Pedestrian-friendly Sidewalk Development in Adama Town

Kibreab Eyob Weldegerima

A Thesis Submitted to the Department of Architecture

School of Civil Engineering & Architecture

Presented in Partial Fulfillment of the Requirement for the Degree of Master's in urban planning and design

Office of Graduate Studies

Adama Science and Technology University

June, 2024

Adama, Ethiopia

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DECLARATION

I hereby declare that this Research entitled " Pedestrian-friendly Sidewalk Development in Adama Town" is my original work. That is, it has not been submitted for the award of any academic degree, diploma, or certificate in any other university. All sources of materials that are used for this Research have been duly acknowledged through citation.

_____ _____ _____

Name of the student Signature Date

RECOMMENDATION

I, the advisor of this Research hereby certify that I have read the revised version of the thesis entitled " Pedestrian-friendly Sidewalk Development in Adama Town" prepared under my guidance by Kibreab Eyob Weldegerima submitted in partial fulfillment of the requirements for the degree of Mater's of Science in urban planning and design.

Therefore, I recommend the submission of a revised version of the thesis to the department following the applicable procedures.

_____ _____ _____

Major Advisor/Supervisor Signature Date

Approval Board of Reviewers

I, the advisor of the Research entitled "Pedestrian-friendly Sidewalk Development in Adama Town" developed by Kibreab Eyob Weldegerima, hereby certify that the recommendations and suggestions made by the board of examiners are appropriately incorporated into the final version of the Research.

_____ _____ _____

Major Advisor/Supervisor Signature Date

We, the undersigned, members of the Board of Examiners of the Research Kibreab Eyob Weldegerima have read and evaluated the thesis entitled " Pedestrian-friendly Sidewalk Development in Adama Town" and examined the candidate during open defense. This is, therefore, to certify that the Research is accepted for partial fulfillment of the requirement of the degree of Master of Science in Urban Planning and Design.

_____ _____ _____

Chairperson Signature Date

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Internal Examiner Signature Date

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Final approval and acceptance of the Research is contingent upon submission of its final copy to the Office of Postgraduate Studies (OPGS) through the Department Graduate Council (DGC) and School Graduate Committee (SGC).

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Department Head Signature Date

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School Dean Signature Date

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Office of Postgraduate Studies, Dean__ Signature Date

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LIST OF ACRONYMS AND ABBREVIATIONS

ADA: Americans with Disabilities Act

PLOS: Pedestrian Level of Service

GIS Geographic Information Systems

UN-HABITAT: United Nations Human Settlement Program

WHO: World Health Organization

CSA: Central Statistical Agency

GDP: Gross Domestic Product

MoUDC: Ministry of Urban Development and Construction

WB: World Bank

SRS: Simple Random Sampling

Abstract

Pedestrian-friendly neighborhoods promote physical activity, well-being, and a vibrant community. However, many towns struggle to create environments that encourage walking. This study aimed to evaluate walkability in Adama Town, Ethiopia, to assess pedestrian challenges and propose solutions for a more pedestrian-friendly environment. A quantitative approach was employed, utilizing a statistically valid sample size of 320 residents determined using Cochran's formula for simple random sampling. This method ensured each resident had an equal chance of being selected, minimizing bias and providing a representative sample of the population. Data collection involved structured questionnaire surveys focusing on residents' walking habits, perceived safety, and the condition of pedestrian infrastructure. Additionally, field observations documented the physical state of sidewalks, crosswalks, and other pedestrian facilities. The study strategically selected four locations within a 1 km radius from the central point of the site, inspired by the 15-minute city concept, to capture a diverse range of pedestrian experiences. This targeted sampling aimed to provide a comprehensive overview of walkability issues across different neighborhoods within Adama Town. Descriptive statistical analysis summarized key trends and findings. The findings reveal significant limitations hindering walkability in Adama Town. These include safety concerns (67% felt unsafe), uneven sidewalk distribution (44% with sidewalks, 56% without), poor sidewalk maintenance (88% rated fair or poor), traffic volume/speed as a barrier (81% agreed), and limited accessibility for people with disabilities (83% reported issues). Consequently, the data shows a low overall walking frequency (only 39% reported walking for transportation at least occasionally). To address these challenges, the study proposes several recommendations. These include prioritizing sidewalk improvements, enhancing safety measures, promoting traffic management, increasing accessibility for all, and improving access to amenities within walking distance. By implementing these recommendations, Adama Town can foster a more walkable environment that encourages physical activity, improves resident well-being, and contributes to a more vibrant community.

Keywords: Walkability, Pedestrian Challenges, Resident Experiences, 04-Kebelle, Adama Town, Oromia, Ethiopia

CHAPTER ONE

1. INTRODUCTION

The term pedestrian friendly can be defined as the degree of suitability in the built environment to walking and it could be used to analyze the status quo related to physical activity and active mobility (Guo et al., 2019). An area's walkability, or how conducive it is to walking, is becoming more and more acknowledged as a crucial component of urban planning and public health. Pedestrian-friendly areas have been linked to several advantages, such as increased levels of physical activity, better mental health, less traffic, and less environmental impact (Frank et al., 2003). Despite these benefits, inadequate infrastructure, safety issues, and bad urban design make it difficult for many communities, particularly in developing nations, to build environments that promote walking (T. A. Litman, 2003). Urban areas such as Adama Town in Ethiopia have a difficult time limiting sustainable urban development, improving the walkability of the community, and improving the quality of life of the inhabitants.

The purpose of this study is to determine the existing state of pedestrian pathways in Adama Town, analyze the implications of the absence of pedestrian-friendly areas for the future, and pinpoint the primary obstacles to walkability. This study aims to offer a thorough analysis of the current situation and suggest workable remedies specific to the region by using organized surveys and methodical field observations. The results are anticipated to provide guidance to stakeholders, legislators, and urban planners, assisting in the creation of more sustainable and inclusive urban environments in Adama Town and other comparable contexts (Gehl, 1987).

1.1. Background of the Study

Urbanization is a major global trend, with more than half of the world's population living in urban areas. By 2050, this percentage is predicted to increase to 68%, or 2.5 billion more people living in cities (UN-DESA, 2018). Cities are the main drivers of economic growth, accounting for over 80% of the world's Gross Domestic Product (GDP). However, the rapid pace of urbanization also presents challenges, such as the need for adequate housing, affordable infrastructure, and basic services. Additionally, since cities produce the majority of greenhouse gas emissions, urban sustainability and climate resilience are important considerations for future urban planning and development; (Satterthwaite, 2009; Seto et al., 2012).

