UNIVERSITY OF CAPE COAST

ASSESSING URBAN INFRASTRUCTURE DESIGN, MOBILITY PATTERNS AND RISK OF INJURY AMONG FEMALE HEAD PORTERS IN THE CBD OF KUMASI

ADWOA AFRA ASUBONTENG

JANUARY 2025

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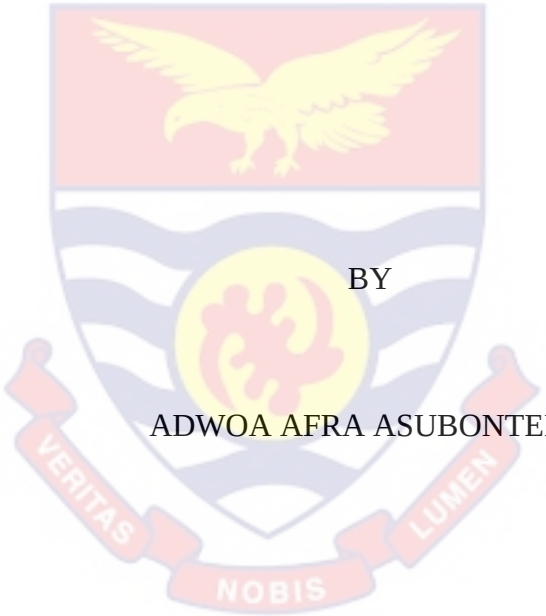

BY

ADWOA AFRA ASUBONTENG

Thesis submitted to the Department of Geography and Regional Planning of the College of Humanities and Legal Studies, Faculty of Social Science, University of Cape Coast, in partial fulfillment of the requirements for the award of Master of Philosophy degree in Geography and Regional Planning

JANUARY 2025

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: Asubonteng Adwoa Afra

Supervisor's Declaration

I 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.

Supervisor's Signature…… Date……

Name: Dr. Mrs. Regina Obilie Amoako-Sakyi

ABSTRACT

The presence of pedestrian infrastructure in cities serves as a safety net for vulnerable road users. Female head porters are classified among the vulnerable in the city as their activities involve walking throughout the city centre with heavy loads from one point to the other. Many researchers have studied the various vulnerabilities of female head porters with little to no insights into their mobility issues. This study assessed the pedestrian infrastructure, female head porters' movement in the Central Business District (CBD) of Kumasi, and how they are exposed to injuries. Questionnaires, interview schedules, and an observation checklist were used to collect data for the study. The study sampled 223 female head porters using purposive, accidental and snowballing sampling techniques. In addition, three key stakeholders were purposively sampled for this study. The findings from the study indicated that pedestrian infrastructure in the CBD of Kumasi is fairly adequate to accommodate the pedestrian volume. Furthermore, the study reveals that several factors influence the movements of female head porters in the city but paramount among these factors is the economic factor, the need for the female head porter to be engaged. During their daily mobilities, female head porters encounter several injuries resulting from their usage of the road and pedestrian infrastructure in the CBD. These include falling into open drainages, tripping due to obstruction on the road, and colliding with other pedestrians. However, these injuries have not been classified under road traffic injuries and getting concrete statistics from designated agencies proved futile. The study therefore recommends the inclusion of injuries due to pedestrian falls, trips and collisions with other pedestrians into the definition of transport injuries.

KEYWORDS

Central Business District

Female Head Porters

Pedestrian Infrastructure

Transport Injuries

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Finally, I would also appreciate my family for all the support and motivation.

DEDICATION

I dedicate this work to all the female head porters in Ghana.

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CHAPTER ONE

INTRODUCTION

Background to the Study

Cities are fascinating, vibrant, and diverse environments, but they can also be noisy, polluting, difficult to navigate, isolated, and crime-ridden. Urban centres are home to 55 percent of the world's population, and this number is expected to rise to 68 percent by the year 2050 (United Nations, 2018). In Ghana Urban population continues to grow, increasing from 12,545,229 (50.9%) in 2010 to 17,472,530 (56.7%) in 2021 with almost half (47.8%) of the increase in Greater Accra and Ashanti regions (Ghana Statistical Service, 2022). Cities and metropolitan areas are economic development engines, accounting for around 60 percent of global GDP (United Nations, 2015). Employment, housing, education, social contact, and cultural and recreational activities are all best found in cities. These factors serve as pull factors for most people in rural areas to migrate to cities and this is leading to the ever-increasing population in cities.

The global surge in migration particularly female migration is a fundamental component of contemporary migration, contributing significantly to the world's ongoing fast urbanisation, with substantial repercussions for the health of migrants and receiving communities (Adepoju, 2011). In Ghana, a significant migration stream from north to south has been that of female teenagers due to lack of education, poverty, the necessity of acquiring home items and clothing in order to prepare for marriage and life and other socio-cultural practices like child marriage (Ahlvin, 2012; Awumbila & Ardayfio-Schandorf, 2008). The young adolescents move from rural areas, notably the

northern regions, to markets in urban centres to work as head porters who carry items on their heads for a negotiated fee. They are exposed to several vulnerabilities in their day-to-day activities. For a fee, head porters transport loads of traders and travellers from one end of the market to a terminal or parking area (Awumbila & Ardayfio-schandorf, 2008). Their operations are mainly done on foot thus competing for space with traffic and other pedestrians in congested space in the Central Business District (CBD), which makes them very vulnerable to traffic collisions and other unintended injuries resulting from slips and falls.

The central business district (CBD) is the area where the city's main commercial streets and public buildings are located (Rice & Bova, 2020a). They are the most densely populated areas in the urban environment, with high visitor flow, particularly in developing countries (Sun, 2011). Pedestrian activity in CBDs accounts for over half of all daily trips in most African countries (Keetse, 2016).

Despite the high amount of pedestrian activity in developing countries' cities, pedestrian infrastructure is almost non-existent. In terms of infrastructure and service provision, governmental attitudes towards pedestrians are frequently neglectful, and policymaking with pedestrian space is progressively eroded (World Bank 2002, cited in Amoako et al., 2014). This problem is exacerbated in developing-country CBDs, where sidewalks/ walkways are insufficient and are increasingly filled by street sellers, encroached upon by store premises, or blocked by parked cars, motorbikes, and bicycles. Pedestrian safety in urban spaces is frequently sacrificed in favour of designing for a speedier flow of automobile traffic particularly in

developing countries (Josephine et al., 2021). For instance, a study by Leather et al., (2011), revealed that, the supply of pedestrian facilities in Asian cities has failed due to a lack of financial resources to fulfil the expanding population demand, which has resulted in pedestrian collisions. In Ghana, a study conducted by Amoako et al., (2014) in Kumasi revealed that many of the available pedestrian infrastructural facilities in the CBDs are add-ons, and not part of the original design of the CBD and with the few infrastructural facilities that do exist, pedestrians consider them to be inadequate due to their bad location and lack of coordination among services.

The needs of motorised vehicles profoundly influenced the design of cities that grew over the twentieth century. The car industry has brought substantial economic, societal, and industrial benefits, but it has also brought significant environmental and human health issues such as the emission of carbon dioxide gas into the atmosphere and road traffic injuries (Stevenson et al., 2016). According to the World Health Organisation (2018), motor vehicle-related deaths and injuries continue to be a severe problem, and current trends indicate that this will be the case for the foreseeable future. In 2021, there were an estimated 1.19 million road traffic deaths globally indicating a rate of 15 deaths per 100,000 population. Road traffic injury is the leading cause of death and primary cause of death in young people between the ages of 5 to 29, surpassing HIV/AIDS, tuberculosis and diarrheal diseases (WHO, 2023). Globally, pedestrians are the third most affected road users in terms of fatalities and the leading road users affected by road traffic injury fatalities in Africa.

Vehicle crashes (often further confined to motor vehicle crashes) on public highways are the focus of widely recognised definitions of traffic crashes. These categories exclude instances such as pedestrians tripping, falling, or colliding with items in public places, resulting in falls that leads to injuries or death (Methorst et al., 2017a). Alcohol consumption, pedestrian and motorist behaviour, the characteristics and design of the roadway and the surrounding built environment are all factors that contribute to pedestrian traffic-related injuries. Much research on pedestrian injuries has been conducted over the years, with significant emphasis on solely car-pedestrian collisions, with little to no insight into the issues surrounding pedestrian-only injuries, such as slips and falls in the built environment (Oxley et al., 2018a). The problem of falls however is well known among epidemiologists (Methorst et al., 2017a). Slips and falls can occur any day and can happen to anybody, including the elderly, young, healthy, and infirm. Injuries might range from bruises or fractured bones to catastrophic head trauma. Pedestrian slips and falls result in unintended injuries as a result of poor urban infrastructures like raised pavements, potholes and clustered walkways. According to the World Health Organization, around 37.3 million falls occur globally each year that are severe enough to necessitate medical attention, with an estimated 424,000 falls resulting in fatal injuries (WHO 2014). Falls are the second leading cause of unintentional injury deaths after road traffic injuries, with an estimated 684,000 fatalities occurring annually. In a study on the Epidemiology of injuries presented to the accident centre of Korle-Bu Teaching Hospital, Blankson et al. (2019) reveals a high incidence of injuries from falls among reported cases second only to road traffic accidents in Ghana. These data,

however, are the sum of all falls, independent of location, making them of little use to transportation and public space researchers. Comprehensive local data specifically detailing pedestrian injuries resulting from falls and trips in Kumasi is limited. Preliminary reconnaissance efforts were conducted to assess the pedestrian injuries reported at the Manhyia District Hospital to identify key patterns. The findings revealed the hospital categorizes injuries reported under transport injury, home injury and occupational injury. Transport injuries according to the hospital are injuries reported as a result of vehicular accidents. Table 1 shows the reported cases of injuries reported to the Manhyia Hospital between the year 2020 and 2021.

Table 1: Manhyia Hospital Reported Injury Cases

Injury type	2020	2021
Transport injuries	0	18
Home Injuries	8	30
Occupational injuries	0	109

Source: Manhyia District. Hospital. 2023

Road safety targets have been incorporated into Goals 3 and 11 of the Sustainable Development Goals (SDGs) to help curb the increasing menace of road traffic injuries. Goal 3 aimed to improve good health and well-being while reducing the number of road traffic crashes by half by 2020. Although this could not be met, major improvements were made towards achieving the target (UN, 2021). Goal 11 focuses on making cities and human settlements more inclusive, safe, resilient, and sustainable through better urban design and administration, particularly in vulnerable urban areas around the world. Target 11.2 explicitly attempts to ensure safe, affordable, accessible, and sustainable

transportation systems for all people, with a particular emphasis on vulnerable populations such as women, children, the elderly, and people with disabilities.

Problem Statement

Central Business Districts (CBDs) are undeniably popular areas of traffic attraction, owing to rising population density, fast urbanisation, and increased commercial and economic activity, especially in developing countries (Olayiwola et al., 2014). Kumasi's CBD is the city's primary employer, employing thousands of people and earning the majority of the city's revenue (Millennium Cities Initiative, 2010 cited in Amoako et al., 2014). The high population in the CBD generates heavy traffic leading to congestion and other mobility challenges which adversely affect the ultimate goal of people's mobility and expose them to injuries. Because CBDs are primarily planned for vehicle users, pedestrian demands are sometimes overlooked in the provision of urban transportation infrastructure, resulting in a lack of cohesive planning for pedestrian and cycling route networks (Earthtec Consultancy, 2007, cited in Amoako et al., 2014).

Poor pedestrian infrastructure planning in developing-country CBDs is frequently worsened by a variety of difficulties such as chronic traffic congestion, pollution from outmoded automobiles, and other environmental concerns. The overall disregard for pedestrian safety also contributes to a high number of pedestrian injuries/fatalities resulting from pedestrian-vehicle collisions (Stoker et al., 2015). Pedestrian injuries continue to rise in Ghana as a total of 2930 people were knockdown in the year 2021, a plummet of the previous year's numbers (Joynewsonline, 2022). These estimates, however, mostly depict injuries sustained when a vehicle collides with a pedestrian, with

the magnitude of pedestrian-only injuries often unreported in police crash records.

Female head porters are exposed to many vulnerabilities like physical, verbal and sexual abuse in their activities (Awumbila & Ardayfio-Schandorf, 2008). They are considered as part of the vulnerable road user group as their job involves lifting and carrying heavy goods for sometimes long distances in the CBD, exposing them to traffic injuries as well as other physical ailments including injuries incurred as a result of trips and falls. Given the vulnerability of head porters, the availability and upgrading of pedestrian infrastructure would provide a safer urban environment while also improving their mobility inside CBDs. Many studies have been conducted on the livelihood and vulnerabilities of head porters as well as traffic injuries among road users which is largely represented by those who have been struck by vehicles, however fewer insights have been conducted to examine existing urban pedestrian infrastructure, mobility of head porters and how they are exposed to pedestrian traffic injuries due to their movements and usage of pedestrian infrastructure in the city. For instance, Shamsu-Deen and Adadow (2019), examined health-seeking Behaviour among migrant female head porters in the city of Accra, Ghana. The findings indicated that the factors influencing health-seeking behaviour among the participants include having health insurance, savings levels, and the social support they receive from others, which encompasses marital status and education

Awumbila and Ardayfio-Schandorf (2008), explored Gendered poverty, migration and livelihood strategies of female porters in Accra, Ghana. The study revealed that while the porters or kayayei have implemented several

strategies to navigate their working conditions, numerous mechanisms present ethical dilemmas and heighten their susceptibility to sexually transmitted infections (STIs), sexual violence, other health hazards, and poverty.

Amoako, et al., (2014), established the relationship between pedestrian infrastructure and pedestrian safety in the Kumasi CBD, Ghana. Findings from the study revealed insufficient and poorly maintained pedestrian infrastructure within the Kumasi CBD. It also identified negligent usage of these facilities by both motorists and pedestrians which has contributed to a rise in pedestrian accidents

While these previous studies have recognized various vulnerabilities of the female head porter as well as the state of pedestrian infrastructure in the Central Business District of Kumasi, the risk of injury due to their movements and usage of pedestrian infrastructure in the city remains unexplored thus this study sought to fill the knowledge gap.

This study sought to examine the existing urban infrastructure in the Central Business District (CBD) of Kumasi, the mobility patterns of female head porters and their exposure to injuries including road traffic collisions, slips, trips and falls. For these reasons the study sought answers to the following questions;

1. What are the mobility patterns of female head porters in the CBD?
2. How does the available pedestrian infrastructure ensure the safety of female head porters in the CBD?
3. How do the mobility patterns of female head porters within the CBD expose them to injuries?

4. What are the incidents of pedestrian accidents involving female head porters in the CBD?
5. How does the pedestrian infrastructure in the CBD influence the risk of injury among female head porters?

Furthermore, the study tested the following hypothesis:

H_1: There is no statistically significant relationship between covered drainage and the incidence of injury

H_2: There is no statistically significant relationship between presence of paved streets and the incidence of injury

H_3: There is no statistically significant relationship between presence of pavements and the incidence of injury

H_4: There is no statistically significant relationship between dilapidated pavements/sidewalks and the incidence of injury

H_5: There is no statistically significant relationship between opened drainage and the incidence of injury

H_6: There is no statistically significant relationship between overcrowded pavements/sidewalks and the incidence of injury

Research Objectives

The main objective is to examine the urban infrastructure design, movement of female head porters, and their risk of injuries in the central business district of the Kumasi metropolitan area.

Specific Objectives

1. Map out mobility patterns of female head porters in the CBD
2. Examine the pedestrian environment of the Central Business District

3. Examine female head porters' exposure to injuries within the CBD due to their mobility pattern
4. Describe the pedestrian injury types among female head porters.
5. Assess the influence of urban pedestrian infrastructure design on risk to injuries

Significance of the Study

The findings and recommendations from this study contributes to literature, and may assist planners, city authorities and decision makers in improving city planning, design and provision of pedestrian infrastructure especially in the central business districts taking into consideration female head porters and all vulnerable road users. The findings may provide a platform for further research into the mobility patterns of female head porters and their risk of traffic injuries in urban centres.

Delimitations

Female head porters from other cities in the country, such as Accra, Tamale, and Takoradi, as well as other terminals outside of Kumasi's CBD, were not included in this study. Head porters from the CBD of Kumasi were selected for this study because Kumasi is one of the biggest commercial centres in the country second to Accra but has the advantage of being closer to a majority of female head porters' place of origin.

Limitations of the study

Certain aspects in the research process that may have an impact on the results; consequently, the researcher must be adept at recognising and acknowledging such factors. For this study, a larger representation of female head porters in the CBD would have been ideal as well as inputs from

institutions like Social Welfare and Non-Governmental Organisations. Unfortunately, the time available for the study could not permit that. This is to be used as a reference point for future research. It is also important to note that the mixed method approach comes with its challenges including time and other resources. In all, I did my best to ensure I undertook a comprehensive study given the time and resources available.

Furthermore, employing a non-probability sampling technique for the study implies that not all Kayayei in Ghana had an equal chance of being chosen for participation. Consequently, the findings cannot be generalised to encompass all Kayayei in Ghana. Nevertheless, because of the CBD's substantial population of Kayayei in Ghana, the sample size was considered sufficient for the study, allowing for the findings to be generalised to those in Kumasi.

Organisation of the Study

This study is organised into five (5) chapters with the first chapter being an introduction to the study which consists of the study background, problem statement, research questions, study objectives, the significance of the study, delimitations and limitations of the study.

The second chapter, also referred to as the literature review, looks at the review of literature relevant to the study. The chapter also looks at theoretical and conceptual reviews respectively. The chapter, therefore, reviews the literature on the major themes of the study.

Chapter three covers the research philosophy underpinning the study which informs the methods to be used. The chapter also looks at the sampling

procedures, sources of data, data collection methods, analysis of the data and the description of the study area.

Chapter four of the study presents the analysis and interpretation of the results generated from the data from the field. The chapter also discusses the data presented in congruence with the literature reviewed. The discussions are therefore organised to address the various objectives of the study.

Chapter five presents the summary of the study, conclusions, recommendations as well as policy implications. The chapter draws the curtains to the study by drawing conclusions and proffering solutions.

CHAPTER TWO

LITERATURE REVIEW

This chapter examines the relevant literature on the phenomenon under study: Assessment of urban infrastructural design, mobility patterns, and risk of injury among female head porters in the CBD. The chapter begins with the conceptual basis of the study, a review of the Central Business District, the concept of pedestrian infrastructure and movement in the CBD, a theoretical and empirical review of pedestrian injuries, and the concept of head porterage and female head porters in Ghana.

Conceptual Framework

A conceptual framework is an abstraction or simplification of reality that enables communication across disciplines, improves our comprehension of real-world systems, and organises knowledge (Heemskerk et al., 2003). According to Tamene, (2016), a conceptual framework is an explanation of the main components, variables, or constructs to be researched and the presumptive relationships between them, either graphically or in narrative form. The development of a study is made clearer, simpler, and more direct with the use of a conceptual framework (Crawford, 2020).

