeholders to serve as a guide in the designing and implementation of holistic road safety programmes and activities from 2008 and beyond. The major aim is making the various key stakeholders proactive, and results oriented which is expected to translate into a reduction of road traffic crashes and its rippling effects (Ministry of Transport, 2008).

Regulatory Transport Institutions in Ghana

In Ghana, the transport sector is managed by several institutions who collectively work together to achieve a common goal. These institutions have policies and mandates which guides them in achieving the goal of general transport safety.

Ministry of Transport

The Ministry of Transport is the ministry responsible for the country's transport sector. Established in 2009, it was separated from the erstwhile Ministries of Aviation, Harbours and Railways, and Road Transport Services. In 2017, through Executive Instrument (EI) twenty-eight, the Ministry was realigned to establish the Ministry of Transport, Ministry of Aviation, and the Ministry of Railways. Currently, the Ministry of Transport has been realigned through the Executive Instrument (EI) 12, 2021 to include the Aviation sub sector (*Ministry of Transport*, n.d.).

Among its core functions are to formulate and co-ordinate transport sector policies; performing oversight responsibility for sector agencies; undertake nation-wide planning, development and implementation of road safety programmes and activities; co-ordinate, monitor and evaluate road safety activities, programmes, and strategies; and provide both public inter-city and intra-city road transport services as well as urban-rural services (*Ministry of Transport*, n.d.).

Establishing Ghana as a transportation Hub for the West African Sub-region is the main goal of the Ministry. Key among its aims is to create an accessible, affordable, reliable, effective, and efficient transport system that meets user needs; integrate land use, transport planning, development planning and service provision; develop and implement comprehensive and integrated Policy; and ensure sustainable development in the Transport Sector (*Ministry of Transport*, n.d.).

National Road Safety Authority

A key agency under the supervision of the Ministry relevant to this study is the National Road Safety Authority (NRSA) which was first established as a commission under the NRSC Act 1999 (Act 567) with the mandate to plan, develop, promote, and coordinate policies in relation to road safety. It however received presidential assent on August 2, 2019, which repeals the NRSC Act, 1999 (Act 567) that established the National Road Safety Commission. In addition to the existing mandate under the Commission of promoting best road safety practices among road users and coordinating road safety activities, the NRSA Act provides for an enhanced mandate where the Authority is now

empowered to regulate, ensure implementation and enforcement of road safety standards and procedures (National Road Safety Authority, n.d.).

Motor Transport and Traffic Directorate

Another agency in charge of ensuring road safety of the general public is the Motor Transport and Traffic Directorate (MTTD). It was initially established in 1952 as the Ghana Police Traffic Unit. In 1981, the Justice Archer Commission, reviewed the MTTD's function and accredited it as the National MTTD. The Unit hence became The Motor Traffic and Transport Department (MTTD) in March 2013 following the enactment of the Police Service Regulation 2012 (C.I 76). Its mandate is to formulate policies regarding the effective and sufficient performance of the MTTD departments in line with mission and vision of the Police Service and as part of its responsibilities conducts research into emerging challenges in the traffic enforcement and road safety sector. The department is also tasked with the development of public education and sensitisation programmes across the country in collaboration with the NRSA, DVLA and other road safety stakeholders (Ghana Police Service, n.d.-a).

One other important institution is the Physical Planning Department which derives its mandate from a host of acts including the Land Use and Spatial Planning Act, 2016 (Act 925). Some of its functions include advising Metropolitan/Municipal/District Assemblies (MMDAs) on national policies on physical planning, land use and development. They also co-ordinate activities and projects of departments and other agencies to ensure compliance with planning standards. To ensure the growth and development of sustainable settlements. Though the Physical Planning Department is not necessarily a

Transport Regulatory body, their mandate in ensuring sustainable settlements gives them the authority to ensure that spaces demarcated for purposes of mobility are in good shape and in the right use.

Conceptual Framework

The conceptual framework for this study is underpinned by the Technology Acceptance Model (TAM) by Davis (1985) and the Theory of Reasoned Action (TRA) by Ajzen andFishbein (1977) which provides some theoretical foundation of this study. In the TAM, Davis (1985) postulates that the usage and acceptance of information systems is based on the final user's perceived ease of use and perceived usefulness which are also influenced by externalities such as system design or its features (Kabanda, 2014). By this, he broadly categorises the variables into four – Design Features, Cognitive Response, Affective Response and Behavioural Response.

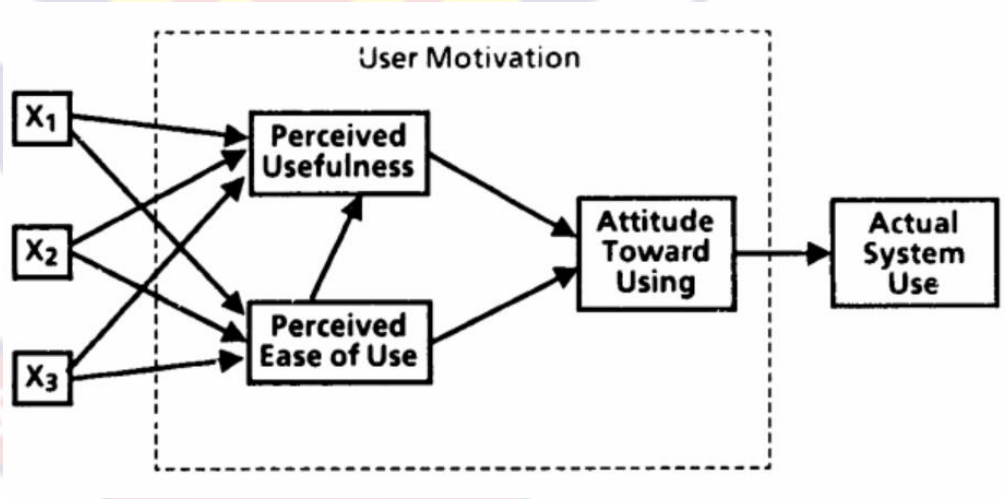


Figure 1 Technology Acceptance Model (Davis, 1985)

According to the model, Cognitive Response is the major determinant of whether a user will actually use a system or not (Davis, 1985). This includes whether the user believes there will be an enhancement in his or her job using a

particular system (Perceived Usefulness) and the extent to which a person believes using a particular system would be free of effort (Perceived Ease of Use) (Marikyan & Papagiannidis, 2022). Davis (1985) indicates a causal effect of perceived ease of use on perceived usefulness. However, perceived ease of use and perceived usefulness have a direct influence on Affective Response (Attitude). Variables X_1, X_2 and X_3 as used in Figure 1 refer to the external variables such as the design of the product, socio-demographics of the person, nature of the job or activity for which the technological innovation will be applied.

Intention to Use (Dependent): An individual's subjective probability that he or she will perform a specified behaviour (Davis, 1989).

The TAM is an adaptation of the Theory of Reasoned Action (TRA) (Davis, 1985). The TRA postulates that the behaviour of an individual is a result an individual's subjective probability of performing a specific behaviour (Behavioural Intention) which is in turn a function of his or her evaluative effect of performing a role (Attitude) and the person's perception that the people who are most important to him or her think he or she should or should not perform the behaviour in question (Subjective Norm) (Hale et al., 2003; Marikyan & Papagiannidis, 2022).

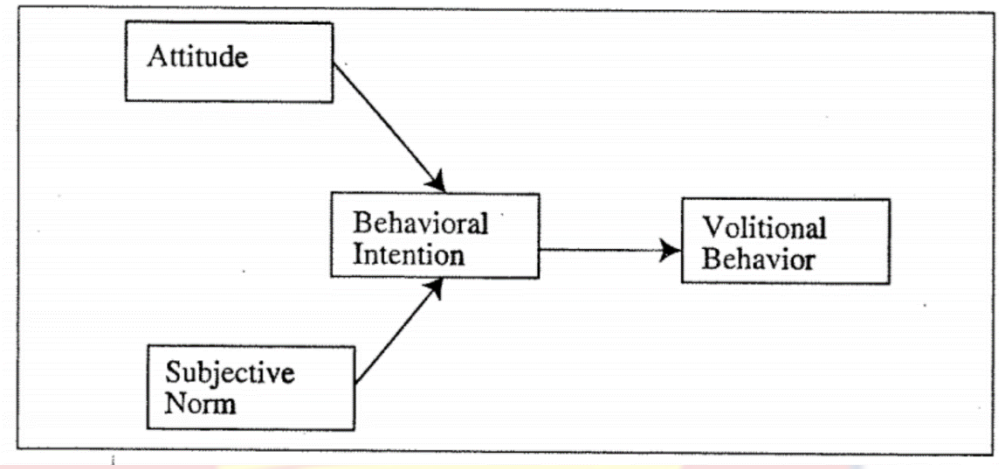


Figure 2 The Theory of Reasoned Action (Hale et al., 2003).

In Figure 2, one thing which was not considered was the socio-characteristics of the individuals. While Davis (1985) puts in external variables, which is open to the inclusion of many variables, as having an influence on one's subjective motivation, this study stems it down to the socio-demographics of individuals. Fernández-Heredia et al. (2016) and Acheampong (2017) states that aside the mobility variables, the user's characteristics also plays a role on the intent of using bicycles and other micromobility modes. Hence, for this study, socio-demographics was introduced as there is an established relationship between user characteristics and their perception towards people and things (American Psychological Association, 2013; Brown-Iannuzzi et al., 2014; Ibrahimova & Huseynov, 2019; Jha & Ye, 2016).

In TAM, subjective norms were exempted from the model. But this study includes it in the study considering the importance of parental influence in the mobility choice of children (Amoako-Sakyi, 2011; Amoako-Sakyi, 2016; Mah et al., 2017; McMillan, 2005).

Perception of Safety was introduced in the model. Various literature has established a relationship between perception of safety and bicycle use (Eren et

al., 2019; Haustein & Møller, 2016b; Hunt & Abraham, 2001; Nazemi et al., 2021). The TAM does not include whether the users perceived the technology to be safe to use but only looked at its perceived usefulness and perceived ease of use. In this model, perceived ease of use and perceived usefulness are in one variable – Perception of Usefulness.

The TAM and TRA also failed to recognise the role of external variables such as regulations and policies in informing one's intent to use a system or in informing one's behaviour in a system. Policies and regulations establish boundaries for what societies consider to be acceptable behaviour in certain situations. They serve as guidelines to ensure uniformity and avoid the creation of personal standards which may differ from one person to the other and may result in a mayhem (Reference, 2020). Hence, the study introduces External Factors – Policies and Regulations, into the model to determine how it influences children's intent to ride a bicycle.

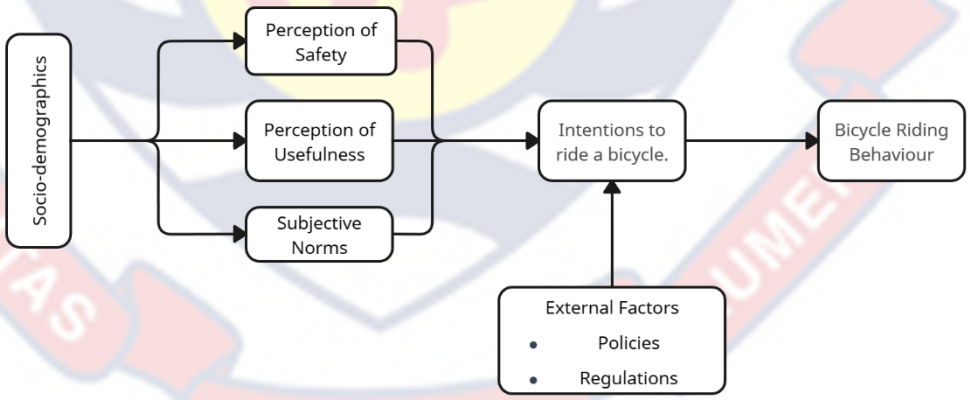


Figure 3 Proposed Conceptual Framework for Micromobility Use

Source: Field Survey (2021) adapted from Technology Acceptance Model (TAM) and Theory of Reasoned Action (Davis, 1985; Ajzen & Fishbein, 1977)

The above review of literature will inform the variables being studied in this research. For instance, given that perception is based on one's socio-demographics, it is viable for this study to understand how children's socio-demographics inform their outlook of emerging modes and how these inform their intents to use these modes. The role of regulations and policies can also not be undermined as policies and regulations inform the use of these modes.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter focuses on the methods used in collecting data and the underpinning philosophies of the study. It discusses the issues on epistemology and philosophies relevant to the study, the characteristics of the study area, several types of data collected, sampling procedures, and methods of data collection and analysis. The chapter finally, considers ethical issues guiding the data collection processes.

Epistemology

The interpretivist and positivist philosophical ideologies were employed in this study to give an in-depth understanding of the issues under study which is broadly understanding the perception of children's safety and use of micromobility modes and the willingness of stakeholders in accepting and putting in place various policies to ensure the safety of the children who choose to travel actively. Positivism was adopted because it allows the discovery of facts and regularities which are observable and measurable. It also gives room for the establishment of relationships of the gathered data to enable generalisation (Alharahsheh & Pius, 2019). Interpretivism on the other hand as described by Alharahsheh & Pius (2019) in the context of this study provides an in depth understanding of factors influencing children's willingness to use bicycles as a mode of transport to school. It enables the consideration of the behaviours and experiences of participants which helps understand their reality. An equal use of the two ideologies offers a flexible approach to the research design, its data sources as well as analysis which in turn provides the opposition of viewpoints and outcomes while embracing the extremities of the two

ideologies. Hence the use of both interpretivist and positivist paradigms enables the study to have in depth understanding of the phenomena while also being statistically reliable.

Research Design

The study employed the Embedded Mixed Method approach for this study. A mixed use of the qualitative and quantitative approach was employed because as a novel topic, micromobility needs to be well understood to provide a foundational basis for further research. As a not well explored concept in the transport space within Ghana, the design gives room for unfamiliar terms to be defined, as well as give room for the exploration of which methodologies will best fit the research problem (Amoako-Sakyi et al., 2022). The use of just one of the approaches will therefore not be sufficient in understanding and defining the subjective nature of social occurrences and experiences under study. According to Creswell & Plano-Clarke (2006), the Embedded approach has one of the data types embedded in the design while the other plays a supplemental role. In the case of this study, the qualitative data serves as a supplemental data to the quantitative data which is major. Also, with the limited period for this research, it is adequate to employ the Embedded Mixed Method as the design is, according to Creswell & Plano-Clarke (2006), logistically manageable for graduate students as one of the methods requires less data than the other.

With the inclusion of transport key stakeholders in the study, this approach will help bring to fore the issues raised by children who use or intend to use these modes and hence establish research priorities for stakeholders and inform them on where resources should be allocated in their policy formulation

and implementation. A one-phase approach was used in taking both the quantitative and qualitative data. This implies both qualitative and quantitative data were collected at the same time (single phase) during data collection in the field. Both qualitative and quantitative data were collected, analysed, and interpreted (approximately) at the same time.

Study Area

This study was conducted in two cities - Kumasi and Cape Coast, both of which are regional capitals of the Ashanti and Central Regions, respectively. Ashanti Region with a population of about 5,440,463 has Kumasi covering an area of about 214.3 km2 (Ghana Statistical Service, 2014, 2021b), making it the largest city in Ghana as well as the bigger of the two study sites, while Cape Coast, has a population of 189,925 and covers an area of 122 km2 (Ghana Statistical Service, 2012; Ghana Statistical Service, 2021a).

Kumasi is in the transitional forest zone of Ghana. Given its location with interconnecting routes to other parts of the country, it makes Kumasi a central city in Ghana (Cobbinah & Amoako, 2012). Kumasi's transport system is similar to that of Accra's majorly characterised by congestion on the roads, high pollution levels and an informal transport sector with the operations of paratransits and private vehicles (Cobbinah & Amoako, 2012). Cape Coast on the other hand is generally hilly with its highest point approximately being 60m above sea level (Ministry of Food and Agriculture, 2023). Cape Coast serves as a transit city, serving as a link between Takoradi and other major cities including Kumasi (Porter, 2013). Its internal transport is majorly characterised by private vehicles, active travel, and paratransits - taxis and autorickshaws (Pragia) being

the major mode of travel within the city and the mini-vans, mostly for intercity trips and private vehicles.

The choice of Kumasi as a study area is informed by the 2017 - 2020 Cyclist Crash Statistics by the Building and Road Research Institute where 2 per cent of the total crash statistics for the period were that of bicyclists which were characterised with fatalities and severe hospitalisation (Building and Road Research Institute, 2020). Of the total number of bicyclist crashes in Kumasi, 26 per cent of them were between the ages of 6-20 years. Though little is known about skating in Kumasi, the 2018 edition of the Skate Xtra and 2019 edition of the Skate Soccer Tournaments were hosted in Kumasi (Ghana Web, 2019; Modern Ghana, 2018).

Map of Ghana Showing Study Areas

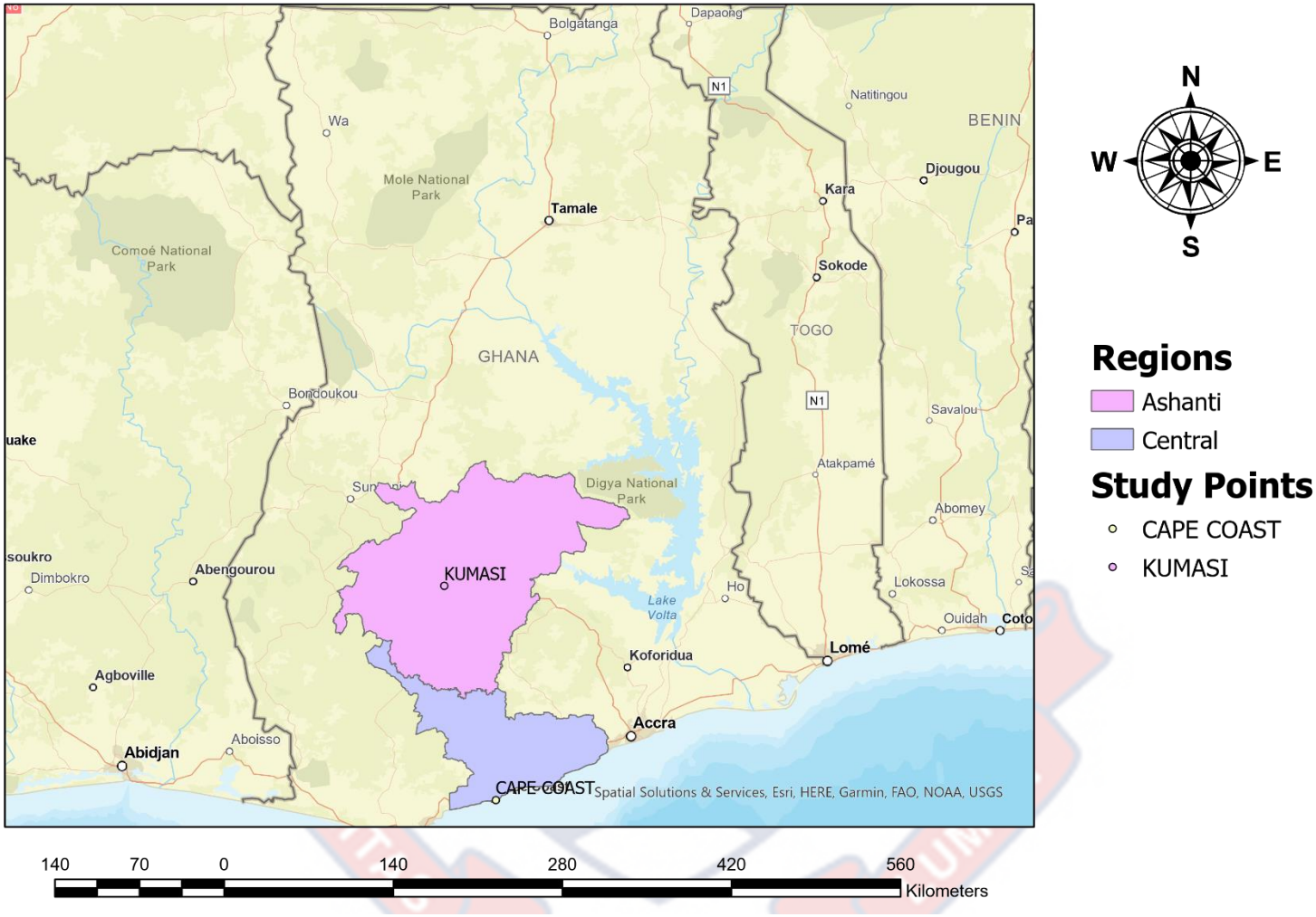


Figure 4 A Map Showing the Study Areas

Source: Field Survey (2021)

Kumasi is also known for being home to some of the popular skating clubs in Ghana - the White Stars Skating and Troop Skateboard Clubs, which have a young membership. This therefore informs the use of skates in Kumasi and raises concern for the safety of these users. Cape Coast was chosen as the second city of study because of an observed skate training session for children between November 2020 and March 2021 at the Cape Coast Stadium and University of Cape Coast Sports Complex by the Principal Researcher and with these events occurring close to the University, it is prudent local events which raise concerns of safety are also studied.