Urban areas worldwide are also increasingly focusing on enhancing walkability as part of their sustainability goals. Walkable cities promote healthier lifestyles, reduce traffic congestion, and lower carbon emissions. Studies have demonstrated that improving pedestrian infrastructure can greatly benefit public health by boosting physical activity and lowering pollution-related illnesses; (Frank et al., 2003; Saelens et al., 2003). Therefore, promoting pedestrian-friendly surroundings is vital for sustainable urban growth globally; (Gehl, 2010; T. Litman, 2013).

Sub-Saharan Africa is experiencing an unprecedented rate of urbanization, with the region's population predicted to triple by 2050 (UN-Habitat, 2014). This rapid urban growth brings with it both opportunities and challenges, as it can stimulate economic development and raise living standards, but it can also put a strain on the region's infrastructure and exacerbate problems like housing shortages, traffic congestion, and environmental degradation; (Pieterse, 2008; Simon, 2008). The region's urban areas frequently suffer from high rates of poverty and inadequate public services, especially in informal settlements where a substantial portion of the urban population resides (Turok, 2014).

Enhancing walkability is becoming more and more important in many African cities, especially those in Ethiopia, in order to improve urban living conditions. Inadequate infrastructure for pedestrians is a prevalent problem that results in dangerous walking conditions and restricted accessibility for locals. Reducing reliance on automobiles, promoting public health, and strengthening social cohesion are just a few advantages of increasing walkability ; (Cervero, 2013; Pojani & Stead, 2015). Consequently, to develop pedestrian-friendly environments in African cities that are rapidly urbanizing, targeted interventions are desperately needed (UN-Habitat, 2014).

Ethiopia is experiencing one of the fastest urbanization rates in Africa. The urban population in Ethiopia is projected to grow from 21% in 2020 to 30% by 2030 (WB, 2020). This rapid urbanization is primarily driven by rural-urban migration, natural population growth, and the expansion of urban boundaries. The Ethiopian government has recognized the need to manage this urban growth effectively to ensure sustainable development. Key priorities include improving urban infrastructure, expanding affordable housing, and enhancing public services (Cheru et al., 2019).

There are many obstacles facing Ethiopian urban planning, such as poor public spaces, heavy traffic, and inadequate infrastructure. In fast-expanding cities like Addis Ababa and Adama, these problems are especially noticeable. Through improving pedestrian infrastructure and public spaces, the Ethiopian government is focusing its urban development strategies on making cities more livable. These measures are vital for supporting sustainable urban development and increasing the quality of life for urban people; (E. Alemayehu, 2017; MoUDC, 2015).

One of Ethiopia's fastest-growing cities, Adama, is a vital hub for trade and transportation in the Oromia region. The city's rapid urban expansion has been spurred by its advantageous location along important transit lines, like as the Addis Ababa-Djibouti railway (Berhanu & Hagedorn, 2012). Common urban problems in Adama include a lack of housing, poor infrastructure, and environmental issues. To solve these problems, the local government is actively working on urban development projects, emphasizing sustainable development and raising the standard of living for its citizens (Adama City Administration, 2018).

In Adama, initiatives include public works projects, urban green space development, and expanding clean water and sanitation services. Unfortunately, inhabitants face several difficulties due to the city's inadequate pedestrian infrastructure. Common problems include poorly maintained walkways, blocked passageways, and safety hazards. Resolving these issues is essential to establishing more inclusive and walkable urban surroundings in Adama (A. Alemayehu & Tamiru, 2016; Tegene, 2018). By focusing on these areas, Adama wants to enhance its role as a dynamic urban center that contributes to regional and national development goals.

1.2. Statement of the Problem

Adama, a fast growing city in the Oromia region of Ethiopia, presents substantial issues relating to urban walkability. Despite being a vital economic and transportation hub, the city's infrastructure has not kept pace with its growing urbanization, leading to various concerns affecting pedestrian circulation and general urban health.

Adama does not currently have enough pedestrian pathways; the amount of walk roads that are already in place is insufficient for a city of its size. The lack of proper pedestrian amenities on the city's streets forces locals to maneuver through congested and dangerous situations (Adama City

Administration, 2018). Walking becomes dangerous due to the lack of marked pedestrian zones and crosswalks, as well as the prevalence of cars parked on sidewalks.

Furthermore, Adama's urban design is not inclusive; it does not take into account the needs of all groups, such as children, the elderly, and people with disabilities. To guarantee that everyone in the community can use public spaces in a safe and comfortable manner, inclusive urban design is essential; (Gehl, 2010; Loukaitou-Sideris & Ehrenfeucht, 2009). Unfortunately, disadvantaged communities in Adama are frequently left out of the full participation of urban life due to the lack of such considerations.

Furthermore, the city does not have any car-free zones, which are necessary to lessen traffic and encourage a pedestrian-friendly atmosphere (Buehler & Pucher, 2012). Additionally, much needed is well-planned streetscape vegetation. For pedestrian comfort, shaded pathways are essential, particularly in Adama's hot temperature, although not many of them are in existence (Li et al., 2017). The lack of vegetation and trees not only detracts from the urban environment's visual appeal but also increases the urban heat island effect, which makes walking more uncomfortable and perhaps dangerous.

Long transit lineups are typical during rush hours, underscoring the inadequacies in the urban transportation network. Vulnerable populations, including youth and the elderly, are especially impacted by this situation because they have difficulty accessing safe spaces for events like mass street runs (Gebre-Egziabher & Berhanu, 2017). Moreover, the increasing frequency of non-communicable diseases such as diabetes and hypertension can be connected to the lack of walkable surroundings, as stated by local health centers (WHO, 2020).

The construction of road infrastructure and urban planning is made more difficult by squatter communities and illegal settlements. The city's layout is upset by this haphazard growth, impeding attempts to develop a pedestrian-friendly environment (UN-HABITAT, 2021). The city municipality has implemented the Smart Adama Project as one of its efforts to address these problems, but given how quickly cities and populations are growing, these efforts fall short. Initiatives such as the smart transport system, for instance, have been implemented, but given the scope of the issue, their impact is minimal ; (Adama City Administration, 2018; Lall et al., 2017).