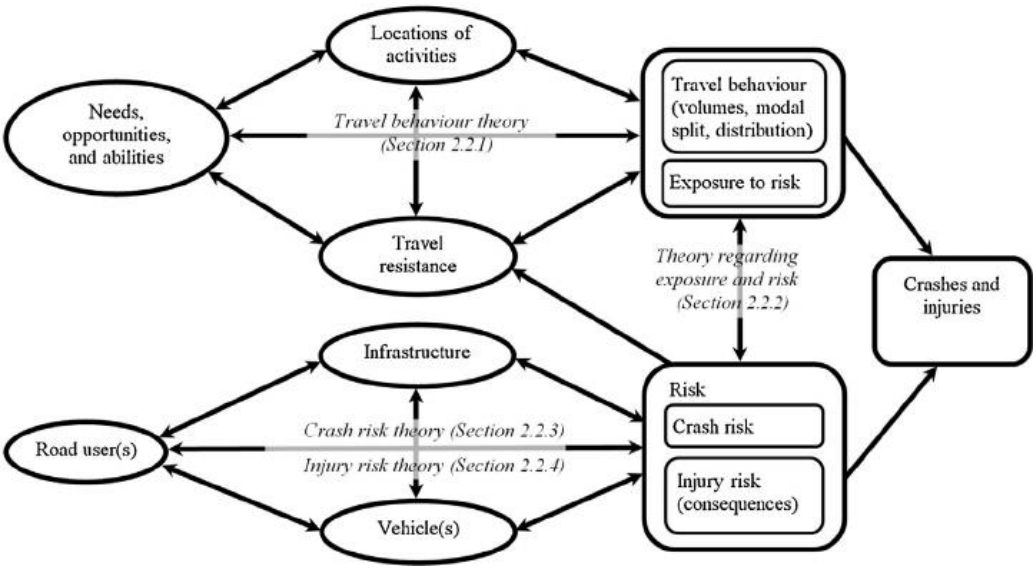

Figure 1: Conceptual framework for road safety and mobility including exposure and risk

Source: Schepers et al, 2014

The conceptual framework for the study was adapted from Schepers et al.'s, framework for road safety and mobility. Their model combines Van Wee's (2009) passenger transport model for exposure to risk and Othman et al.'s (2009) three traffic safety pillars for risk. The framework includes variables that determine exposure to risk (caused by travel behaviour), accident risk, and injury risk (or severity of harm). People are subject to risk because they travel and because there are risks in transportation. The exposure to risk measurements employed in the literature on road safety is closely related to travel patterns. (Schepers et al., 2014), therefore, travel behaviour and risk exposure were placed in one box in their framework. The study proposed that before passenger travel occurs, certain factors come to play to determine their travel behaviour and also how they are exposed to the risks in transportation. These factors include locations of activities, transport resistances, and needs, opportunities and abilities. People move between places to carry out tasks including living, working, and shopping. Travel

resistance is the combination of the time, money, and non-monetary costs associated with it. Needs, opportunities and abilities also affect travel behaviour; for instance, the need for active transportation, owning a car and a driver's license, or the physical fitness required for cycling and walking.

Crash risk and injury risk are a result of the interaction between three variables sometimes referred to as the "three pillars of traffic safety," infrastructure, vehicles, and road users (Othman et al., 2009). Crash injuries can range in severity depending on the amount of energy that is exchanged between road users, vehicles, and infrastructure. When victims are subjected to forces that are greater than their biomechanical tolerance, crashes may be lethal. This tolerance is determined by the age, health, stature, and other characteristics of the other road users involved in the collision.

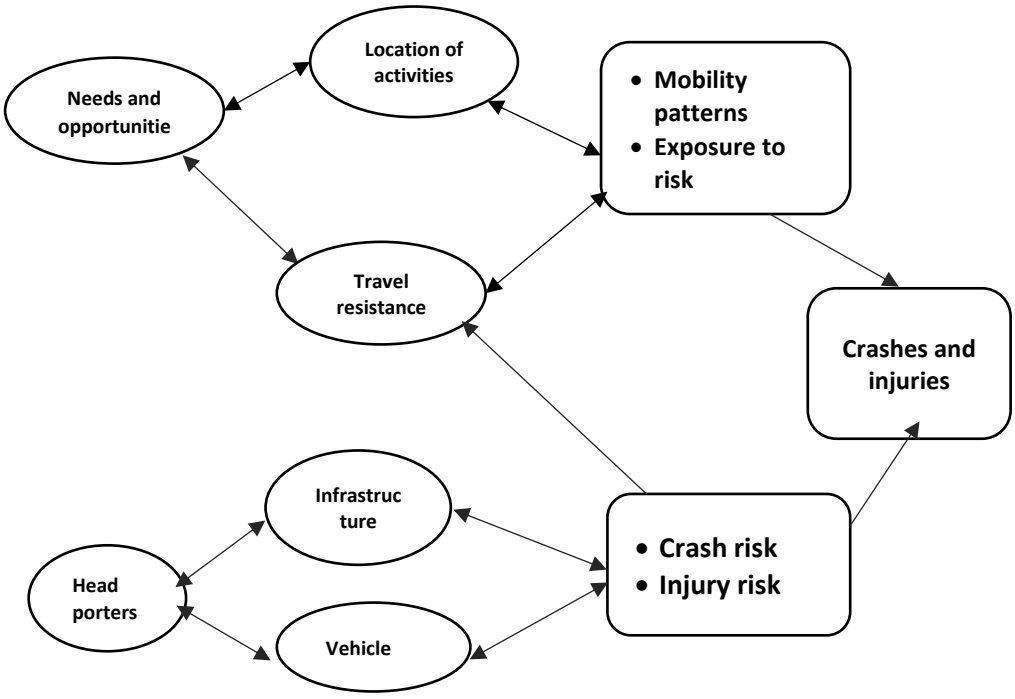

Figure 2: Conceptual framework

Source: Adapted from Schepers et al, framework for road safety and mobility (2014)

Hence, the study adapted Schepers et al (2014) model and attempts to contribute to literature using the key factors being studied which is similar to the original model. The model developed for this study adapted similar variables in the original framework. However, this model is applied to just the female head porter in the CBD as shown in Figure 2. The model seeks to explain the interactions between the existing urban infrastructure, mobility patterns, and risk of injury among female head porters.

First, the model proposes that the mobility pattern of the female head porter in the CBD is determined by their needs and opportunities present such as the location of certain social amenities, residence, and also the location of activities or in this case, where most shoppers and travellers can be found and further the travel resistance present, for instance, nature of road, state of pavements, etc. These factors also reveal their exposure to risk in the CBD.

Head porters crash and injury risk which leads to the actual crash and injury is as a result of their usage of the existing infrastructure and the volume of vehicular activities present. Crash risk may be as a result of vehicular movements and also the presence or lack of pedestrian facilities such as sidewalks, zebra crossing, and footbridges. Injury risk may be due to the state of the infrastructure; for instance, the presence of open sewer, potholes, and encroachment of sidewalks by traders, hawkers or even parked vehicles.

The Central Business District

The idea of a central business district (CBD) was proposed by E. W. Burgess, an American urban geographer, for the first time in 1923 in his famous model of concentric city structure. He considers that a city expands from within to without in the form of a concentric circle. Five circles could be

drawn around the spatial structure. The geographic and functional core of the city, known as CBD, is located in the centre of the circle structure. CBDs historically used to be central markets where locals would trade. CBDs in the modern era however are the complex result of rapid urbanisation and waves of economic and technological change (Rice & Bova, 2020b). According to Yaguang (2011), modern society CBD can be described as a location for the urban population to engage in various social, economic, and institutional activities, with numerous supporting facilities such as business office buildings, hotels, apartments, etc., with excellent traffic, communications, and other infrastructure, providing a favourable economic development environment, and locations that are convenient for commercial activities. Olayiwola and Olaseni (2014) also define the CBD as a downtown within a city centre enclave where development is concentrated.

Historically, the CBD originated as a market square in ancient cities, where farmers, merchants, and customers gathered to trade. They became fixed locations where retail and business took place as cities grew and evolved. The CBD is usually located in or near the city's oldest part and is frequently near a significant transit route that provides the site for the city's location, such as a river, train, or highway (Rosenberg, 2023). It grew into a financial and control hub for the government, as well as a hub for office space, throughout time. In the early 1900s, CBDs in European and American cities predominantly consisted of retail and commercial centres and grew to accommodate office space and commercial firms in the mid-twentieth century, while retail took a back seat. Eventually, they experienced skyscraper expansion, causing them to become denser (Rosenberg, 2023).

Infrastructure and Pedestrian Movement in CBD

Human movements encompass the pulse of a city, supporting the adage “the city never sleeps”. Travel has increased over the decades, showing more complicated patterns and becoming more unpredictable in both developed and emerging nations. Land use, transportation, and individual characteristics are the three main elements that affect travel behaviour or mobility patterns.

Following the Industrial Revolution and the development of the vehicle, walking distances have been mythicized in favour of motorised comfort. Most of the time, while designing metropolitan areas, motorised transportation, rather than pedestrians, is considered (Rastogi et al., 2011). The development of cities aligns with the "consumerism and status" culture and has resulted in an out-of-control use of automobiles in urban areas all over the world. Therefore, based on the false belief that such demand should be satisfied, the implementation of a street infrastructure to handle this increasing demand rises. The infrastructure for bikes and pedestrians, on the other hand, is either disregarded or ignored. This circumstance demonstrates how most cities no longer provide the human population with the room it previously did in favour of motorised transportation, failing to deliver a more comfortable urban existence where cities are built for people instead of cars (Gehl, 2013).

In developing cities, pedestrian walking accounts for nearly half of all mobility; nevertheless, pedestrian infrastructure, particularly in Africa's CBDs, is inadequate and badly maintained (Oviedo et al., 2021). Walking is one of the most essential modes of transportation in Ghana, although it is not prioritised by urban planners when developing transportation plans. The

majority of residents of the Accra Metropolitan Area (AMA) walk to work or school, trade, access health care, visit friends and family, or engage in other socioeconomic activities (Adjei-Boadi et al., 2022). CBDs have a high population density, particularly in developing nations, necessitating the provision of the integration of pedestrian infrastructure into the design, construction, and administration of them. According to Lasmini and Indriastuti (2010), due to the large number of pedestrians and the poor nature of pedestrian infrastructure, pedestrians are forced to walk on the road, which contributes to an increase in pedestrian accidents.

The transportation network is supposed to serve as a foundation for urban growth. While it has a significant impact on the expansion of our cities, it also has an impact on its users. The primary function of a road remains the same: to facilitate movement (Kenworthy, 2006). People travel to destinations for a variety of reasons, including economic, social, and religious ones, and the base network provides them with options for getting there. Furthermore, depending on the mode of transportation (private car, public transportation, or non-motorised transportation), the options available may differ (Josephine et al, 2021). Walking becomes a major choice in developing countries CBDs for penetrating the dense crowd. Walking gives people access to locations that motorised transportation is unable to access and often the quickest way to get about in the CBD is by walking.

Three pedestrian infrastructural facilities are essential, according to Lasmini and Indriastuti (2010), to support socioeconomic development and ensure the successful running of CBDs: road infrastructure such as Sidewalks/walkways, traffic signals such as traffic lights, and road markings

such as pedestrian crossings. Even though pedestrian walking accounts for nearly half of all mobility in developing cities, pedestrian infrastructure in CBDs, particularly in Africa, is inadequate and badly maintained, as city planners frequently overlook pedestrian demands when constructing street layouts (Hook, 2011, World Bank, 2005 cited in Amoako et al, 2014). Sidewalks/pavements are inadequate, safe road crossings are limited and little effort is being made by authorities to enforce speed limits

Road Infrastructure

The mobility of people is crucial, and it takes place via transportation networks. The cities' road networks tend to paint a picture of them. Starting with the number of roads and their total length, then their arrangement and spatial expansion from the city centre, and finally the structures they form, all of these characteristics give a reflection of the city's transportation network. Lasmini and Indriastuti (2010), revealed that Sidewalks/walkways, medians, crossing islands, curbs, drop-off zones, and speed tables/ramps are examples of road infrastructure that can influence the number and accessibility of pedestrians as well as their journey route in the CBD.

A sidewalk is a concrete path that runs along the side of a street or road for pedestrians to stroll on. Sidewalks allow pedestrians to move about safely. Because of weak urban planning and regulation enforcement procedures, sidewalks in many developing nations are used not only for safe pedestrian activities, but also by hawkers and vehicles. This illegal change and insufficient pedestrian infrastructure limit sidewalk width and force walkers to utilise lanes and shoulders of roadways, which is unsafe and inconvenient for pedestrian mobility in the CBD (Lasmini & Indriastuti, 2010). For instance,

Sumabrata and Rahma (2003), in their study revealed that 65 percent of traffic accidents in Jakarta, the capital of Indonesia involved pedestrians. In Ghana, a review of road deaths and serious injuries in the Accra Metropolitan Assembly's Road Safety Report in 2018, revealed pedestrians accounted for 60 percent of traffic-related deaths and 37 percent of serious injuries.

Pedestrian Infrastructural Facilities

To provide safe pedestrian movement within the CBD, pedestrian infrastructure design must include traffic signals and road markings. However, the majority of studies show that CBDs in developing countries are inadequately equipped with proper traffic lights and road markings (Mansour et al., 2018; Mudzengerere & Madiro, 2013; Ribbens, 1996). Traffic signals are traffic lights that aid pedestrians in crossing roads at intersections. A traffic light with the colours red and green can be used as a pedestrian signal. Red indicates that it is unsafe for pedestrians to cross the road, and green indicates that it is safe to do so. Other pedestrian signals display the words WALK and DON'T WALK or display an image of a white "walking person" and an orange "raised hand." When it is safe to begin crossing, the "walk" or "walking person" signal emerges. You may not begin crossing the street when the "Don't walk" or "raised hand" symbol is displayed.

Road marking for pedestrians popularly known as zebra crossing is a path that is painted with stripes on a street or road and that marks the place where people can safely cross. Vehicles are to slow down on this path and allow pedestrians to cross safely. Most of these pedestrian infrastructural facilities in developing countries cities are poorly situated which leads to pedestrians' negligent and occasionally non-use of these amenities. This

condition disrupts traffic flow and puts pedestrians at risk (Lasmini & Indriastuti, 2010).

Preferably, pedestrian infrastructure should be incorporated into the design of CBDs; but, in many developing nations, the situation is different and the amenities seem to be extras or afterthoughts. For instance (Amoako, Cobbinah, & Niminga-Beka, 2014) in their study revealed that many of the pedestrian infrastructure amenities in Kumasi's central business district are additions that were not originally planned to be there. Pedestrians are forced to use the CBD without pedestrian infrastructural facilities due to the inadequate and poor location of these facilities, as well as poor maintenance culture (Lasmini & Indriastuti, 2010; World Bank, 2005; Sumabrata & Rahmah, 2003).

Pedestrian Injuries

A road traffic crash is a global epidemic affecting millions of lives around the world today. Currently, more than 1.3 million people are killed and 50 million grave injuries are recorded every year due to road traffic crashes, of which more than half of all road traffic deaths are among vulnerable road users (cyclists, motorcyclists and pedestrians). Road traffic injury is the 8th leading cause of death and primary cause of death in young people between the ages of 5 to 29, surpassing HIV/AIDS, tuberculosis and diarrheal diseases (WHO, 2018). According to the National Road Safety Authority (NRSA, 2020), an average of 6 people die daily as a result of road traffic crashes in Ghana.

It is commonly known that pedestrians are vulnerable in traffic. Compared to most other road users, pedestrians are always the weakest party

in a collision with a vehicle and are more likely to be injured or killed (Oxley et al., 2018b). Pedestrians and cyclists account for 26 percent of all road traffic deaths worldwide, with Africa having the highest proportion of pedestrian and cyclist mortalities with 44 percent of deaths which are anticipated to occur at 26.6 per 100,000 people (WHO,2018).

Crashes are complex, involving behavioural variables like inattention, bad road crossing technique, intoxication, etc., as well as environmental factors like land use, the design and operation of the built environment, and high vehicle speeds (Oxley et al., 2018b). The definition of traffic crashes over the years however has not done enough justice to the overall phenomenon. Widely accepted definitions of traffic crashes concentrate on collisions involving vehicles on public roadways, sometimes narrowing the concept to just motor vehicle collisions. These definitions don't include occurrences like pedestrians tripping, slipping, or falling in public places as a result of collision with objects which leads to injury or death (Methorst et al., 2017b).

The present concept of traffic crashes originated in the early 20th century as the frequency of fatal motor vehicle collisions increased as a result of the development of motorisation (Norman, 1962 cited in (Methorst et al., 2017). As a result, (motor) vehicle wrecks were used to define and quantify traffic accidents. According to Norman (1962), in the United States in 1957, the number of people killed in car accidents outnumbered people who died from all contagious and communicable diseases combined, regardless of age. There was a heightened risk of motor vehicle collisions involving pedestrians, which resulted in numerous fatal traffic accidents. The number of deaths from Pedestrian Falls is likely to have been insignificant when compared to the

number of official motor crash deaths leading to its neglect in the overall definition of traffic crashes. However, the problem of pedestrian falls, trips and slips cannot be ignored anymore especially, in developing countries where rapid urbanisation is taking place, with the population outgrowing the existing infrastructure.

Trends in Pedestrian Injuries

Globally death and injuries as a result of road traffic crashes are on the increase. However, the statistics available in many cases are that of vehicle-vehicle crashes and vehicular-pedestrian crashes, having little to no data on the incidence of pedestrian-only injuries resulting from falls, slips, collision with other pedestrians and obstructions in the built environment. Pedestrian injury casualties have been defined in many instances as the sum of pedestrian victims following a collision with a vehicle (Damsere-Derry et al., 2010).

The severity of a pedestrian injury is classified as fatal, hospitalized, or minor or slight injury. A hospital injury necessitates at least 24 hours of hospital care, while a fatal pedestrian injury results in death within 30 days of the crash incident. Slight injury is defined as any other injury that does not necessitate a 24-hour hospital stay (Damsere-Derry et al., 2010). According to (Methorst et al., 2017), pedestrian falls cause the vast majority of non-fatal pedestrian injuries in traffic; as a result, the idea has not received much attention. They concluded that 4–9 times as many pedestrians are injured in falls as in pedestrian-vehicle collision utilising data from certain European countries.

Although walking is good for health, the highest road traffic fatalities are among pedestrians at 3.4 per 100,000 inhabitants, after passengers of

motorised four-wheeled vehicles at 5.9 per 100,000 inhabitants (WHO, 2018). In the United States of America, the National Centre for Health Statistics estimated a total of 8,984 pedestrian fatalities in both traffic and non-traffic-related accidents throughout the year 2021, with most pedestrian deaths happening in urban settings (NHSR, 2023). Non-traffic incidents are defined as accidents that take place on non-traffic routes, including driveways, parking lots, or other privately owned areas. A report by the National Road Safety Authority in 2016 revealed pedestrians accounted for the biggest percentage of fatalities on the roads in Ghana (824; 39.5%), followed by motorcycle riders (437; 21%) and bus passengers (364; 17.5%). The Accra Metropolitan Assembly's road safety report for the years 2019 and 2020 reveals that in both 2019 and 2020, a significant proportion of road traffic fatalities were attributed to vulnerable road users, namely pedestrians, motorcyclists, and cyclists, accounting for 76 percent and 85 percent of total deaths, respectively.

Head Porterage

Although it is not a new phenomenon, the practice of head porterage has changed recently. This custom dates back to the colonial era when mostly elderly women engaged in it. In response to the significant unemployment during Ghana's period of independence, there was an upsurge in the practice of head porterage as a temporary income source. The most noticeable component of porterage during the immediate post-independence era was young men pushing carts through the market. But at the start of the 1970s, young women who were eager to accept a lower pay for carrying the items outcompeted the men.

Porterage activity was historically a female activity, according to Agarwal et al., (1997). Rural women in Ghana and other parts of Africa have been known to carry heavy loads on their heads while working in agriculture. They utilised it to convey their harvest from their farms to their villages, either for consumption or for sale. In modern Ghana, the activity is still prevalent in both urban and rural areas. The practice of head porterage in Ghana is characterised by a great representation of females, particularly young women and girls, who are the principal participants in this occupation. The aforementioned phenomenon can be attributed to conventional gender roles and societal expectations (Porter, 2008).

Congestion in and around Ghanaian city centres caused by unplanned buildings and structures, human traffic, and motorised traffic makes effective utilisation of trucks and vehicles difficult. Because of this, head porterage is the favoured option by many traders, market women and travellers (Agarwal et al., 1997).