Population

Several actors contribute to safe micromobility use among children. These are mostly major road users and also in the position to influence and enforce child mobility policy, and the provision of elements that influence access; infrastructural development and policy guidelines that influence safety. This study thus targeted different audiences - among them, the school children who are the subject matter of the study and policy makers and planners. Whereas the various groups were targeted for the study, the samples cover were determined by the actual size of the student population.

Sample Size and Sampling Procedure

The study adopted a multi-stage sampling technique to select respondents for the study. The first stage involved the identification of common routes used by cyclists and skaters alike in the respective cities. These were the Mampong stretch within the Kumasi Metropolis and the UCC-Cape Coast township stretch within the Cape Coast Metropolitan Assembly (CCMA). A common characteristic of these routes was the presence of most schools along

the sides of major roads in their cities. Upon request from the Education Directorates in the Metropolis the list of schools along the selected routes were given. Coordinates of these schools were picked using the Google Earth app on a laptop. Kumasi Metropolis had a total of eight (8) schools while Cape Coast Metropolis had four (4) schools along the selected routes based on the selection criteria which is described later in this section. These points were saved as a Keyhole Markup Language (KML) file and exported into ArcMap 10.8 for further processing.

The next stage was to create a buffer along the sides of the selected roads using ArcMap 10.8. Dempsey (2019) defines a buffer as a reclassification based on distance of a given proximity. A buffer operation is defined by Baral (2015) as the creation of a zone of a specified width around a point, a line or a polygon area or a zone of specified distance around coverage features. Though literature is limited on the appropriate distance between a school and a major road, the minimum length of a school zone is determined by the speed limit of the roads in some cities such as Queensland. In Ghana, per regulations, the permitted speed limit in school zones is 30km/h. Where the speed limits are 50km/h and 60km/h, the school zone should not extend more than 100m beyond the limits of the school frontage in either direction. In speed zones of 70km/h and greater and on multi-lane roads, the minimum length of a school zone should be 300m. Where the school is situated on a short block less than 200m, the school zone must encompass full block (Department of Transport and Main Roads, n.d.). Based on these guidelines, the study employed an arbitrary buffer of four hundred metres on all routes resulting in all twelve identified schools in both cities being within the buffer zone. To ensure a balance in the study of the issues

in both cities, three schools from within the Kumasi Metropolis were selected to match that of Cape Coast which was reduced to three because of the disqualification of Bakatsir Methodist School from the study due to the low enrolment in the Upper Primary Classes. The total number of pupils from Classes 4 to 6 was ten. To do so, a simple random sampling technique was employed where the names of the schools were written on pieces of papers and folded into a container. Through the lottery method, three Research Assistants picked the papers at random to decide which schools were going to be understudy in Kumasi, resulting in Scales Adventist Preparatory School, WESCO Demonstration B School and Old Tafo Methodist School being chosen. For Cape Coast, Philip Quaicoe Boys' School, St. Francis Catholic School and Jacob Wilson-Sey School were the three schools selected for the study.

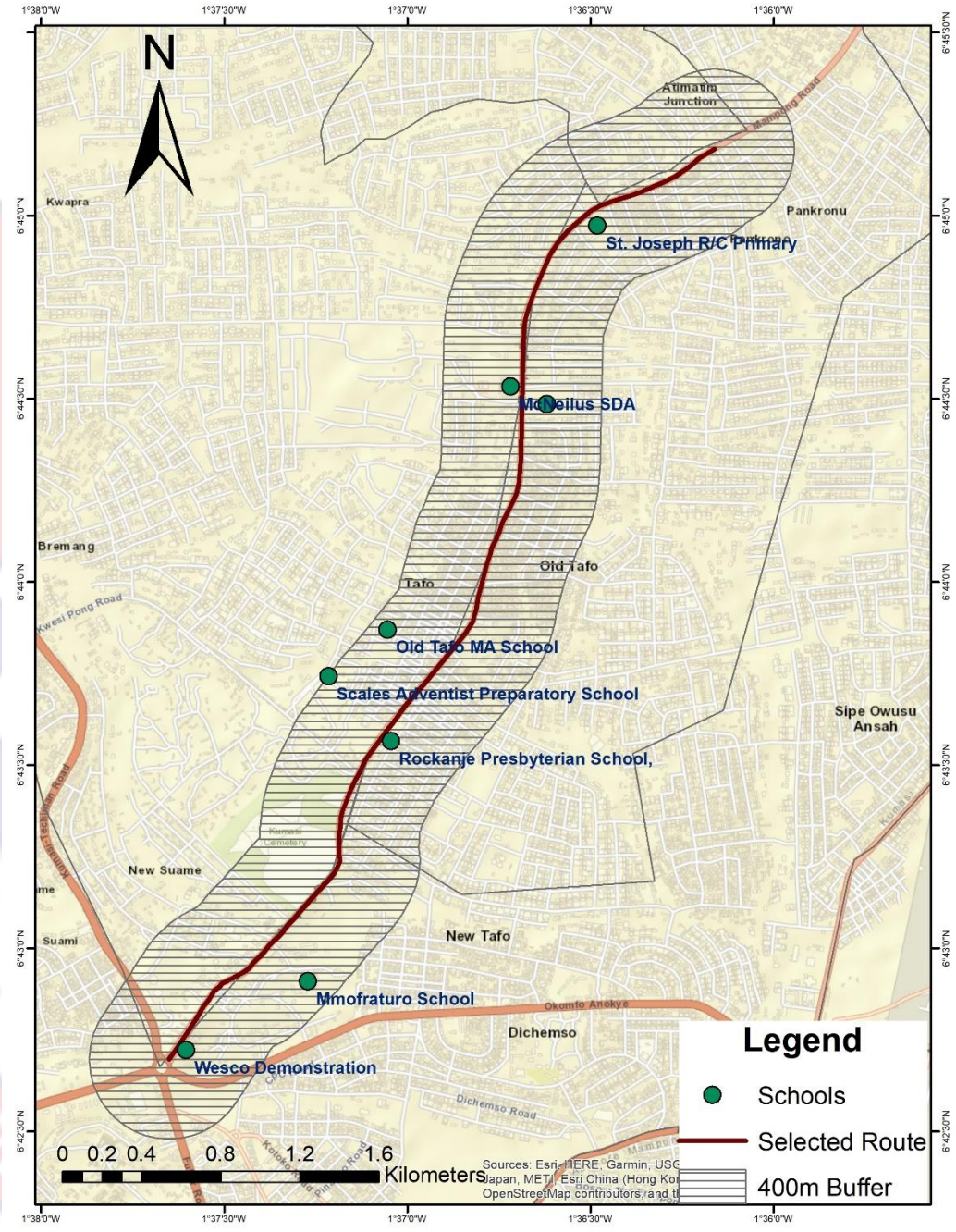


Figure 5 Kumasi Schools Buffering Result

Source: Field Survey (2021)

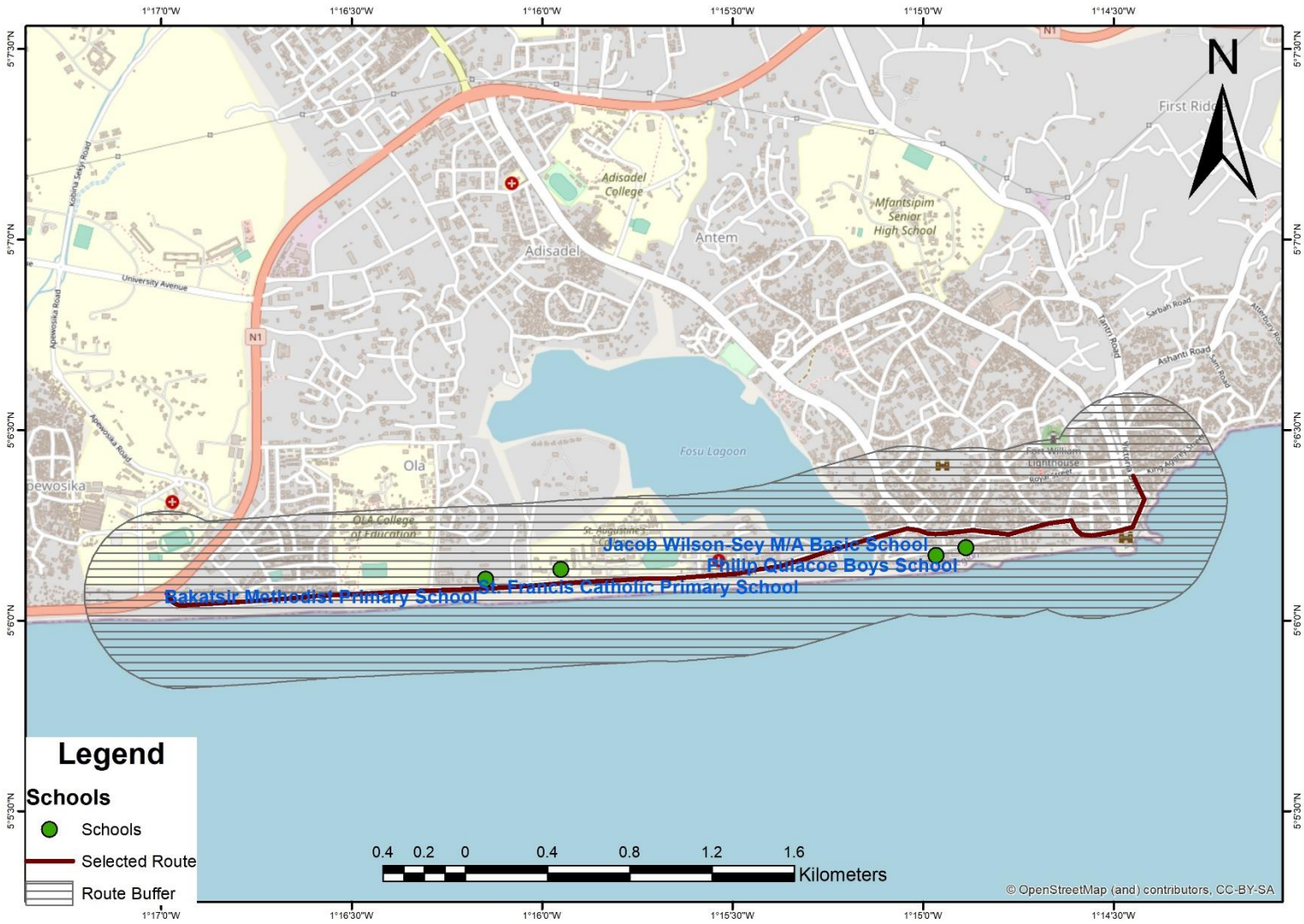


Figure 6 Cape Coast Schools Buffering Result

Source: Field Survey (2021)

The next step was to determine the sample size per school. According to WHO (2018), children aged 10-15 years are the most vulnerable road users with the highest casualty and fatality rates. School children, the main subjects of this study, within this age category are enrolled between Primary 4 and JHS 3. At the time of data collection, the Junior High School levels (JHS 1 – 3) were on a one-week mid-term break as part of new school regulations post-pandemic. The study thus limited the target population to the Upper Primary students who were still in school at the time of data collection. The population of students in these schools were not readily known hence the study adopted the "rule of 5" approach by Hair et al. (2010) to arrive at the desired sample size for the study. This rule proposes that the sample size be equal to the number of items on the questionnaire – in the case of this study fifty-one questions were used, multiplied by five. Therefore, for this study, a sample size of 255 (51 * 5) was attained. However, the study had a 71 per cent response rate resulting in a final sample size of 182 children.

The simple random sampling technique specifically the lottery method - a probability sampling technique, was used in the selection of the school children for the study. The simple random technique first involved numbering all units in a sequential order starting from one to the last unit. After which, the assigned numbers are written on pieces of papers, folded, and mixed up in a bowl to be randomly picked until the n^{th} number is picked. An average of thirty pupils were drawn from each of the six selected school. In all, a total of 182 pupils were selected from the six schools for the user perception survey – 91 per city.

Table 1 Selected Schools and Number of Respondents

City	School	No. of Respondents
Kumasi	Wesco Demonstration Primary B	32
	Scales Adventist School	28
	Old Tafo Methodist Primary A	31
Cape Coast	Jacob Wilson-Sey M/A Basic School	31
	Philip Quiacoe Boys School	30
	St. Francis Catholic Primary School	30
Total		**182**

Source: Field Survey (2021)

A purposive sampling technique was also employed for this study in selecting key stakeholders to interview. Purposive sampling makes use of the knowledge and experience of the individuals with regards to the issue at stake in this case, micromobility users and enablers (policymakers and implementors). The advantage of such a technique is the importance of availability and willingness of these stakeholders to participate, and the ability to communicate experiences and opinions in an articulate, expressive, and reflective manner. Personnel each from the National Road Safety Authority (NRSA), Motor Traffic and Transport Directorate (MTTD), Land Use and Spatial Planning Authority (LUSPA) and six members of a skating club in Cape Coast.

Data Collection Instrument

The study adapted Amoako-Sakyi's (2016) walkability study multiple data sources technique to obtain the data required as detailed below:

1. User Perception Survey:

The User Perception Survey (UPS) was used to collect data on pupil's perception on micromobility use – its safety and propensity to use it, using bicycle as a proxy. The user perception survey gave understanding to the conditions that informed children's perspective about micromobility modes and their inclination to use them. The Perception Survey was categorised under five themes – Background Information, Child's Cycling Experience, Introduction of Micromobility in Ghana, Shared Micromobility Schemes and Non-Users' Perspectives on Child Cyclists.

2. Interview guides were used to elicit responses from the key stakeholders. The questions asked were informed from the responses the children gave with regards to their perception of bicycle use, the riding environment, and their perception of child cyclists. Some of the questions were also based on observations made by the research team of the selected routes.

   Personnel from the National Road Safety Authority (NRSA), Motor Traffic and Transport Directorate (MTTD), Land Use and Spatial Planning Authority (LUSPA) and members of some skating clubs were interviewed using these questions. Some questions asked included the mandates of their respective institutions, their role in the transport industry, initiatives in ensuring children's safety on the road, challenges their institutions faced and some other questions useful to the study.

3. Field notebooks were used to document relevant observations during data collection. A Canon 500D camera was used to capture some images

on micromobility use as well as recorders to record responses from in-depth interviews and focus group discussions.

Data Collection Procedure

The study recruited five field assistants - four graduate students (MPhil and Ph.D.) and a National Service Personnel. Previous experience in data collection and use of a CAPI were the criterium for which these field assistants were considered for selection as field assistants. A three-day training session was organised by the Principal Researcher under the supervision of the Supervisor. Despite the field experience of the assistants, the training session was necessary as micromobility is a grey area and as such needed to be well understood to translate and breakdown the technicalities of it to the respondents. The training included skills for conducting in-depth interviews as well as the use of the Kobocollect to collect data from participants. Due to the sensitivity of some questions, Field Assistants were educated on ethical issues such as the right to informed consent, participation, privacy, and confidentiality to subject them to the ethics of scientific research approved by the University of Cape Coast.

Key informant interviews were conducted with the Heads of the NRSA in Kumasi and Cape Coast (2), officers at the MTTD, LUSPA. Focus group discussions were held with a selected skating club in Cape Coast. The FGD was not conducted with a skating club from Kumasi due to their unavailability. The group consisted of six members – each with different skating experiences based on how long they have skated – from the experienced to amateurs.

An observation was conducted along the routes and recorded with the aid of visual recording devices – a DSLR Canon camera and mobile phones.

This process was adopted to give a picture voice to the issues. This was particularly done to ascertain the claims of child respondents on their riding environments.

During the interviews and in adherence with the COVID-19 protocols, social distancing of two metres was observed. The research team also had its members in their nose masks as well as some spare masks for the respondents which were given to them after obtaining their consent. This was to ensure that both the field assistants and their respondents were not exposed to the possible risk of contracting the Coronavirus.

The research team applied adequate measures to ensure that techniques were child-friendly in cases where children were directly involved besides applying necessary ethical procedures.

Data Processing and Analysis

The study relied on both qualitative and quantitative data analysis techniques. The data obtained were primary data as they were derived from the field. Analysis within and across cities was important given the unique conditions of each city to establish areas of learning for instance on child safety policy measures and how urban planning can promote safe transport access and mobility for children (Amoako-Sakyi, 2016). Content/thematic analysis and descriptive statistics were used where necessary. Multiple response analysis was also employed in the analysis of the data.

Data Management

The study employed the institutional policy and the guidelines set out by the University of Cape Coast with regards to handling data from the field. After each day's interviews, the recorded interviews as well as field notes and

pictures were kept in confidentiality on my personal laptop that is password protected to prevent access to a third party. After transcription, the audio source files were deleted, and their transcripts were password protected. Photos involving participants were kept on a password protected external hard drive and the source file immediately deleted.

Responses from the questionnaires went through data cleaning to remove incorrect, corrupted, incorrectly formatted, duplicates and incomplete data within the dataset. For quality assurance purposes, the supervisor at the end of each day vetted the responses to ensure the collection of valid and reliable data. Transcribed data and responses from questionnaires were kept by the Principal Investigator for data management and the source file from field assistants were discarded.