Despite these initiatives, there is still a discernible lack of studies that are especially concerned with Adama's pedestrian infrastructure. Studies that have already been done mostly focus on more general urban planning and transportation issues; they do not, however, go into great detail about pedestrian routes and their effects on public health and safety. By offering a thorough analysis of Adama's pedestrian infrastructure, highlighting important issues, and suggesting workable alternatives to improve the city's walkability, this study seeks to close this gap.

1.3. Objective of the Study

1.3.1. General Objective;

The main objective of this study is to evaluate the walk way condition of Adama Town by relating the dwellers daily activity and over all movement versus the streetscape of the town.

1.3.2. Specific Objective;

The specific objectives include the following;

1. To evaluate the status of pedestrian walkway challenges in the built environment.
2. To identify the main walkability challenges thereby proposing solutions Propose solutions supported by 3D drawings.

1.4. Research Question

What is extent of the key challenges facing the pedestrians in daily life activities in the town?

What are the major walkability challenges facing the dwellers related?

What are the expected and unexpected results of this research in achieving pedestrian friendly neighborhood?

1.5. Scope of the Research

Due to resource and time limitation the study focuses only on the evaluation and examination of the existing challenges and their effects of lacking appropriate pedestrian friendly walk ways and the current situation of the town. Within the town a random neighborhood has been considered. The site starts from the area commonly known 04 Kebelle and spans 1km in four directions. Methodologically, questionnaire survey and physical auditing and observation has been used to carry out the data collection method. Participants were randomly selected in convenient places at

the specified neighborhood action area but was not be rigid only to dwellers and visitors but every walking people in the neighborhood was considered without bias.

1.6. Significance of the Research

This study is expected to be one input document in future planning for the municipal authorities and researchers and shall have a positive impact in the dwellers of Adama Town who are suffering from a vehicle dominated town way. This study will indicate the healthiness of the existing pedestrian walkway, & walkability condition and its persistent influence in the lives of the people in the town. This paper has proposed a new trend, upgrading mechanism, or sustainable and futuristic practical proposals that can change the existing weird view, safety, movement, interaction and disturbance.

This study will be one piece of input for those concerned authorities on social service for awareness creation on the existing condition of the town to the public so that they can be part of cooperation in the development of the pedestrian friendliness & walkability of Adama Town. Therefore, this paper would be an important tool and an addition to the nearly unavailable walkability research for both the people and authorities to develop their city through cooperation and mutual understanding.

The community can benefit from this research on neighborhood walkability in Adama Town by learning more about the factors that influence walkability and how they affect health and well-being. Residents can use this information to advocate for improvements in pedestrian infrastructure and to promote a more walkable lifestyle. Policymakers can gain valuable insights that inform strategies to improve walkability, such as the creation of dedicated walkways, improved traffic management, and the promotion of mixed-use development. Researchers can also benefit from this research by gathering valuable data on the current state of walkability in Adama, which can help researchers better understand the opportunities and challenges related to walkability in developing cities.

1.7. Limitations of the Study:

It is evident that there is no a standard or walkability index nationally. Hence internationally set standards were used to evaluate the walkability issues. Despite the comprehensive approach, this study has its own limitations. Since the research is self-sponsored and the researcher is on active job duty there is a limitation both in time and finance.

1.8. Organization of the Research

The research is organized into five chapters. Each chapter examines the content and data of the study. The main chapter in the research is further described as follows.

Chapter 1: Introduction: This chapter introduces the concept of walkability and its connection to factors like health, community, and sustainability. It then identifies the research problem - limited walkability in Adama Town, Ethiopia - and outlines the research objectives. These objectives will focus on assessing the challenges pedestrians face and proposing solutions to create a more walkable environment.

Chapter 2: Literature Review: This chapter delves into existing research on factors that influence walkability in urban settings. It explores how elements like safety, sidewalk infrastructure, traffic management, accessibility, and access to amenities impact how much people walk. The chapter will also analyze successful strategies implemented in other cities to improve walkability.

Chapter 3: Materials and Methods: This chapter describes the research design, which will be a quantitative approach using surveys and field observations. It will explain how a statistically valid sample size of 320 residents was determined and chosen using a specific sampling method. The data collection methods will be detailed, including structured questionnaires on walking habits, safety perceptions, and the condition of pedestrian infrastructure. Additionally, field observations documenting the physical state of sidewalks and other pedestrian facilities will be mentioned. Finally, the chapter will briefly explain how the data will be analyzed using descriptive statistics to summarize key trends and findings.

Chapter 4: Results and Discussion: This chapter will present the key findings from the data analysis, focusing on the challenges pedestrians face in Adama Town. The discussion will explore findings related to safety concerns, sidewalk issues, traffic factors hindering walking, and accessibility for people with disabilities. It will also analyze the low overall walking frequency observed in the data on resident walking habits.

Chapter 5: Conclusion and Recommendation: This chapter will summarize the main conclusions about the limitations hindering walkability in Adama Town. It will reiterate the research objectives and emphasize the importance of creating a more pedestrian-friendly environment. Specific recommendations will be proposed to address the identified challenges. These might include prioritizing sidewalk improvements, enhancing safety measures, promoting

traffic management, increasing accessibility for all, and improving access to amenities within walking distance. The chapter will conclude by discussing the potential benefits of implementing these recommendations on factors like physical activity, resident well-being, and community vibrancy.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Evolution of Neighborhood Walkability: From Historical Roots to Contemporary Movements:

The idea of walkability has evolved significantly throughout history, encompassing not only physical accessibility but also social interaction, cultural vibrancy, and a sense of safety. This chapter delves into the historical origins of walkability in various cultures, the reasons behind its decline in the 20th century, and the rise of modern movements advocating for its resurgence.

2.1.2 Traditional Walkable Settlements

Walkable communities have historically been the epicenter of many societies. From the medinas of North Africa to the hutongs of China, traditional city centers placed a premium on pedestrian circulation through the design of small streets, mixed-use developments, and public spaces (Jacobs, 1982). Social engagement and a strong sense of community were encouraged in these neighborhoods.