Female Head Porters

The term “kayayo” is made up of two terms from two separate Ghanaian dialects: “kaya” in Hausa, which means “load”, and “yoo” in Ga, which means “carry”. Thus, “Kayayo” literally means “to carry the load”. In this regard, “Kayayo” is more or less a sort of employment in which people (often young women and girls) carry bundles of products on their heads for a charge from one location to another (Shamsu-Deen & Adadow, 2019b). Opare (2004), also describes Kayayei as women who, for a small price, carry goods and wares on their heads for customers and traders in and around commercial centres (Ahlvin, 2012). "Kayayei" are mainly younger and unskilled people

with little or no education who relocated from Ghana's undeveloped rural areas in the north in search of work in cities (Yeboah & Appiah-Yeboah, 2009).

Movements of Head Porters

In developing nations with inadequate transportation and market planning, head porters make up a significant portion of the transportation systems and structures (Ahmed & Rikko 2005, cited in Akanle & Chioma, 2014). Female head porters organise their daily tasks to some extent. They work within clearly defined, mostly based on ethnic settings. For the several ethnic groups, ethnic spaces had been created to prevent or reduce conflicts (Awumbila & Ardayfio-Schandorf, 2008).

Head porters carry heavy loads on their heads, covering long distances in the city centre while navigating heavy vehicular and human traffic exposing them to traffic injuries and crashes (Yeboah, 2009). According to a study by Akanle and Chioma (2014) in Nigeria, head porters in Bodija market battle for space and walkways while they transport products for customers because of encroachment by store owners and hawkers selling their wares near to roadside as well as the flow of other walkers. There was also a physical obstruction by big trucks offloading tubers of yam. Head porters had to devise a strategy to move through the crowded market despite physical obstacles like trucks parked on the walkways.

Female head porters, or Kayayei as they are more commonly known, work mostly in Ghanaian towns and cities' central market areas. In quest of customers, they walk from one end of the market to the other. Others also sit in groups waiting to be engaged. Market women occasionally hire them to

transport their merchandise from storage sites in the morning and to return the goods to the storage places after the working day. Sometimes they have to accompany women shoppers and help them carry their luggage while they shop and when they return to the parking lot. Similar to shoppers, traders hire kayayei to convey their luggage to the transport terminals (Opare, 2004).

Female head porters' movement in the CBD is influenced by many factors. For instance a study by Afriyie et al., (2015) revealed that economic factors play a significant role in the movements of head porters. They typically relocate from rural to urban regions in quest of greater economic prospects. The availability of work in specific places influences their decision to move from one place to the other. Social factors, such as family ties and community networks, also influence the movement patterns of female head porters. Female head porters are sometimes accompanied by family members or acquaintances, which also affects their mobility patterns. Female head porters' mobility patterns are similarly influenced by the urban environment. Market location and transportation infrastructure are two elements that influence where and how frequently they move. Their mobility habits are influenced by the state of the roads, the availability of transportation terminals, and the level of congestion in the city.

Health and Access to Healthcare among female head porters

The World Health Organization defines health as "a condition of complete physical, mental, and social well-being and not only the absence of disease or disability. This portion of the thesis covers the physical injuries that head porters sustain as a result of their work and how they get medical care.

According to Mucci et al., 2019, migrants, who are mostly unskilled, are usually employed in risky jobs and in dangerous and unsanitary conditions, which hurt their health and well-being. Female head porters or Kayayei are part of the unskilled category of migrants whose activities can be classified as risky.

Previous studies reveal most head porters in cities live in exposed locations like open spaces, platforms at truck stops, makeshift wooden huts, and stalls. Teenage females who participate in head porting activities face challenges such as insufficient hygienic facilities, substandard lodging, and harassment from men in their sleeping areas (Nyarko & Tahiru, 2018; Shamsu-Deen & Adadow, 2019b). the majority of studies concerning female head porters have been on their reproductive health, maltreatment by their partners and other communicable diseases. However, none of the studies have been concentrated on injuries they incur as a result of their mobility in the urban space.

To conclude, CBDs in developing countries are characterised by inadequate pedestrian infrastructure. Infrastructure for road users had been planned with just motorised vehicles in mind neglecting the needs of pedestrians and cyclists. Road traffic injuries have predominantly been defined as injuries sustained as a result of vehicular crashes and pedestrian knockdowns with no consideration for falls and slips due to movement. This phenomenon is however predominant in the epidemiological field as it is seen as a health-related issue. Female head porters engage in strenuous and risky activity. Their activities see them moving a lot in the Central Business District and this also exposes them to lots of harm in the city.

CHAPTER THREE

RESEARCH METHODS

This section looks at the methods used to achieve the objectives of the study. The study is focused on assessing the urban infrastructure design of the CBD of Kumasi, mobility, and the risk of injury of female head porters. Urban Infrastructure is measured in terms of the existing pedestrian facilities in the Central Business District. The mobility of female head porters was examined using their daily activities.

Research Design

The study adopted the concurrent triangulation design. Research design establishes a connection between a study objective or topic, a suitable technique of data collection, and a predetermined set of results. The concurrent triangulation design entails the simultaneous collection of qualitative and quantitative data within a single study. The study collected and analysed both qualitative and quantitative data simultaneously to validate findings generated by each method to through evidence produced by the other. In this study, the researcher conducted interviews with some respondents with others answering questionnaires and findings from both methods corroborated each other.

Research Approach

A mixed research methodology was used to accomplish the set objectives for this study since it gave the researcher the chance to combine qualitative and quantitative research methods in a single study (Creswell & Creswell 2013). The fundamental premise behind using such a research approach, according to Creswell (2012), is to aid the researcher in developing

a deeper understanding of the identified problem. The strength of one research approach compensates for the weakness of the other in this circumstance.

The relative benefits of combining both qualitative and quantitative approaches surpass the identified constraints, even if the employment of a mixed-method approach requires significantly more time and resources to design and implement. When both quantitative and qualitative methods are used, the data produced is more diverse, as different sources and types of data, contexts or environments, and analyses are addressed. Furthermore, the use of both procedures increases the degree of validity and dependability of the data because both methods allow the researcher to cross-check data obtained in the field (Creswell, 2014).

Qualitative data for this study was obtained by interviews with female head porters on their pedestrian environment and incidence of injury. Here, participants narrated how they go about their daily activities, and shared their views on factors that influence their movements in the CBD. They also recounted places where they incurred injuries the most, and the medical care they received after incurring injuries. Qualitative data was also collected from stakeholders, with a focus on their role in providing accessible and safe pedestrian infrastructure in the city centre. An observation checklist was used as well to document the state of the available pedestrian infrastructure in the Central Business Centre as well as the activities and movements of female head porters.

The questionnaire was used to collect quantitative data for this study about the movement patterns, pedestrian environment, and injury incidence of female head porters.

Study Area

Kumasi is the capital of the Ashanti region and among the largest metropolitan areas in Ghana. Kumasi, Ghana's second-largest city, has served as the Ashanti region's principal commercial, industrial, and cultural hub for the past 100 years (Cobbinah et al., 2019). Because of its geographical location and road network, Kumasi is the most important commercial city not only in Ghana but also in West Africa. Kumasi's CBD encompasses Adum, the Central Post Office Area, Asafo Market, the Kejetia Lorry Terminal, and the Central Market; the business district spans 294.5 acres. The Central Market and the Kejetia Lorry Park form the heart of the CBD, generating massive traffic that crosses the city and the region (Amoako et al., 2014). Because of the city's importance as an administrative and commercial centre, there has been a massive influx of female migrants from Ghana's three northern regions to engage in economic pursuits as head porters (Adomako, 2016).

The actual population of head porters (Kayayei) in Kumasi is unclear; this is due to a lack of national survey specifically aimed at the group. However, a study by Baah-Ennumh and Adoma (2012), estimated 23,000 kayayei in Kumasi. Female head porters work in the CBD, carrying heavy loads of traders, shoppers, and travellers for a charge. The majority of female head porters in the Kumasi metropolis are minors who moved from rural areas in the Northern region for greener pastures. The majority reside in wooden shacks within the city's slums, while some pool resources to rent a modest single room, still some sleep in front of stores, terminals, or abandoned industrial buildings. (Baah-Ennumh & Adoma, 2012).

With an elevation of 250 to 300 meters above sea level, the CBD region is located between latitudes 6.35 N and 6.40 S and longitudes 1.30 W and 1.35 E. To the north, it is bordered by Ashanti New Town; to the east, it is bordered by Bompata, Fante New Town, and Asafo; and to the south, it is bordered by Asokwa. The CBD of Kumasi is developing vertically due to a lack of sufficient land area to allow physical lateral growth in commercial operations. Increased commercial activity without proper attention to pedestrian safety has resulted in various pedestrian issues in the CBD, such as traffic congestion and inadequate road networks caused by hawkers' invasions of streets and available sidewalks (Amoako et al., 2014).

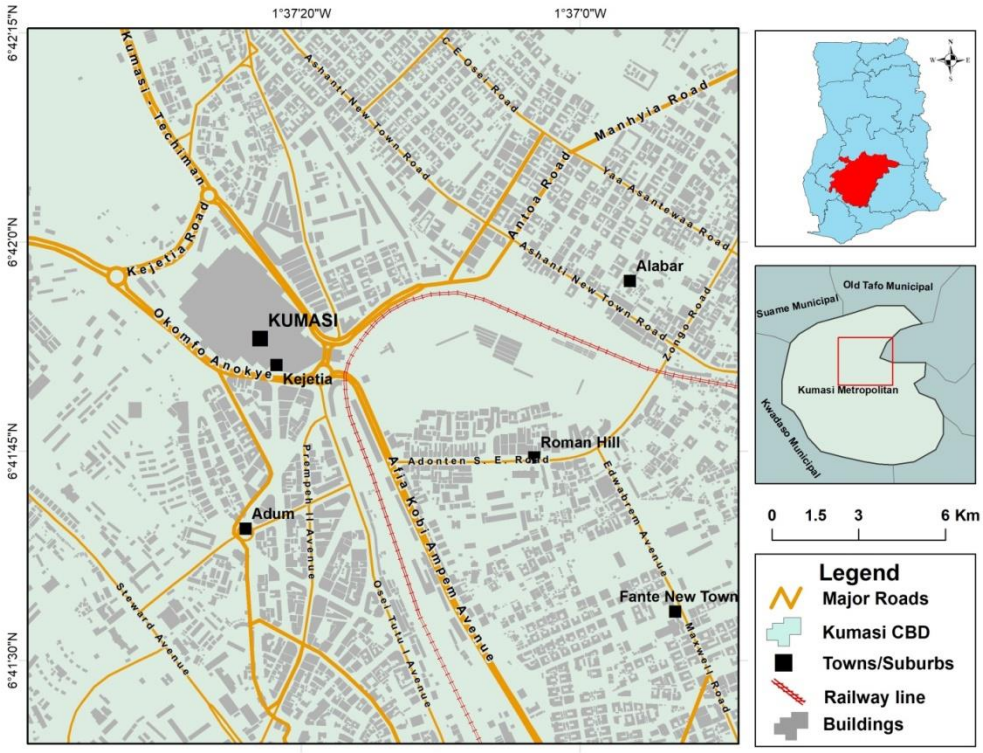

Figure 3: Map of CBD of Kumasi

Source: Department of Geography and Regional Planning (2023)

Target Population

All female head porters within the CBD of Kumasi constituted the target population since their activities are all done on foot in the CBD and can be considered as part of the most active travellers in the city and most vulnerable as well according to the WHO (2018). To gauge how stakeholders respond to the mobility needs of female head porters, the study targeted the Department of Urban Roads, whose outfit oversees the construction and maintenance of road infrastructure and other pedestrian facilities in the city. National Road Safety Authority was also a target stakeholder as they take care of road safety education and awareness. Further, the Motor Traffic and Transport Department was targeted because their outfit oversees the traffic flow and maintenance and also keeps data on the crash incidents in the city. The last stakeholder target of the study was the Manhyia District Hospital. The Manhyia District Hospital was chosen for the study due to its proximity to the CBD and its accessibility to many residential areas where female head porters reside and seek medical care.

Sample Size

Obtaining the total population of female head porters in the city centre was not possible because data is not readily available. There is no proper database where data on female head porters operating in the CBD of Kumasi was stored. The researcher therefore had to rely on a previous study conducted by Baah-Ennumh and Adoma (2012), which estimated the population of female head porters in Kumasi to be 23,000. The study then used Yamane's formula to calculate for the sample size for female head porters. The sample

size for a particular population size, confidence level, and margin of error is determined using Yamane's formula. The formula is:

n = N / (1 + N(e2)) where:

n= sample size

N= Size of the population

e= Margin of error expressed as a decimal

The population size in this instance is 23,000, the level of confidence is 95%, and the margin of error is 5%. Therefore:

e = 0.5

N = 23,000

z-score for 95% confidence level = 1.96 (from the standard normal distribution table)

Using the formula, we get:

n = N / (1 + N(e^2))

n = 23,000 / (1 + 23,000(0.05^2))

n = 23,000 / (1 + 57.5)

n = 23,000 / 58.5

n = 393.16

The sample size, rounded to the nearest integer, is 393. Thus, using Yamane's formula, a sample size of at least 393 is needed to attain a confidence interval of 95% and a margin of error of 5% for a population of 23,000 people. However, the study could not gain the sample size to help with the study due to time constraints as a result of the nature of the respondents' work and the time allocated for the study. Hence a representative number was gained to help with the study.

By purposive sampling, the study also conducted in-depth interviews with the key stakeholders. The study selected personnel from the Motor Transport and Traffic Department (MTTD), and National Road Safety Authority because these institutions are related and concern themselves with the planning and construction of pedestrian infrastructure as well as the safety of pedestrians in the city. Manhyia District Hospital was selected because it is closer to the city centre and also the residential area of most of the female head porters and as such the researcher assumed data on injuries of head porters can be made accessible to help with the study. In total, a sample size of 396 participants was to be used for the study, 3 key informants and 393 female head porters. However, only 223 head porters agreed to participate in the study.

Sampling Procedure

In the selection of participants for the study, non-probabilistic sampling techniques were used. Non-probability sampling, according to Creswell (2013), is most suited when the study's goal is to provide an in-depth understanding of the world as seen through the eyes of the people being studied. In this regard, the study employed purposive, accidental and snowballing sampling techniques for female head porters and purposive sampling for the key informants.

In the sampling of the key respondents for the study, locations within the CBD with high commercial and economic activities were identified first. These locations include Kejetia market complex, Adum, Pampaso and Dr. Mensah. Kayayei based on their distinct features of always being with a pan either on their heads or used as a seat, long dresses and most times head

coverings and often in groups were approached opportunistically. The researcher first built rapport with them and explained the purpose of being there. Having built a rapport with them, the head porters who were willing to participate were interviewed. Other key respondents were administered with questionnaires by explaining the contents of the questionnaires and seeking their answers to help with the study. After the interview and questionnaire administration, the participants were asked if they knew others who would like to help with the study and through their referrals other female head porters were accessed to participate in the study.

The study purposively sampled the key informants from three institutions whose mandate align with pedestrian infrastructure and safety, and injury treatment in the city. These key stakeholders were from the Motor Traffic and Transport Department of the Ashanti region, Manhyia District Hospital and the National Road Safety Authority Ashanti regional office.

Research Instruments

The main instruments for the study were Questionnaires, Semi-Structured Interviews, an In-depth interview guide and an Observation checklist. Questionnaires were used mainly for the primary respondents because it is fast and efficient which makes is effective due to the nature of their work. The questionnaire was divided into three sections. Section A comprised the background information or demographic information of the respondents. Section B sought to investigate the route choice of respondents, that is the study sought to understand the characteristics of the route respondents use and the factors that influence their route choice. Section C explored the incidence of injury. The objective was to investigate the types of

accidents respondents have been involved in, the causes, aftercare and effects of the accident. The questionnaire was electronically coded with the Kobo toolbox and deployed via smartphones. The decision to use Kobo toolbox was influenced by the numerous advantages of electronic data collection over the traditional paper and pen method. In this case, kobo enabled the researcher to obtain real-time data while also sparing the researcher from data entry because these were automatically included in the platform. Other primary respondents were interviewed using a semi-structured interview guide. The instruments were categorised into three major themes, the respondent's socio-demographic characteristics, movement patterns in the CBD, and the incidence of injuries as a result of their movement. Participants shared the influencers of their movement, experiences of walking in the CBD, how they sustain injuries, and the aftercare they receive.

The study developed interview guides for the Kayayie and stakeholders at the institutional level. According to Turner (2010), a personal interview is a data-gathering process in which the interviewer asks particular questions about the topic under examination to participants or interviewees. Stakeholders included a representative of the MTTD Kumasi branch, the District Director of Nursing of Manhyia District Hospital, and a representative from the NRSA. Information concerning pedestrian facilities, healthcare of female head porters, and crash statistics were elicited from these respondents.

The study also heavily relied on an observation checklist. The study constructed an observation checklist to observe the activities of the female head porters and the pedestrian environment in the Central Business District of Kumasi. According to Kawulich (2012), in the social sciences, observation is a

way of gathering information about people, processes, and culture and unstructured observation assists the researcher in recognising the role of context in the development of knowledge.

Recruiting Research Assistant

A research assistant was recruited for the study to reduce the workload, manage time and, minimize the researcher's bias. It was therefore imperative to train the research assistant to become conversant with the study. The research assistant was first given the overview of the study including the main purpose of the study as well as the specific objectives. Following that, the research assistant was taken through the data collection instruments, ethics, and the entire data collection procedure. The assistant was also taught how to recruit volunteers and preserve proper data records at all times. During data collection, the assistant was constantly engaged to discuss emergent topics as well as new techniques for recruiting more respondents for the study.

Data Collection Procedure

This section of the study gives a detailed account of how the primary respondents, that is female head porters and the other key informants of the study were accessed. The process of gaining access to the female head porters, commonly referred to as Kayayie or "Paa O Paa" by the people of Kumasi, will be detailed.

The initial plan to get in touch with the leaders of the head porters to help with the organising of the porters proved futile since there seemed not to be a structure like that in existence. This was through the questioning of the porters to ask of their leaders. The whole process of data collection took

approximately five weeks. The data collection process started in the month of September and ended in the month of October.

On day one, together with my assistant went to the newly constructed Kejetia market to get participants for the study. Many of the target population were already at post with some waiting on buses that had arrived and offloading passengers and their belongings. Others had converged at a place relaxing and waiting on customers as well. We first approached a group of female head porters who were relaxing in front of some stores around the first gate of the Kejetia market. I introduced myself to them and told them the purpose of my visit. Among the group, only two were willing to participate in the study. This was because the rest claimed not to be fluent in both English and Twi language. After our interaction with them, I asked if they knew where most of their other colleagues could be found and we were directed to them.

In the subsequent days, together with my research assistant, we moved throughout the Central Business District to interact with more participants willing to help with the study. We moved from Doctor Mensah, through Adum, Roman Hill to Aboabo Station, a distance of about 2 km. This allowed the researcher to make good observations of the pedestrian environment of the city centre and also take records of such in the form of pictures and videos. Averagely ten questionnaires were administered each day. The interviews with the fifteen primary respondents were conducted in five days.

With the institutions, a letter of introduction was obtained from the Department of Geography and Regional Planning to help with making known the intentions of the study formal to the appropriate sections to help with the study.

On average, completing a questionnaire took approximately 10 minutes. The semi-structured interview with primary respondents took about 20 minutes to be done due to the probing and narration of respondents' stories. Interviews with key stakeholders lasted approximately 60 minutes, allowing sufficient time to explore the relevant themes and gather in-depth insights for the study.

Data Analysis

The data for the study were analysed in three phases per the design of the study. The qualitative was analysed first, then the quantitative study and finally both data were integrated to validate the findings generated by each method through evidence produced by the other.

In-depth interviews were transcribed verbatim, not missing anything that was recorded during the interview. This was done to record the participants' words, the context in which they were spoken, and other nonverbal gestures displayed during the interview. The written interviews were also transcribed into a Word document. To ensure clarity in the transcribed data, the researcher deleted all unnecessary information such as unfinished sentences, duplication of words/sentences, and non-relevant items that diluted the meaning of the transcripts. Transcripts were read and reviewed by the researcher's peers during the analysis of the qualitative data, and this served as the foundation for the construction of a coding scheme that classified common ideas into discrete themes.