Ethical Consideration

This study ensured the highest ethical standards were maintained through-out the study. The first step was applying for an ethical clearance from the Institutional Review Board, University of Cape Coast which was granted. During the data collection, the research teams obtained informed consent from the participants after explaining the purpose of the study and their roles. Participation in the study was voluntary without coercion. The study participants were informed of the possibility to withdraw from the study at any time and were assured of their actions not affecting them in any way.

A letter was obtained from each circuit of the Ghana Education Service under which the schools fell. This was to ensure that the Educational Authorities were aware of the study which ensured that we got the permission and cooperation of the heads of the selected schools as well as their teachers. For

the children, in addition to obtaining parental and guardian and school's consent, the children's' assent were obtained. Confidentiality and privacy were maintained at all levels of the research process, as any key for individual identification of the research participants in the data analysis was removed. There was no monetary compensation from the study. However, the study was conducted during the break time hours and early mornings before class hence, respondents were given some snacks to compensate for their eating time used for the study.

The major benefit however is that the urban areas where the study were conducted will be the first beneficiaries of a dissemination since it is a study critical to safety issues among children. The policy makers, community and planners will also benefit from the research as critical issues relating to children safety will be addressed and comparisons will be made across the cities. In the era of COVID-19, the necessary protocols – physical distancing, use of nose mask and use of hand sanitizers were employed.

Chapter Summary

This chapter discussed the methodology of this research. The epistemologies used in this study were the interpretivist and positivists philosophical ideologies. This hence saw the use of the embedded mixed method approach for this study. The study was conducted in Kumasi and Cape Coast – two cities in Ghana where the use of micromobility modes especially roller-skates are emerging. School children and stakeholders of various agencies and institutions were interviewed to get answers with regards to the set objectives. Various instruments were used in carrying out the research including the User Perception

Survey. The primary data used for this study were analysed thematically and descriptively.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

This section discusses the study's principal findings and presents them within the theoretical and conceptual framework. The chapter is structured in five parts. The first part discusses the socio-demographics of child respondents and its influence on children's mobility, the second part looks at children's knowledge and recognition of micromobility modes, the third part discusses children's perceived usefulness of these micromobility modes. The fourth part discusses perceived safety of the modes and the final part reviews local policies and the role of stakeholders in ensuring safety of children who choose to use these modes as a means of travel. The interviews with children and stakeholders and policy and regulation documents were the main sources of information for the study while observations were used to complement findings.

Socio-Demographics

Table 2: Demographics of Respondents in Cape Coast and Kumasi

Demographics Variable	Cape Coast (n(C)=91) %	Kumasi (n(K)=91) %
Sex		
Male	63.7	47.3
Female	36.3	52.7
Age		
8	0	3.3
9	12.1	16.5
10	12.1	25.3
11	20.9	26.4
12	24.2	20.9
13	14.3	5.5
14	11	2.2
15	4.4	0
16	1.1	0
Stage		
Class 4	29.7	46.2
Class 5	14.3	35.2
Class 6	56	18.7
Child's Living Arrangement		
Both Parents	58.2	53.8
Father Only	1.1	1.1
Guardian	11	14.3
Mother Only	29.7	30.8
Who do you most frequently travel to school with?		
Alone	36.3	36.3
Friends	13.2	9.9
Other adults (friend's parents/guardians)	1.1	1.1
Parent(s)	4.4	5.5
Sibling(s)	45.1	46.2

Source: Field Survey (2021)

In Cape Coast, the ages of the children interviewed ranged from nine to sixteen years (M = 11.73 years) while in Kumasi, children interviewed ranged between the ages of eight and 14 years (M = 10.73 years).

Spread across three classes - Class 4, Class 5, and Class 6, both males and females were interviewed with males being dominant (63.7%) in the survey as against females (36.3%) in Cape Coast. However, in Kumasi, females dominated (52.7%) as against the males (47.3%) in the study.

The study further sought to enquire the living arrangement of the children as children's travel behaviour is mostly influenced by parental decisions (R. O. Amoako-Sakyi, 2016; Fulton et al., 2005; Hillman et al., 1990; Larsen et al., 2009; Mah et al., 2017; Nevelsteen et al., 2012).

Many of the child respondents in Cape Coast (58.2%) and Kumasi (53.8%) lived with both parents. Children living with their mothers only came up second (29.7% and 30.8 per cent in Cape Coast and Kumasi respectively). It was realized also that living with guardians (11% and 14.3% in Cape Coast and Kumasi respectively) came ahead of children who lived with their fathers only (1.1% in both cities).

Although in both cities, children living with both parents dominated the study, most of these children were frequently accompanied to school by their siblings (45.1% and 46.2% in Cape Coast and Kumasi respectively) or they went alone (36.3%, in both Cape Coast and Kumasi). Parents' frequent participation in accompanying their children to school was low among the study's respondents (4.4% and 5.5% in Cape Coast and Kumasi respectively) as accompaniment by friends (13.2% and 9.9% in Cape Coast and Kumasi

respectively) came ahead of it. However, in both cities, only two of the respondents (1.1% in each city) were accompanied by either a friend's parent or a guardian.

The study enquired from respondents if their households owned a vehicle. There was a lower household vehicle ownership among respondents in both Kumasi and Cape as 30.8% of respondents in Cape Coast reported of having vehicles owned in their households and 26.4% for Kumasi within the sample frame. Table 3 however shows the various vehicles available in the children's households.

Table 3: Child Respondents Household Vehicle Type

Household Vehicle Type	**City**	
	Kumasi	Cape Coast
Bicycle	28.6%	22.5%
Motorcycle	17.9%	15.0%
Tricycle (Aboboyaa/Pragia)	3.6%	17.5%
Private Car	35.7%	25.0%
Taxi/Trotro	14.3%	20.0%
Total	100%	100%

Source: Field Survey (2021)

From Table 3, it is realised that of the types of vehicles owned by the households of the child respondents, there were more bicycles in the households of children in Kumasi (28.6%) than there was in Cape Coast (22.5%). However, in both cities, ownership of private cars was prevalent. Given the vehicle options available to children, the study probed further to find out the various means by which the children travelled to school as shown in Table 4.

Table 4: Child Travel Mode to School

Mode To School	City	
	Cape Coast (n(C)=117)	Kumasi (n(K)=106)
	%	%
Walk	65	49.1
Bicycle	0.9	0
School Bus	2.6	0.9
Private Car	5.1	7.5
Motorcycle (Private)	0.9	0.9
Taxi	11.1	7.5
Trotro	0	32.1
Tricycle (Aboboyaa/Pragia)	14.5	1.9
Frequently used mode to school	Cape Coast (n(C)=91)	Kumasi (n(K)=91)
	%	%
Walk	73.6	54.9
Bicycle	0	0
School Bus	2.2	1.1
Private Car	4.4	5.5
Motorcycle (Private)	2.2	1.1
Taxi	8.8	3.3
Trotro	0	33
Tricycle (Aboboyaa/Pragia)	8.8	1.1

Source: Field Survey (2021)

Walking was the most selected response by the children as one of the modes they used to travel to school in Cape Coast (65%) and Kumasi (49.1%). It was also the most frequent means by which respondents travelled to school in Cape Coast (73.6%) and Kumasi (54.9%). This confirms the 2012 National Household Transport Survey where travelling on foot was the major means of transport to and from school(Ghana Statistical Service, 2013). However, in

Cape Coast, the two alternatives to walking were by patronising taxis (8.8%) or tricycle (Pragia or Aboboyaa) service (8.8%) while in Kumasi it was the trotro (33%). Although 1.1 per cent of respondents stated they used bicycles as means in Cape Coast and Kumasi recorded none, the bicycle failed to make the list of most frequently used means to school in both cities.

Of the school children interviewed, about 66 per cent knew how to ride a bicycle. Previous studies have observed that the cycling culture of Ghanaians tend to change as one moves from the South towards the North (Grieco, Turner, & Kwakye, 1994). In some cases, people along the coast tend to be hostile towards bicycle use by children as opposed to people in the northern part being more acceptable to its use.

The study found out that there was a statistically significant ($p<0.002$) difference between children who knew how to ride a bicycle in both cities. There were more children who knew how to ride a bicycle in Cape Coast (76.9%) than in Kumasi (54.9%). Although literature finds a higher bicycle utility as people move from the south towards the north, the findings of this study showed otherwise within the sample frame.

Sex plays a significant role in understanding the cycling behaviour of respondents. Hence the sex of child riders in Kumasi and Cape Coast were considered in this analysis in Table 5 below.

Table 5: Sex Distribution of Child Riders

Sex	City			t-test	
	Kumasi (n(K)=50)	Cape Coast (n(C)=70)	Total	X^2-value	df
Female	34%	20%	36.3%	46.963 (p-value=0.000)	1
Male	66%	80%	63.7%		
Total	100%	100%	100%		

Source: Field Survey (2021)

The data shows a statistically significant ($p<0.001$) disparity between sex in both cities. Most of those who knew how to ride a bicycle were males – 66 per cent in Kumasi and 80 per cent in Cape Coast as against majority of females constituting the non-riders group. It confirms the 2012 Household Transport Survey Report which says that there are twice as many as male cycle users as there are females (Ghana Statistical Service, 2013). It was also found that there were more upper primary girls in Kumasi who rode a bicycle than in Cape Coast. This can be attributed to the differences in cultural and societal perceptions and norms in the various cities which dictate different activities expected of males and females (Adom-Asamoah et al., 2020).

Age Distribution of Child Riders

The study further investigated the age characteristics of child cyclists. This is to facilitate the understanding of the riding behaviour of these child riders. Table 6 shows the age distribution of the school children.

Table 6: Ages Distribution of Child Riders

Age	City		t-test		
	Kumasi (n(K)=50) %	Cape Coast (n(C)=70) %	X^2-Value	df	Mean
8	4	0			
9	20	7.1	Kumasi		
10	18	12.9	9.934	6	7.14
11	22	18.6	(p<0.127)		
12	22	24.3			
13	10	17.1	Cape Coast:		
14	4	12.9	11.257	7	8.75
15	0	5.7	(p<0.128)		
16	0	1.4			

Source: Field Survey (2021)

In Table 6, the mean ages of child respondents who knew how to ride was 7.14 years for Kumasi and 8.75 years for Cape Coast. In Kumasi it was realized most of the riders were aged 11 and 12 years (22% each) while for Cape Coast, most of the riders were aged 12 years (24.3%). There were statistically no significant differences among the various ages within both cities.

In order to know how long child riders have been cycling, the study sought to find the age at which respondents learnt how to ride a bicycle. The results are presented in Table 7 below.

Table 7: Biking Learning Age of Child Cyclists

Learning Age	City		Total	t-test	
	Kumasi (n(K)=50)	Cape Coast (n(C)=70)		X^2-value	df
	45.1%	23.1%	34.1%		
Before 5 years	6.6%	4.4%	5.5%	16.068 (p<0.001)	3
5-9 years	38.5%	29.7%	40.7%		
10-14 years	9.9%	42.9%	19.8%		
	100%	100%	100%		

Source: Field Survey (2021)

From Table 7, there is a statistically significant difference ($p<0.001$) between the learning ages of 5-9 years and the other age groups. This is evident as most of the respondents (70% in Kumasi and 55.7% in Cape Coast) learnt how to ride the bicycle between 5 and 9 years in both cities. This is similar to the notion that the average cycling learning age by children is between the ages of 5 and 7 years (OutdoorGearsHub, n.d.).

Parents are said to be the permission givers and final deciders of their children's travel mode to school (Amoako-Sakyi, 2016; Mah et al., 2017). The study hence found out how many of the respondents had the support of their parents to ride a bicycle. The result is presented in Table 8.

Table 8: Parental Support of Child Riders

	City Kumasi (n(K)=50) %	Cape Coast (n(C)=70) %
Parental Support	70	75.7
Reason for No Parental Support		
It is unsafe	72.2	64
It is costly	0	4
It will take all/most of my time	11.1	20
It is associated with truancy	5.6	2
Other	11.1	0

Source: Field Survey (2021)

From Table 8, 70 per cent of the children in Kumasi and 76 per cent of those in Cape Coast claimed their parents supported the idea of riding a bicycle. Those who indicated that their parents did not consent to them riding still rode – an act seen as one of defiance against the authority of their parents (Grieco et al., 1994).

The UPS further probed for the perceived reasons their parents did not support their decision to ride a bicycle. Respondents highlighted issues of safety as parents' main concerns in both Kumasi (72.2%) and Cape Coast (64%), and this supports findings in literature where children's traffic safety was paramount in parents' decision on children's travel choice (Hillman et al., 1990; Timperio et al., 2006). Secondly, respondents in Kumasi (11.1%) and Cape Coast (20%), stated their parents perceived bicycle riding as a time-consuming activity for their children. The perception of cycling associated with truancy accounted for 5.6 per cent and 2 per cent in Kumasi and Cape Coast, respectively. This confirms Grieco et al.'s (1994) study where parents' perception of cycling was equated to hooliganism. Some other reasons (2%) given by the respondents included parents not wanting their kids to ride because they did not own one yet or because the respondent was a girl. Though not significantly represented in this study, it confirms the influence of cultural and societal perceptions and norms in categorising activities according to gender, hence, largely impeding females from partaking in certain activities such as cycling (Adom-Asamoah, Amoako, & Adarkwa, 2020; Pochet & Cusset, 1999; Prati, 2018).

According to the children, even though most parents supported their decision to ride, other factors motivated them to ride bicycles. Table 9 shows the various motivation children have in using a bicycle.

Table 9: Motivation to Cycle

Motivation	**City** Kumasi (n(K)=50) %	Cape Coast (n(C)=70) %
My family owned a bicycle	23.8	17.8
I had access to a bicycle within the family or from friends	33.3	26.7
All/most of my friends knew how to ride bicycles	16.7	18.9
I could hire one within the community	2.4	2.2
To enable me ride to school	1.2	1.1
To enable me ride when I am sent on errands	7.1	12.2
It fascinated me to see others ride	13.1	20
Other	2.4	1.1

Source: Field Survey (2021)

In Table 9, accessibility to a bicycle belonging to either a family member or a friend was the most selected response in Kumasi and Cape Coast - 33.3 per cent and 26.7 per cent, respectively. Family ownership of a bicycle was a dominant factor in Kumasi (23.8%) than in Cape Coast (18.9%). Children within the sample frame in both cities were also motivated to ride a bicycle if all or most of their friends knew how to ride – 16.7 per cent for Kumasi and 18.9 per cent for Cape Coast; or in admiration of seeing others ride a bicycle. Though this was not a top factor in Kumasi (13.1%), in Cape Coast (20%) it was one of the top three factors.

In understanding why 34.1 per cent of the child respondents did not know how to ride a bicycle, Table 10 lists what prevented them from riding.

Table 10: Demotivation to Cycle

Demotivation	**Kumasi (n(K)=63)**	**Cape Coast (n(C)=31)**
	%	%
There was no one to teach me to ride	7.9	9.7
My family did not own a bicycle	19.0	22.6
I did not have access to a bicycle	20.6	16.1
I was afraid of injuring myself	27.0	35.5
My parents/guardians did not allow me to ride	11.1	12.9
It was not important to me	4.8	0.0
Bicycle riding was associated with bad kids	1.6	0.0
Other	7.9	3.2
Total	100	100

Source: Field Survey (2021)

In Table 10 above, the fear of getting injured was most dominant in Kumasi (27%) and Cape Coast (35.5%). Family's lack of ownership of a bicycle (22.6%) was the second dominant demotivator in Cape Coast while that of Kumasi was children's inaccessibility to a bicycle (20.6%). Associating bicycle riding to activities of deviant children was the least selected response (1.6%). Of the six who chose other, they associated it to them being females.

Objective One: Children's knowledge and recognition of micromobility and its modes

For one to perceive a mode of transport as useful or safe, one must have an idea of what the mode is without necessarily having a user experience. The study therefore sought to find out if the respondents had heard of the term micromobility and if they knew what they were. Majority of the respondents in

Kumasi (93.4%) and Cape Coast (85.7%) were unfamiliar with the term "Micromobility."

The study then proceeded to ask which of the Micromobility Modes they were familiar with by showing them images of these modes. The result of this assessment is presented in Table 11 below.

Table 11: Familiar Micromobility Modes

Modes	**City**	
	Kumasi (n(K)=352)	Cape Coast (n(C)=419)
Roller skates	23.3%	19.3%
Bicycles	22.4%	20.5%
E-bikes	15.1%	11.5%
Scooters	12.8%	18.1%
E-scooters	6.3%	15.5%
Skateboards	20.2%	15%
Total	100%	100%

Source: Field Survey (2021)

The roller skates (23.3%) were the most familiar micromobility mode in Kumasi while in Cape Coast, it was the bicycle (20.5%) as seen in Table 11. The least known modes in Kumasi were the electric scooter (6.3%) while that of Cape Coast was the electric bike (11.5%). The study was further interested in knowing the means by which these children might have been exposed to these modes they were familiar with.

Children's Exposure to Micromobility

With majority of the child respondents not knowing what the term 'Micromobility' was but could identify the various modes when shown images,

the study was interested in the ways by which they were exposed to these means as seen in Table 12.

Table 12: Children's Exposure to Micromobility

	City					
Mode	**Kumasi**			**Cape Coast**		
	Within Respondent's Community (n(K)=308)	Outside Respondent's Community (n(K)=294)	Media (n(K)=263)	Within Respondent's Community (n(C)=332)	Outside Respondent's Community (n(C)=295)	Media (n(C)=333)
Roller skates	25.3%	26.5%	0.0%	21.4%	25.1%	0.0%
Bicycles	25.3%	23.1%	27.0%	23.8%	22.0%	23.1%
E-bikes	14.6%	23.5%	18.3%	9.0%	10.2%	17.4%
Scooters	11.0%	13.3%	17.5%	16.6%	17.3%	20.7%
E-scooters	4.5%	9.9%	10.6%	13.9%	11.9%	17.7%
Skateboards	19.2%	3.7%	26.6%	15.4%	13.6%	21.0%
Total	100%	100%	100%	100%	100%	100%

Source: Field Survey (2021)

Source: Field Survey (2021)

In Table 12, it is noticed that in Kumasi, 25.3 per cent each of the children reported to have seen bicycles and roller skates in the communities or vicinities where they lived. About 4.5 per cent of them had seen the e-scooter, making it the most uncommon mode in their communities after scooters. 26.5 per cent of them had also come across the roller skate in communities other than where they lived. 23.5 per cent of them stated they had seen electric bicycles in other communities too. However, when asked about which of them they had seen via the media, none reported of seeing a roller skate through that means. The bicycles and skateboards were the commonly seen modes by the children as 27 per cent and 26.6 per cent of them had respectively indicated seeing them through the media.