2.1.3 Colonial Impacts on Patterns of Walkability

Cities' walkability has been permanently impacted by colonial urban development, particularly in colonized areas. Rather than considering the requirements of pedestrians, colonial governments frequently prioritized administrative efficiency and segregation when designing towns. Numerous former colonies still bear the scars of this history, with their broad, car-centric roads and dispersed public places that make walking more difficult (Njoh, 2009). For instance, road networks were given top priority during colonial era design in African cities like Nairobi and Lagos in order to facilitate economic exploitation and control. This resulted in the sprawling, car-dependent urban forms that still exist there today (Gandy, 2006). Moreover, the development of pedestrian walkways and public transit networks was frequently overlooked by colonial infrastructure, leading to urban regions where walking is hazardous or inconvenient (Gilbert & Myers, 2004). Due to the colonial design decisions' lasting impact, modern urban strategies must confront and correct these historical patterns in order to support more walkable and sustainable cities (Parnell & Robinson, 2012).

2.1.4 Rise of Car-Centric Development

Urban landscapes and societal norms were altered by the rise of car-centric development in the industrialized world, especially during the industrialization of the 20th century. The post-World War II economic boom, particularly in the US, drove the mass manufacture and ownership of automobiles, which in turn impacted residential and urban design trends. Driven by legislation like the Federal-Aid Highway Act of 1956, which supported massive highway development, and zoning restrictions that encouraged low-density, single-family dwellings accessible solely by automobile, suburbanization became a defining feature of this era (Cooney & Jackson, 1987). The development of commercial districts dependent on cars and the underfunding and underutilization of public transit networks served to further solidify this trend (Gutfreund, 2004). The prioritization of car-centric infrastructure resulted in the development of expansive metropolitan areas with vast road networks, ample parking places, and a diminished focus on pedestrian paths. These factors have been linked to environmental issues and a decrease in community cohesion (Davies & Kay, 1997). As a result, the built environment and social dynamics were significantly impacted by this development paradigm, highlighting the continuous need to reevaluate urban planning techniques in order to address current sustainability concerns.

2.1.5 The Impact of Car-Centric Development

Due to the emphasis placed on automobiles throughout the design of cities, wide highways, vast highway networks, and expansive suburban communities that are frequently inaccessible on foot have been created (Speck, 2012). This method of urban planning made cities less walkable by reducing the number of sidewalks, pedestrian crossings, and public areas. Zoning regulations that divided residential from business and industrial zones in nations like the US made the problem worse by making people depend on their cars for even short excursions (Andrés et al., 2000). Furthermore, the focus on expansive parking lots and drive-through establishments further divided the urban environment and erected obstacles for walkers (Jacobs, 1982). As a result, walkability declines, which has a detrimental effect on social interaction, public health, and environmental sustainability. This emphasizes the urgent need for urban planning reforms that give pedestrian-friendly infrastructure top priority.

2.1.6 Re-emergence of Walkability Movements

The environmental, social, and health benefits of pedestrian-friendly urban design have led to a major resurgence of walkability movements in recent decades (Speck, 2018). Globally, more and

more cities are implementing policies that give priority to public transportation, walking, and bicycling over infrastructure designed primarily for cars (Smart Growth America, 2020). The adoption of "complete streets" policies, which seek to build roads that safely accommodate all users, including bikes, pedestrians, and transit users, is indicative of this change (Smart Growth America, 2020). Urban planners are also reexamining ideas for mixed-use development, which combine commercial, residential, and recreational areas within walking distances to create communities that are lively and cohesive (Gehl, 2010). Walkable settings are becoming more and more popular, as evidenced by the success of programs like pedestrian plazas, car-free zones, and downtown area rehabilitation (Speck, 2018). In addition to changing urban environments, this trend is improving social interaction and public health while also lowering air pollution, traffic congestion, and greenhouse gas emissions.

2.1.7 Citizen-Led Initiatives

The revival of walkability has been largely attributed to citizen-led efforts, which have sparked grassroots campaigns in favor of more pedestrian-friendly urban settings. In order to promote the advantages of walkable cities—such as better public health, less of an impact on the environment, and increased social cohesion—local communities frequently organize for these initiatives (Tolley, 2003). The emergence of pedestrian advocacy groups that collaborate with municipal authorities and urban planners to impact policy and planning choices is another result of these grassroots initiatives. These movements have been successful in cities like Portland and Copenhagen, where the implementation of comprehensive walkability plans has been made possible by citizen engagement (Gehl, 2010). Citizen-led projects play a critical role in creating urban environments that put people before cars by energizing local support and increasing awareness.

2.2 Theories and Concepts

2.2.1 Defining Walkability

The degree to which a place promotes and supports walking as a means of transportation, leisure, and social contact is known as its walkability. The existence and condition of sidewalks, pedestrian crossings, street network connectivity, varied land uses, and safety from traffic and crime are important elements that determine a neighborhood's walkability (Southworth, 2005). By making sure that locations like stores, schools, and parks are easily accessible by foot, effective urban

planning significantly contributes to improving walkability (Frank et al., 2003). A comfortable walking environment is further enhanced by visual features including benches, street trees, and appealing building facades (Ewing & Handy, 2009). Stronger communal bonds, less of an influence on the environment, and better public health are only a few advantages linked to high walkability (Speck, 2012). Urban surroundings can be made more sustainable and livable by cities through the study and use of walkability principles.

2.2.2 Importance of neighborhood walkability in urban planning and public health

Walkability has a big impact on the quality of life in cities and is an important component of public health and urban planning. Urban environments with high walkability levels encourage physical exercise, which is crucial for averting chronic illnesses including diabetes, obesity, and cardiovascular diseases (Frank et al., 2006). Additionally, walkable areas frequently have lower emissions and less traffic, which improves the sustainability of the environment and the quality of the air (Ewing & Cervero, 2010). Socially speaking, walkable communities encourage people to interact with their surroundings and with one another, which strengthens social cohesion (Leyden, 2003). Walkability is a top priority in urban design because it boosts foot traffic to local businesses and makes public places more lively (Speck, 2012). Thus, walkability must be included into urban design in order to build communities that are healthier, more sustainable, and more cohesive.

2.2.3 Key Theoretical Frameworks

Jane Jacobs' Theories: Urban planning was transformed by Jane Jacobs' beliefs, which were outlined in her groundbreaking work "The Death and Life of Great American Cities" and focused on the significance of walkable, diverse, and lively communities. The emphasis on large-scale redevelopment projects and suburbanization, which Jacobs claimed contributed to the collapse of urban life, were among the modern urban planning tendencies she criticized in the 1950s and 1960s (Jacobs, 1982). She presented important ideas like "eyes on the street," which emphasizes how natural monitoring may improve neighborhood safety by encouraging mixed-use construction and lively street life. In order to foster social and economic vibrancy, Jacobs also supported the concept of "mixed primary uses," which calls for a combination of commercial, residential, and recreational areas.She also emphasized the significance of dense street networks and small blocks for promoting pedestrian interactions and mobility. Modern urban planning has been greatly impacted

by Jacobs' emphasis on diversity, local involvement, and human-scale design. He promoted cities that put people before cars and build strong, cohesive communities.