For the quantitative analysis, the Statistical Package for Social Sciences (SPSS) Version 28 programme was used to code the information gathered from the questionnaire. To make sure there were no incorrect data

entries or missing data, the data was further cleaned. According to the questionnaire results, descriptive statistics, mainly means, frequencies, and percentages, were produced. Charts and tables were used to present the results.

Furthermore, regression analysis and chi-square test of significance were also employed to test the association between selected variables. The regression analysis conducted for this study was multiple linear regression. Multiple linear regression is a statistical technique that examines the connection between a dependent variable and two or more independent variables. Multiple linear regression was used in this study because it helped in determining how changes in the independent variables influenced the dependent variable, making it useful for prediction and decision-making. It also assisted in the testing of hypotheses as well as uncovering patterns within the data. Further, it is very effective in determining causal relationships.

In the study, multiple linear regression was used to analyse the influence of certain pedestrian facilities on the incidence of injury among female head porters. The dependent variable was the incidence of injury and the independent variables included the presence of covered drainage, paved streets, pavements/sidewalks, dilapidated pavements, opened drainage and overcrowded pavements. These variables were selected to aid in analysing the influence of the state of pedestrian facilities on injury incidence. Further, the influence of experience and age of porters on the incidence of injury were analysed using regression. The variables included in the regression analysis were measured on a nominal scale. These variables represented distinct, non-ordinal categories without inherent order or ranking. The study conducted three multiple linear regressions and they are as follows;

$II = \beta_0 + \beta_1$ (covered drainage) + β_2 (paved streets) + β_3 (pavements/sidewalks) + e

$II = \beta_0 + \beta_4$ (opened drainage) + β_5 (dilapidated pavements) + β_6 (overcrowded pavements/sidewalks) + e

$II = \beta_0 + \beta_7$ (number of years working) + β_8 (age) + e

Where II is the dependent variable incidence of injury and $\beta_0 + \beta_1 + \beta_2 + \beta_3$, $\beta_0 + \beta_4 + \beta_5 + \beta_6$, $\beta_0 + \beta_7 + \beta_8$ are the regression coefficients. The e represents the error term. The regression coefficients were calculated using the SPSS version 28 and to evaluate the connection between the independent variables and injury incidence, the model was fitted to the data.

The R-squared statistic, which calculates the proportion of variance in the dependent variable explained by the independent variables, was used to assess the model. To evaluate the importance of each independent variable and the overall significance of the model, the F-statistic and p-values for individual coefficients were also looked at.

The data collection process was conducted while upholding ethical standards. All research participants were informed of the study's purpose and encouraged to voluntarily participate. Additionally, respondents received guarantees of confidentiality and privacy.

Challenges from the field

During the data collection processes, a couple of challenges were encountered and these are discussed below. The first and most pressing challenge that the study encountered in the field was the language barrier that existed between the respondents and the researcher. Most of the respondents approached had difficulty understanding the language as most claimed they

were not very fluent in both English and Twi languages. For this challenge, a female head porter who is fluent in Twi assisted in translating the language to her colleagues for us and we were able to get the needed data. For places where we couldn't get a translator to help, the respondents were appreciated for their time and willingness to help with the study with no data being taken from them.

Further, there was the problem of time. The head porters are always on the go so getting a few minutes of their time was a heckle. The female head porters often work long hours and during their free time, they just want to rest and not be bothered. There was also the issue of trust. Most of the porters purported that they have been asked questions all the time and they have not seen any improvements in their situation and as such they don't see the need to help with the study. To help overcome these barriers, the researcher took the time to build rapport with the porters and ensured that they understood the purpose of the research, the confidentiality of the information provided, and the protection of their privacy.

There was also the problem of literacy. Most of the respondents had limited formal education and as such made their understanding of the survey questions quite difficult, however, the researcher took time to explain step by step all the questions in simplified terms to help with easy comprehension.

Getting in touch with the key stakeholders to help with the study was another challenge. Though personnel from the MTTD, Manhyia District Hospital, and NRSA were easily accessible, getting personnel from the Urban Roads Department was a hassle. The bureaucracy in this institution made it

difficult to have access to a representative. The researcher made sure to persist in the quest to get a response from the department.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter presents the key findings of the study, which provide answers to the research questions and are contextualised within the theoretical and conceptual framework. The chapter commences by presenting the socio-demographic characteristics of the participants, followed by a subsequent delineation into five distinct sections. Section one covers the movements of female head porters. The second section investigates the Pedestrian Environment in the CBD. The third section examines female head porters' exposure to injury in the Central Business District, section four assesses the influence of pedestrian infrastructure on the risk of injury and section five describes the types of pedestrian injuries among female head porters.

Socio-demographic characteristics of respondents

This section of the study presents the socio-demographic characteristics of the sampled female head porters in the Central Business District of Kumasi. It highlights characteristics such as; age, educational level, number of years working, average income per day, living arrangement, and place of residence.

Table 2: Background characteristics of Respondents

Demography	Category	Percentage
Age of respondents	Below 18 years	36.0
	18-24 years	48.1
	25-31 years	10.1
	32 years and above	1.0
	Missing	4.8
Educational level	No education	54.3
	Primary	35.1
	Junior high	8.7
	Senior high/NVTI	1.9
Number of years working	Less than a year	18.8
	1-2 years	49.0
	3-4 years	27.9
	5 years and above	4.3
Average income in a day (GHS)	Less than 20 Cedis	34.6
	21-40 Cedis	32.7
	41-60 Cedis	30.3
	61-80 Cedis	1.9
	Above 80 Cedis	0.5
Living arrangement	Self	2.9
	With friends	41.8
	With family	31.7
	With partner	23.6
	n=	**208**

Source: Field Survey, 2023.

Age

The study surveyed 208 female head porters in the Central Business District of Kumasi for the quantitative study and interviewed 15 others as well as 3 key stakeholders for the qualitative study. From Table 2, the age distribution of respondents who participated in the quantitative study shows most of the sampled population were young adults between the ages of 18-24 years. The mean age of respondents was 18.8 years. Among the 15 key respondents interviewed, the youngest was 16 years old, the oldest was 39, and the mean age was 23. This supports Yeboah (2009) earlier finding that head porterage is a distinct occurrence from street children and at the same

time refutes Azumah and Onzaberigu, (2018) earlier findings that asserted that most people engaged in kayayie in the Kumasi metropolis are engaged in child labour even though this study shows a significant percentage of respondents being below the age of 18 .

Educational level

The educational level among the participants in this study is very low. Table 2 shows more than half that is 54.3 percent of the respondents engaged in the survey lacked basic education which is very alarming because basic and junior high education in Ghana has been free and compulsory since the introduction of the Free Compulsory Universal Basic Education in 1995. This confirms the findings from a study by Azumah and Onzaberigu (2018) that that kayayie leaving home early at a very young age affects their attainment of education. Also, recently the introduction of the Free Senior High School initiative to ensure that every child in the country at least gains formal education up to the senior high level can be said to have fallen below expectations. About 35.1 percent of the respondents had a form of basic education up to the primary level. Those who had graduated from the junior high school level made up 8.7 percent of the participants and only 1.9 percent had attained senior high school education. Regarding the level of formal education among the 15 key participants interviewed, 6.7 percent of them had completed Senior high school and 40 percent had not had any formal education at all.

Years engaged in business

Regarding the number of years' participants have been engaged in the porterage business, the analysis revealed in Table 2 portrays that 49 percent

had been engaged in the business for between 1-2 years, 27.9 percent had been working for 3-4 years, and 18.8 percent had been working for less than a year. It is also evident that some had been working for less than three months while 4.3 percent has been in the business for more than four years. The duration of which the kayayoo have been in the business can be explained by the fact that they migrate to the city to engage in the porterage business as a form of employment and to save income. This confirms the observation from other studies that young women migrate to cities to work (Awumbila & Ardayfio-Schandorf, 2008; Azumah & Onzaberigu, 2018; Baah-Ennumh & Adoma 2012). However, for the respondents who participated in the key respondent interviews, the longest a participant had been involved in the business was 7 years, and the least was a year.

Income

From Table 2, the study revealed that about 97.6 percent of kayayei reported they earned less than 60 Cedis daily. This translates to less than 5 USD daily for these vulnerable ladies as compared to the nature of their work which includes carrying heavy and bulky goods throughout the day. Some (34.6 percent) earned as low as 20 Cedis while only one respondent (0.5 percent) reported earning more than 80 Cedis in a day. Although the majority are earning above the minimum wage of 14.88 Ghana Cedis, the earnings are quite low considering the risks and challenges they face in their line of work.

Number of years working vs income

The study further sought to find out if there was a relationship between the number of years a kayayoo has worked and her daily take-home pay using cross-tabulation and chi square test. The results from the test revealed a chi-

square value of 116.7 with a p-value of <.001 at a significance level of 95% which means that there is a statistically significant association between the number of years a head porter has worked in the city and her daily income. This implies that the longer a head porter has been in the business the higher she is likely to earn due to some acquired experience in getting customers as well as negotiating skills in getting a better fee for her services. Figure 4 displays in more detail the association that exists between the variable number of years worked and income.

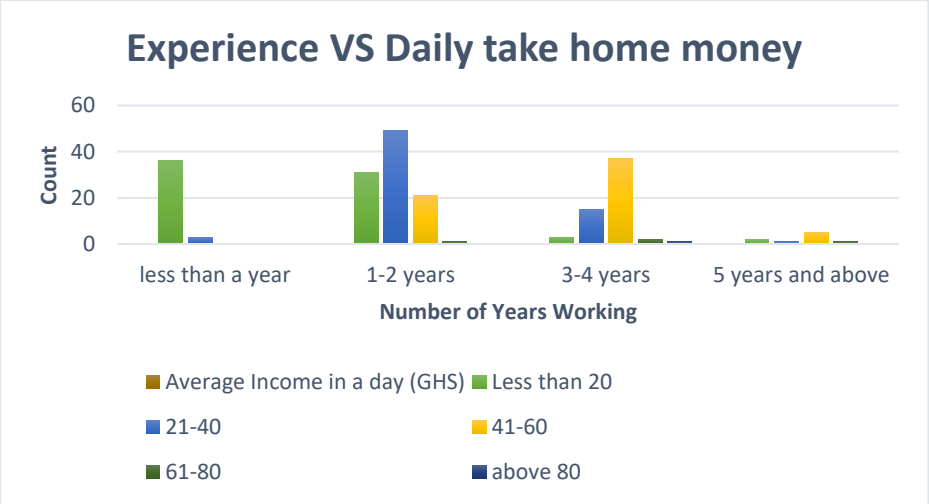

Figure 4: Number of years by Average Income

Source: Field survey 2023

Figure 4 displays the average income in a day (in GHS), that is the money they have left at the end of each day for different groups of female head porters based on their years of experience. From Figure 4, majority of respondents (92.3 percent) who have worked less than a year in the CBD as head porters earn less than GHS 20 average income in a day, 7.7 percent earn between GHS 21-40, and none earn more.

Among the 102 participant female head porters with 1-2 years of experience, Figure 4 above displays majority (48 percent) earn between GHS

21-40, 30.4 percent earn less than GHS 20, 20.6 percent earn between GHS 21-40 and 1 percent earn between GHS 61-80 and none earn more. For participant female head porters who have worked between 3-4 years, 63.8 percent earned between GHS 41-60 which forms the majority of them as depicted in Figure 4 above, 25.9 percent earn between GHS 21-40, 5.2 percent earned less than GHS 20, 3.4 percent earn between GHS 61-80 and 1.7 percent earn more than GHS 80. The last category of participants in the study were female head porters who had worked in the CBD for 5 years and above. From Figure 4, majority in this category earn between GHS 41-60 followed by those who earn less than GHS 20, 11.1 percent earned between GHS 21-40 and 61-80 each and none earn more.

Living arrangements

With the living arrangements, the analysis revealed in Table 2 shows that 41.8 percent of the respondents live with their friends while 31.7 percent live with their family, mostly siblings. This implies that most of the female head porters tend to live within a familiar space which confirms an earlier finding by Awumbila and Ardayfio-Schandorf, (2008) that kayayie carve out ethnic spaces where similar ethnic groups tend to live among themselves to prevent conflicts. Other respondents also lived alone (2.9 percent) and 23.6 percent lived with their partners.

Place of residence

To better understand their movement patterns in the city, participants were asked to provide data on their place of abode. The data shows that head porters lived in different suburbs in Kumasi with a majority of these places being in informal settlements. This confirms the findings by Baah-Ennumh

and Adoma, (2012) that the informal settlements serve as living spaces for migrants. Figure 5 shows the names of the various suburbs where respondents live and commute to work.

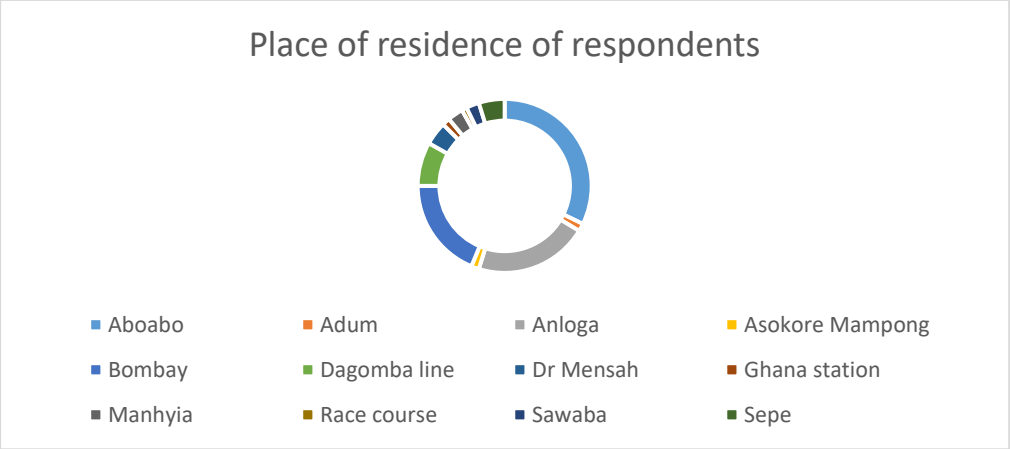

Figure 5: Place of residence

Source: Field survey, 2023

Among the 15 participants who were interviewed 46.7 percent reside in Aboabo, 20 percent reside in Dagomba line and 33.3 percent reside in Anloga.

Number of children

The analysis of the study as revealed in Figure 6 shows that the majority of the female head porters in the CBD have not given birth yet. They were represented by 63.9 percent. Over 18 percent of the respondents had a child. Twenty-five respondents representing 12 percent stated they had two children while 4 percent had three children and only two respondents representing (1 percent) had four children.

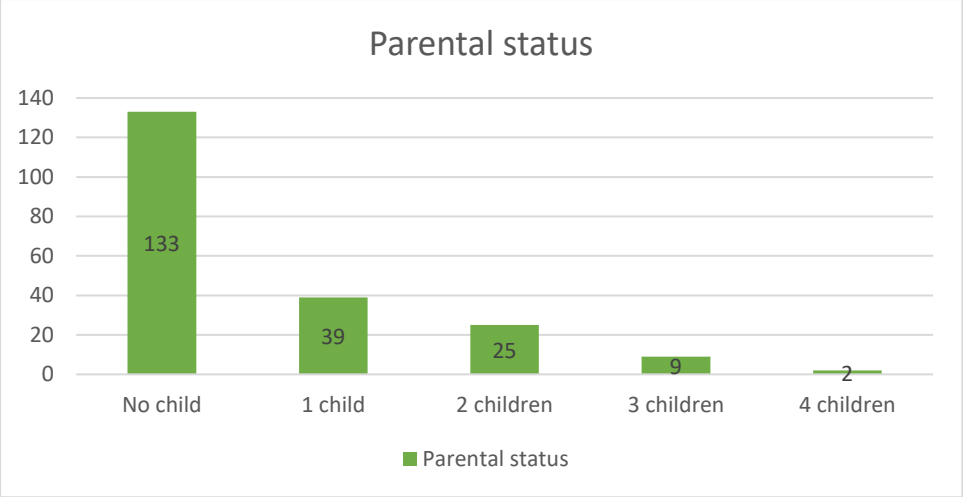

Figure 6: Number of Children

Source: Field Survey, 2023

Section One: Movements of female head porters

The movement patterns of Kayayie can be difficult to track, as they often do not have fixed schedules. However, this study sought to understand their movement patterns by taking into consideration how their daily routine spans.

The female head porter's day starts as early as 4 a.m. in order to get to the CBD. According to the participants engaged in interviews, their daily routine spans from waking up at dawn and preparing for the day's activity which starts as early as 6:00 am at the Kejetia Market or the Roman Hill, where they work until dusk. This confirms earlier findings of Komesuor (2021), that female head porters get to the Agbogbloshie market to start work as early as five o'clock in the morning. The day is usually filled with the struggle of obtaining clients, negotiating for payments and getting paid. This assertion aligns with the conceptual framework of the study where movement occurs as a result of the need for head porters to be engaged and to take

advantage of opportunities in the city centre. The following represents some of what respondents had to say about their daily routines:

"I wake up by 4 am, get ready with my child, and by 6 am we will be at work" (21-year-old, mother of one)

"Having to cater for 3 children and a partner, I wake up at 3 am, prepare food for the house and leave for work by 5 am" (30-year-old mother of three)

Usually, when they arrive for work in the Central Business District (CBD), female head porters' core business is to scout for potential clients and according to study participants, this feat is achieved in two main ways. While some head porters are mostly stationary working with shop owners by carrying loads and arranging these loads in the shops as well as assisting patrons of these shops in carrying their merchandise/goods to various terminals or to the patron's vehicles, others are more of 'free-range' scouts who roam the streets and terminals in search of potential clients. Once the kayayo is done providing her services by carrying the merchandise to the desired location of the client, she is unlikely to return to her previous spot but may move on to the next location where she can secure her next client. On the other hand, the first category of kayayei will always return to their stations (shops) where they are permanently located as presented in the following narratives from participants:

"I work with a shop owner in the kejetia market complex so when I come to work, I tidy up the shop's surroundings and wait for the owner to open for the day. When goods come, I carry the loads to where they are to be stored. Also, when

customers come and shop, I carry their goods to their cars or the lorry station and come back to the shop to continue with the loads" (18 years old)

"I do not have a particular place or shop I work; I roam the streets, markets, and lorry stations in search of clients. When someone calls for my assistance then I carry their load to their destination for an agreed fee" (30 years old, mother of 2)

"I have a particular shop owner who usually engages my services to carry loads for her and her customers and when the market is not that good in the shop I roam the streets in search of potential clients, so I am stationary at times and also on the move at times" (28 years old, mother of one)

From the narratives, it can be deduced that, kayayei who operate from more permanent locations such as shops, may be doing extra work for shop owners beyond their core work of carrying merchandise for clients for a fee. This may earn them extra money on the side aside from the money they gain from carrying patron's goods and this confirms an earlier study by Nyarko and Tahiru (2018) where they revealed that some female head porters engage in other activities to earn extra money. Figure 7 shows a picture of Kayayie in the city with their pans on their heads going about their daily activities.

Figure 7: Kayayie carrying their pans

Source: Field survey, 2023

Routes from residence to CBD

Female head porters frequent the city centre daily from their place of residence and back, as such their knowledge of the streets they frequent use and the factors that influence their decision to use such streets were sought through the questionnaire and interviews.

For the number of streets available to the respondents, 90 percent stated that there or more than three routes they can use to get to the city centre. Further, 6.7 per cent of the participants revealed that there are just two routes they can use to get to the CBD and 2.4 per cent stated that they only have one connecting route to the CBD. Figure 8 shows a graphical view of the number of streets available to participants.