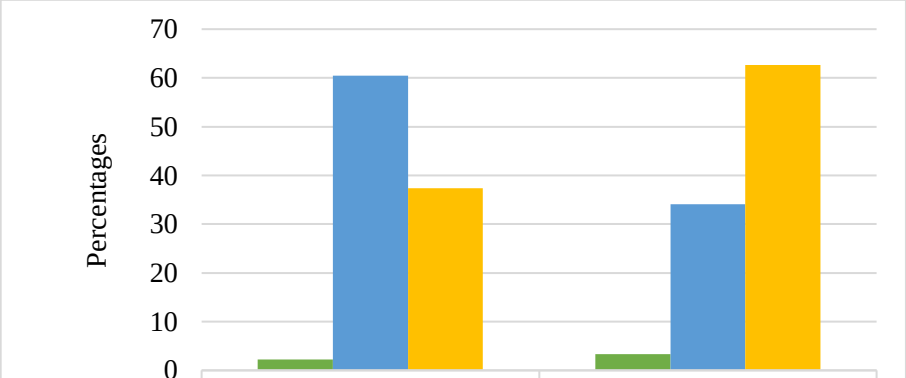
From Table 12 also, the scenario was quite similar in Cape Coast, as the roller skates and bicycles were the most familiar as 21.4 per cent and 23.8 per cent had respectively reported to have seen such modes in their communities while only 9 per cent reported to had seen an e-bike, making it the most uncommon mode in their communities. The same could also be said of what they reported of other communities. 25.1 per cent of them reported seeing the roller skates being used in other communities while 22 per cent said same of the bicycles. 10.2 per cent of the child respondents mentioned having seen the e-bike used in other communities – slightly higher than what those who had seen it in their communities. 23.1 per cent of the children reported having been exposed to the bicycle via the media – slightly lower than the number of those who had seen it in their community. However, 20.7 per cent of the children said it is via the media they got to know of scooters while 21 per cent said same of

skateboards. These are relatively higher than those who had come across these modes in their communities or other communities.

This confirms Barevadia's (2014) findings that children can use media to increase their understanding of the world by providing information which is clearly able to broaden their knowledge.

Objective Two: Children's perceived usefulness of micromobility modes

Given children's exposure to micromobility as seen in Table 12 and the ability of some of them to use some of these modes especially the bicycle, the study asked the child respondents if they thought these micromobility modes had any importance to its users. Figure 6 presents their perception on the usefulness of these modes.



	Kumasi	Cape Coast
Indifferent	2.2	3.3
No	60.4	34.1
Yes	37.4	62.6

Figure 7 Perceived Importance of Micromobility Modes

Source: Field Survey (2021)

Most of the children in Cape Coast (62.6%) perceived these modes as important to its users. In contrast, most of children in Kumasi (60.4%) indicated it had no importance to its users. A smaller proportion of the respondents in

Kumasi (2.2%) and Cape Coast (3.3%) were indifferent about the importance of these modes.

Children's Perception on the Advantages of Micromobilities

Those who perceived micromobilities to be important were asked what they thought were the advantages of these alternative modes of transport. The result is reported in Table 13.

Table 13: Perceived Advantages of Micromobility Use

	Kumasi (n(K)=40)	**Cape Coast (n(C)=95)**
Perceived Advantages	%	%
They do not pollute the environment	22.5	8.4
They do not add to the traffic congestion situation in the city	15	15.8
They are cheaper to use because they do not use fuel	25	28.4
They easily weave through traffic	27.5	34.7
Other	10	12.6
Total	100	100

Source: Field Survey (2021)

From Table 13, the ability to weave through traffic easily was the most chosen response in Kumasi (27.5%) and Cape Coast (34.7%). The cheap cost of usage was the second most mentioned response in Kumasi (25%) and Cape Coast (28.4%). This confirms studies by Maduwanthi et al. (2015) and Mensah (2018) where convenience and cost of travel come as dominant factors in mode choice, and in this case, a micromobility mode. Other responses they gave included their ability to use these modes to run errands, use of these modes as a form of recreation and exercise and ability to move faster compared to walking. One child cited easy escape from trouble as a reason these modes are important.

Children's Perception on the Disadvantages of Using Micromobilities

Some children perceived micromobility to be disadvantageous to its users as seen in Figure 6. Hence, the study investigated what they thought were the downsides of these modes. The results are shown in Table 14 below.

Table 14:Perceived Disadvantages of Micromobility Use

Perceived Disadvantages	**Kumasi (n(K)=77)**	**Cape Coast (n(C)=38)**
	%	%
It is not suited for our road condition here	29.9	21.1
It is dangerous because it can cause accidents	55.8	68.4
It is expensive to acquire	2.6	10.5
It is slow moving and may add to the traffic congestion in the city	5.2	0
If many people use it, there might be a problem with secured parking	1.3	0
Other	5.2	0
Total	100.0	100

Source: Field Survey (2021)

The major perceived disadvantage of micromobilities in Table 14 according to the children centred on safety. According to the children in Kumasi (55.8%) and Cape Coast (68.4%), these modes were dangerous as they could cause accidents on the roads. The second most chosen response was about these modes not suited for the roads in their cities. These represented 29.9 per cent in Kumasi and 21.1 per cent in Cape Coast.

Cost of acquisition was one of the issues the children in Kumasi (2.6%) and Cape Coast (10.5%) raised. Respondents from Cape Coast did not consider

micromobility modes as a contributing factor to traffic congestion nor did they mention issues on parking spaces. However, their counterparts in Kumasi did. This could be because, children in Cape Coast are unable to relate to the problem of congestion due to lower volumes of traffic experienced in the city as compared to Kumasi. For those who were indifferent towards micromobility modes, they stated their reasons as shown in Table 15.

Table 15: Perceived Indifference towards Micromobility Use

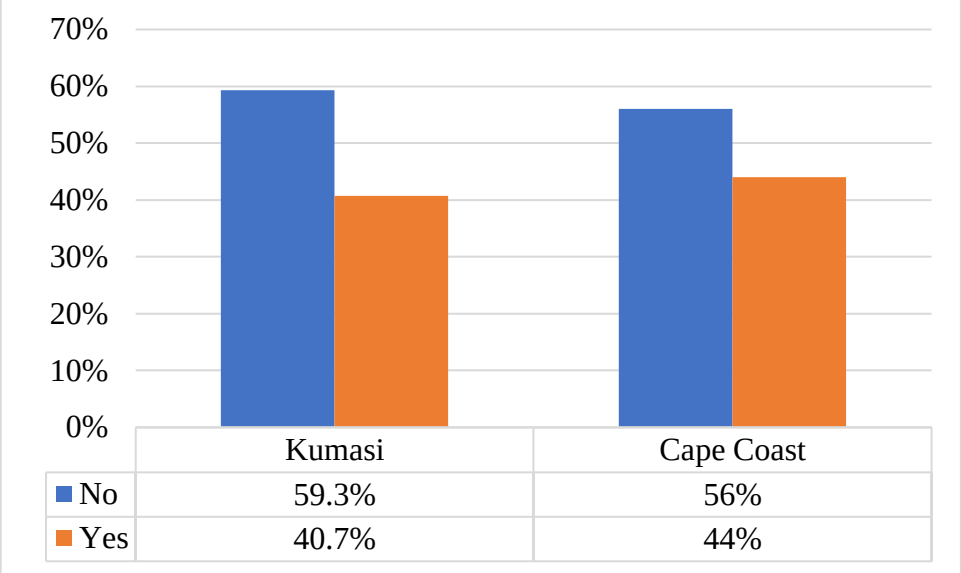
Indifferent Perception	**Kumasi (n(K)=8)**	**Cape Coast (n(C)=9)**
	%	%
They do not pollute the environment	12.5	0.0
They are cheaper to use because they do not use fuel	12.5	22.2
They easily weave through traffic	12.5	11.1
It is not suited for our road condition here	12.5	22.2
It is expensive to acquire	12.5	22.2
It is slow moving and may add to the traffic congestion in the city	12.5	0.0
It is dangerous because it can cause accidents	0.0	22.2
Other	25.0	0.0
Total	100.0	100.0

Source: Field Survey (2021)

As seen earlier in Tables 13 and 14, some of the children perceived micromobilities to have its advantages as well as its disadvantages. However, in Table 15, some of the child respondents were of the perception that these modes had both advantages and disadvantages and were indifferent about the usefulness of these modes. While they believed they are sustainable, facilitate easy mobility and minimize the cost of mobility as well, they also believed that these modes were costly, could contribute to the congestion in the city and could cause accidents on the roads. In addition, they believed that these

micromobility modes are not suitable for the environment based on available infrastructure.

Respondents were asked if micromobility modes should be accepted on the roads in the cities in which they lived. This was to appreciate the acceptance of the use modes by children. Figure 7 presents the responses of these child respondents.



	Kumasi	Cape Coast
No	59.3%	56%
Yes	40.7%	44%

Figure 8 Acceptance of micromobility modes on community roads

Source: Field Survey (2021)

Despite the acknowledgment of the importance of these micromobility modes especially by children in Cape Coast as seen in Figure 6, more than half of respondents (Kumasi =59.3%, Cape Coast =56%) said they were not going to accept the use of these modes on the roads citing the factors listed in Table 14 as some of the reasons.

Availability of Community Bike Hire Schemes and Present-Day Functionality

Traditionally, the common bicycle hire scheme in Ghana is the rental method. Community bicycle rentals are mostly operated by bicycle mechanics or repairers who give out bicycles to people in need of them at a fee. These are mostly operated based on an hour-per-use fee with extra charges for extra minutes spent beyond the agreed initial terms. In the event of a damage to the bicycle upon return, the user pays a damage fee. Hence, the study asked the children if they had functioning bicycle hire schemes in their communities as seen in Table 16.

Table 16: Presence and Functionality of Bike Hire Schemes

City		**Bike Hiring Schemes Presently Functional**
Kumasi (n(K)=91)	**Presence of bicycle hiring schemes in the community**	41.8%
Cape Coast (n(C)=91)		53.8%

Source: Field Survey (2021)

In Table 16, 41.8% of the children in Kumasi reported of bicycle hiring schemes being existent and functional in their communities while in Cape Coast, 53.8% of the children also reported of the same situation. It is evident that there are more operational bicycle hiring schemes in Cape Coast than Kumasi. The study hence explored the children's perception on the importance of these bicycle hiring schemes in their communities. The results are depicted in in Figure 8.

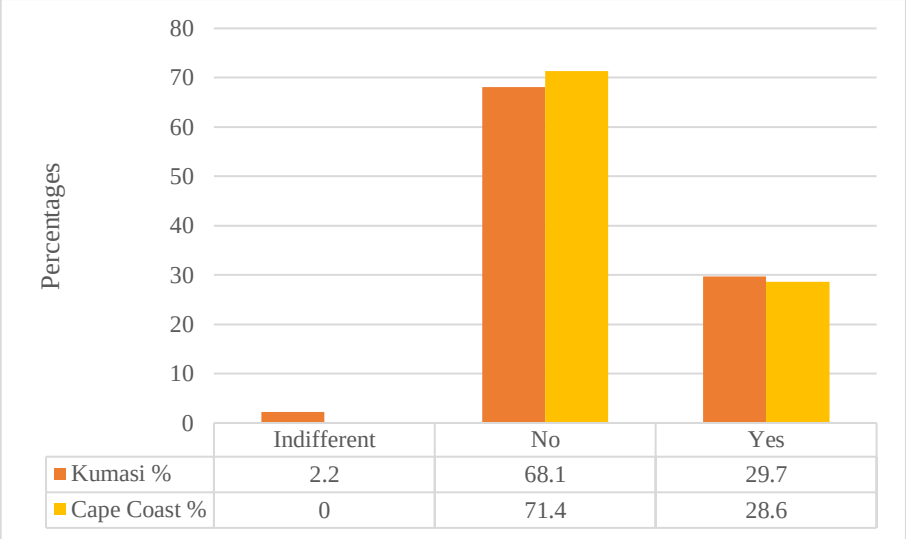


Figure 9 Children 's perception of bicycle hiring schemes.

Source: Field Survey (2021)

Figure 9 it was realised that most of the respondents in both cities – 68.1 per cent for Kumasi and 71.4 per cent for Cape Coast, perceived the bicycle hiring scheme as a negative scheme for children with only a very few from Kumasi (2.2%) who were indifferent about the scheme.

Children's Perception on the Disadvantages of Bicycle Hire Schemes

Considering that most of the respondents perceived bicycle hiring schemes to be disadvantageous, the study explored the reasons informing the negative perception they held of the bicycle hiring scheme in their communities. This is presented in Table 17.

Table 17: Perceived Disadvantages of Bike hire Schemes

Disadvantages of Bicycle Hiring Schemes	**Kumasi (n(K)=133)**	**Cape Coast (n(C)=130)**
	%	%
It increases bad behaviour and truancy among children	21.8	35.4
Children spend all/most of their time at such places	20.3	17.7

Children tend to spend all/most of their monies in hiring bicycles	20.3	20
They get injured through such schemes	26.3	21.5
They engage in unsafe riding behaviours through such schemes	11.3	5.4
Total	100	100

Source: Field Survey (2021)

In Table 17, a key perception held by respondents in Cape Coast was that these schemes raised or increased the tendency of children to engage in truancy and bad behaviour (35.4%) while in Kumasi, the fear of getting injured most the most expressed concern (26.3%). Children engaging in unsafe riding practices was the least expressed concern in both Kumasi (11.3%) and Cape Coast (5.4%). Some children believed the scheme had some advantages, so the study enquired from them what the advantages were, and these ranged from cost to user experiences as shown in Table 18.

Table 18: Perceived Advantages of Bike hire Schemes

	City	
Advantages of Bicycle Hiring Scheme	**Kumasi** (n(K)=46)	**Cape Coast** (n(C)=42)
It provides a cheaper way of travelling in the community	23.9	26.2%
It encourages active travel in the community	17.4	23.8%
It affords children the opportunity to gain **experience** how to ride bicycles	28.3	26.2%
It adds on to the fun/recreational activity for children	28.3	21.4%
Other	2.2	2.4%
Total	100%	100%

Source: Field Survey (2021)

In Kumasi, children's biggest perception on the advantages of the bicycle hire scheme were on the basis of the scheme affording children the opportunity to learn how to ride a bicycle (28.3%) as well as the fun and

recreational aspect of it (28.3%). In Cape Coast, they were attributed to the basis of making mobility cheap within the community (26.2%) and also serving as grounds for the children to learn how to ride bicycles (26.2%). The "Other" reasons included these schemes aiding in the running of errands and also as a form of exercise to the children.

A section of those who were indifferent towards the use of micromobility modes gave both the negative and positive responses to the bike hire scheme in Table 19.

Table 19: Perceived Indifference towards Bike hire Schemes

	Kumasi
Indifferent Perception of Bicycle Hiring Scheme	%
It increases bad behaviour and truancy among children	25
Children spend all/most of their time at such places	25
It encourages active travel in the community	25
It affords children the opportunity to gain **experience** how to ride bicycles	25
Total	100

Source: Field Survey (2021)

Two children within the sample frame in Kumasi were indifferent about the bicycle hiring scheme as shown in Table 19. According to them, though it increased truancy and led to children spending most of their times at such places, it encouraged children who did not own a bicycle to learn how to ride a bicycle which in turn also encourages active travel in the community.

Figure 10 A child sighted on a scooter on an errand in Kotokuraba, Cape Coast

Source: Field Survey (2022)

Figure 11 Skaters riding through Kingsway Street, Cape Coast

Source: Field Survey (2022)

Consideration of Hiring Schemes for Micromobility Modes

Having used bicycles as a proxy for micromobility modes, the study sought to find out if the children welcomed the idea of a hiring scheme for other micromobility modes.

Table 20: Establishment Micromobility Hire Schemes

Response	**Kumasi (n(K)=91)**	**Cape Coast (n(C)=91)**
	%	%
Indifferent	0	2.2
No	67	67
Yes	33	30.8
Total	100	100

Source: Field Survey (2021)

Most respondents from both cities (K=68.1%, C=71.4%), perceived the bicycle hiring scheme as a negative scheme for children as seen in Figure 8. Their position did not differ much from their perception on the bicycle hiring schemes as most children in Kumasi and Cape Coast (67% each) still perceived it to be a negative scheme not worth introducing.

Children's perceived safety of micromobility use.

Another objective the study sought to examine was children's perceived safety of micromobility use in shared spaces using bicycles as a proxy. It looked at children's experience with regards to safety as riders or non-riders. This is due to the fact that the perception of safety has an influence on the usage of bicycles (Eren et al., 2019; Nazemi et al., 2021)

Objective Three: Child Riders' Perception on the Safety of their Riding Environment

Child riders were asked if they perceived their riding environments to be safe. This is to give the study an understanding of what may inform their cycling behaviour and to an extent micromobility use in their environment. This is shown in Table 20.

Table 21: Cyclists Perceived Safety of Environment

	Kumasi (n(K)=50)	**Cape Coast (n(C)=70)**
	%	%
Safe	64	70
Unsafe	36	30
Total	100	100

Source: Field Survey (2021)

Children who rode bicycles were asked how safe their riding environments were. In Table 21, Kumasi and Cape Coast recorded, 64 per cent and 70 per cent of the children's responses respectively describing their environments to be safe. Although the 2020 cycle crash data from the Building and Road Research Institute (BRRI) shows extremely low reported incidences of bicycle casualties in Kumasi (2.3%) and Cape Coast (13.7%) within 2017 and 2020, it can be said that it is safer cycling in Kumasi than in Cape Coast. Though under-reporting of bicycle crash incidences could account for this, it is relatively on a low compared to that of other travel modes.

With most of the respondents indicating their riding environments to be safe, they were further presented with indicators to assess their riding environments. Results are shown in Table 22.

Table 22: Riders' Assessment of Riding Environment

Safe Environment Indicators	Kumasi (n(K)=50) (%)	Cape Coast (n(C)=70) (%)
Presence of dedicated lanes	1.1	1.1
Provision bicycle crossing points	1.1	-
Routes are level and undulating	7.9	4.6
Drivers are considerate to me	6.7	5.7
My path does not have loose gravels/sand/puddles	12.4	2.3
The roads do not have many vehicles (heavy traffic)	21.3	12.6
My path does not have other hazards.	12.4	18.4
I ride on community roads that are less busy	18.0	25.3
The use of helmets is enforced	-	2.3
None of the above	10.1	25.3
Other	9.0	2.3

Source: Field Survey (2021)

The study asked child riders to assess the environments in which they rode their bicycles as seen in Table 22. In Kumasi, 21.3 per cent of the respondents stated they rode on roads with less traffic. These roads were mostly within the neighbourhoods of where they lived. This was followed by 18 per cent of them stating that they rode on community roads which are less busy. The presence of dedicated cycling lanes and bicycle crossing points scored low (1%). Further probing indicated that they considered pedestrian pavements and crossings as dedicated lanes for cycling and crossings, respectively. This was also the situation in Cape Coast where the presence of dedicated bike lanes and crossing points scored low (1.1% and 0% respectively). However, 10.1 per cent

of the child respondents in Kumasi said none of these indicators were in their environments.

In Cape Coast, 25.3 per cent of the children said none of the indicators in Table 22 existed in their communities. 25.3 per cent also said they rode on less busy community roads with 18.4 per cent indicating the absence of hazards on their paths. About 2.3 percent indicated the use of helmets was enforced. The other factors, making 9 per cent and 2.3 per cent of the responses in Kumasi and Cape Coast respectively, indicated that they rode their bicycles within the confines of their homes or on community parks and playgrounds.

Figure 12 Skaters riding on a road with other vehicles in Cape Coast.

Source: Field Survey (2022)

Having had the respondents assess their riding environments, the study proceeded to enquire about the safety of the riding environment by enquiring

if participants had been involved in road traffic crashes as child cyclists. Table 23 presents the findings.