Kevin Lynch's Urban Design Theories: Urban design theories by Kevin Lynch, especially those found in "The Image of the City," place a strong emphasis on imageability and legibility, both of which have a big influence on walkability. Imageability is a term used to describe how unique and memorable a location is, which helps people go around and interact with their environment (Lynch, 1960). Legibility is the degree to which individuals can comprehend and navigate an urban environment with ease. Lynch found that a city's readability is improved by five essential components: pathways, edges, districts, nodes, and landmarks. By making these components better, pedestrian settings become more entertaining and easier to navigate, which promotes walking by lowering stress and cognitive load. Lynch's views emphasize the significance of coherent spatial and visual designs in cities that promote and strengthen walkability.

Theories of Environmental Psychology: Environmental psychology theories focus on the relationship between individuals and their surroundings and investigate how constructed environments affect human behavior. According to these views, physical environments have a big impact on people's moods, stress levels, social interactions, and general well-being (Gifford, 2014). For example, features of urban design including green areas, natural light, and attractive architecture can improve mental health and encourage constructive social activities (Ulrich et al., 1991) . On the other hand, ill-designed spaces that are noisy, crowded, and devoid of natural light can exacerbate stress, anxiety, and social isolation. Environmental psychology also emphasizes how crucial it is to create environments that meet basic human needs, such comfort, safety, and accessibility, in order to raise standards of living. Through an awareness of the psychological impacts of the built environment, architects and urban planners may design environments that encourage productive and healthy habits, leading to more livable and sustainable communities.

Transportation and Land Use Theory: With a focus on how the physical layout of metropolitan regions affects travel behavior, transportation and land use theory investigates the complex link between land use patterns and modes of transportation. Due to the near proximity of households, workplaces, and facilities, dense, mixed-use complexes generally enable a variety of transportation options, such as walking, cycling, and public transportation (Cervero & Kockelman, 1997). On the other hand, because destinations are dispersed and frequently unreachable by foot or public

transportation, low-density, single-use zoning promotes a reliance on cars. In land use planning, the goal of "transit-oriented development" is to establish compact, walkable communities that are based around excellent public transportation services (Bertolini, 1999). This relationship exemplifies this concept. By increasing the viability and appeal of alternative means of transportation, an efficient integration of land use and transportation can alleviate traffic congestion, minimize greenhouse gas emissions, and encourage healthier, more sustainable lives.

2.3 Contemporary Approaches of Neighborhood Walkability

2.3.1. Walking Score and Other Metrics

A popular metric for assessing walkability is the Walk Score, which assigns a number between 0 and 100 to each area's level of pedestrian friendliness. This score is determined by taking into account the street network's connectivity as well as the proximity of other amenities such restaurants, stores, parks, and schools (Walk Score, 2024). Higher scores correspond to more walkable neighborhoods where people can run their everyday errands without using a car. Walk Score has grown to be an important resource for people, real estate developers, and urban planners alike. It provides an easy-to-use method for evaluating and contrasting the walkability of various locales. It also has a correlation with other measures of quality of life, like property values and the degree of physical activity among the populace (Carr et al., 2010). The Walk Score categories and their descriptions are shown in the table below:

Table 2.1 Walk Score Categories

Walk Score Range	Description
90–100	Walker’s Paradise
70–89	Very Walkable
50–69	Somewhat Walkable
25–49	Car-Dependent
0–24	Car-Dependent (Few Amenities)

(Source: Walk Score, 2024)

Walkability is assessed using a variety of techniques and measures in addition to Walk Score. These include the Walkability Index, which integrates elements including land use mix, population density, and street connection, and the Pedestrian Level of Service (PLOS), which rates the safety and quality of pedestrian infrastructure (Schlossberg & Brown, 2004). Additionally, bigger urban

areas' walkability is modeled and geographical data is analyzed using Geographic Information Systems (GIS) (Clifton et al., 2007). Urban planners can use these technologies to pinpoint problem locations and create walkability-enhancing initiatives. Cities can foster a more pedestrian-friendly atmosphere that supports community life, sustainability, and good health by utilizing these several indicators. Based on the standards listed in Clifton, Smith, and Rodriguez's study on the creation and testing of a pedestrian environment audit, the table for testing an audit for the pedestrian environment is provided below:2.

Table 2.2 Pedestrian walkability audit

Category	Criteria	Scoring (1-5)	Notes
Sidewalk Infrastructure	Width of sidewalks	1-5	Minimum width requirements
	Condition of sidewalks (cracks, obstructions)	1-5	Surface quality assessment
	Presence of curb cuts and ramps	1-5	ADA compliance
Safety	Adequate lighting	1-5	Streetlight presence and type
	Crosswalks (visibility, markings, signals)	1-5	Pedestrian crossing safety
	Traffic calming measures (speed bumps, signage)	1-5	Speed control measures
Accessibility	Presence of benches and resting places	1-5	Availability of seating
	Accessibility of public transportation stops	1-5	Proximity and condition
	Universal accessibility (wheelchair, strollers)	1-5	ADA compliance
Aesthetics	Presence of greenery (trees, plants)	1-5	Green space integration
	Cleanliness (trash bins, absence of litter)	1-5	Maintenance level
	Aesthetic quality of the built environment (building facades, public art)	1-5	Visual appeal

Connectivity	Directness of routes	1-5	Route efficiency
	Connectivity to key destinations (schools, parks, shops)	1-5	Proximity to amenities
	Presence of shortcuts or pedestrian pathways	1-5	Pathway availability

Source (Clifton et al., 2007)

2.3.2. Livability and Quality of Life In relation to Neighborhood Walkability

Walkable neighborhoods provide healthier, more sustainable, and socially cohesive communities, which greatly improves livability and quality of life. Elevated walkability encourages physical exercise and lowers the chance of chronic illnesses like diabetes, heart disease, and obesity (Frank et al., 2006). Environmentally speaking, walkable areas encourage individuals to choose walking over driving, which lowers carbon emissions and reduces traffic congestion (Ewing & Cervero, 2010). In terms of social interaction, these areas are typically more cohesive and have higher levels of community ties because pedestrian-friendly environments encourage people to interact with their neighbors and spend more time outside (Leyden, 2003). Additionally, walkable neighborhoods are more likely to have better access to amenities and services, which improves convenience and accessibility for all residents, including the elderly and people with disabilities. Taken together, these wider effects highlight the significance of incorporating walkability into urban planning in order to create more vibrant and livable urban environments.