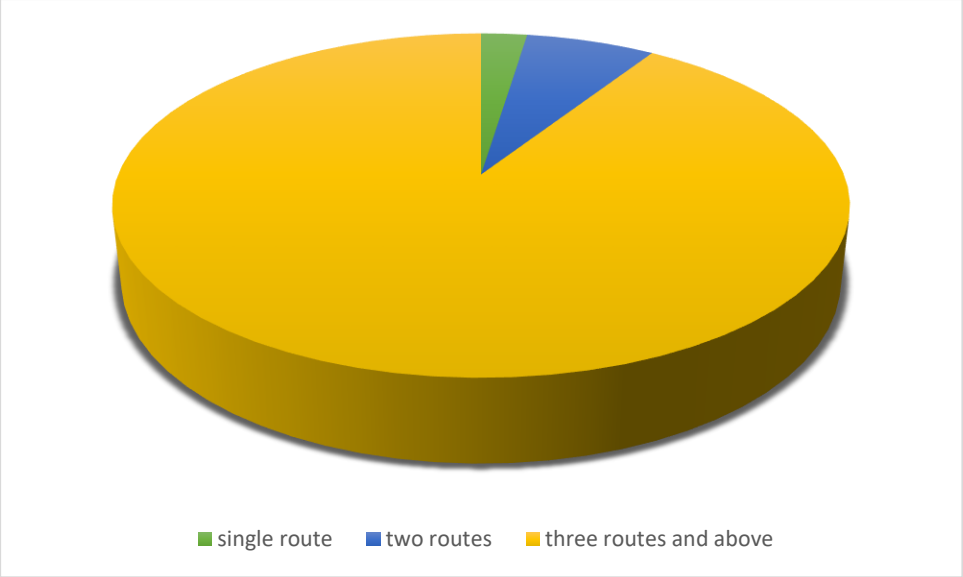

Figure 8: Route from home to the CBD

Source: Field survey, 2023

Type of route

Considering the route type, the respondents were to choose between whether the roads are exclusively pedestrian routes or multi-modal routes which means the shared routes with different user categories. From Table 3, out of the 208 sampled respondents, 65.9 percent asserted the routes available to them are a combination of pedestrian-only and multi-modal routes. 70 respondents representing 33.7 percent argued they use a multi modal route and only one person (0.5%) uses an exclusive pedestrian path.

Table 3: Type of Route

Routes	Frequency	Percentage
Exclusive pedestrian path	1	0.5
Multi-modal routes	70	33.7
Combination	137	65.9
TOTAL	208	100

Source: Field survey 2023

Nature of streets in the CBD

Roads are classified into two categories namely paved and unpaved. Unpaved roads are typically made out of gravel that has been put and compacted on finer-grained material such as clay or silt (Zhou et al., 2024) Participants were allowed to choose whether streets they frequently use in the CBD are paved or unpaved. They were to choose either one or both at the same time. The study revealed as displayed in Table 4 that 97.1 percent of the sampled population stated that streets in the CBD are paved and 41.8 percent indicated that some streets in the CBD are unpaved. The findings of the study revealed that a majority of the streets in the CBD are paved and well-developed. These findings confirm a study by Yaguang (2011) that the CBD has the most developed transport facilities and high accessibility in the city.

Table 4: Nature of streets in the CBD

Nature of street	Frequency (responses)	Percent of cases
Paved	202	97.1%
unpaved	87	41.8%
Total	289	138.9%

Source: Field survey, 2023

Factors that influence female head porters' movements in the CBD

Ahmed and Rikko (2005), in their study on market institutions for maize in northern Nigeria, revealed that due to the inadequate transportation systems and market planning in developing countries, head porters make up a significant portion of the transport systems and structures (cited in Akanle and Chioma, (2014). Head porters as part of the transport system move to achieve a greater good, that is to engage in transporting goods of shoppers, travellers,

market women and shop owners. For head porters to move within the city, many factors may come into play and as such the study sought to reveal the most important factors that influence how the head porter moves in the city. Based on the number and percentage of people who responded "YES" to the various factors outlined by the study, they were ranked from first to last in the factors that influence the movements of the female head porter in the city centre.

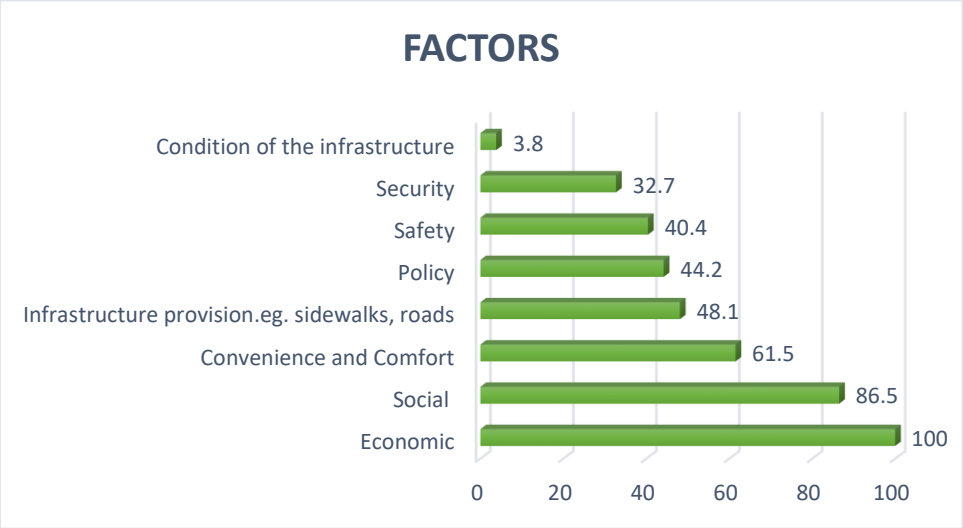

Figure 9: Factors that influence mobility patterns of female head porters

Source: Field survey, 2023

From Figure 9, the findings show that economic factors ranked first, the female head porter's main priority for being in the city centre is to generate income and thus she strategically moves to area where there will be the presence of potential clients. This confirms the findings from a study by Agyei et al., (2016) which revealed that the business of head porterage is the main livelihood activity of migrant females in the markets of cities. From the observations and interviews with some participants of the study, it was discovered that customers also have a significant impact on the female head porter's movement once her service has been engaged. The porter goes where

the customer is going, even though she might know a shorter route, she needs to follow the customer. These finding support the framework for the study where movement patterns of head porters are highly influenced by the location of businesses in this case the location of customers accessing their services. Below is an account from a female head porter:

> *"When a customer hires me to carry their load, I follow them although I might know the shortest route to where they are going, they always want to be behind you directing you to where they are going. Some will take you through very congested routes where you have to fight with other pedestrians and hawkers for manoeuvring space" (29 years old)*

This might present the porter with a greater risk of injury while manoeuvring the CBD or perhaps colliding with other commuters due to the congested alleys and routes they are 'forced' to use.

Social factors were determined to be the second most influential factor that determined their movement in the CBD. Female head porters tend to move in groups of similar beliefs and characteristics such as language, place of residence and ethnic affiliations. This confirms (Awumbila & Ardayfio-Schandorf, 2008) study of how female head porters tend to work within a clearly defined space mostly based on ethnic settings.

According to respondents, convenience and comfort, that is the availability of certain facilities like benches, rest rooms, shade and shortest routes to get to destinations is the third factor that influences the female head porter's movements in the city centre. Female head porters after roaming

about need places to rest and rejuvenate before resuming their tasks, thus they tend to seek out places well-equipped with shades and benches. Another facility of importance is a restroom to ease themselves although for a fee. Below are narrations from participants involved in the interview process:

> *"The new Kejetia market has now become a haven for me, the market is equipped with benches and restrooms that I can access at any time. The lanes are also big that I can rest by the shoulders and not be disturbed by any passer-by" (22 years old)*
>
> *"I usually come to the new Kejetia market when I get tired from all the roaming and take some rest on the benches with my friends. I get to relax comfortably before moving on again for the day" (19 years old porter)*

The presence of roads, pavements/sidewalks were prominently mentioned as factors that influence the movement patterns of female head porters in the city. Roads are an important part of the city and also serve as connecting links to the other parts of the city, thus it plays a significant role in the factors influencing movements.

Policy factors in this study refer to the restrictions that have been placed on some streets and areas in the city that prohibit entry. These are mainly streets that lead to institutions with hawking activities banned. This factor came fifth as respondents revealed certain streets in the city have hawking prohibition and as such, they steer clear of such streets as there are no customers even present to patronise their services.

Safety in terms of traffic volume, dilapidating drainage covers and presence of pedestrian guard rails came sixth in the ranking, although a very important factor to consider when moving around in the city, the majority of the sampled population did not deem it very important to hinder their movements in the city. This indicates that although the safety factor was considered important, it was not a top priority. It also suggests that, while factors such as traffic volume, dilapidating drainage covers, presence of pedestrian guardrails are crucial for overall safety, female head porters' perceptions and behaviours may not always align with their significance in hindering their movements within the city.

The presence of security personnel and even thieves and pickpockets were not that much of an important influence in the movement patterns of female head porters in the city, as such the security factor was penultimate. The presence of security personnel in the city, such as police officers or private security guards, is expected to have a positive impact on individuals' perception of protection. However, in the case of female head porters, the statement suggests that these security personnel have a limited impact on how they navigate the urban environment. The presence of thieves and pickpockets indicates that there are potential security risks in the city however, they do not significantly affect the movement patterns of female head porters. This suggests that these women may have developed strategies to mitigate these risks or have other concerns that take precedence over the threat of theft.

The least factor that the female head porter considers in her movements in the city is the conditions of infrastructure like roads, pavements/sidewalks, and traffic lights. Whether the pavements are

overcrowded or not, the female head porter aims to do her job and earn money hence will find the least space to manoeuvre. The study reveals that irrespective of the conditions of infrastructure in the city, the female head porter will survive as they are resilient. The study thus aligns with Kwankye et al., (2007), assertion that although female head porters are faced with numerous challenges, there are opportunities that exist in the informal sector for them to make earns meet as such they strive to overcome these existing challenges with the aim of earning and saving money in the city.

Section Two: Pedestrian Environment in the CBD

Pedestrian infrastructures are put in place to facilitate the efficient movement of pedestrians in the city. The study collected data on the pedestrian environment in the city based on the responses from the questionnaire, observations and key informant interviews with 15 other participants.

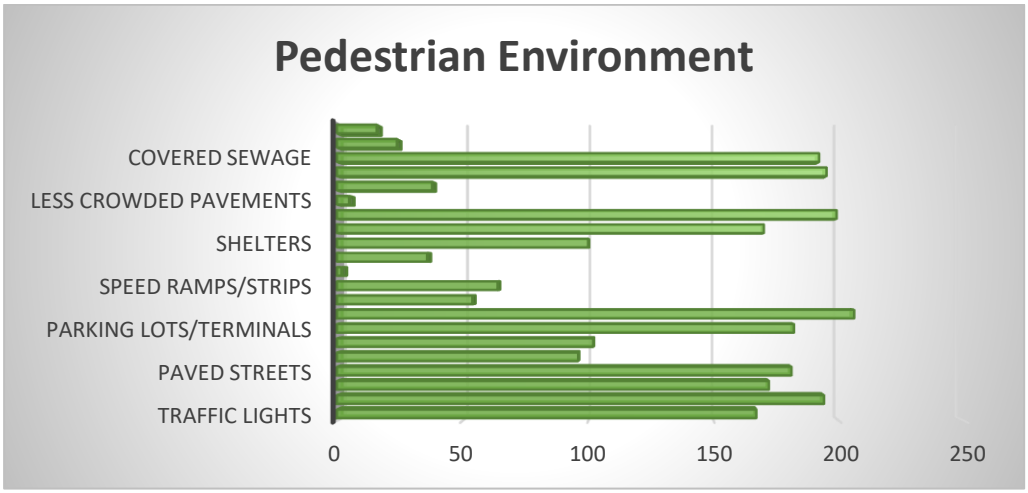

Figure 10: Pedestrian facilities in the CBD

Source: Field Survey, 2023

Figure 10 provides information on various pedestrian features of the CBD environment. The majority of respondents revealed the availability of

traffic lights, pavements, pedestrian crossings, bus stops, parking lots, and other amenities like benches, shelters and restrooms. Pavements in the CBD are overcrowded by hawkers while other parts are dilapidated. It was also observed that most sewers were covered with some few left bare.

The aforementioned findings from the survey align with the views expressed by participants in the interviews. They mentioned that almost all the road networks in the city centre are paved with just a few parts of the city not well paved citing Aboabo station as an example. In the case of pavements and sidewalks, the participants mentioned that although they are mostly present in the city and wide to accommodate at least two people at the same time, these facilities have been taken over by street-hawkers, shop owners, and parked vehicles. This situation forces them to compete on the road with moving vehicles, motorcycles, and *Pragya* which is very risky. These findings confirm an earlier observation by Lasmini and Indriastuti (2010) which asserted that due to the poor conditions of walkways in the CBD, pedestrians prefer to walk on the roadway. Below are some statements from participants

> *"Moving from Dr. Mensah to Kejetia lorry park is one hell of a journey, although not that long in terms of distance, all the pavements have been overtaken by sellers, from shoe sellers to clothes to foodstuffs, which forces me to use the road and when not careful one can be run over by a Pragya" (20 years old kayayoo)*
>
> *"The pavement stretches from the children's hospital to Kejetia and Adum has been overtaken by spectacles, shoes, and thrift clothes sellers" (23 years old kayayoo)*

Some of the participants also noted how some of the pavements are dilapidating with the pavement blocks being removed and leaving that portion bare.

From observations, the researcher also noted that most streets in Kumasi have sidewalks for pedestrians, but they are often narrow and uneven, with potholes due to the removal of some of the pavement blocks and obstructions. One of the major obstructions was sound systems and offering bowls that had been mounted by street preachers. Almost every street had at least one preacher on it. The pavements had also been overtaken by street hawkers, sellers, cars, and motors. Sellers of mostly clothing, utensils, foodstuffs, and groceries display their wares on the pavements to attract customers and thereby overcrowd the space. Store owners also display their wares in front of their shops to attract customers. This makes it difficult for pedestrians to move around safely and comfortably. People keep bumping into each other at each step of the way. This finding corroborates findings by earlier studies done in the CBD of cities (Amoako et al., 2014; Lasmini & Indriastuti, 2010). Lasmini and Indriastuti (2010), in their study argued that the sidewalk in the CBD of Malang City in Indonesia has been overtaken by hawkers, pots, and parked motorcycles. Figure 11 shows an image of a sidewalk that has been overtaken by sellers, hawkers, and shop owners forcing pedestrians and head porters to use the road

Figure 11: An overcrowded sidewalk

Source: Field survey, 2023

Figure 12 also displays pavement/sidewalk with some pavement blocks removed and rubbish piled up and serving as an obstruction for pedestrians with its open drainage being a threat to pedestrian safety as well.

Figure 12: Exposed gutter and pavement with piled-up rubbish

Source: Field survey, 2023

Considering the drainage system in the city, the majority of the roads are connected to a sidewalk by a gutter with some covered with concrete slabs

and metal steel. The participants mentioned that most of the metal coverings are rusted with others having caved in and posing a serious health risk to their movement. There is also the case of concrete slabs being broken and caved in. Some gutters in the city do not have any coverage at all, just bare and posing a risk to all pedestrians and not just the participants. The participants also mentioned that some shop owners and sellers use wooden slabs to cover the drainage in front of their shops as well as put their wares on them. These findings confirm earlier findings by Amoako et al., (2014) in their study about pedestrian safety in the CBD. The study also revealed that some of the drainage systems were covered to a point and left open to a point. Some had slabs covering it broken into the gutter and others also had slabs being displaced. Other stretches of the drainage system also had dangerous metal coverings that had caved-in exposing pedestrians to higher risk of being injured. Figures 13 and 14 show images of some drainages in the city captured by the researcher displaying the coverage, caved-in metal slabs and exposed drainage.

Figure 13: Metal slabs covering gutter caved-in

Source: Field survey, 2023

Figure 14: Exposed drainage

Source: Field survey, 2023

With traffic lights, the participants mentioned that although some parts of the city centre have them installed, they barely work, they are mostly broken down or just do not work. Observations by the researcher also revealed major intersections in the CBD had traffic lights, which provide a safe crossing for pedestrians. However, the traffic lights are poorly maintained, and some were not working at all during the time of the study. Personnel from the Motor Traffic and Transport Department had to step in to regulate the flow of both vehicles and pedestrians' traffic. It can thus be deduced that the traffic lights in the CBD are not properly managed and maintained.

In the entire city centre, the Kayayie' knew just one footbridge at Adum and they hardly used it. This was confirmed through the researcher's observations. The footbridge is located at Adum, on the Osei Tutu 1 Avenue. However, its location is not strategic. Thus, not many people access the facility which has now been overtaken by beggars. Also, hawkers used it as a resting point when they tired are after all the hawking they engage in. Figure 15 is an image of the footbridge located along the Osei Tutu 1 Avenue in

Adum and a crowded sidewalk with sellers selling their goods and pedestrians as well as head porters navigating through the little space left.

Figure 15: Footbridge and crowded sidewalk

Source: Field survey, 2023

The researcher also observed the presence of some zebra crossings in the city, but they were not well-marked and were often ignored by drivers. Others were also well-marked however, drivers kept ignoring them. An example of a well-marked pedestrian crossing can be found in front of the newly built Kejetia market just after the Kejetia roundabout.

Further, the researcher observed that there were limited guard rails in the city centre to separate pedestrians and vehicles. The new Kejetia roundabout and its connecting roads had pedestrian guard rails installed. Also, the Adum road had pedestrian guard rails installed however, they had been overtaken by thrift cloth sellers. The thrift clothes sellers use the rails as hangers to display their wares as depicted in Figure 16.

Figure 16: Guard rail being used to display clothes

Source: Field survey, 2023

Through observation, it was revealed that there is vehicular congestion in the city irrespective of the time of the day. The presence of tricycles popularly known as “pragya” has made the congestion even more unbearable. Due to their size, they can manoeuvre through small spaces thus taking some space meant for pedestrians in the city. This situation has made pedestrian movement in the city difficult and unattractive.

It can thus be deduced that although pedestrian infrastructure in the city centre is fairly adequate, it presents many challenges to pedestrians. Also, encroachment and lack of maintenance of these facilities have made walking in the city centre not conducive and even more dangerous for head porters who walk long distances with heavy loads on their heads.

Another part of the pedestrian environment that the researcher noticed during the study is the new Kejetia market complex. The new market complex at Kejetia is a major improvement to the old market. The market boasts a lot of pedestrian-friendly facilities. There is a car terminal at the ground level of the

market and two more levels housing different kinds of economic activities which are made accessible by staircases and ramps for people with disabilities. The market is very spacious and organised. There are wider walkways that can accommodate more than five people at a time, covered drainage systems, zebra crossings, pedestrian guardrails, and strict security. The female head porters take advantage of the less pedestrian traffic on the walkways and rest on their pans when they are tired, others even use their clothes as mats and sleep there during their break period. There was however a drain in front of the second gate of the market with little to no covering. Figures 17 and 18 show some pictures of the various pedestrian-friendly facilities in the market complex.

Figure 17: Well-marked zebra crossing in front of the market complex

Source: Field survey, 2023

Figure 18: Wide pedestrian walkway with kayayoo resting on her pan

Source: Field survey, 2023

The Urban Roads Department in Kumasi undertakes three major activities including, planning, development, and maintenance of roads and pedestrian facilities in the metropolis. The maintenance is grouped under routine and periodic maintenance. There is also traffic management. The department undertakes routine maintenance in the metropolis which includes the following: pothole patching/sectional repairs, minor drainage repairs, culvert repairs, grading, and replacement of slabs and metal gratings. Periodic maintenance includes drainage construction, culvert construction, curbs and retaining wall, gravelling, culvert approach fill, gravel supply, clearing and grading of unengineered roads, and resealing and shoulder repairs. With traffic management, the department caters to road line marking, speed humps, erection and repair of bollards, installation of traffic signals, removal of directional signs, walkway construction, intersection improvement, and

horticultural works (grass planting), street lights, road signs, and pedestrian guardrails.