Table 23: Cyclists Involvement in Accidents

	Kumasi (n(K)=50)	Cape Coast (n(C)=70)
	%	%
No	38	48.6
Yes	62	51.4
Total	100	100

Source: Field Survey (2021)

Despite the children stating their cycling environments to be safe, most of the children in both cities had been involved in an accident - 62 per cent in Kumasi and 51.4 per cent in Cape Coast in Table 23. The study hence probed further from victims of accidents the type of accidents they were involved in Table 24.

Table 24: Accident Type of Child Cyclists

Accident Type	**City**	
	Kumasi (n(K)=31)	Cape Coast (n(C)=37)
Fell off the bike	83.9%	75.7%
Crashed into a stationary object	9.7%	16.2%
Cycle to cycle crash	3.2%	0.0%
Cycle to pedestrian crash	0.0%	2.7%
Cycle to vehicle/car crash	3.2%	5.4%
Total	100.0%	100.0%

Source: Field Survey (2021)

In both cities, in Table 24, most of the child respondents (83.9% in Kumasi and 75.7% in Cape Coast) reported falling off a bike as the most

common type of crash they had been involved in with some of these being as a result of stone trip-offs, brake failures, clogging of bicycle chains and careless riding. Some of the children also reported of crashing into a stationary object in Kumasi (9.7%) and Cape Coast (16.2%).

In Cape Coast, 5.4 per cent had been involved in a vehicular crash as compared to Kumasi (3.2%). The rest were cycle-cycle and cycle-pedestrian crashes which recorded 3.2 per cent and 2.7 per cent each in Kumasi and Cape Coast, respectively. This confirms the 2017-2020 crash data of the Building and Roads Research Institute (BRRI) where 60.9 per cent and 50 per cent of cyclist crashes in Kumasi and Cape Coast respectively were not attributed to drivers' error.

According to the BRRI cyclist crash data, cyclists between the ages of 6 and 20 years accounted for 26.1 per cent and 25 per cent of casualties recorded from 2017 to 2020 in Kumasi and Cape Coast, respectively. Therefore, the study sought to enquire if any of the child cyclists had been involved in any form of casualties as a result of cycling. The result is presented in Table 25.

Table 25: Injury of Riders or Others in the Accident

	Kumasi (n(K)=31)	**Cape Coast (n(C)=36)**
	%	%
No	29	16.7
Yes	71	83.3
Total	100	100

Source: Field Survey (2021)

In both Kumasi and Cape Coast, in Table 25, many of them reported that they or other persons involved had ever sustained injuries as a result of cycling. This was represented by 71 per cent in Kumasi and 83.3 per cent in Cape Coast. In the United States, nearly one-third of all bicycle-related injuries recorded by US Emergency Departments are of children and young adults (Centers for Disease Control and Prevention, 2022).

Degree of Injury of Child Cyclists and other Road Users Involved in Accidents

Having been involved in an accident with other road users, the study probed to understand the extent of injury these child cyclists and other victims sustained.

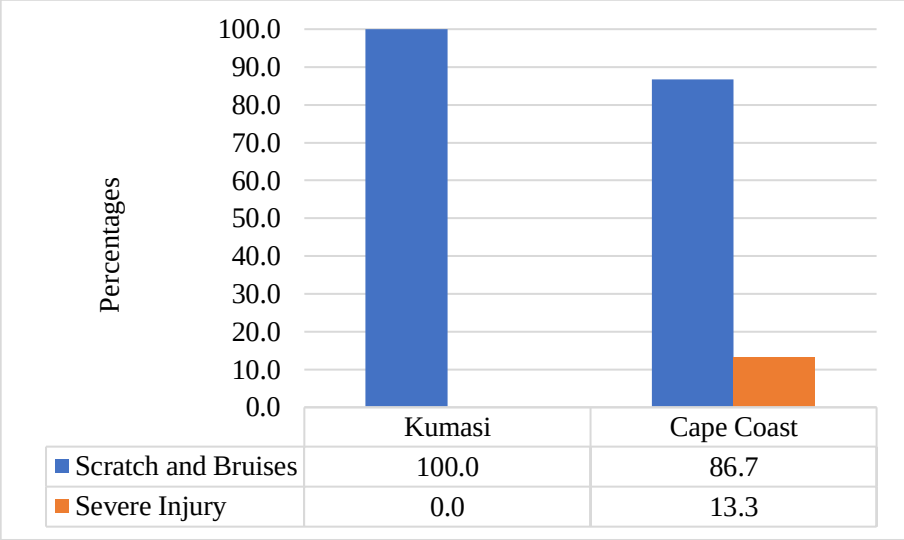


Figure 13 Degree of Injury for Cyclists

Source: Field Survey (2021)

From Figure 12, it emerged all respondents (100%) in Kumasi who reported that they had ever sustained injuries as a result of a crash involving

bicycles indicated that they sustained scratches and bruises. However, in Cape Coast, 13.3 per cent indicated their injuries required hospitalisation.

Non-cyclists were asked if they had witnessed an accident involving cyclists and other road users and the level of injury of the accident victims.

Table 26: Witnessed Degrees of Injury

Degree of Injury	Kumasi (n(K) = 31)	Cape Coast (n(C) = 49)	**t-test**	
	%	%	X^2-Value	df
Fatal (at least one person died)	65.9 5.5	46.2 2.2	10.504 (p-value<0.015)	3
Scratch and bruises (no hospitalisation needed)	6.6	12.1		
Severe injury (required hospitalisation)	22	39.6		
Total	100	100		

Source: Field Survey (2021)

There is a statistically significant difference ($p<0.015$) between the various degrees of injury reported by respondents from the two cities as shown in Table 26. The table showed that there were higher incidents of cyclist crashes that led to hospitalisation in Cape Coast (39.6%) as compared to Kumasi (22%). This contradicts the 2017-2020 cyclist crash data where 50 per cent of casualties in Kumasi involving child cyclists resulted in hospitalisation while in Cape Coast, 100 per cent resulted in injuries which required no hospitalisation. Fatal crashes were slightly higher in Kumasi (5.5%) than in Cape coast (2.2%). According to the cyclist crash data from BRRI (2021), Cape Coast recorded no fatalities involving child cyclists, but they accounted for 16.7 per cent in Kumasi. Although 60.9 per cent of cyclists' casualties were not due to driver error according to BBRI 2017-2020 data, 39.1 per cent of their actions

resulted in casualties with the inexperience of the driver resulting in 100 per cent of the fatalities recorded in Kumasi. Inattentiveness of drivers led to 66.7 per cent and 80 per cent of hospitalisation and injuries respectively in Kumasi while over-speeding accounted for 33.3 per cent and 20 per cent of hospitalisation and injuries, respectively. In Cape Coast, inattentiveness of drivers accounted for 100 per cent of the injuries and caused by drivers.

Attitude Towards Child Cyclists on the Road

The study thence proceeded to investigate from child cyclists how they are treated on the road by drivers and other road users. It is important to understand how children are treated on the road while cycling. This will give a view of how they will be treated when using the other micromobility modes. Result is shown in Table 27.

Table 27: Treatment of Child Cyclists on the road

	Kumasi (n(K)=67)	**Cape Coast (n(C)=83)**
	%	%
I am treated as a fellow road user	13	8
I am treated as a vulnerable road user	30	41
I am treated indifferently	12	12
I am treated as a hazard/danger	12	8
I am avoided if they can	12	11
None of the above	21	19
Total	100	100

Source: Field Survey (2021)

Reported in Table 27, the study indicated that children in Kumasi (30%) and Cape Coast (41%), reported of drivers treating them as vulnerable road users and this confirms (Amoako-Sakyi et al., 2022) findings on drivers' perception of cyclists as most of them perceived cyclists to be vulnerable road users. Some of the children stated that they were treated as hazards and dangers

on the road by drivers. For others, the drivers avoided them entirely. About 13 per cent and 7 per cent of the kids in Kumasi and Cape Coast respectively, reported that drivers treated them as fellow road users – an occurrence which is strongly associated with the drivers' level of education (Amoako-Sakyi et al., 2022).

Non-Riders' Perception of their Environment

This section sought to find out the perception non-riders have towards the environment. This was to explore if both riders and non-riders had similar or different views of the environment they commute daily. The results are shown in Table 28 below.

Table 28: Non-Riders' Perceived Safety of Environment

Response	**Kumasi (n(K)=41)**	**Cape Coast (n(C)=21)**
	%	%
Unsafe	58.5	61.9
Safe	41.5	38.1
Total	100	100

Source: Field Survey (2021)

In Table 28, it is realised non-riders, unlike riders as seen in Table 15 perceived the riding environment to be generally unsafe. This was evident in both cities where 58.5 per cent of respondents from Kumasi and 61.9 per cent of respondents from Cape Coast perceived the general environment to be unsafe. This is in contrast with the perception of riders, most of whom perceived their environment to be safe for cycling. Therefore, non-riders were asked to assess their environment choosing the indicators that made their environments safe or unsafe. Table 29 shows the results below.

Table 29: Non-Riders' Assessment of Riding Environment

Safe Environment Indicators	Kumasi (n(K)=63) %	Cape Coast (n(C)=22) %
Presence of dedicated lanes	1.6	0
Provision bicycle crossing points	4.8	0
The use of helmets is enforced	3.2	4.5
Routes are level and undulating	6.3	0
Drivers are considerate of riders	9.5	0
The path does not have loose gravels/sand/puddles	4.8	0
The roads do not have many vehicles (heavy traffic)	14.3	4.5
The path does not have other hazards.	7.9	4.5
Children ride on community roads that are less busy	17.5	18.2
There are road signs to guide child cyclists	3.2	0
None of the above	27.0	68.2
	100	100

Source: Field Survey (2021)

In Table 29, 27 per cent of child non-cyclist respondents from Kumasi and 68.2 per cent from Cape Coast indicated that their environments did not have any of the mentioned safety indicators. For those who did have some safety indicators in their environment, 17.5 per cent responses from Kumasi 17.5 per cent and 18.2 per cent from Cape Coast said that cyclists rode on community roads which were less busy. This is in synchronisation with the riders' assessment presented in Table 13 where most of the children indicated they rode on community roads less busy from traffic.

Pictorial Observation of Riding Environment

Observations were made along the selected routes in Kumasi and Cape Coast and for both cities, one common denominator was the absence of dedicated cycling lanes. For those who cycled or skated, they mostly rode along

the sides of the roads, on the road, pavements dedicated to pedestrian usage or walking paths as shown in Figures 13 to 22.

Figure 14 Concrete pedestrian lane on the Cape Coast Beach Road

Figure 15 Cyclist riding on the side of the road in Cape Coast

Figure 16 Sandy Pedestrian Path in Cape Coast
Source: Field Survey (2021)

Obstructions and Dangers

On the field it was observed that some of these useable parts of the routes which can subjectively be safe for users, were obstructed or exposed users to danger. Some of these obstructions were vehicles parked on these paths, fallen trees, stalls and mechanic shops and sand among many others. Such obstructions led to inconvenience and lack of safety for riders as they are pushed further into shared road spaces often risky for their use. In Kumasi where the selected route was a high-volume route, riders were confronted with competing with other vehicles for space on the road. In Cape Coast, though the selected route was largely a low volume road, vehicles were noted to speed excessively.

Figure 17 A spoilt vehicle parked on the side of the road.

Figure 18 Traders occupying the walkway.

Figure 19 Vulcanisers operating on the side road.

Figure 20 Stalls and canopy placed side of the road.

Figure 21 Fallen Tree on side of the Road.

Figure 22 Parked Vehicles on the side of the road

Source: Field Survey (2021)

Most parts of the selected routes were also characterised by uncovered drainage. Hence riders who chose to ride on the side of the roads were at the risk of falling into these open drainages as shown in Figure 22.

Figure 23 Images showing open drainages along routes in Kumasi and Cape Coast

Source: Field Survey (2021)

It was also observed that while there were no dedicated cycling lanes, the paths cyclists termed as bicycle lanes were in poor conditions in terms of maintenance as shown in Figure 20. These paths were unattractive for cycling, hence forcing riders to ride on the roads. Though some sections of the routes were in good shape, others had potholes.

Figure 24 State of some parts of selected routes in Kumasi and Cape Coast

Source: Field Survey (2021)

These observations confirm child non-riders' perception of the safety of the environment children as seen in Table 29 were given the indicators, the riding environment was generally said to be unsafe. In Table 30, child non-cyclists' general perception on the safety of cycling routes is shown.

Table 30: General Safety Perception of Cycling Routes

	Kumasi (n(K)=41) %	**Cape Coast (n(C)=21)** %
Roads are not safe for cyclists	95.1	90.5
Roads are safe for cyclists	4.9	9.5
Total	100	100
	Kumasi (n(K)=41) %	**Cape Coast (n(C)=21)** %
Roads are not safe for young cyclists	97.6	100.0
Roads are safe for young cyclists	2.4	0.0
Total	100	100

Source: Field Survey (2021)

Non-riders were asked if they perceived the road environment to be supportive of cyclists' safety, especially among younger cyclists. From Table 30, it was reported that in both cities, non-riders were strongly of the opinion that the road environment was not safe for cyclists of all ages accounting for 95.1 per cent and 90.5 per cent in Kumasi and Cape Coast, respectively. Almost all non-rider respondents from Kumasi (97.6%) and all (100%) from Cape Coast indicated that the roads were unsafe for young cyclist.

Witnesses to Cycle Crash

With child non-riders indicating their environments, and that of riders' as unsafe, they were asked if they had witnessed any crash involving cyclists, the cause and the degree of casualties sustained. The results are presented in Tables 31 and 32.

Table 31: Witness to Cycle-Vehicle Crash

Witness to Crash Involving a Cyclist and a Car	Kumasi (n(K)=91)	Cape Coast (n(C)=91)
	%	%
No	61.5	44.0
Yes	38.5	56.0
Total	100	100.0

Witness to Crash Involving a Child Cyclist and a Car	Kumasi (n(K)=35)	Cape Coast (n(C)=51)
	%	%
No	17.1	37.3

Yes	82.9	62.7
Total	100	100.0

Source: Field Survey (2021)

From Table 31, child non-cyclists in Cape Coast (56%) had witnessed crashes involving a cyclist and a vehicle as compared to their counterparts in Kumasi (48.5%). Those who had witnessed a cyclist-vehicle crash were asked if they had seen a crash involving a child cyclist and a vehicle. In Table 31 it was also reported that children in both Kumasi (83%) and Cape Coast (63%) responded in the affirmative.

Causes of Accidents

Table 32: Cause of Accidents and Description

Cause of Accident	**Kumasi** (n(K) = 34) %	**Cape Coast** (n(C) = 49) %
A third-party	0.0	2.0
Both driver and cyclist	2.9	2.0
Cyclist	61.8	63.3
Driver	32.4	30.6
Mechanical Failure	2.9	2.0
	100%	100%

Accident Description	**Kumasi** (n(K) = 36) %	**Cape Coast** (n(C) = 52) %
The cyclist crossed the driver's path suddenly	28	44
The cyclist crashed into the car	28	14
The driver tried overtaking the cyclist and crashed into the rider	19	15
The cyclist attempted to weave through traffic and crashed in the car	6	2
The cyclist suddenly took a turn without signalling	0	4
Other	19	21
	100	100

Source: Field Survey (2021)

From Table 32 it was reported from the crash witness accounts of child non-riders that, about 62 per cent and 63 per cent of crashes they witnessed in Kumasi and Cape Coast respectively were caused by cyclists. Drivers

constituted 32.4 per cent in Kumasi and 30.6 per cent in Cape Coast, making them the second highest cause of accidents. Accidents caused by both drivers and cyclists and third parties accounted for about two per cent of accidents in Cape Coast in this study. Mechanical failure as a result of failed brakes and clogged chains also scored about three per cent and two per cent in Kumasi and Cape Coast respectively.

The children were therefore asked to describe what they witnessed with regards to the crashes. In Cape Coast, cyclists crossing the drivers' path (44%) suddenly was the commonest description of witnessed incidents. This was also in Kumasi as well as cyclists crashing into vehicles – both scoring 28 per cent each.

Drivers trying to overtake cyclists and running into them constituted 19 per cent and 15 per cent each in Kumasi and Cape Coast, respectively. It was the second most common incident in Kumasi and confirms the observation by Amoako-Sakyi et al. (2022) that drivers in Kumasi overtook cyclists more frequently than those in Cape Coast. Some other descriptions as narrated by the children include:

"The cyclist wanted to ride in the middle of the road." – 10-year-old Male (Kumasi)

"The cyclist's brakes failed him, and he run into a car." – 12-year-old Male (Kumasi)

"The driver's brakes failed him, and he run into the cyclist" – 11-year-old Female (Kumasi)

"The rider was crossing the road. Stopped for the car to pass. Car did not move; rider makes attempt to cross and is hit by the vehicle" – 13-year-old Male (Kumasi)

"The cyclist got distracted when someone called him while he was riding. He veered from his path and a car run into him." – 12-year-old Male (Kumasi)

"The cyclist knocked a child down. I have also been hit by a bicycle before" – 9-year-old Female (Kumasi)

"The cyclist was being skilful on the bicycle." – 11-year-old Male (Cape Coast)

"The cyclist fell, and the driver passed on him." - 13-year-old Female (Cape Coast).

Some members of the skating group attested to engaging in risky riding behaviours such as holding on to vehicles – cars or goods-carrying tricycles (aboboyaa) while in motion and competing against vehicles. This confirms findings in Table 24 where cyclists' behaviour put them as the major cause of crash incidents.

Children Riding on the Roads

Based on the premise that in both cities, most of child respondents perceived their riding environments to be safe, despite being witnesses or victims of cycle crashes, the study sought to find out if they thought children should be allowed to ride on shared roads. This presented in Table 33.

Table 33: Perception on Children Riding on the Roads

	City	
	Kumasi (n(K)=91)	Cape Coast (n(C)=91)
Children should not ride on shared roads	93.4%	91.2%
Children should ride on shared roads	6.6%	8.8%
Total	100%	100%

Source: Field Survey (2021)

From Table 33, it was found out that in both cities, majority of the children in Kumasi and Cape Coast (93.4% and 91.2% respectively) were of the view that children should not be allowed to ride on shared roads. Though bicycles had been used as a proxy and respondents stated that the roads were not safe for cyclists, the study sought the perceptions of the child respondents on the ability of the road to support other forms of micromobility. The results are shown in Table 34.

Perceived Suitability of Roads for Micromobility Modes

Table 34: Perceived Suitability of Roads for Micromobility Modes

	Kumasi (%) (n(K)=91)	Cape Coast (%) (n(C)=91)
Road environment does not support micromobility	85.7	86.8
Road environment supports micromobility	14.3	13.2
Total	100	100

Source: Field Survey (2021)

The response was same across both cities – Kumasi (85.7%) and Cape Coast (86.8%) in Table 34, as they stated that the road environment in both cities was not suitable for micromobility. Perceiving the environment of cyclists to be unsuitable for other micromobility modes also, child respondents were asked what measures they felt should be put in place to ensure that the road environment is micromobility-friendly. The results are shown in Table 35.