2.4 Factors Influencing Walkability

2.4.1. Physical and Built Environment

The constructed and physical environment has a significant impact on how walkable and generally livable metropolitan areas are. Essential elements include street design and connection, which dictate how simple it is for people to move around and navigate a community. Because they provide quick and easy access to a variety of locations, well-planned streets with a dense network of connecting routes promote walking (Southworth, 2005). Walking becomes a more appealing choice because to features like safe crossings, traffic calming measures, and small streets that improve pedestrian safety and comfort. An area must also have pedestrian walkways and sidewalks in order to be considered walkable. Accessible and secure areas for pedestrians are provided by

well-maintained, unobstructed sidewalks (Clifton et al., 2007). Walking is further promoted by pedestrian walkways that are well-lit, kept up, and connected with the neighborhood's infrastructure. Furthermore, walkability is greatly impacted by accessibility to facilities and services. Being close to places of education, parks, shopping centers, and public transportation allows people to run their everyday errands without using their cars, leading to a more environmentally friendly way of living (Frank et al., 2006).

2.4.2. Socio Economic Factors

Walkability is greatly influenced by socioeconomic factors, with income inequality and demographic traits playing major roles. Walking habits are influenced by demographic factors including age and income. Families and senior citizens need safer, more accessible pedestrian infrastructure, while younger people and those without children typically walk more (Forsyth et al., 2008). Access to walkable areas is impacted by economic inequality since, in general, higher-income communities have better infrastructure than lower-income districts, including well-maintained parks and walkways (Dannenberg et al., 2003; T. A. Litman, 2003). This discrepancy results in unequal access to the health benefits and economic savings associated with walking, among other advantages of walkability. Enhancing pedestrian infrastructure in underprivileged areas through urban design is necessary to promote equal access to walkable neighborhoods.

2.4.3. Policy and Governance

Enhancing walkability through government programs and urban planning policies is mostly dependent on policy and governance. To create walkable neighborhoods, urban planning strategies must give priority to mixed-use development, pedestrian infrastructure, and public transportation (Litman, 2003). By incorporating sidewalks, crosswalks, and public areas into urban design, these regulations make cities more livable and pedestrian-friendly. These objectives are further supported by government initiatives like traffic calming programs and money for pedestrian infrastructure. Participation in the community is also crucial because locals may offer insightful information about their wants and preferences, which can be used to create inclusive and successful policies (City of Copenhagen, 2012). Walkability is an essential element of more dynamic and sustainable urban environments that can be achieved via cooperative efforts between communities and government organizations.

2.5 Case Studies

2.5.1. Copenhagen, Denmark

Policies Promoting Walkability: Copenhagen's commitment to improving walkability stems from its urban plans that place a high priority on sustainable mobility and pedestrian infrastructure. The "CPH 2025 Climate Plan," the city's municipal plan, places a strong emphasis on encouraging walking and bicycling and reducing the use of cars in order to make Copenhagen carbon-neutral by 2025 (City of Copenhagen, 2012). Significant investments in pedestrian infrastructure are part of this plan; these include the enlargement of pedestrian zones, better street lighting, and the construction of additional public areas.

Moreover, land use and transportation planning are integrated into Copenhagen's plans. Designed in the 1940s and modified frequently, the city's Finger Plan guarantees that urban expansion aligns with transit corridors, making it easier to use public transportation and promoting walking as the major form of transportation (Knowles, 2012). Copenhagen successfully lessens reliance on automobiles and encourages a more walkable urban environment by concentrating construction around hubs for public transportation.

Urban Design Initiatives: Copenhagen's urban design prioritizes creating safe, attractive, and easily accessible spaces for pedestrians. One of the most remarkable initiatives is the extensive network of pedestrian streets and public squares. For example, Strøget, one of the longest pedestrian streets in Europe, showcases Copenhagen's dedication to pedestrian-friendly design. This car-free zone, established in 1962, has evolved into a lively commercial and social center, promoting walking and outdoor activities (Gehl, 2010).

The city of Copenhagen prioritizes "shared space" design principles, where pedestrians, cyclists, and motorists all use the same space. This approach reduces the dominance of cars and improves the overall pedestrian experience. Streets are designed with wide sidewalks, ample seating, and green spaces, creating an inviting environment for walking. Additionally, Copenhagen's emphasis on "human scale" design ensures that buildings and public spaces are developed with pedestrians in mind, which enhances the overall walkability of the city (Gehl, 2010).

Community Involvement and Sustainability: Copenhagen's approach to urban planning is based on community involvement. In order to make sure that community needs and preferences are taken

into account when designing urban areas, the city constantly interacts with citizens through public consultations and participatory planning processes (City of Copenhagen, 2012). This cooperative approach produces more sustainable and successful urban solutions in addition to encouraging a sense of responsibility among inhabitants.

Copenhagen also prioritizes sustainability in its walkability programs. The incorporation of green infrastructure, such as parks and green roofs, into pedestrian pathways improves the quality of the surrounding environment and offers citizens comfortable places to walk. In comparison to other cities with lower walkability, the city's dedication to sustainability and walkability has also resulted in major health benefits, with lower rates of obesity and cardiovascular diseases (Pucher & Buehler, 2010).

To conclude, the promotion of walkability in Copenhagen has been successful due to the implementation of comprehensive legislation, creative urban design, and engaged community involvement. The city's comprehensive strategy improves the lives of its citizens and sets an example for other cities hoping to build more sustainable and walkable metropolitan areas.

Figure 0-1.1 the main shopping and pedestrian street

(Source: https://www.visitcopenhagen.com)

2.5.2. Walkability in Kigali, Rwanda

Policies Promoting Walkability: Kigali's strategies for urban development, which place a high value on the establishment of secure and convenient pedestrian spaces, reflect the city's dedication to walkability. The Kigali City Master Plan prioritizes public transportation, open areas, and mixed-use development. It was created with the help of foreign specialists in urban planning (KIGALI CITY, 2013). These laws are meant to promote walking and bicycling while lessening the need for automobiles.