Section three: Exposure to Injury in the CBD

Head porters are exposed to a lot of threats such as mental, physical and emotional threats as a result of their activities. Head porters' activities in the city involve lots of walking and as such can be counted among the most vulnerable groups of road users. They are exposed to injuries resulting from vehicular crashes as well as falls, trips and collisions with other pedestrians in the congested city. The study sought to find the number of the sampled population who have been involved in crashes resulting in injuries during their working hours. Out of the 208 sampled population for the study, 75.5 percent revealed that they had incurred injuries and 24.5 percent responded that they had not been involved in any sort of injury as a result of their movements in the city.

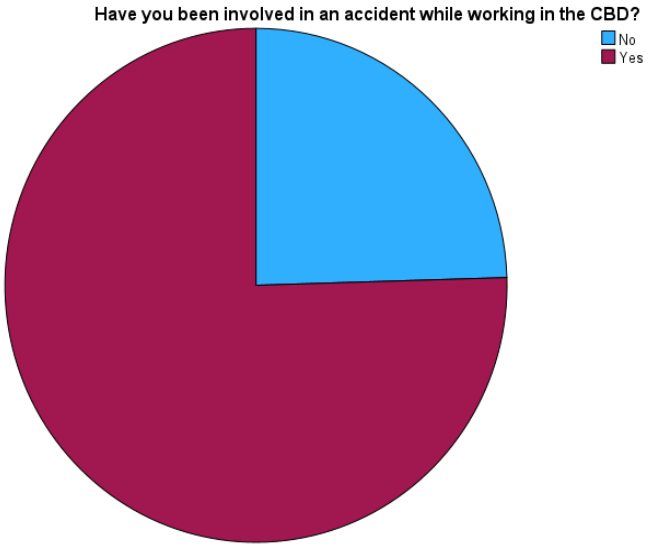

Figure 19: Incidence of Injury

Source: Field survey, 2023

Participants who were involved in the interview also revealed that they indeed incurred injuries due to their activities and movements in the city centre. Below is a narration of a participant:

> *"How can I be working for all these years without sustaining an injury, I have fallen more times than I can count, especially in gutters" (32 years old kayayoo)*

Age and Incidence of injury

The relationship between age and the incidence of injury was analysed using a Chi-Square test. This analysis aims to assess whether the age group of female head porters is significantly associated with the likelihood of experiencing an injury. With a chi-square value of 63.812 and a p-value <.001 (X^2=63.812, P<0.001), the study revealed that there is a statistically significant association between age group and the incidence of injury among female head porters working in the CBD. Table 5 shows the distribution of injury incidence across four age categories: below 18 years, 18-24 years, 25-31 years, and 32 years and above.

Table 5: Age and incidence of injury

Age group	No injury	Injury
Below 18 years	42	33
18-24 years	7	93
25-31 years	0	21
32 years and above	0	2

Source: Field survey, 2023

From Table 5, it is evident that injury incidence varies significantly across age groups. While the majority of individuals below 18 years have not experienced

injuries, higher age groups, particularly 18-24 years and 25-31 years, show a much higher proportion of injuries. Younger adults (18-24 years) are at the highest risk, followed by middle-aged adults (25-31 years). This revelation corroborates the World Health Organisation's finding in the 2023 road safety report about road traffic injuries being among the leading health challenges affecting young adults between the ages of 5 to 29 years.

Frequency of injury occurrence

Having known their status concerning injuries, the study further sought from those who had responded in the affirmative, about the number of times they have sustained injuries in the city. It was revealed that, out of the 157 respondents who responded yes to having an injury before, about 36 percent had sustained injuries more than ten times in their stay in the city. The results reveal how often head porters got injured while engaged in their activities in the city. Figure 20 depicts the frequency of injury sustained by the 157 respondents.

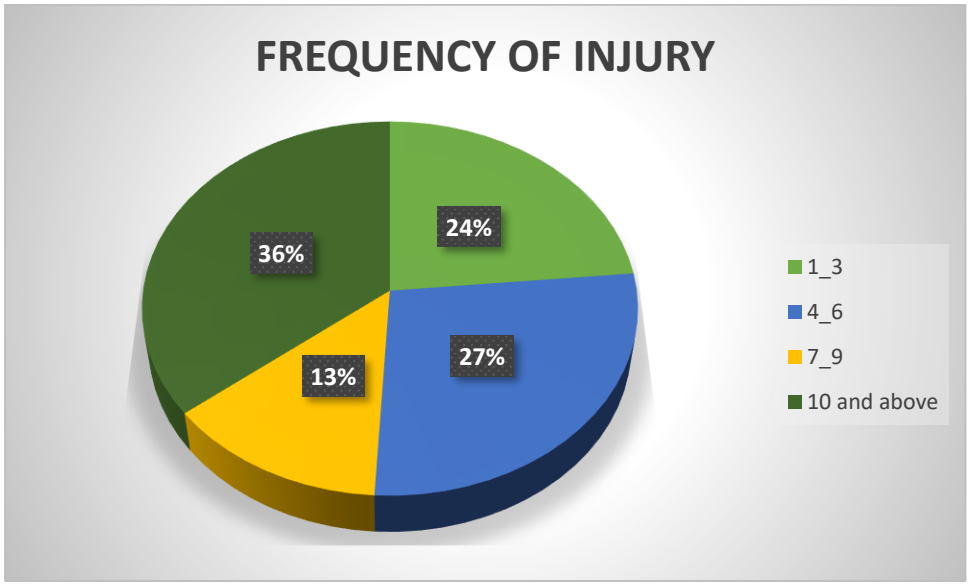

Figure 20: Frequency of Injury

Source: Field survey, 2023

Number of years working Verses frequency of Injury

Furthermore, the study sought to find out if there was an association between the number of years a head porter had worked and her incident of injury. With a chi-square value of 123.91 and a p-value <.001 at a significance level of .005 (X^2=123.91, P<0.001), the study found that the relationship between the number of years a female head porter had been in the business and pedestrian injuries was statistically significant. Thus, there is an association between the number of years worked in the city and the incidence of injury of female head porters. Figure 21 shows respondents who had been working in the city for a year or more tend to have a higher frequency of injury occurrence than those who had been working for less than a year. This implies that female head porters who have been in the city for long have a higher risk of injury occurrence due to cumulative exposure as compared to those who have just started working.

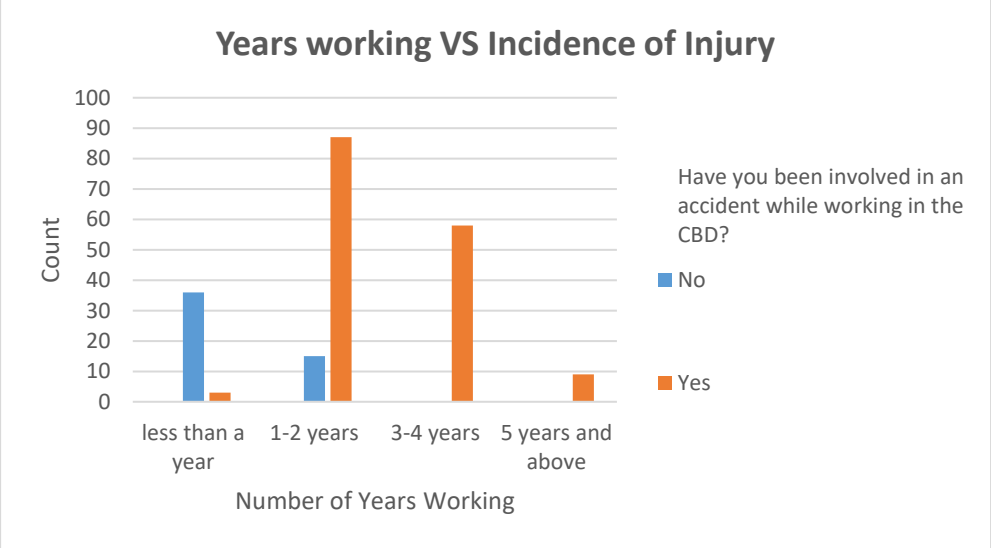

Figure 21:Years working vs Incidence of Injury

Source: Field Survey, 2023

Place of Injury

The study sought to examine the locations where female head porters have a higher chance of getting injured, as such multiple responses of five locations in the city were provided for the respondents to choose from. From the survey, it was revealed that the majority of injuries occur along the roads, followed by opened drainages. Sidewalks/Pavements follow, then parking lots and last but not least crossing the road. This corresponds to the causes of injuries in the city centre as a majority of the respondents revealed that, falling into gutters, trips and falls are the major cause of injuries among female head porters in the city centre.

Table 6: Place of Injury

Locations	Incidence of injury (%)
Opened drainage	68.2
sidewalks	40.1
Parking lots/terminals	35.7
Along the roads	72
Crossing the road	7

Source: Field Survey, 2023 n=157

Participants involved in the qualitative study mentioned that, the presence of pragya and motorcycles threaten their safety as they can be run over when using the roads. Also due to the long distances and heavy loads they carry, they tend to get tired and fall into drainages that are left bare without any cover. Those with babies also mentioned being exposed to neck and other bodily pains. This finding corroborates an earlier study by Komesuor, (2021) where she argued that due to the heavy loads female head

porters carry over long distances, they get tired easily and sometimes fall with the load. Below are some narratives from the respondents:

> *"Walking by the road-side with heavy load on the head is always dangerous. Pragya or motorcycle can hit you at any time and you will get injured" (17 years old)*
>
> *"Sometimes I fall as a result of the load and the long distance covered, leading to sustaining wounds on my leg and even chest pains at times" (24 years old)*
>
> *"One day I got so tired after carrying loads and walking all over the city that, I didn't even realise the metal covering the gutter had caved in and I fell inside" (20 years old)*

It can therefore be deduced that, movements and the activities of female head porters in the city centre expose them to different harms such as getting knocked down by a tricycle, sustaining injuries due to falling into gutters, falling by the roadside and pavements and colliding with other pedestrians.

The Ghana National Road Safety Authority (NRSA) is mandated to combine road safety education and enforcement to avoid accidents and the resulting injuries and deaths in the country. The Authority's main mandate had been to educate all road users on road safety awareness, however, the president in 2019 upgraded an act of parliament that added the enforcement role which also resulted in the change of its status from a 'Commission' to an 'Authority'. The authority provides education and sensitisation programmes to all road users with much emphasis on children. As part of this study, an in-

depth interview was conducted with representatives of the authority to know if there are sensitisation programmes in place to help reduce female head porters' exposure to injury and be safe in the city centre as they go about their daily activities.

According to the rep from the NRSA, their programmes target all road users whether drivers, passengers, or pedestrians. Citing the "Arrive Alive" campaign, where the main aim was to educate both drivers and passengers of the need for drivers to go according to the speed limit of the road and also to encourage passengers to speak up when the driver is over speeding and not keep quiet in the car. Their campaigns are for all road users and do not however have any special programmes tailored to the needs of head porters because they are classified generally as pedestrians in the city.

Section Four: Pedestrian Injury Type among Female Head Porters

The main focus of this objective was to describe the injuries that female head porters sustain within the CBD in the course of their work, where they encounter these injuries and the medical care they receive after sustaining these injuries.

Cause of injury

The study revealed that the major cause of injury among female head porters was opened drainages in the city, clashing with fellow pedestrians, tripping as a result of obstacles through to vehicular crashes among other causes. Figure 22 depicts the distribution of the various causes of injuries among female head porters in the city.

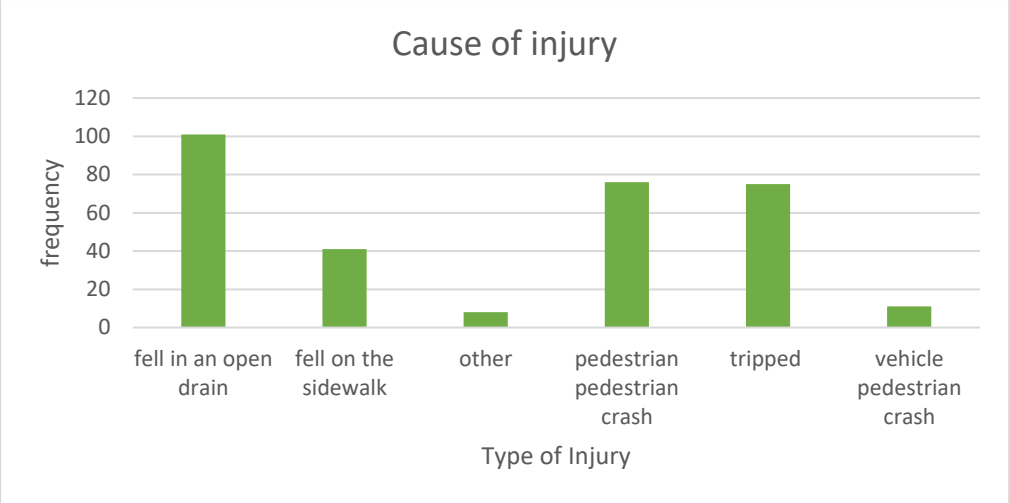

Figure 22: Causes of injuries among female head porters

Source: Field survey, 2023

During the interview sessions, participants revealed that they sustain injuries through tricycles, motorcycles, and vehicular accidents, falling due to the long distances they cover, the weight of the loads as well the conditions of the infrastructure in the city. The participants also mentioned that, due to the encroachment of pavements and certain roads by street hawkers, there is always human traffic which makes manoeuvring with a heavy load on one's head a risky task. They sometimes collide with other pedestrians leading to falls and eventually sustaining injuries. Below are some narrations from the participants:

> *"Carrying a load with a baby strapped at your back and manoeuvring through thick human traffic from the central market to Kejetia lorry station makes one very exhausted, I collide with at least one person a day" (24-year-old mother of 1)*

Revelations from the field show that the cause of the majority of injuries among female head porters is falling and the least is due to vehicular

crashes. This confirms earlier findings by Methorst et al., (2017) who argue that pedestrian falls are a high contributor to pedestrian injuries.

It can be deduced from the findings that, the majority cause of injury among female head porters is falls. Falling due to their activities is common among female head porters which leads to slight to serious injuries that might need medical assistance.

Time of Injury

The study revealed that the majority of injuries by the sampled population occurs during the day, in the afternoon when the sun is out, peak hours for traffic as well as pedestrians. Figure 23 shows a graphical representation of how participants responded to the time of day when they normally get injured in the CBD.

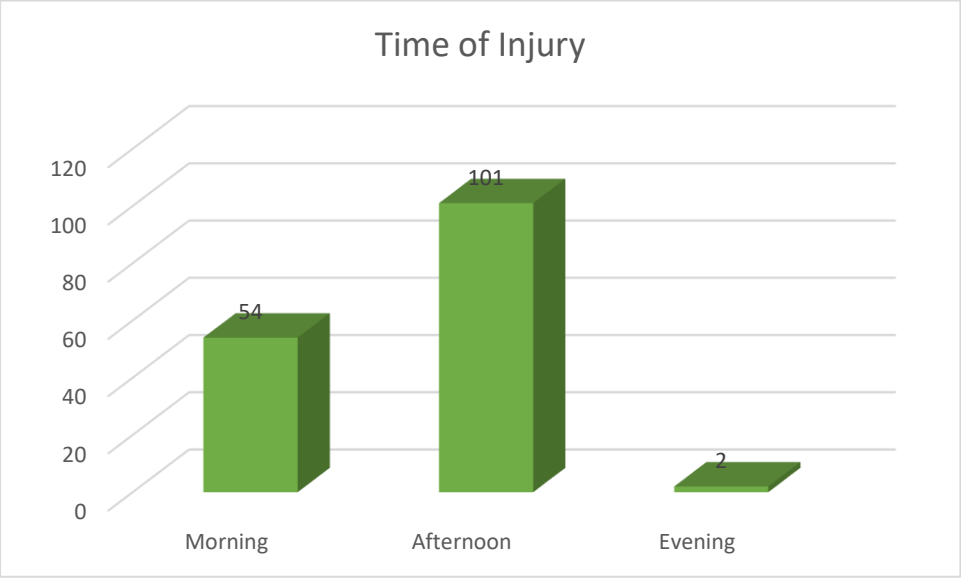

Figure 23: Time of injury

Source: Field survey, 2023

In the quest to get a better view of the injury patterns among female head porters, the Motor Traffic and Transport Department of the Ghana Police Service and National Road Safety Authority was consulted to solicit

information. The Motor Traffic and Transport Department, a division of the Ghana Police Service, and the National Road Safety Authority play a key role in actively collecting data and knowledge that can help shed light on the injury trends and related issues faced by road users.

The Motor Traffic and Transport Department of the Ghana Police Service is in charge of protecting lives and properties as well as the enforcement of rules and regulations on the road. They also collate and analyse accident data in the metropolis. The MTTD sees to it that, drivers adhere to safe speed, have a valid driving license, are dressed appropriately and their vehicles are in good shape. The department also directs vehicular and pedestrian flow in the city during peak hours when traffic lights break down.

Concerning data on injuries of female head porters, the respondent at the Kumasi MTTD office interviewed for this study mentioned that, the agency collates data on only injuries and fatalities as a result of vehicular movements and does not consider any injuries that are due to pedestrian-only activities. He further stated that if a pedestrian-pedestrian collision results in an alteration, that is when officers on duty step in to resolve the issue and, that is recorded as an assault case and not a mobility issue. Table 7 shows a breakdown of the data on pedestrian crashes in Ashanti Region.

Table 7: Pedestrian Crashes in the Ashanti Region

Knockdowns	2021	2022	DIFF	%DIFF
Total pedestrian knockdowns	693	530	-163	-24%
Total No. of persons killed by knockdown	188	127	-61	-32%
Total injured by knockdowns	509	402	-107	-21%

Source: Ashanti Regional MTTD, 2023.

According to the NRSA (2022), pedestrian death has been on the rise over the past four years and in 2021 pedestrians accounted for 60 percent of deaths as a result of road traffic crashes in the metropolis. Concerning serious injuries as a result of crashes in the metropolis, pedestrians accounted for 38 percent, only behind vehicle occupants. Tables 8 and 9 show the data on fatal injuries and serious injuries by road user type in the metropolis from the year 2017 to 2021 respectively.

Table 8: Fatal injuries by road user category

Road user	2017	2018	2019	2020	2021
Pedestrians	58	40	55	74	95
Vehicle occupants	19	21	31	42	38
Motorcyclists/tricyclists	25	36	42	36	25
Cyclists	0	6	0	0	0
Total	102	103	128	152	158

Source: KMA annual road safety report, 2021

Table 9: Serious injuries by road user category

Road user	2017	2018	2019	2020	2021
Pedestrians	137	169	238	215	213
Vehicle occupants	270	248	439	291	236
Motorcyclists/tricyclists	120	161	235	158	103
Cyclists	4	4	14	4	5
Total	531	582	926	668	557

Source: KMA annual road safety report, 2021

Tables 8 and 9 reveal that agencies in charge of recording accident and crash data do not have any database on reported cases of falls as a result of walking as the main focus of these agencies is vehicle-vehicle crashes and vehicular-pedestrian crashes. This confirms earlier findings by Methorst et al., (2017) and Oxley et al., (2018) that falls as a contributor to pedestrian-only

injury have not been considered as a transport injury by agencies in charge of recording crash data. The study also reveals that even with that, all pedestrian knockdowns are recorded based on the gender of the person involved, that is either a male or female and not by their occupation in the city, hence there is no specific data that caters for female head porters knocked down in the city.

The findings from the field further reveal that female head porters are not considered any different from the everyday pedestrians in the city and are not given special consideration or considered when recording data of crashes in the city. Also, injuries resulting from falls in the course of movements are not considered as transport injuries and have been taken leniently as something that usually occurs which should not be the case.

Type of Injury

The study reveals in Figure 24 that, the majority of the respondents in the study area sustained slight to moderate levels of injuries that do not need hospitalization while a minority sustained serious injuries and tended to seek professional medical help.