Table 35: Measures for Micromobility Safety

Road Safety Measures	**Kumasi (%)** (n(K)=137)	**Cape Coast (%)** (n(C)=209)
The provision of dedicated lanes for micromobility users	39.4	30.1
The expansion of roadways	15.3	20.1
Speed calming measures	8.8	16.7
Placement of road signs and markings that will keep micromobility users safe	9.5	15.3
The insistence of the use of helmet for micromobility users	15.3	14.8
A complete ban of the use of micromobility modes	11.7	2.9
	100	100

Source: Field Survey (2021)

It emerged from Table 35 that, in Cape Coast about 30 per cent of the respondents proposed the provision of dedicated lanes for micromobility users, about 20 per cent selected an expansion of the roadways and about three per cent, a complete ban of the use of micromobility modes in Cape Coast. In Kumasi, the provision of a dedicated lane was also the most proposed measure (39.4%). The expansion of roadways and insistence on the use of helmets were the next highly recommended measures (15.3% each). Unlike their counterparts in Cape Coast, a complete ban of the use of micromobility modes was suggested by about 12 per cent of these children.

Objective Four: Evaluation of Ghana's National Policies and Regulations on Micromobility

To assess the policies and regulations with regards to micromobility use, this study undertook a content analysis of some national policies and road regulations from Ghana relevant to the study. While various policies exist within the context of children's travel safety, the analysis paid particular attention to policies regarding the use of modes which can be classified as micromobilities. For purposes of this study, several factors were used in the analysis of the policies or regulations. In total, four documents – two policies and two regulations, were reviewed based on their relevance to the study. These are the Road Traffic Regulations (L.I. 2180), Ghana Highway Code, National Transport Policy, and National Road Safety Policy.

The study therefore uses eleven indicators to evaluate their currency and how each of the policies and regulations ensure the safety of users of micromobility modes. Some of these indicators were adapted from Sørensen's (2019) evaluation of e-scooter policies between Denmark and Norway. They are explained below within the context of this study.

Year Established: The year the policies or regulations were promulgated is vital to this study as it gives the study grounds to evaluate if it is keeping up with trends in the transport sector and how it has evolved to integrate with modern technology.

Mention of Micromobility: The study seeks to identify the mention of Micromobility in these documents which also demonstrates how these policies and regulations are keeping up with modern trends.

Age Requirements: The study will evaluate if there is an age limit to the use of the micromobility modes. This will inform the study of how restrictive or encouraging the policies make these modes for children.

Max. Speed Requirement: Micromobilities are defined to have a maximum speed limit of 25km/h. The study looks at the maximum speed limits of micromobility users in Ghana.

Carrying Capacity: The maximum number of people or load weight capacity for which these modes are required to carry.

Rider Education: Policies and Regulations requiring riders to attain road safety education before use.

Rider Safety Regulations: Provision of dos and don'ts to users of micromobility modes.

Weight and Dimension (Max.): Required maximum weight and dimension of micromobility modes.

Technical Requirement: Regulations on the instalment of lights, reflectors, sounds or horns, and brakes and other relevant safety measures.

Insurance Requirement: Issuing of insurance to users of micromobility modes.

Personal Safety Equipment: Use of safety equipment such as helmets, elbow and kneecaps, gloves, and reflective jackets.

Infrastructure and Interaction: Available infrastructure for micromobility modes and guidelines on how to use them.

Table 36: An Examination and Evaluation of Some of Ghana's Policies and Regulations on Road Transport

Policies and Regulations				
Guidelines	Ghana Highway Code	National Road Safety Policy	Road Traffic Regulation (L.I. 2180)	National Transport Policy
Year Established	1974	2008	2012	2020
Mention of Micromobility	✗	✗	✗	✗
Age Requirements	✗	✗	✗	✗
Max. Speed Requirement	✗	✗	✓	✗
Carrying Capacity	✓	✗	✓	✗
Rider Education	✗	✗	✗	✗
Rider Safety Regulations	✓	✗	✓	✗
Weight and Dimension (Max.)	✗	✗	✗	✗
Technical Requirement	✓	✗	✓	✗
Insurance Requirement	✗	✗	✗	✗
Personal Safety Equipment	✗	✓	✗	✗
Infrastructure and Interaction	✓	✓	✓	✓

Note: (✓) indicates policy has measures on micromobility use (✗) means otherwise.

Source: Mensah (2022)

Mention of Micromobility

The term 'Micromobility' is not mentioned in any of the four documents reviewed. Instead, it was found that 'Non-Motorised Transport' was widely used in the National Road Safety Plan 2008 and National Transport Policy, 2020. With 'Intermediate Means of Transport' used interchangeably with NMT in the National Road Safety Plan 2008. Though all four documents mentioned bicycles, only the L.I. 2180 made mention of roller skates in

Regulation 151. Although NMTs refer to means of transport which require efforts other than an engine or motor to move, not all NMTs qualify to be termed as micromobilities, as modals defined as such have a common characteristic. This is similar to the strategies and policies of Kenya, Ethiopia and Rwanda reviewed in the literature where the term 'Micromobility" was not mentioned. Similar to these strategies from these African countries where they limit NMTs to walking and cycling, the Ghana Highway Code makes mention of "The Road User on Wheels" specifically mentioning motorcycles, scooters, and mopeds (pp. 4) excluding cyclists and skaters. It also makes mention of Pedal Cyclists (pp. 41) which hence excludes all other forms of micromobility which do not make use of pedals such as skates, roller skates, scooters, e-scooters, among others. L.I. 2180 however makes mention of roller skates and skateboards in Regulation 151 (5). The exclusion and unclear definition of micromobility modes in these policies and documents can be seen in the years they were published. For instance, the Ghana Highway Code is 52 years old and considering the current transport system and major infrastructure developments in the transport system, the Highway Code is almost obsolete (Nsiah-Achampong et al., 2020). The Road Safety Policy and L.I. 2180 were developed in 2008 and 2012, nine years and five years respectively, before the term Micromobility was developed. The National Transport Policy developed in 2020 excludes it though that was developed 3 years after the term was coined.

Age Limit

In Ghana, there is no age limit to which one can access or use micromobility modes. This means that children of all ages can use micromobility modes. This is contrary to the Denmark policy on e-scooters where the minimum required age for using an e-scooter in 15 years and the rider must be accompanied.

Maximum Speed Requirement

With regards to speed limits, the regulations and policies were not definite about the maximum speed limit. Regulation 151 (3)(g) states, 'A person on a road shall not drive at a speed of more than ten kilometres per hour a vehicle carrying a load which projects more than ninety centimetres beyond either end of the vehicle.' Hence the only mention of a speed limit is in when a load is being carried and nothing on when there is no load. It is also not specific on if this is applicable to roller skates or bicycles or restricted to hand carts, animal drawn carts, which it classifies under the same regulation. Although the Highway Code is silent on the permitted speed limit it states, 'You must not ride recklessly or at a speed or in a manner which is dangerous to the public' (pp.41).

Carrying Capacity

The regulations restrict the riding capacity to one person. Ghana Highway Code 131(a) states, 'While riding do not carry passenger in an urban area'. It however gives room for bicycles constructed or modified to carry more than one person. L.I. 2180 151(3)(a) states, 'A person on a road shall not ride a bicycle abreast of more than one person also riding a bicycle except in an

authorised guided racing event.' The policies however do not make mention of anything with regards to speed limits.

Rider Education

Users of micromobility modes are not required by law to go through formal training to use these modes. While some scholars believe that formal education is needed for riders to familiarise themselves with local traffic laws (Deighton-Smith, 2018), in Ghana, one is not required to go through training. They are however required to know the laws which govern their use on the road. The Road Safety Policy, 2008 and National Transport Policy, 2020 hence makes mention of creating awareness through road safety programmes and activities.

Rider Safety Regulations

The Regulations state the various things riders are supposed to do in order not to obstruct the flow of traffic and avoid crashes. L.I. 2180 also gives specific guidelines for users of bicycles and roller skates on the road. In the Ghana Highway Code, it also mentions the dos and don'ts of cyclists on the road including ways to signal as a cyclist using the arm.

Weight and Dimension (Max.) and Technical Requirement

Though none of the documents covered the required weight and dimensions of a micromobility mode, the Ghana Highway Code and L.I. 2180 had technical requirements of cycles and roller skates mostly based on mechanical functioning and extra fittings which ensures rider safety. Highway Code 128 states, 'Make sure your cycle is in good condition – particularly the brakes, tyres, lamps and rear reflector before you ride it.'

L.I. 2180 Regulation 79(5) states:

"A person who drives a motorcycle or bicycle shall ensure that the motorcycle or bicycle is fitted,

(a) at the front and in the centre of the handlebar, with a white retro- reflector strip measuring thirty centimetres by five centimetres

(b) at the rear on the mudguard, with a red retro-reflector strip measuring fifteen centimetres by five centimetres."

Insurance Requirement

Unlike motor vehicles and motorcycles, users of micromobility modes are not required by law to have insurance for their vehicles in Ghana. This means that in the case of an accident, the user (whether as a victim or offender) will not be covered.

Personal Safety Equipment

The National Road Safety Policy, 2008 is specific about the need for users to use a crash helmet. It aims to enforce laws and regulations on the wearing of crash helmets. Though there are many protective equipment riders can wear while riding, the Ghana Highway Code and L.I. 2180 do not make it a requirement for cyclists. The only mention of safety helmets is for use by motorcyclist and riders of motor-assisted pedal cycles.

Infrastructure and Interaction

All the regulations and policies had infrastructure and infrastructure use incorporated in them. Both regulations were specific about what infrastructure is required of riders and their restrictions. The policies identified the need of

having dedicated lanes for NMTs. Highway Code regulation 132 states: "If there is an adequate cycle path beside road ride on it." It goes further to state, that a rider must not deliberately ride on a footpath by the side of any road made or street apart for the use of foot passengers. It also states that one must not leave the cycle on any road in such a way that is likely to cause danger to other road users. Furthermore, it is forbidden to leave a cycle where waiting is prohibited (pp. 41). LI. 2180 (151) states:

(4) A person shall not operate a roller skate or skateboard on a road.

(5) A person may operate a roller skate or skateboard at a designated playground authorised by the appropriate Metropolitan, Municipal or District Assembly.

(6) A person on a roller skate, bicycle or skateboard or riding in or by means of a coaster, toy vehicle, or similar device shall not interfere with the intended use of a sidewalk, a parking lot, or a court area.

Except for the bicycle, sub-regulations 4, 5 and 6 restrict the use of roller skates and skateboards to the playground as they are barred from using the road, sidewalk, parking lots or a court area. The use of micromobility modes is therefore recognised as recreational activities rather than an alternative mode of transport or an active and sustainable mode. This means that children who only have roller skates and prefer to skate to school which will be a faster alternative to walking and could be the only affordable means to school will be breaking the law if they do. This therefore discourages the use of micromobility modes to school.

The Road Safety Policy identifies the lack of dedicated bicycle spaces for the movement of cyclists and encroachment of the few dedicated lanes by traders as challenges causing riders to share the road with other motorised transport (pp. 16). It therefore aims to provide and maintain dedicated lanes for IMTs and, construct and upgrade roadways to minimize modal conflict (pp. 28). Consideration of NMTs of which bicycles are classified under can be found in Theme 4 - Improved Public and Private Investment in Transport. "Integrate non-motorised transport facilities in all transport infrastructure developments" is one of the policy objectives on Theme 1 in the National Transport Policy. It strategizes to "*provide dedicated safe, reliable and appropriate facilities for NMT users across all transport Modes*; and *maintain and free-up all existing NMT facilities from encroachment* (pp. 43)." It fails to specifically mention dedicated cycling lanes or lanes for micromobility use. This therefore restricts the implementation most often to the construction on pedestrian sidewalks which users of micromobility modes are barred from using.

Stakeholders' Role in Ensuring Sustainable Mobility Among Children

With these policies in place, the study went further to individually find out from organisations their preparedness towards the influx of micromobility modes and the level of collaboration among these institutions collaborating in terms of taking initiatives to ensure that children were safe on the road should they adopt micromobility modes as an alternative to school.

On providing dedicated bicycle lanes as part of urban designs and construction, the National Transport Policy's Goal 1 (Strategy 1.4.1) indicates the provision of dedicated safe, reliable, and appropriate facilities for NMT

users across all transport modes (Government of Ghana, 2020 pp. 86). This, the policy tasks the Ministry of Transport to collaborate with the Metropolitan-Municipal-District Assemblies (MMDAs). The policy goes further to state that manuals and standards for planning, design, construction, maintenance, supervision, and operations for the transport sector should be developed for MMDAs (Government of Ghana, 2020 pp. 59). What this means is that MMDAs are also responsible for various infrastructure projects in their districts. At the MMDA level, the department responsible is the Physical Planning Department.

An interaction with a Head of the Physical Planning Department revealed that the Department is responsible for the drawing of the local plan. This includes designing the road plan, road design – width and structure. However, they do not factor in what goes into the structure. According to him, it was the responsibility of the Department of Urban Roads (DUR). He said:

"For instance, if I prepare any local plan, I provide a right of way which is not only the carriageway. It is for services, it is for pedestrian walks, it is for bicycles, for everything…As to the planning of the right of way, it is not within my jurisdiction but that of Urban Roads. We decide this should be a road, this should be the width. They [DUR] decide what should go into it." (Interview with Head of the Physical Planning Department, 16-03-2021)

Probing further as to why the department did not factor the inclusion of dedicated bicycle lanes into the plans and if the department was prepared to make such provisions as per the National Transport Policy, the Head of LUSPA said:

> Every city ought to decide what they want to do. I think what we have in our cities now is we have not been able to decide which of these two options that we want - whether we want to put emphasis on public transport or private transport. Because that will inform you on what you want to do…We have not been able to decide where we want to go. Areas where they have put emphasis on cycling, there are provisions to make cycling an enjoyable activity where it is economically viable to ride bicycles. So, you see the trend but then you ask yourself if we are ready for such trend. (Interview with Head of the Physical Planning Department, 16-03-2021)

He further said, "With regards to bikes and skates, it is a matter of provision of infrastructure. In the matter of planning, everything has been done. Even if it is a 20ft road, we are supposed to provide for bicycle lanes if we want them. For this to happen it must include Department of Urban Roads and Government. It is not a part of our system. If anything at all in areas like the North where people ride on bicycles to farms and other places, that should have been done and it can be replicated in other parts of the country… Currently a carriageway is the priority not the other infrastructure as bicycle lanes, pedestrian lanes." (Interview with Head of the Physical Planning Department, 16-03-2021)

This implies that though provisions have been made for the inclusion of bicycle lanes, the construction of such spaces is going to be as a result of increased use of micromobility modes and the demand for the bicycle lane by users. Currently, it is not the priority of the government which is now more focused on the roads. This therefore means that the possibility of having dedicated

bicycle lanes are not possibilities to be realised soon and users will have to share the road with other motor vehicles.

"For this to happen it must include Department of Urban Roads and Government" – this statement shows that it is a collaborative effort in the provision of infrastructure and that it is not the sole responsibility of the Physical Planning Department through the MMDAs. The study hence went further to enquire the level of collaboration among the various road transport agencies.

Collaboration Among Stakeholders

"All Transport Sector Agencies shall be required to collaborate with the sector ministries and other agencies ensuring their short, medium and long-term action or business plans and their budgetary submissions align with the strategies and actions identified and approved in this policy." - (Government of Ghana, 2020 pp. 67)

The above extract from the National Transport Policy lays emphasis on the need for collaboration between the various agencies, in the context of this study, road transport agencies. Interaction with the head of the Physical Planning Department showed minimum collaboration but an "order from above" approach. He explained:

"When it comes to roads in Ghana, Ministry of Roads and Highways is the highest decision-making body. Assemblies may make suggestions, but the ministry decides and that becomes final because at the end of the day whatever design being done will be decided by them. Having the land and the kind of infrastructure you want to put there is a decision not taken only by Urban

Roads. MMDAs do not even have much stake in it. When they [Ministry of Roads and Highways] decide this is the kind of infrastructure they are bringing, we can only advise and make suggestions but at the end of the day it is the budget they have that matters." (Interview with Head of the Physical Planning Department,)

The constant mentioning of the sector ministry and the Department of Urban Roads gives an indication that there is a significant amount of collaboration among the three institutions. When asked about the collaboration between his department and the National Road Safety Authority, he said:

"National Road Safety Authority, not much. We engage them in just a few situations. When they are organising a workshop, they get in touch with us but Urban Roads is a sister department so there is that collaboration. The DUR are also members of the planning committee here at the Department." (Interview with Head of the Physical Planning Department)

As part of its responsibilities, the National Road Safety Authority is to coordinate and regulate activities, procedures and standards related to road safety and to provide for related matters. This includes ensuring that public spaces are safe for all road users including users of micromobility modes. The NRSA Head, Central Region, however said the Authority is not included in the design process of road infrastructure. She said:

"The NRSA has a responsibility to ensure the provision of pedestrian safety facilities by the road agencies, for instance, the Department of Urban Roads. This is expected to be done during the inception stages of the road project. In the design stages of new roads, the road agencies will progressively

create facilities that will accommodate these micromobilities. Unfortunately, the Authority is usually not consulted in such cases." (Interview with Head of Ashanti Regional NRSA)

The Ashanti Regional head confirmed this but added that their mandate as an authority gives them the right to call for road designs but there are challenges when it comes to these things. Some of the challenges include the number of people who make use of these micromobility modes. According to her, it is a few percentages of Ghanaians who cycle and the provision of infrastructure for its use will imply an additional task of maintaining them. She admitted it was going to be difficult to add another lane for cycling hence the need to find other alternatives in handling micromobility users.

The heads of the Ashanti and Central NRSA Regional Offices however made it known that the type of collaboration between the various agencies and their outfits were solely based on running road safety sensitisation programmes. The Central Regional Head said:

"Ministry of Transport is the sector ministry for the Authority. DUR, MTTD and DVLA are major stakeholders in the road transport space to provide all engineering measures and enforce the needed laws respectively to ensure the safety of all road users. There is constant collaboration with DUR, DVLA and MTTD and they are well represented also in the Action Plans of the Authority to provide for their respective actions related to road safety. There is no or limited collaboration with the Physical Planning Department even though there exists some collaboration with the Assemblies." (Interview with Head of Central Regional NRSA)

The Ashanti Regional Head also said:

"We do it (road safety education) as often as possible especially with our stakeholders thus the Police, the MTTD and the DVLA."

The collaboration between the NRSA and the MTTD was confirmed by an MTTD officer who said:

"We collaborate with NRSA by moving to communities, schools, stations at times churches to educate students and children on how to cross roads."

This goes to show the low level of collaboration among the various road sector agencies in ensuring the provision of dedicated, safe, reliable, and appropriate facilities for NMT users across all transport modes as stated in the National Transport Policy (p.43).

Sensitisation of Micromobility Users

In the absence of these infrastructure which will keep users of micromobilities safe especially children, there is the need to educate children and all road users on the need to accommodate each other and safe road practices. The various heads of the NRSA and the MTTD officer did confirm that they run such sensitisation programmes in their various areas. The study then sought to find out the type of education that was given to these children. The Ashanti Regional Head said:

"Personally, road safety should not be something you must grow up and meet but as you start to understand things as a child, you should be able to start getting the road safety culture, so we always try to make sure children in schools have some kind of culture. We do not wait for them to get to the

university before teaching them about traffic indicators and speed calming measures and seat belts. It is also examinable so now it is in the Curriculum. We have textbooks for basic schools too as well as teachers' guides. As part of our workplan we make sure we do not educate less than 50,000 children in the region."