The "Vision 2020" plan of the Rwandan government also emphasizes the significance of sustainable urban development, which includes improving the infrastructure for pedestrians. This goal has prompted large investments in public infrastructure initiatives intended to raise citizens' quality of life by increasing walkability in urban areas (The Government of Rwanda, 2012).

Urban Design Initiatives: The creation of aesthetically pleasing and useful pedestrian areas is the main goal of Kigali's urban design projects. The city has built wide sidewalks, pedestrian crossings, and street lighting as part of its massive roadway improvement projects. The Kigali Urban Upgrading Project is one noteworthy initiative that attempts to develop unplanned urban areas with better pedestrian infrastructure from informal settlements (World Bank, 2018).

Kigali's public places are planned with pedestrians in mind; they have plenty of seating, greenery, and well-kept pathways. Walking and social interactions are promoted when car-centric regions are converted to pedestrian zones. One such program is the car-free day initiative, which closes some streets to motorized traffic on specific days (UN-Habitat, 2020). These programs not only improve walkability but also encourage social contact and a feeling of community.

Community Involvement and Sustainability: Kigali's strategy for enhancing walkability places a strong emphasis on community involvement. Public consultations and participatory planning workshops involve the active participation of local residents in the planning process. By including the community, urban development initiatives are made to take into account their wants and preferences, which results in more sustainable and effective outcomes (UN-Habitat, 2020).

Kigali's emphasis on sustainability is demonstrated by the way that green infrastructure is incorporated into urban planning. In order to improve the environment and give locals nice places to walk, the city has built a large number of parks and green areas beside pedestrian walkways.

Kigali's emphasis on order and cleanliness also makes the city's urban landscape more welcoming and walkable.

In conclusion, comprehensive legislation, creative urban planning, and engaged community participation are the reasons for Kigali's success in increasing walkability. In addition to improving the quality of life for its citizens, the city's integrated strategy acts as a model for other African communities hoping to develop more sustainable and walkable metropolitan areas.

Figure 2.2 Designs of the renovated car free zone courtesy of City of Kigali

(Source: https://africa.itdp.org)

Summary of Key Findings: The walkability literature study identifies several important themes and perspectives that are crucial to comprehend the complex process of developing pedestrian-friendly surroundings. Historically, the 20th century's car-centric development led to urban plans that frequently disregarded pedestrian infrastructure, having a detrimental effect on social cohesion, environmental sustainability, and public health. But the necessity of developing thriving, human-scaled neighborhoods has been highlighted by the resurgence of walkability movements, which were sparked by the theories of urban planners like Jane Jacobs and Kevin Lynch. The physical and architectural environment, which includes roadway layout and connection, the

existence of sidewalks and pedestrian walkways, and the accessibility of facilities and services, are important determinants of walkability. Socioeconomic factors are highly influential and impact both the availability and quality of pedestrian infrastructure. These aspects include economic inequities and demographic effects. It has been demonstrated that when executed well, policy and governance, in particular through urban planning policies and government initiatives, greatly improve walkability. Furthermore, measurements and other tools like Walk Score have offered useful ways to gauge and contrast walkability in various urban areas.

Research Gap: Although the body of research on walkability and its effects on health, happiness, and community vitality is expanding, little of it is relevant to Ethiopian towns like Adama Town. The majority of research to date has focused on walkability in developed nations, where socioeconomic circumstances, infrastructure, and cultural perceptions of walking are very different from those in poor nations. There are particularly few studies that look at the unique issues that pedestrians in Adama Town experience, like high traffic volumes, uneven sidewalk distribution, inadequate maintenance, safety concerns, and restricted accessibility for those with impairments. Moreover, a dearth of studies exists that offer customized suggestions suited to Adama Town's distinct urban setting and infrastructure requirements locally.

By evaluating pedestrian challenges through both quantitative surveys and field observations, this study seeks to close these gaps in the literature. By addressing these particular issues and offering workable solutions, it advances the understanding of walkability in developing urban contexts and provides useful information for Ethiopian policymakers and urban planners.

CHAPTER THREE

3. METHODOLOGY

The methodology that will be applied in the study will be chosen to acquire information and deduce conclusions about the walkability problems of Adama Town and propose a solution. This paper will investigate by involving all stakeholders to bring attractive, safe, all-inclusive, well-lighted, defined and futurity-aiming streets and walkways that could add value to the public by making Adama a walkable and pedestrian-friendly town.

2.1. Description of the Study Area:

My study area is located in Adama town spaning 1km in four directions starting from the center of the area commonly known as 04. The exact location of my site in Latitude and Longitude is 8°33'8.81"N & 39°16'39.88"E.