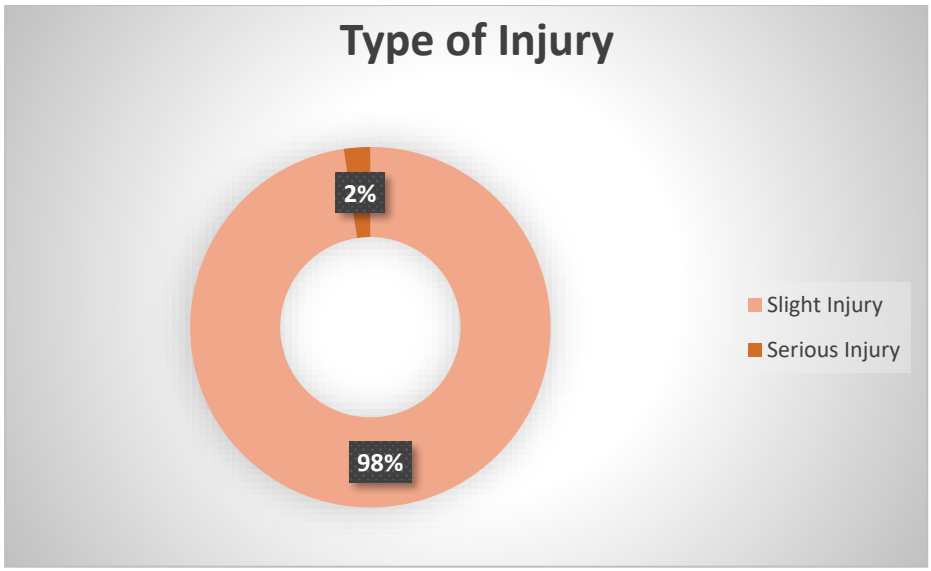

Figure 24: Type of injury

Source: Field Survey, 2023

Findings from key respondents engaged in the interviews also revealed they sustained slight injuries and thus tend to self-medicate due to the non-severity of the injuries and also because it is a cheaper option as compared to reporting to the hospital. Most of the participants mentioned that they resort to self-medication to manage the pain. This assertion corroborates an earlier study by Amoah (2021), that less than 50 percent of head porters access healthcare in the city due to their inability to fund the expenses. Others also noted that, when they are involved in serious injury as a result of a vehicular collision, they first seek professional assistance and later go back to their hometowns for treatment using herbal medications and practices. Below are some quotes from the participants

> *"I usually buy over-the-counter painkillers like paracetamol and ointments for the pain and bruises respectively" (20-year-old)*
>
> *"My go-to medicines are the herbal roots, powders, and bitters, they are very effective for pains and help cure wounds fast" (27-year-old)*

Recounting an experience of a friend who had been severely injured as a result of being knocked down by a moving vehicle, a kayayoo mentioned that they took the friend to the hospital for immediate care and later she was taken back to the village in the Northern region to receive herbal treatment. However, the friend never came back again to join the head porter business. The reasons for her absence were not revealed clearly, but this invites exploration into the potential physical and mental toll of accidents on Kayayei. Perhaps her injuries were severe enough to prevent her from returning to her

prior job, or she may have chosen a different career following her life-changing accident. This section of the study emphasises the enormous, and sometimes irreparable, impact of accidents on the lives of individuals, particularly those in physically demanding occupations such as head portering.

From a professional view, the study sought information from the Manhyia District Hospital on the injuries that female head porters present at the hospital. Manhyia District Hospital was chosen for the study due to its proximity to the city centre and the residence of the female head porters and also the hospital is easily accessible to the female head porter.

According to the Director of Nursing at the Manhyia District Hospital, they do not have any data on the head porters' injury type that they present at the hospital. According to the director, the head porters come in with different cases of medical needs however what is prominent among them is maternal care. She further mentioned that the database they have at the hospital groups injuries under transport injury, home injury, and occupational injury. According to her, the hospital defines transport injuries as injuries that are recorded as a result of vehicular accidents. Home injuries are recorded as injuries sustained in various homes and reported to the hospital and Occupational injuries are injuries that patients sustained in their workplace or as a result of their activities at work, these injuries are mainly from those working in the industrial, manufacturing, and construction sectors.

There is no database specifically for head porters who report injuries as they are counted as part of the general patients that go to the hospital to seek medical assistance. This also reveals the lapses that exist in data collected and

stored in the majority of the nation's public agencies making gathering data from these agencies very challenging.

Effects of injury on the female head porter

The study further probed into the effects injuries had on the life of the female head porter and answered the question of how their economic life, physical health and above all their everyday life is affected by the injury they incur due to their activities in the city

Table 10 shows the economic burden the female head porter gains as a result of the injury. In 64 cases, or approximately 40.8 percent of the total, the injury had limited the female head porter's ability to carry loads. This restriction could affect their productivity and income, as they would be unable to earn as much as they do when physically active. Respondents also revealed that they couldn't carry goods for a while which significantly affected their sales and income. The "Other" category, reported in 64 cases (40.8%), indicates that there are additional, diverse economic effects not explicitly listed in the table. Here respondents indicated that, the injury did not affect their economic activities and went on with their daily activities like they used to.

Overall, as indicated in Table 10, the injuries have significant economic consequences for individuals, influencing their work productivity, income, financial security, and ability to support their families. It also shows the resilient nature of the female head porter in the city.

Table 10: Economic effects of injury

Economic Effects	Response (%)
I couldn't carry goods for customers	17.2
I limited the load	40.8
I couldn't make enough sales	17.2
My finances dwindled	5.7
I couldn't send money back home	2.5
Other	40.8

Source: Field Survey,2023

For the effects the injuries had on their physical health, the majority of the female head porters from the sampled population selected other effects aside from the ones the study had provided, specifically stating that, they suffered from headaches, body pains and wounds on their body. Others also stated that they could not walk for some time thus affecting their work. Limping which resulted in reducing their usual loads was also selected by respondents while others were also bedridden for some time due to the type of injury incurred. However, just a few of the respondents disclosed that they couldn't use their hands which implies that, most of the injuries female head porters suffer due to their activities do not affect their hands. Table 11 displays the result of the findings from the survey conducted among female head porters on the physical effects of injury.

Table 11: Physical effects of injury

Physical effects	Response (%)
I was bedridden for days	9.6%
I couldn't walk for some time	21%
I developed a limp in one leg	12.7%
I couldn't use my hands for some time	2.5%
Other	70.1%

Source: Field Survey,2023

With the injuries having effects on both economic life and physical health, the effects they had on their everyday life were also investigated. Table 12 displays the findings from the field. The findings reveal that the majority of the respondents do not see any changes in their everyday life due to an injury, life goes on as usual. The finding further reveals that those with partners had to rely on their partners in the running of their homes as they couldn't take care of the family. Just a few respondents mentioned how their children were not well taken care of due to their injuries.

Table 12: Effects of injury on everyday life

Everyday life effects	Response (%)
I couldn't take care of my family	18.1%
My partner had to do all the housework	19.4%
My child/children became neglected	1.9%
Other	65.2%

Source: Field Survey,2023

Section Five: Influence of pedestrian infrastructure on risk of injury

The state of pedestrian infrastructure influences where and how an injury is sustained in the city. This section highlights the relationship between the pedestrian infrastructure and the incidence of injury in the city centre by female head porters.

The study employed a regression analysis to examine the relationship between the incidence of injury, which served as the dependent variable, and a set of predictor variables. The first set of predictor variables include Covered Drainage systems (CD), Paved Streets (PS) and Presence of Pavements/

Sidewalks (PP). These variables represent some of the positive pedestrian infrastructure in the city that can support smooth pedestrian flow.

The results of the analysis indicate that the independent variables have a significant predictive effect on the Incidence of injury (II), as evidenced by the statistically significant F-value (5.745, $p<0.001$). This suggests that the factors examined in this study have a substantial influence on the occurrence of injuries. In addition, the coefficient of determination (R squared) of 0.078 indicates that the model accounts for 7.8 percent of the variability in the incidence of injury. Table 13 displays the model summary for the regression analysis.

Table 13: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.279	.078	.064	.417

a. Predictors: (Constant), sewers on the route are covered, the streets are paved, there are pavements

Additional coefficients were further evaluated to determine the impact of each individual factor on the criterion variable, specifically the incidence of injury. The following hypotheses were proposed:

H_1: There is no statistically significant relationship between covered drainage and the incidence of injury

H_2: There is no statistically significant relationship between presence of paved streets and the incidence of injury

H_3: There is no statistically significant relationship between presence of pavements and the incidence of injury

Table 14 presents the results of the hypothesis testing for Hypotheses 1 to 3. Null hypotheses are either rejected or failed to be rejected according to the results. The B coefficient in the table is an unstandardized regression coefficient, representing the change in the dependent variable (II) for a one-unit change in the independent variable. The t-statistic shows how far the coefficient is from zero in terms of standard error while the p-value shows the significance value indicating whether the result is statistically significant. A p-value less than 0.05 is typically considered statistically significant.

Table 14: Hypothesis results

Hypotheses	Regression weights	B	t	p-value	results
H_1	CD→ II	-.188	-1.661	.098	Unsupported
H_2	PS →II	.210	2.414	.017	Supported
H_3	PP →II	.371	3.070	.002	Supported
R	.279				
F (3, 204)	5.745				

Note: p<0.05 II-Incidence of Injury, CD – Covered Drainage system, PS – Paved Street, PP – Presence of Pavement/Sidewalk

Findings from the study show a negative coefficient (B = -0.188) for hypothesis 1, suggesting that the presence of a covered drainage system decreases the incidence of injury however, the relationship is weak. The t-value (-1.661) is relatively low, indicating weak evidence against the null hypothesis and the p-value is greater than 0.05 (p = 0.098) which means the result is not statistically significant thus the study fails to reject the null hypothesis which states that there is no statistically significant relationship between covered drainage and the incidence of injury. This result suggests there is insufficient evidence to conclude that the presence of a covered drainage system impacts the incidence of injury.

With a p-value of less than 0.05 for hypothesis 2 (p=0.017), the study revealed a statistically significant relationship between paved streets and incidence of injury thus the null hypothesis 2 which states that there is no statistically significant relationship between presence of paved streets and the incidence of injury is rejected. The study also indicates a positive coefficient (B=0.210) suggesting that paved streets are associated with a slight increase in the incidence of injury while a sufficiently high t-value (t=2.414) indicate a meaningful relationship.

The study rejected hypothesis 3 which states that there is no statistically significant relationship between the presence of pavements and incidence of injury. Findings from the study revealed a p-value of less than 0.05 (p=0.002) which indicates a statistically significant relationship between the independent and dependent variables. Further a positive coefficient of 0.279 indicates that the presence of pavement is associated with an increase in the incidence of injury and a high t-value (3.070) suggests a strong relationship

Based on the findings and given coefficients and p-values, the model suggests that the presence of pavements and paved streets are positively associated with the likelihood of incurring injuries, while a covered drainage system has a negative association, though it is not statistically significant at the conventional 0.05 significance level. Overall, the model is statistically significant in predicting the dependent variable which is the incidence of injury.

The study further conducted a regression analysis to examine the relationship between the incidence of injury, which served as the dependent

variable, and another set of predictor variables. These predictor variables include Dilapidated Pavements/Sidewalks (DP), Opened Drainage systems (OD) and Overcrowded Pavements/Sidewalks (OP). These variables are considered to be the negative state of pedestrian infrastructure which might hinder the smooth flow of pedestrians.

The results from the analysis indicate that the model is statistically significant. The independent variable thus has a significant influence on the dependent variable as evidenced by the statistically significant F-value (7.744, $p<0.001$). Table 15 shows the summary of the regression model

Table 15: Model Summary 2

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.320[a]	.102	.089	.412

a. Predictors: (Constant), pavements are dilapidated, there are open drainage, the pavements are overcrowded by hawkers

To ascertain the effect of every single component on the criterion variable that is, the incidence of injury, further coefficients were assessed. The following hypotheses were put forth:

H_4: There is no statistically significant relationship between dilapidated pavements/sidewalks and the incidence of injury

H_5: There is no statistically significant relationship between opened drainage and the incidence of injury

H_6: There is no statistically significant relationship between overcrowded pavements/sidewalks and the incidence of injury

Table 16: Hypothesis results 2

Hypotheses	Regression weights	B	t	p-value	results
H_4	DP → II	.108	1.872	.063	Unsupported
H_5	OD → II	.278	1.830	.069	Unsupported
H_6	OP → II	.359	1.984	.049	Supported
R	.320				
F (3, 204)	7.744				

Note: p<0.05 II-Incidence of Injury, DP – Dilapidated Pavements/sidewalks, OD – Open Drainage, OP – Overcrowded Pavement/Sidewalk

The study failed to reject hypothesis 4 which states that there is no statistically significant relationship between dilapidated pavements/sidewalks and the incidence of injury. The analysis indicates a p-value greater than the conventional 0.05 (p=0.063) suggesting that there is no statistically significant relationship between dilapidated pavements/sidewalks and incidence of injury. Although dilapidated pavements and incidence of injury have a weak association as revealed by the coefficient (B =.108) and t-value (1.872), it does not reach statistical significance.

Likewise, there was no statistically significant relationship between Open Drainage and Incidence of injury (B =.278, t = 1.830, p =.069). This suggests that the study failed to reject Hypothesis 5 also which states that there is no statistically significant relationship between opened drainage and the incidence of injury. The results indicate that although there may be an association between open drainage and injury incidence, there is not enough data to support this at the significance level $p < 0.05$.

The study rejected hypothesis 6 which states that there is no statistically significant relationship between overcrowded pavements/sidewalks

and the incidence of injury. The coefficient (B = .320), t-value (1.984), and p-value (.049) indicate a statistically significant relationship between overcrowded pavements and incidence of injury. This finding implies that overcrowded pavements are a significant predictor of the incidence of injury.

Based on the findings, the overall model is statistically significant in predicting the dependent variable which is the incidence of injury among female head porters however, among the three predictor variables only overcrowded pavements/sidewalks exert a statistically significant impact on the dependent variable while dilapidated pavements/sidewalks and open drainage systems in the CBD are not statistically significant.

Further, it can be deduced from the study that while the models are statistically significant, the amount of variance explained is relatively low, which indicates that there are other factors which were not included in the study which are also significantly contributing to the incidence of injuries among female head porters in the city. This means that there are other contributing factors leading to transport injuries among head porters and not solely due to their usage of pedestrian infrastructure in the city centre.

The study furthermore conducted regression analysis to examine the influence of participants' age and experience on the incidence of injury. The regression analysis revealed that the model, incorporating number of years working and age as independent variables, was statistically significant ($F = 75.155$, $p < 0.001$) and explained 43.5% of the variance in accident involvement among participants in the CBD. Between the two independent variables, number of years working or experience was found to be a significant positive predictor of the incidence of injury among participants (B

= 0.353, Beta = 0.610, p < 0.001), indicating that female head porters with more years of experience are more likely to have been involved in an accident. Conversely, Age was not a significant predictor (p = 0.405), suggesting that it does not meaningfully influence the likelihood of the incidence of injury in this context.

Table 17: Model Summary 3

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.660	.435	.429	.327

a. Predictors: (Constant), number of years working, age

Source: field survey, 2023

To conclude this chapter, findings from the study revealed that pedestrian facilities in the CBD of Kumasi are not adequate to support the number of pedestrians that troop into the city centre daily. Female head porters commute to work and back daily on foot with all their activities in the city also being done on foot. Many factors influence how they move in the city however; the most important and leading factor is their ability to generate income. The female head porter as a pedestrian in the city centre coupled with her activities is always at risk of traffic injuries.

Findings revealed that female head porters incur injuries from falling and tripping due to the state of pedestrian facilities in the city such as obstructions on the way and also collisions with other pedestrians and vehicles. Victims of vehicular knockdowns incur serious injuries which needs hospitalization and staying off work for several weeks and can even lead to the victim not returning to work again and victims of slight injury tend to self-

medicate. Injuries affect the female head porter economically most as they are not able to be productive as compared to when they are healthy.

Furthermore, as proposed by the conceptual framework, the findings from this study reveal that female head porters move to the CBD to take advantage of the opportunities present that is the availability of clients and their mobilities are shaped by these opportunities. The conditions of the pedestrian environment coupled with female head porters' activities expose them to different types of injuries in the city that lead to diverse effects on the lives of female head porters. The study further revealed experience and age of participants had a statistically significant influence on the incidence of injury.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter provides a summary of the study aligned with the research questions, concludes, and presents recommendations. Additionally, the study elucidates the contributions it makes to the existing body of knowledge, as well as identifies potential avenues for future research.

Context of the study

The main objective of the study was to assess the urban infrastructure design, movement of female head porters, and their risk of injuries in the central business district of the Kumasi metropolitan area. Specifically, the study sought to

1. Examine the daily routine of female head porters in the CBD
2. Describe the pedestrian environment of the Central Business District
3. Examine female head porters' exposure to injuries within the CBD due to their mobility pattern
4. Assess the influence of urban infrastructure design on the risk of injuries
5. Describe the pedestrian injury types among female head porters.

Utilising a mixed-methods methodology, a sample size of 226 participants were included in the study, consisting of 223 female head porters and 3 key stakeholders who contributed valuable information. The selection of female head porters was conducted by a combination of accidental sampling, which involved selecting individuals based on specific qualities, and snowball sampling. The selection of key stakeholders was conducted purposively.

The research instruments for the study were questionnaires, interview guides and an observation checklist. Data collected included, the daily routines of female head porters, presence and type of streets in the CBD, factors that influence movements of female head porters, presence and conditions of pedestrian facilities in the CBD, incidence of injuries among female head porters, location, time and type of injury among female head porters and the effects of injuries. Data collected was analysed and presented using frequencies, percentages, graphs, pictures, regression models, chi-square tests and direct quotations that put the views of participants in the correct perspective.

Summary of Findings

The main findings of the study were as follows:

1. Most respondents were young adults, however a significant percentage of them were below 18 years old.
2. Almost half of the head porters had worked in the CBD between 1-2 years.
3. The study revealed that many factors interplay to influence the movements of female head porters in the CBD however, the main factor that influences their movements in the CBD is economic. They move to where they can have access to customers, this confirms (Agyei et al. 2016) earlier findings stating that the business of head porterage is the main livelihood activity for female migrants in the markets of big cities. The least factor that influenced their movements was the conditions of infrastructure in the city.

4. The study further revealed that the CBD of Kumasi is equipped with many different pedestrian facilities ranging from pedestrian crossings, pedestrian guard rails, bus stops, traffic lights, pavements/sidewalks, covered sewage, footbridges, and shelters. However, the pedestrian guard rails have been overtaken by cloth sellers, pavements have also been overtaken by hawkers, motorcycles and some shop owners to display their wares making movements difficult. The footbridge is also cited in an inconvenient location.
5. The majority of respondents stated how they have been involved in an injury in one way or the other since they started the kayayei business.
6. The leading causes of injury among female head porters are falls and trips with these injuries occurring along the roads, terminals, sidewalks and some opened drainages. This can be attributed to the congestion along the roads and sidewalks.
7. There are many educative programmes targeted at road users in the city by the National Road Safety Authority however, none has been specialised for the female head porter as they are all grouped under pedestrians and not as a special group in road safety education settings.
8. The study revealed that the conditions of pedestrian facilities in the city influences the incidence of injury among female head porters with overcrowded pavements and paved streets having a statistically significant influence on the incidence of injury. The study further revealed that there are other factors such as load carried and distance covered that can influence on female head porters sustaining injuries in the city.