When asked if the use of micromobilities had been factored in the road safety education programmes, the regional head of NRSA Ashanti Region said she had personally witnessed young skaters holding on to a vehicle in motion and though she did not have the opportunity to educate them, she took the opportunity to discuss it on radio. Nevertheless, she was of the view that the number of users of these micromobility modes makes it difficult to identify them to educate them. She said:

"They are very minimal. It is in existence but they a very minimal. Most of the time, once we see a rising trend in our transport system, our major challenge will be accessibility to these people. Now how soon can we get these groups of skaters, scooters, or people who are using these e-bicycles to inform them or educate them on road safety? Now day-in-day-out we are seeing these things in our system so road safety can quickly come out to educate them."

This was confirmed by the Central Regional head of NRSA who said the Authority's sensitisation programmes currently have been very bias against micromobilities because the use of these micromobilities is limited in this part of the country.

Another challenge mentioned was the law's position on the use of these modes. The Ashanti Regional head of NRSA said:

"They are already in the system and the law does not come out exquisitely to say these kinds of people have this kind of punishment. But when it comes to the enforcing of their operation and usage it becomes a challenge because the law at the time of preparation did not take note of these things but as it comes out, we try to find ways and means to massage the law and enforce certain things to ensure they are safe and other road users are also safe."

Though the law is clear on the position on the use of these as per Regulation 151(7) of L.I. 2180 which states, *"A person who operates a non-motorised vehicle contrary to a provision of this regulation commits an offence and is liable on summary conviction to a fine of not more than ten penalty units or to a term of imprisonment of not more than fourteen days or to both"*, which makes it repressive to most users considering that they have no dedicated lanes and they being classified as recreational activities, she however added that as an Authority, theirs is to ensure the safety of all users on the road whether the mode they use is legal or illegal per the regulations and while it is not feasible to restrict children on the mode they use to schools because of the differences in economic backgrounds especially in this country, the NRSA is doing its best in making recommendations to the law agencies to do something about their operations. But in the meantime, they are currently focusing on road user safety education which also has challenges.

Organisational Challenges

The study then sought to probe what the challenges these organisations faced in carrying out their mandates. The challenges were the same across all stakeholders. These include financial constraints in funding road safety

programmes and activities which goes further to affect logistics and limited capacity development in the various organisations.

The other challenge was political interferences at both traditional and governmental levels, in the planning and implementation of policies. With regards to land use planning and politics, Throgmorton (2021) terms the relationship between the two as a deeply intertwined one and further explains that a good city plan is not sufficient to develop a city as the values of elected officials largely determine which plans are commissioned, approved, and used as an action guide and which plans need to be amended over time. This in a way influences a weak political will to implement policies most especially if the politician does not perceive it to score political points despite its progressiveness.

Thirdly low staff strength at all levels of the organisations was a challenge especially to the NRSA. This disables their ability to be efficient in reaching out to the lowest levels with road safety education. Also, they are unable to gain data from the grassroots effectively as their works are data-driven hence being limited to data within their maximum or nearest reach.

The final challenge raised was ineffective collaboration with sister agencies. They acknowledged the fact that there was not a maximum collaborative effort between them and as such, hindered the progress of their activities and goals in ensuring best road safety practices.

Conceptual Framework

Considering the results above, the study's proposed conceptual framework kept all variables but had a slight change in the causal relationship of External Factors

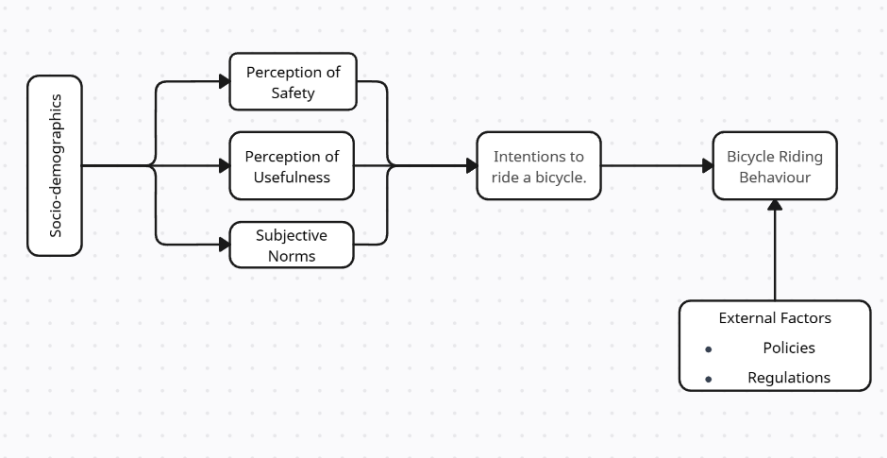


Figure 25 Micromobility Utility Model

Source: Field Survey (2021)

From the study, socio-demographic factors such as sex, age, living arrangement, travel time to school and city, societal associations among others, informed children's ability to ride a bicycle. This confirms that perception of bike safety, perception of bike usefulness and subjective norms, are a function of Socio-demographics. Intentions to ride bicycle in the model is a function of children's perception of bike safety, perception of bike usefulness and subjective norms.

Children's perception of safety varied between users and non-users. While they both agreed the riding environment was unsafe, riders did not see it as much of a risk compared to non-riders, which influenced their intent to make use of a bicycle hiring scheme. Children's perception on the usefulness of

micromobility modes though varying in both cities also influenced their intent to use these modes.

Subjective norms in this case looked at what motivated and demotivated them to ride or not ride a bicycle. Dominant in those factors were what children perceived to be their parents' perception on the safety of these and their usefulness. This means subjective norms fits the model.

In Figure 3, external factors are depicted to have an influence on intent to ride a bicycle. However, questions on the existence of riding regulations in Kumasi and Cape Coast showed that despite there not being local laws (by-laws), children still intended to ride. Nevertheless, authorities believe that educating riders on the regulations and enforcing laws will shape their riding behaviour. This therefore accounts for the change in proposed model.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This concluding chapter begins with a summary of the objectives of the study, its key findings with regards to the objective and the conclusions drawn from them. Specific recommendations from the findings and conclusions are made to stakeholders for decision making. The chapter ends with some recommendations for policy implementation and further research.

Summary of the Study

To understand children's perception on the safety of micromobility modals and the willingness and preparedness of stakeholders in accepting micromobilities on the roads, four objectives were set. The first was to explore children's knowledge and recognition of micromobility modes. Secondly, to examine children's perceived safety of micromobility use in shared spaces using bicycles as a proxy. Thirdly, to establish children's perceived usefulness of micromobility modes in shared spaces using bicycles as a proxy. Lastly, to explore policies and regulations that have been developed by transport governing institutions on the possible influx of micromobility modes in urban spaces. This study relied on secondary sources of information including scholarly articles, news reports, website articles and institutional reports, to largely inform the study.

The study was conducted in Kumasi and Cape Coast – two capital cities in Ghana. Both qualitative and quantitative data were collected through interviews with school children and key stakeholders. Adopting a multi-stage

sampling technique, an arbitrary buffer of four hundred meters was created along the selected routes of which six schools were finally drawn out in both cities – three schools per city. 182 school children were selected from three schools each in both cities using the simple random sampling technique specifically the lottery method. Key informant interviews were conducted with resource persons at the National Road Safety Authority, Motor Transport and Traffic Directorate and Physical Planning Department. A focus group discussion was used to get the skating experience of skaters in Cape Coast alongside an observation along the routes with the aid of visual recording devices – a DSLR Canon camera and mobile phones.

Key Findings

The following are key findings of the study:

1. Household vehicle ownership was low in Cape Coast and Kumasi among the households of the child respondents within the sample frame.
2. Despite a majority of child respondents claiming to have cycling abilities, walking was the most frequent used mode of travelling to school.
3. There were more children who knew how to ride a bicycle in Cape Coast than in Kumasi, although literature finds an increasing cycle utility from the coast towards the north of Ghana.
4. There was a wide gender disparity among children who could ride a bicycle in both cities within the sample frame as very few of them were females.

5. The term ‘Micromobility’ was unpopular among majority of the respondents. However, they could identify the various modes when shown images.
6. Majority of children in Kumasi perceived micromobility modes to be unimportant, a sharp contrast with that of children in Cape Coast who perceived it to be important. As they used it to easily weave through traffic.
7. Child respondents in both cities did not accept that micromobility modes should be used on the roads citing injury as the main deterrent. However, a majority of child cyclists in both cities perceived their riding environments to be safe as a result of few vehicles on their riding routes in their communities, non-riders on the other hand thought otherwise stating the non-existence of an appropriate riding condition for cyclists.
8. A majority of cyclist crashes observed by child non-riders were attributed to cyclists’ riding behaviour with most being cyclists crossing a driver’s path or crashing into a vehicle.
9. Based on observation, there were no riding infrastructure on the selected routes. However, some useable parts of these routes which can subjectively be safe for users, were obstructed or exposed users to danger. These obstructions were vehicles parked on these paths, fallen trees, stalls and mechanic shops and sand among many others causing inconvenience and poor safety for riders.
10. The term, Micromobility, was not mentioned in any of the transport policies and regulations reviewed. However, modes such as bicycles,

skateboards and roller skates were mentioned in some of the documents and this can be attributed to the fact that most of these documents, with the exception of the National Transport Policy, which was launched in 2020, existed before the concept of Micromobility came into being.

11. Generally, there seems to be a reactive approach towards emerging modals as most of the stakeholders did not seem to have a plan towards accepting micromobility into the transport system.
12. The position of the law on the use of micromobility modes such as skates is repressive. However, the National Road Safety Authority claims it is making recommendations for the amendment of that aspect of the law.
13. There is a low level of collaboration among the various government institutions in charge of ensuring safety within the transport sector. The various institutions faced several challenges ranging from political interferences to inadequate resources – human and logistics. This impeded them in carrying out their duties.

Conclusion

Micromobility is fast emerging in countries of which Ghana is no exception to. In an era where cities are moving towards alternative travel modes which are safe, affordable and cause no damage to the environment, active travel is the suitable way to go. A majority of Ghanaian school children are engaged in active travel to and from school as they engage primarily in walking. With some cycling to school, micromobility has the potential to reduce travel time to school for school children. From this study, it can be concluded that

Micromobility as a concept is novel to school going children in Kumasi and Cape Coast. However, they had a good knowledge of the various modes that constitute micromobility when shown images. This is due to their exposure if these modes within their community, other communities or via the media.

On the perception of the usefulness, it can be concluded that children in Kumasi perceive cycling and the use of micromobility to be of less important while children in Cape Coast think of it to be particularly useful. It came out that gender stereotyping as a result of societal expectations of females, deterred female children from riding the bicycle. Also, in order not to be perceived as truants, some children desisted from going close to the bicycle hence perceived bicycles not to be of use. Hence, they also perceive bicycle hiring schemes to be an agent for the increase in bad behaviour among children. The other factors which deter children from riding are inaccessibility, lack of ownership, fear of injury, parental influence. Access to bicycles, peer influence, ownership, and parental support accounted for the motivating factors for which children ride bicycles.

On the perception of safety, it can be concluded that riders and non-riders have different views on the safety of cycling. Child riders perceive cycling to be safe while non -riders think otherwise. However, when it comes to the general perception of the riding environment, both riders and non-riders agree it is unsafe for cyclists in general and child cyclists. This is due to the absence of dedicated spaces for cycling and micromobility use. Also, spaces which cyclists could manage to use on

the side of the roads are obstructed with various objects and activities hence forcing cyclists to compete with vehicles on the road. It can also be concluded that a substantial number of cyclist crashes witnessed by children are attributed to cyclist behaviour.

A review of the Ghana Highway Code and Road Traffic Regulation (LI 2180) depicts regulations that consider the use of Micromobility as an alternative travel mode. It can be concluded that the Road Traffic Code relegates Micromobility modes to recreational modes as it only limits the use of skates to approved recreational grounds. It can also be concluded that the collaboration among the various transport institutions have been limited to organising road safety sensitisation programmes. When in actual sense their mandates demand that they actually work together beyond organising road safety sensitisation programmes. For instance, the National Road Safety Commission needs to be aware of road projects to make inputs into the plan. However, they do not have a relationship with the Physical Planning Departments. The lack of human and capital resources impedes the organisation of various road safety programmes of all road users particularly micromobility users.

Political interferences from government and traditional authorities in the works of the Physical Planning Department has led to a deviation from the various national transport policies hence, instead of being in charge of the road plans at the local level, instructions are brought from the national level and the local Physical Planning

Departments just carry out and supervise the implementation even if it is a deviation from the national transport policy.

Finally, it can be concluded that the various institutions are not prepared for the emergence of micromobility utility in the country. Institutions will want to see these micromobility modes being used in large numbers before investing in infrastructure since it will demand some maintenance once it is built.

Recommendations

The study makes the following recommendations based on the key findings and conclusions. These recommendations are to largely inform policy reforms and future research on Micromobility use.

1. The concept of Micromobility and active travel should be included in the road safety lessons for schools to teach children on safe riding practices. Thia can successfully be carried out through an effective collaboration between the Ghana Education Service and the National Road Safety Authority.
2. Schools should encourage children willing to ride bicycles to school. However, they should regulate and monitor the use of these bicycles in schools so as not to have school children being truant during school hours. The teachers should also teach children the importance of cycling as an alternative mode of transport to school and not only as a recreational mode.
3. The Ministry of Transport in collaboration with the National Commission for Civic Education should roll out, a national sensitisation programme on the importance of active travel should be conducted

through all means available including the media. This will desensitise society's perception on the social and cultural attitude towards bicycle riding.

4. There should be a conscious effort by the various transport institutions from the Ministry of Transport to its various agencies, institutions, and departments to implement the National Transport Policy. This is possible when there is a strong collaboration among the various institutions which transcend beyond organising road safety programmes.
5. There is the need for the Ministry of Transport in collaboration with its institutions to review the Ghana Highway Code and amend the Road Traffic Regulation to make it more inclusive and accommodating of micromobility modes and not restrict them to modes for recreation.
6. In the absence of dedicated lanes for micromobility modes, users should be permitted to use the pedestrian walks. There should also be an enforcement of regulations to ban the parking of vehicles, trading activities and the depositing of construction materials on pavements meant for walking.
7. There is the need for a proactive action to be taken by the Ministry of Transport and its appropriate agencies towards the future influx of micromobility modes. Waiting for the number of users to increase before putting in place the needed infrastructure will only spell out disaster for control and regulation of these modes.
8. Further studies should be held to explore the sustainability and viability of bicycle and micromobility hiring schemes in Ghana.

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APPENDIX A

UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

FACULTY OF SOCIAL SCIENCES

CHILDREN'S QUESTIONNNAIRE

Safety of Micromobility Use Among Children in Selected Cities in Ghana: Perspectives of Children and Stakeholders

Good morning/afternoon. My name is Manuel Nii Martey Mensah. I am a postgraduate student of the Department of Geography and Regional Planning, University of Cape Coast (UCC). I am conducting a research titled *Safety of Micromobility Use Among Children in Selected Cities in Ghana: Perspectives of Children and Stakeholders*. I am asking you to take part in this study because I am trying to learn more about children's perception on the safety of using skates, bicycles, scooters and others, and the willingness and preparedness of stakeholders such as drivers and the elderly in society in accepting micromobilities on the roads. This is because it has been understudied in Ghana because of its novelty. If you accept to be in this study, you will be asked to answer some questions to aid in the study. We shall also be seeking, where appropriate, your experience or witness to accidents involving cyclists and drivers. This will take about 20 – 30 minutes to complete this survey. There no risks associated with this study. However, if you have witnessed first-hand an accident involving a cyclist especially child cyclist and a driver, I shall seek you to share with me what you saw. This may bring some discomfort. However, this will be addressed by allowing you to discontinue the account whenever you want. If you are also willing to share with me the experience later other than today, I will respect that. You are also free to join this study and you can stop participating at any time if you feel uncomfortable. No one will be angry with you or punish you if you do not want to participate or stop participating. Kindly note that these data being collected will exclude names and contact addresses of the participants. This means that your name will not be taken as well any address which can make the information you provide easily traced to you. Also, no third-party organization or person gets access to this information you provide. There is no form of reward for partaking in this study. You may ask me any questions about this study. You can call me at any time on 0205511504/0555494568 (Manuel Nii Martey Mensah) or talk to me the next time you see me. You may also contact my supervisor, Dr. Regina Amoako-Sakyi on 0244974916.

Background Information

Municipal Assembly	
Type of school [Pub/Prvt]	
Name of School	
Location of school	
Age of child	
Sex	
Stage	
Religion	
Any disability	
Child's living arrangement	a) Parent [ ] b) Guardian [ ] c) Self [ ]
Parent/guardian' occupation	a) Mother's Occupation…… b) Father's Occupation…….. c) Guardian's Occupation
Number of siblings	
Number of siblings currently in Basic school	
Location of Home	
Vehicle availability in household	a) None [ ] b) Bicycle [ ] c) Motorcycle [ ] d) Tricycle [ ] e) Private car [ ] f) Taxi/Trotro [ ] g) other…….
How do you travel to school (select all that applies)	a) Walk [ ] b) Bicycle [ ] c) School bus [ ] d) Private car [ ] e) Motorcycle (private) [ ] f) Taxi [ ]

	g) Trotro [ ] h) Tricycle/Pragia [ ] i) Motorcycle (Okada) [ ] k) other……
Which mode do you frequently use?	a) Walk [ ] b) Bicycle [ ] c) School bus [ ] d) Private car [ ] e) Motorcycle (private) [ ] f) Taxi [ ] g) Trotro [ ] h) Tricycle/Pragia [ ] i) Motorcycle (Okada) [ ] k) other……
Time taken to get to school	
Who do you usually travel to school with?	a) Parent(s) [ ] b) Other adults (e.g., Friend's parents) [ ] c) Sibling (s) [ ] d) Friends [ ] e) Alone [ ]

A. Child's cycling experience

1. Do you know how to cycle?
   a) Yes [ ] b) No [ ]→→**skip to Q.12**
2. If yes to Q.1, at what age did you learn to cycle
   a) Before 5 years [ ] b) 5-9years [ ]
   c) 10-14 years [ ] d) 15- 17 years [ ]
3. What motivated you to learn to ride?
   a) My family owned a bicycle
   b) I had access to a bicycle within the family or from friends
   c) All/most of my friends knew how to ride bicycles.
   d) I could hire one within the community
   e) To enable me ride to school
   f) To enable me ride when I am sent on errands
   g) It fascinated me to see others ride
   h) Other
   (Specify)……
   …
4. Do your parents/guardians support the decision to ride
   b) Yes [ ] →→**skip to Q.6** b) No [ ]

5. If no to Q.4, Why?
   a) It is unsafe
   b) It is costly
   c) It will take all/most of my time.
   d) It is associated with truancy
   e) All of the above
   f) Other
   (Specify)……
   ……
6. Kindly describe your riding environment.
   a) Presence of dedicated lanes [ ]
   b) Provision bicycle crossing points [ ]
   c) The use of helmets is enforced [ ]
   d) Routes are level and undulating [ ]
   e) Drivers are considerate to me [ ]
   f) My path does not have loose gravels/sand/puddles [ ]
   g) The roads do not have many vehicles (heavy traffic) [ ]
   h) My path does not have other hazards. [ ]
   i) I ride on community roads that are less busy [ ]
   j) None of the above [ ]
7. What is your general assessment of your riding environment?
   a) Safe [ ] b) Unsafe [ ]
8. Have you ever recorded any accident as a child cyclist?
   a) Yes [ ] b) No [ ]
9. If yes to Q.8, describe the incident
   a) Fell off the bike
   b) Crashed into a stationary object
   c) Cycle to cycle crash
   d) Cycle to pedestrian crash
   e) Cycle to vehicle/car crash
   f) Other (specify)
   ……
10. Were you or others involved injured in this incident?
    a) Yes [ ] b) No [ ]
11. If Yes to Q. 10, what was the level of injury?
    a) Scratch and bruises (no hospitalisation needed) [ ]
    b) Severe injury (required hospitalisation) [ ]
    c) Fatal (at least one person died) [ ]

    For child cyclist→→**skip to Q.15**

12. If no to Q.1, Why haven't you learnt how to ride a bicycle?
    a) There is no one to teach me to ride [ ]
    b) My family does not own a bicycle [ ]

c) I do not have access to a bicycle [ ]
d) I am afraid of injuring myself [ ]
e) My parents/guardians do not allow me to ride [ ]
f) My community does not allow the use of bicycles by children [ ]
g) It is not important to me [ ]
h) Bicycle riding is associated with bad kids [ ]
i) Other
(Specify)……
……

13. Kindly describe the riding environment.
a) Presence of dedicated lanes [ ]
b) Provision bicycle crossing points [ ]
c) The use of helmets is enforced [ ]
d) Routes are level and undulating [ ]
e) Drivers are considerate of riders [ ]
f) The path does not have loose gravels/sand/puddles [ ]
g) The roads do not have many vehicles (heavy traffic) [ ]
h) The path does not have other hazards. [ ]
i) Children ride on community roads that are less busy [ ]
j) There are road signs to guide child cyclists
k) None of the above
14. Would you describe the riding environment as safe?
a) Yes [ ] b) No [ ]

Non-cyclist→→**skip to Q.16**

15. How are you treated as a child cyclist by drivers on the road?
a) I am treated as a fellow road user [ ]
b) I am treated as a vulnerable road user [ ]
c) I am treated indifferently [ ]
d) I am treated as a hazard/danger [ ]
e) I am avoided if they can [ ]
f) Other (specify)
……
….
16. Should child cyclists be allowed to ride on shared roads?
a) Yes [ ] b) No [ ]
17. Do drivers see child cyclists as vulnerable?
a) Yes [ ] b) No [ ]
18. Have you ever witnessed a crash involving a cyclist and a car?
b) Yes [ ] b) No [ ]
19. Have you ever witnessed a crash involving a *child* cyclist and a car?
c) Yes [ ] b) No [ ]
20. If Yes to Q. 18 or Q.19, who was at fault

a) Driver [ ] b) Cyclist [ ]
c) A third-party [ ] d) No one [ ]

21. If yes to Q.18, describe the incident
    a) The cyclist crossed the driver's path suddenly [ ]
    b) The driver/a passenger opened the door of the car and it hit a cyclist [ ]
    c) The cyclist crashed into the car [ ]
    d) The cyclist suddenly took a turn without signalling [ ]
    e) The driver tried overtaking the cyclist and crashed into the rider [ ]
    f) The cyclist held on to the car and fell off [ ]
    g) The cyclist attempted to weave through traffic and crashed in the car [ ]
    h) Other (specify)……

22. Was the cyclists or others involved injured in this incidence?
    b) Yes [ ] b) No [ ]
23. If Yes to Q. 24, what was the level of injury?
    d) Scratch and bruises (no hospitalisation needed) [ ]
    e) Severe injury (required hospitalisation) [ ]
    f) Fatal (at least one person died) [ ]

C. Introduction of Micromobility in Ghana

24. Are you familiar with the term micromobility?
    a) Yes [ ] b) No [ ]
25. Are you familiar with the following micromobility modes?

Skates

E-bikes, bicycles and E-Scooter

Skateboard

E-bike

a) Skates [ ]
b) Bicycles [ ]
c) E-bikes [ ]
d) Scooters [ ]
e) E-Scooters [ ]
f) Skateboards [ ]

26. Have you ever seen someone use the following in your community before?
    a) Skates [ ]
    b) E-bikes [ ]
    c) Scooters [ ]
    d) E-Scooters [ ]
    e) Skateboards [ ]
27. Have you ever seen someone use these in another community before?
    a) Skates [ ]
    b) E-bikes [ ]
    c) Scooters [ ]
    d) E-Scooters [ ]
    e) Skateboards [ ]
28. Have you ever seen someone use the following on T.V or social media before?
    f) Skates [ ]
    g) E-bikes [ ]
    h) Scooters [ ]
    i) E-Scooters [ ]

j) Skateboards [ ]

29. Do you think there are any advantages of its use to the user?
    a) Yes [ ] b) No c) Indifferent
30. If yes/indifferent to Q. 32, why
    a) They do not pollute the environment [ ]
    b) They do not add to the traffic congestion situation in the city [ ]
    c) They are cheaper to use because they do not use fuel [ ]
    d) They easily weave through traffic [ ]
    e) Other (specify) ……..
31. If no/indifferent to Q 32, why
    a) It is not suited for our road condition here [ ]
    b) It is dangerous because it can cause accidents [ ]
    c) It is expensive to acquire [ ]
    d) It is slow moving and may add to the traffic congestion in the city [ ]
    e) If many people use it, there might be a problem with secured parking [ ]
    f) Other (specify) ……
32. Do you think the road environment can support the use of micromobility modes in your community?
    a) Yes [ ] b) No [ ]
33. If No to Q. 32, what should be done?
    a) The provision of dedicated lanes for micromobility users [ ]
    b) The expansion of roadways [ ]
    c) Speed calming measures [ ]
    d) Placement of road signs and markings that will keep micromobility users safe [ ]
    e) The insistence of the use of helmet for micromobility users [ ]
    f) A complete ban of the use of micromobility modes [ ]
34. Will you accept the use of micromobility modes on roads in your community?
    a) Yes [ ] b) No [ ]

D. Shared micromobility Schemes

35. Has there been bicycle hiring schemes in your community?
    a) Yes [ ] b) No [ ]
36. Are they functioning today in your community?
    a) Yes [ ] b) No [ ]
37. Are these schemes good to have in communities?
    a) Yes [ ] b) No [ ] c) Indifferent [ ]
38. If yes/indifferent to Q. 37, How

a) It provides a cheaper way of travelling in the community [ ]
b) It encourages active travel in the community [ ]
c) It affords children the opportunity to learn how to ride bicycles [ ]
d) It adds on to the fun/recreational activity for children [ ]

39. If no/indifferent to Q. 37, why?
    a) It increases bad behaviour and truancy among children [ ]
    b) Children spend all/most of their time at such places [ ]
    c) Children tend to spend all/most of their monies in hiring bicycles [ ]
    d) They get injured through such schemes [ ]
    e) They engage in unsafe riding behaviours through such schemes [ ]
    f) Other (specify)……

40. Will it be good to consider introducing such hiring schemes for Micromobility modes?
    a) Yes [ ] b) No [ ]
41. If yes/indifferent to Q.40 why?
    a) It will provide a cheaper way of travelling within the community [ ]
    b) It will encourage active travel within the community [ ]
    c) It will offer children the opportunity to learn to use these modes [ ]
    d) It will add on to the fun/recreational activity for children [ ]
42. If no/indifferent to Q. 40, why?
    g) It will increase bad behaviour and truancy among children [ ]
    h) Children will spend all/most of their time at such places [ ]
    i) Children will spend all/most of their monies in hiring these modes [ ]
    j) They will get injured through such schemes [ ]
    k) They will engage in unsafe riding behaviours through such schemes [ ]
    l) Other (specify)……

For child cyclist→→**End interview**

E. Non-users' perspectives on child cyclists

43. Are roads safe for cyclists in general
44. Are roads particularly safe for young cyclists
45. What do you think about child cyclists?
    a) They think they own the road [ ]
    b) They intrude my space [ ]

c) They ignore the rules such as stopping at red lights [ ]
d) They use both ways even in a one-way systems [ ]
e) They mount the pavement [ ]
f) They cause an accident. [ ]
g) They often do not wear reflective clothes when riding at night [ ]
h) They have no reflectors on their bikes [ ]
i) They are a nuisance [ ]
j) They are unpredictable [ ]
k) Weave in and out of traffic [ ]
l) They do not look out for traffic before they turn [ ]
m) They do not signal before manoeuvring [ ]
n) They display a lack of regard for other road users [ ]
o) They fail to adhere to basic road safety guidelines [ ]
p) They display poor cycling behaviour [ ]
q) They do not pay road tax [ ]
r) They are unable to keep up with other traffic [ ]
s) They do not show courtesy to other road users [ ]

APPENDIX B

UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

IN-DEPTH INTERVIEW GUIDE FOR MOTOR TRAFFIC & TRANSPORT DEPARTMENT (MTTD)

Introduction and Informed Consent Statement

Good morning/afternoon Sir/Madam. I am Manuel Nii Martey Mensah, a postgraduate student of the Department of Geography and Regional Planning, University of Cape Coast (UCC). The purpose of this interview is to gather information on ***Safety of Micromobility Use Among Children in Selected Cities in Ghana: Perspectives of Children and Stakeholders***. Specifically, to understand children's perception on the safety of using skates, bicycles, scooters and others, and the willingness and preparedness of stakeholders in accepting micromobilities on the roads. As an emerging trend, this study will contribute to the knowledge on micromobilities in Ghana and contribute to a foundation for future research in Africa. You have been selected to partake in this study because you are a key actor in the transportation sector. We would be glad to get your views and perspectives about children's safety in Ghana specifically this city, which is under your jurisdiction, and how this can be enhanced. We would also be glad to know whether there are any ongoing efforts that you may be aware of that are aimed at improving children safety during travel to schools and other places. The information which you are going to share with me will be treated with confidentiality and used only for the purpose of this research. Please note that participation in the study is voluntary and there will be no direct benefits to you or monetary compensation. We thank you for your willingness to take part in this study. This interview should take about 60 minutes. Please confirm that you have understood why we are doing this study and whether I can continue with the interview. If you need additional information, please contact **Manuel Nii Martey Mensah**, Department of Geography and Regional Planning, University of Cape Coast via email: manuel.mensah@stu.ucc.edu.gh (0205511504).

Questions

1. Brief background of yourself and your role at MTTD

2. Mandate of the MTTD
3. What are your views on children's journey to school within Kumasi/Cape Coast and its environs?
4. Are there specific guidelines on child safety as they travel to school in and round Kumasi/Cape Coast? (Probe for safety within school neighbourhoods and along routes to school)
5. What are your views on the use of micromobilities (bicycle, scooter, skateboard, e-bikes, etc) by children on our roads?
6. Are there any guidelines from the MTTD governing the use of micromobilities such as bicycles, skates, and skateboards among children?
7. How best can children using micromobilities be protected in various communities?
8. Are there any educational programmes by the MTTD to educate child pedestrians, paratransit and micromobility users on road safety within the municipality?
9. What is the nature of collaboration between your department and other institutions such as the Urban Roads Department, NRSA, Physical Planning Department, DVLA and Ministry of Transport?
10. What challenges does your Directorate face in the implementation of its mandate to achieve? (Financial, logistics, staff strength etc)

APPENDIX C

UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

IN-DEPTH INTERVIEW GUIDE FOR NATIONAL ROAD SAFETY AUTHORITY

Introduction and Informed Consent Statement

Good morning/afternoon Sir/Madam. I am Manuel Nii Martey Mensah, a postgraduate student of the Department of Geography and Regional Planning, University of Cape Coast (UCC). The purpose of this interview is to gather information on ***Safety of Micromobility Use Among Children in Selected Cities in Ghana: Perspectives of Children and Stakeholders***. Specifically, to understand children's perception on the safety of using skates, bicycles, scooters and others, and the willingness and preparedness of stakeholders in accepting micromobilities on the roads. As an emerging trend, this study will contribute to the knowledge on micromobilities in Ghana and contribute to a foundation for future research in Africa. You have been selected to partake in this study because you are a key actor in the transportation sector. We would be glad to get your views and perspectives about children's safety in Ghana specifically this city, which is under your jurisdiction, and how this can be enhanced. We would also be glad to know whether there are any ongoing efforts that you may be aware of that are aimed at improving children safety during travel to schools and other places. The information which you are going to share with me will be treated with confidentiality and used only for the purpose of this research. Please note that participation in the study is voluntary and there will be no direct benefits to you or monetary compensation. We thank you for your willingness to take part in this study. This interview should take about 60 minutes. Please confirm that you have understood why we are doing this study and whether I can continue with the interview. If you need additional information, please contact **Manuel Nii Martey Mensah**, Department of Geography and Regional Planning, University of Cape Coast via email: manuel.mensah@stu.ucc.edu.gh (0205511504).

Questions

1. Designation [Probe for Number of years worked with institution, number of years lived in the community, etc.]
2. What is the mandate of the NRSA?

3. What are your views with children's travel?
4. How would you describe the incidence of child pedestrian crashes within the Kumasi Metropolis?
5. What are your plans for ensuring the safety of children's school travel in urban environment?
6. Does the department take into consideration the role of urban design in shaping travel needs of children's school travel? (Probe for the provision of pedestrian walkways, bicycle lane and safety measures long school neighbourhoods)
7. With the emergence of micro mobilities such as skates, scooters, e-bikes etc, what sensitization programmes do you have for all road users?
8. Are there any sensitization programs / instruction on safety measures for ensuring sustainability of safe trips to and from school? [probe for how it is implemented]
9. What has already been done, what had worked and what had not worked before? [probe for reasons]
10. Do you think there is the need for child travel policy on the following?
11. What is the level of collaborations between your institution and the other institutions such as the Urban Roads Department, Physical Planning Department, MTTD, DVLA and Ministry of Transport?
12. What challenges does your Directorate face in the implementation of its mandate to achieve? (Financial, logistics, staff strength etc)

APPENDIX D

UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

IN-DEPTH INTERVIEW GUIDE FOR THE PHYSICAL PLANNING DEPARTMENT

Introduction and Informed Consent Statement

Good morning/afternoon Sir/Madam. I am Manuel Nii Martey Mensah, a postgraduate student of the Department of Geography and Regional Planning, University of Cape Coast (UCC). The purpose of this interview is to gather information on ***Safety of Micromobility Use Among Children in Selected Cities in Ghana: Perspectives of Children and Stakeholders***. Specifically, to understand children's perception on the safety of using skates, bicycles, scooters and others, and the willingness and preparedness of stakeholders in accepting micromobilities on the roads. As an emerging trend, this study will contribute to the knowledge on micromobilities in Ghana and contribute to a foundation for future research in Africa. You have been selected to partake in this study because you are a key actor in the transportation sector. We would be glad to get your views and perspectives about children's safety in Ghana specifically this city, which is under your jurisdiction, and how this can be enhanced. We would also be glad to know whether there are any ongoing efforts that you may be aware of that are aimed at improving children safety during travel to schools and other places. The information which you are going to share with me will be treated with confidentiality and used only for the purpose of this research. Please note that participation in the study is voluntary and there will be no direct benefits to you or monetary compensation. We thank you for your willingness to take part in this study. This interview should take about 60 minutes. Please confirm that you have understood why we are doing this study and whether I can continue with the interview. If you need additional information, please contact **Manuel Nii Martey Mensah**, Department of Geography and Regional Planning, University of Cape Coast via email: manuel.mensah@stu.ucc.edu.gh (0205511504).

Questions

1. Designation [Probe for Number of years worked here]
2. What is the role of the Physical Planning Department?
3. Is there a blueprint (spatial plan) available for the municipality?

4. Has it been followed through and through or there have been modification to the plan?
5. Do you make plans for roads in your planning process? How?
6. What do you consider in allocating spaces for schools?
7. How do you allocate spaces such as pedestrian walkways and bicycle lanes?
8. Does your plan cater for the needs of emerging trends in mobilities such as skates, E-bikes, scooter, etc? (Probe for how prepared they are in insuring an inclusive mobility.
9. What is the nature of collaboration between your department other institutions such as the Urban Roads Department, NRSA, MTTD, DVLA and Ministry of Transport?
10. What challenges do your department face in implementation of your mandate? (Probe for financial, logistics, staff strength etc)

APPENDIX E

UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

IN-DEPTH INTERVIEW GUIDE FOR THE PHYSICAL PLANNING DEPARTMENT

Introduction and Informed Consent Statement

Good morning/afternoon Sir/Madam. I am Manuel Nii Martey Mensah, a postgraduate student of the Department of Geography and Regional Planning, University of Cape Coast (UCC). The purpose of this interview is to gather information on ***Safety of Micromobility Use Among Children in Selected Cities in Ghana: Perspectives of Children and Stakeholders***. Specifically, to understand children's perception on the safety of using skates, bicycles, scooters and others, and the willingness and preparedness of stakeholders in accepting micromobilities on the roads. As an emerging trend, this study will contribute to the knowledge on micromobilities in Ghana and contribute to a foundation for future research in Africa. You have been selected to partake in this study because you are a key actor in the transportation sector. We would be glad to get your views and perspectives about children's safety in Ghana specifically this city, which is under your jurisdiction, and how this can be enhanced. We would also be glad to know whether there are any ongoing efforts that you may be aware of that are aimed at improving children safety during travel to schools and other places. The information which you are going to share with me will be treated with confidentiality and used only for the purpose of this research. Please note that participation in the study is voluntary and there will be no direct benefits to you or monetary compensation. We thank you for your willingness to take part in this study. This interview should take about 60 minutes. Please confirm that you have understood why we are doing this study and whether I can continue with the interview. If you need additional information, please contact **Manuel Nii Martey Mensah**, Department of Geography and Regional Planning, University of Cape Coast via email: manuel.mensah@stu.ucc.edu.gh (0205511504).

Questions

1. Designation [Probe for Number of years worked here, number of years lived in the community, etc.]

2. How do you plan for the provision of cycling spaces? (probe further for the consideration for children in walking spaces development)
3. What is the key infrastructure for cycling for children in this metropolis?
4. What do you take into consideration in the determination of walking infrastructure provision for specific location? (Probe for laid down codes for streetscape and general street design)
5. How child friendly is the urban environment in KMA/OTMA/ CCMA?
6. In your view, are there enough pedestrian facilities in this municipality to promote safe road infrastructure crossing behaviour among children?
7. What should be done to ensure that children travel safety to schools and other places that they need to travel?
8. Do you think drivers are responsive to children's crossing behaviour?
9. What are the challenges do you face as a department in the provision of roads and traffic infrastructure?
10. Which other institutions do you collaborate with in the provision of urban road traffic infrastructure? (Probe for NRSC, Physical Planning Department, LUSPA, etc)?
11. What is the nature of collaboration between your department and those institutions?
12. In your opinion, what modifications will be needed to promote a safer cycling environment in this municipality.

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