9. The majority of injuries involving female head porters occur in the afternoon according to the study.
10. The Motor Traffic and Transport Department (MTTD) of the Ghana Police is in charge of protecting lives, and properties as well as the enforcement of rules and regulations on the road. They also collate and analyse crash data as a result of vehicular activities in the metropolis and do not non-vehicular injuries sustained by pedestrians due to their movements and this confirms earlier findings by Methorst et al., 2017; and Oxley et al., 2018 where they argue that falls as a contributor to pedestrian injury have not been considered as a transport injury by agencies in charge of recording crash data.
11. The study further reveals that the majority of participants suffer slight injuries which makes the female head porters rely heavily on self-medications like ointments, herbal medications and painkillers. Findings from the health facility display the lack of information on female head porters' injuries in their database as injuries reported are grouped under transport, home and occupational. Transport injuries however describe injuries as a result of vehicular accidents only.
12. Female head porters experience different effects of injuries sustained however prominent among them is the effects it has on their economic life as majority of participants indicated that due to injuries, they limit their loads. This further has a negative effect on the income generated.

Conclusion

Female head porters are in the Central Business District for economic activities however they form an integral part of the transportation system in

the city as they help in the transportation of goods from one end to the other. The conditions of the pedestrian infrastructure present a challenge to the female head porter as well as other pedestrians in the city. The presence of street preachers, potholes, sellers and beggars on pedestrian walkways exposes porters to the risk of injuries as there is limited space left for the female head porter to navigate with her load. The congestion on pedestrian walkways also makes the female head porter a threat to other pedestrians because they tend to take much space due to the pans and loads, they carry and as they force their way through, they tend to collide with other pedestrians which may lead to injuries for both parties involved.

Female head porters incur various injuries as a result of their activities and movements in the city centre. Prominent among these injuries are the ones sustained due to trips and falls. These injuries are seen by the victims as minor and as such do not need professional attention hence, they tend to rely heavily on self-medicating with over-the-counter pain killers and herbal roots, creams and ointments.

Crash and injury data on female head porters most especially pedestrian-only injury data is non-existent from the various government agencies in charge of the collating and analysing road traffic injuries. The data available take into consideration vehicle-involved accidents only. Falls, trips and collisions due to movements in the city have not been factored as transport injuries. It is seen as an everyday occurrence that does not necessitate the same attention as vehicular crashes and pedestrian knockdowns.

Furthermore, the crash data available is inadequate. The data has not been segregated to include other demographic characteristics of victims aside

gender and age. Data from the health facility also does not have a database that records injuries from falls due to pedestrian activities. Their database records injuries under transport, home, and occupation, with occupational injuries being injuries recorded from the industrial and construction sectors.

Recommendations

The study makes the following recommendations based on the findings and conclusions

Modification of pedestrian environment in the CBD

- In order for pedestrians to fully utilise the pedestrian walkways provided in the city, the Works Department of the Metropolitan Assembly is urged to relocate all sellers who have overtaken the walkways to a better place where they can display their wares without obstructing movements. In addition, preachers occupying these walkways should be advised to move to community information centres or radio stations so they can reach a wider audience instead of obstructing movements in the city centre.
- The study further recommends the Urban Roads Department ensure the regular maintenance of pedestrian facilities such as pavements, traffic lights and pedestrian guard rails to avoid their fast deterioration. Although it is in the department's mandate to undertake routine maintenance, the situation on the ground is different.

Sensitisation programmes for female head porters on the effects of self-medication.

There is a need for educational campaigns running throughout the city and the residential areas of female head porters on the effects of self-medication. These efforts should aim to enlighten them about the importance of seeking professional medical attention in the event of injuries as opposed to resorting to self-medication.

Inclusion of pedestrian-only injuries as part of transport injuries.

- The study recommends policy makers makes an amendment to the definition of transport injuries to include pedestrian-only injuries. Injuries as a result of pedestrian falls, trips and collisions should be part of transport injuries as these occur as a result of mobility.
- With the inclusion of pedestrian-only injuries as part of transport injuries, the study recommends a holistic database that will record all transport injuries including the complete demographic characteristic of victims. This is to help policy makers; researchers and the public be aware of the transport injury trends in the country and will also aid in coming out with some mitigating policies.

Contributions to Knowledge

This study presents a pioneering examination and assessment of the urban pedestrian infrastructure and movements of female head porters as well as their risk of injuries due to their movements in the city. The study advances our understanding of the mobility of female head porters in the city and the factors that influence it. The study also reveals the exposure to injury due to the condition of pedestrian facilities in the city as well as the hotspot locations for injuries among female head porters.

Furthermore, the research conducted has added to knowledge on the state of the pedestrian environment in the CBD of Kumasi and reveals a relationship between the state of pedestrian facilities and incidents of injury among female head porters in the city.

The study advances our knowledge of the deficiencies existing in the crash database in the country in the various agencies handling such cases and last but not least the study has contributed to the need to include pedestrian-only injuries like falls, trips and collision with obstruction to the definition of transport injuries.

Suggestions for Future Research

This study concentrated on the pedestrian environment, mobility and risk of injury among female head porters due to their activities in the city centre. Further studies can be undertaken on the rehabilitation process of female head porters who have suffered serious injuries due to their activities in the city. Furthermore, different studies could be conducted on the risk female head porters pose to other pedestrians in the city as they force their way to manoeuvre through the human traffic in the city.

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APPENDICES

APPENDIX A

UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

FACULTY OF SOCIAL SCIENCES

QUESTIONNNAIRE FOR FEMALE HEAD PORTERS

Title: Assessment of Urban Infrastructural Design, Mobility Patterns and Risk of Injury among Female Head Porters in the CBD of Kumasi

Good morning/afternoon. My name is Adwoa Afra Asubonteng. I am a master student at the Department of Geography and Regional Planning, University of Cape Coast (UCC). We are doing a research on **Assessment of Urban Infrastructural Design, Mobility Patterns and risk of Injury among Female Head Porters in the CBD of Kumasi.** We want to understand how female head porters move within the CBD, their challenges and their exposure to injuries. We are interested in understanding about your movements within the CBD, as you go about your activities, and whether you experience any difficulties. We would also wish to understand how you move from one point of the CBD to the other and how this decision is made. For example, the routes you use and who decides on this. We would be glad to get your general views about pedestrian infrastructure in Kumasi, and whether there is anything that can be done to improve upon it to ensure safe pedestrian movement. The information which you are going to share with us will not be shared with anyone else. We have selected you because your leaders have given us permission to talk to you. If you however do not feel comfortable to talk to us, please let us know. If you refuse to talk to us, please note that you will not be

punished in any way. We are not going to share any information about our discussion with you with anyone else. We are not giving any rewards for participation in the study. We thank you for your willingness to take part in this study. This interview should take about 20 minutes. Please confirm that you have understood why we are doing this study and whether I can continue with the interview. If you need get any other information, please contact Adwoa Afra Asubonteng via email: aaafra94@gmail.com (0274673058)

SECTION A: BACKGROUND INFORMATION

Age of respondent	
Level of formal education	a) None [ ] b) Primary [ ] c) Junior high [ ] d) Senior high [ ] e) other
Migrated from	
Parental status	
Number of years working as kayayie	
Average earning in a day	
Reasons for engaging in kayayie business	
Any disability	
Respondent's living arrangement	a) Self [ ] b) with partner [ ] c) with family [ ] d) with friends [ ]
Place of residence	

SECTION B: MOBILITY PATTERN

1. How many routes are there from your home to the CBD?

   a) 1 [ ] b) 2 [ ] c) 3 and above [ ]

2. Indicate the route type?

   a) Exclusive pedestrian path [ ] b) Multi-modal routes [ ] c. Combination [ ]

3. What is the nature of routes/streets within the CBD?

   a) Paved [ ] b) Unpaved [ ]

4. What influences your route choice?

Factor	**Response**	
	Yes	**No**
Infrastructure provision like roads, sidewalks, pavements		
Condition of pedestrian infrastructure like sidewalks, etc		
Economic factors		
Social factors		
Convenience and comfort		
Safety		
Security		
Policy factors		

5. What are the specific influencers?

Kindly indicate respondent's knowledge on the presence of the following facilities on the routes frequently used

		Yes	No
Infrastructure provision	There are traffic lights		
	There are pavements		
	There are pedestrian crossings		
	The streets are paved		
	Pavements are dilapidated		
	There are bus stops		
	There are parking lots/ terminals		
Condition of infrastructure	The traffic lights work at all times		
	Sidewalks are wide to accommodate two people		
	There are road signs indicating pedestrian crossing		
	Speed ramps/strips are present		
	Pedestrian buffers like rails are always present		
Economic factors	There is presence of shoppers		
	There is presence of travellers		
Social factors	Most of my friends use that street		
	I walk alone		
	I have to drop my child in school		

	I have to drop my child with family		
	I have to greet my family along the way		
Convenience and comfort	There are benches on the way		
	There are shelters along the stretch		
	There are public restrooms along the stretch		
	The pavements are overcrowded by hawkers/ other pedestrians/parked vehicles		
	The pavements are not overcrowded		
	The distance to the CBD/ terminals/parking lots is short		
Safety	Drivers stop for me to cross		
	There are open drainage		
	Sewers on the route are covered/sealed		
	There is the presence of footbridge/overhead		
	The drivers adhere to safe driving speeds		
	There are buffers protecting pedestrians from vehicles		
Security	There are thugs on the way		
	Security personnel are located along the way		
	I have been robbed of my belongings on the route before		
Policy factors	There are rules governing walking on certain streets		

SECTION C: INCIDENCE OF INJURIES

6. Have you been involved in an accident while working in the CBD?

   a) Yes [ ] b)No [ ]

7. If Yes to Q 10, what type of accident occurred?

a) Vehicle-pedestrian crash [ ]

b) Fell on the sidewalk [ ]

c) Fell in an open drain [ ]

d) Tripped on the pathway as a result of an obstruction [ ]

e) Pedestrian-pedestrian crash [ ]

f) Other (specify)……..

8. What was the level of injury?

a) Slight bruise [ ]

b) Serious injury (hospitalization) [ ]

9. How many times have you sustained injuries since you started working as a Kayayie?

   a) 1-3 [ ]

   b) 4 -6 [ ]

   c) 7-9 [ ]

   d) Above 10 [ ]

10. How many times do you sustain injuries in a month?

a) 1-3 [ ]

b) 4-6 [ ]

c) 7-9 [ ]

d) 10 and above [ ]

11. What time do you normally sustain injuries?

a) Morning

b) Afternoon

c) Evening

12. Where (location) do you mostly sustain injuries or crashes?

a) Opened drainage

b) Sidewalks

c) Terminals/parking lots

d) Along the roads

e) Crossing the road

13. How did the injury affect your economic life?

a) I couldn't carry goods for customers [ ]

b) I limited the load [ ]

c) I couldn't make enough sales [ ]

d) My finances dwindled [ ]

e) I couldn't send money back home [ ]

f) Other, specify……

14. How did the injury affect your physical health?

a) I was bedridden for days [ ]

b) I couldn't walk for some time [ ]

c) I developed a limp in one leg [ ]

d) I couldn't use my hands for some time [ ]

e) Other, specify……

15. How did the injury affect your everyday life?

a) I couldn't take care of my family [ ]

b) My partner had to do all the housework [ ]

c) My child/children became neglected [ ]

d) Other, specify……

16. How do you pay for the medical bills?

a) From savings

b) Health insurance

c) Family and friends

d) Others, specify……

APPENDIX B

UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

INTERVIEW SCHEDULE FOR FEMALE HEAD PORTERS

Good morning/afternoon. My name is _____. I work at the Department of Geography and Regional Planning, University of Cape Coast (UCC). We are doing a research on **Assessment of Urban Infrastructural Design, Mobility Patterns and risk of Injury among Female Head Porters in the CBD of Kumasi.** We want to understand how female head porters move within the CBD, their challenges and their exposure to injuries. We are interested in understanding about your movements within the CBD, as you go about your activities, and whether you experience any difficulties. We would also wish to understand how you move from one point of the CBD to the other and how this decision is made. For example, the routes you use and who decides on this. We would be glad to get your general views about pedestrian infrastructure in Kumasi, and whether there is anything that can be done to improve upon it to ensure safe pedestrian movement. The information which you are going to share with us will not be shared with anyone else. We have selected you because your leaders have given us permission to talk to you. If you however do not feel comfortable to talk to us, please let us know. If you refuse to talk to us, please note that you will not be punished in any way. We are not going to share any information about our discussion with you with anyone else. We are not giving any rewards for participation in the study. We

thank you for your willingness to take part in this study. This interview should take about 20 minutes. Please confirm that you have understood why we are doing this study and whether I can continue with the interview. If you need get any other information, please contact Adwoa Afra Asubonteng via email: aaafra94@gmail.com (0274673058)

Date of interview:

Place of interview.

Interviewer name:

Age:	Marital status:
Place of residence:	Maternal status:
Hometown:	Average earning:

1. How many routes are there from your home to the CBD?
2. What route do you frequently use?
3. How do you start your day?
4. What influences your routes in the CBD?
5. What is the condition of the route you use?
6. Are pedestrian facilities provided on these routes?
7. Can you tell me the conditions of the pedestrian facilities in the CBD?
8. Have you been involved in any injury while working in the CBD?
9. Can you tell me what caused the injury and the place you got injured?
10. What medical assistance did you seek after incurring the injury?
11. How did the injury affect your life?
12. Do you have any recommendation in making the CBD pedestrian friendly for you?

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 MOTOR TRAFFIC & TRANSPORT DEPARTMENT (MTTD)

Introduction and Informed Consent Statement

Good morning/afternoon. My name is Adwoa Afra Asubonteng, 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 **Assessment of Urban Infrastructural Design, Mobility Patterns and Risk of Injury among Female Head Porters in the CBD of Kumasi.** The study seeks to understand the movement patterns of female head porters and how the existing pedestrian infrastructure exposes them to injuries. With regards to ethical guidelines underlying scientific research involving human participants, formal consent is required. The information which you are going to share with us will not be shared with anyone else. I humbly, want to seek your consent to participate in this study. Your participation is voluntary and you may refuse to participate in or withdraw from this study at any time. However, your participation in this study is key since the intention is to aid in policy drafting and implementation. The interview will last between 30 to 40 minutes. Thank you for your willingness to take part in this study. Please confirm that you have understood why we are doing this study and if I can continue with the interview. If you need to get any other information, please

contact **Adwoa Afra Asubonteng** via email: aaafra94@gmail.com (0274673058)

1. Brief background of yourself and your role at MTTD
2. What is the mandate of the MTTD?
3. What are your views on the movements and activities of kayayie in the city?
4. Do you have documented statistics of traffic crashes and pedestrian crashes involving female head porters available?
5. How would you describe the incidence of kayayie's pedestrian crashes within the metropolis?
6. Is there a trend in the incidence of injury among kayayies in the city?
7. What is the most occurring cause of pedestrian injury among kayayies in the CBD?
8. Are there any guidelines from the MTTD governing the use of certain routes/streets in the CBD?
9. In your opinion, what modifications will be needed to promote a safer walking environment in the CBD of the metropolis?

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 NATIONAL ROAD SAFETY AUTHORITY

Introduction and Informed Consent Statement

Good morning/afternoon. My name is Adwoa Afra Asubonteng, 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 **Assessment of Urban Infrastructural Design, Mobility Patterns and Risk of Injury among Female Head Porters in the CBD of Kumasi.** The study seeks to understand the movement patterns of female head porters and how the existing pedestrian infrastructure exposes them to injuries. With regards to ethical guidelines underlying scientific research involving human participants, formal consent is required. The information which you are going to share with us will not be shared with anyone else. I humbly, want to seek your consent to participate in this study. Your participation is voluntary and you may refuse to participate in or withdraw from this study at any time. However, your participation in this study is key since the intention is to aid in policy drafting and implementation. The interview will last between 30 to 40 minutes. Thank you for your willingness to take part in this study. Please confirm that you have understood why we are doing this study and if I can continue with the interview. If you need to get any other information, please

contact **Adwoa Afra Asubonteng** via email: aaafra94@gmail.com (0274673058)

1. Brief background of yourself and your role at the NRSA?
2. What is the mandate of the NRSA in the metropolis?
3. What are your views on head porters' movement in the CBD?
4. Does the Agency takes into consideration the role of urban design in shaping the movement patterns of the Kayayies in the city?
5. How would you describe the incidence of head porters' pedestrian crashes and injuries in the city centre?
6. Are there any special sensitization programs or education programs for head porters within the city to ensure they practice such? (how has it been implemented and what was the results)
7. Do you have crash and injury data of head porters within the metropolis?
8. In your opinion, what modifications will be needed to promote a safer walking environment in the CBD of the metropolis?

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 MANHYIA DISTRICT HOSPITAL

Introduction and Informed Consent Statement

Good morning/afternoon. My name is Adwoa Afra Asubonteng, 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 **Assessment of Urban Infrastructural Design, Mobility Patterns and Risk of Injury among Female Head Porters in the CBD of Kumasi.** The study seeks to understand the movement patterns of female head porters and how the existing pedestrian infrastructure exposes them to injuries. With regards to ethical guidelines underlying scientific research involving human participants, formal consent is required. The information which you are going to share with us will not be shared with anyone else. I humbly, want to seek your consent to participate in this study. Your participation is voluntary and you may refuse to participate in or withdraw from this study at any time. However, your participation in this study is key since the intention is to aid in policy drafting and implementation. The interview will last between 30 to 40 minutes. Thank you for your willingness to take part in this study. Please confirm that you have understood why we are doing this study and if I can continue with the interview. If you need to get any other information, please

contact **Adwoa Afra Asubonteng** via email: aaafra94@gmail.com (0274673058)

1. Brief background and your role at the facility?
2. Does your facility cater for head porters most times? Probe for the average numbers monthly and yearly
3. What are the common cases kayayie's reports with at the health facility?
4. Do the head porters often come with injuries sustained due to their activities?
5. Are there available statistics of the injuries and the causes? Can it be made available to help with the study?
6. How severe are these injuries and does it requires the kayayies to be admitted overnight or days?
7. How are their medical bills settled?
8. In your opinion, what modifications will be needed to promote a safer walking environment in the CBD of the metropolis?

APPENDIX F

OBSERVATION CHECKLIST

Introduction: this observation checklist serves as a guideline to outline the presence and condition of pedestrian facilities in the CBD od Kumasi as well as observe that activities of female head porters in the city. The topic for this study is ' Assessing urban infrastructure design, mobility patterns and risk of injury among female head porters in the CBD of Kumasi' and the findings will be used to validate the account of female head porters and also come out with a description on the state of pedestrian facilities in the city.

1. Location
2. Pedestrian facilities available
3. What is the condition of the facilities
4. How do the female head porters go about their activities
5. What are some hazard exposures for female head porters in the city

APPENDIX G

ETHICAL CLEARANCE

UNIVERSITY OF CAPE COAST
INSTITUTIONAL REVIEW BOARD SECRETARIAT
TEL: 0558093143 / 0508878309
E-MAIL: irb@ucc.edu.gh
OUR REF: IRB/C3/Vol.1/0064
YOUR REF:
OMB NO: 0990-0279
IORG #: IORG0011497

7TH MARCH 2023

Ms Adwoa Afra Asubonteng
Department of Geography and Regional Planning
University of Cape Coast

Dear Ms Asubonteng,

ETHICAL CLEARANCE – ID (UCCIRB/CHLS/2022/73)

The University of Cape Coast Institutional Review Board (UCCIRB) has granted Provisional Approval for the implementation of your research on **Assessment of Urban Infrastructural Design, Mobility Patterns and Risk of Injury among Female Head Porters in the CBD of Kumasi.** This approval is valid from 7th March 2023 to 6th March 2024. You may apply for a renewal subject to the submission of all the required documents that will be prescribed by the UCCIRB.

Please note that any modification to the project must be submitted to the UCCIRB for review and approval before its implementation. You are required to submit a periodic review of the protocol to the Board and a final full review to the UCCIRB on completion of the research. The UCCIRB may observe or cause to be observed procedures and records of the research during and after implementation.

You are also required to report all serious adverse events related to this study to the UCCIRB within seven days verbally and fourteen days in writing.

Always quote the protocol identification number in all future correspondence with us in relation to this protocol.

Yours faithfully,

Kofi F. Amuquandoh

Ag. Administrator

ADMINISTRATOR
INSTITUTIONAL REVIEW BOARD
UNIVERSITY OF CAPE COAST