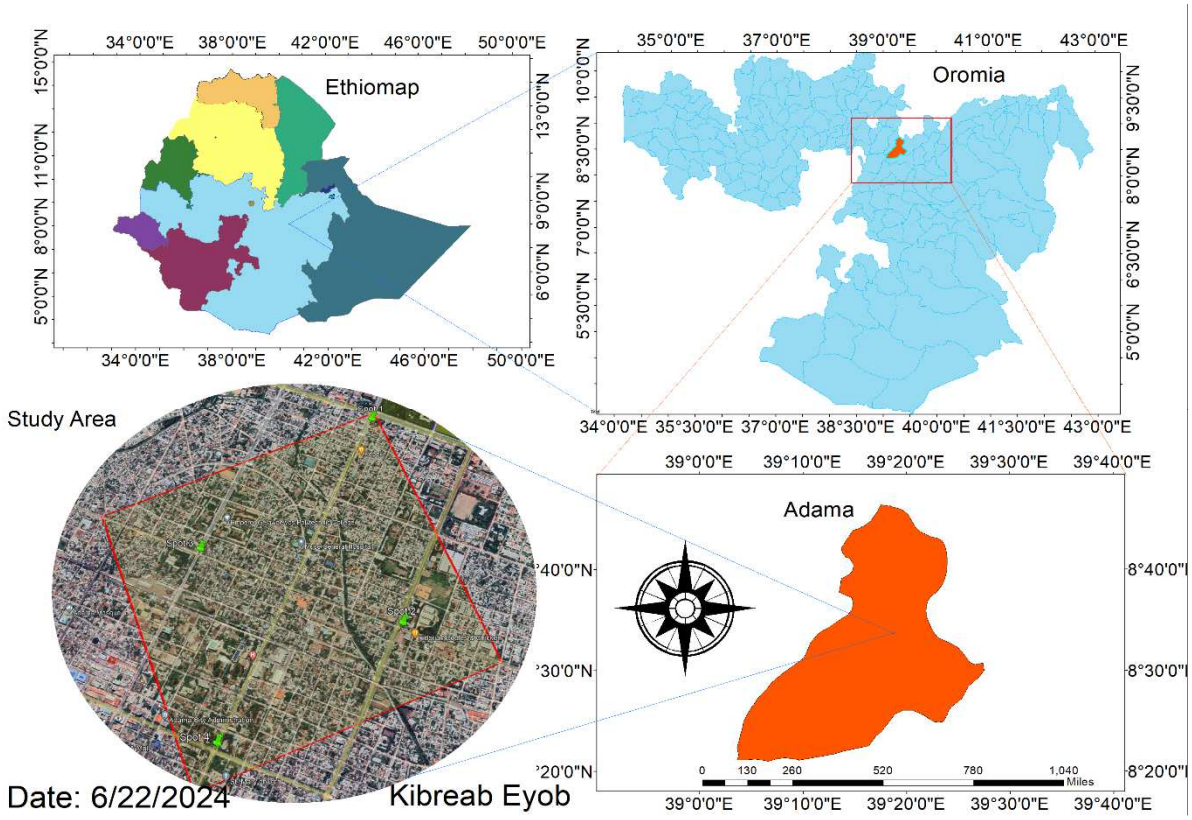

Figure 3. 1 Location map

Land Use Land Cover (LULC): The urban built-up area expanded by about 22% annually from 1995 to 2019. Similarly, the runoff depth in Adama City administration increased by 9.5%(Bulti & Abebe, 2020). This indicates the horizontal expansion is prevalent.

Climate: The maximum, minimum, and mean annual precipitations of the town are 1371, 629 and 920 mm, respectively(Bulti & Abebe, 2020). Below is a graph depicting the climate of Adama. As can be seen from the drawing 3. below, maximum rain occur between June and July.

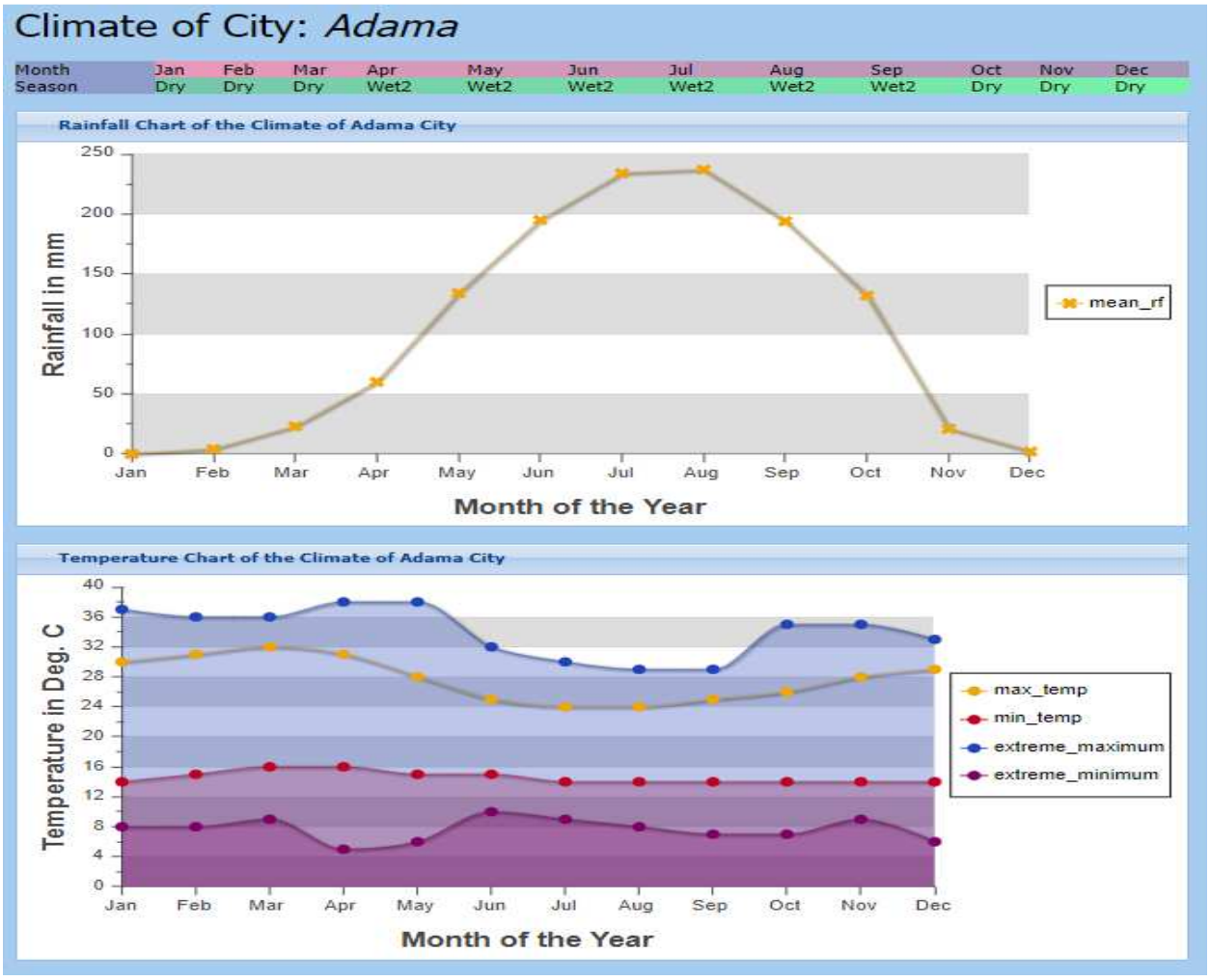

Figure 3. 2 Adama Climate

Source: National Meteorology Agency

2.2. Materials and methods used for the specific objectives

To achieve the specific objectives of this research, a comprehensive methodological approach was employed, utilizing both quantitative data collection and descriptive analysis methods.

Objective 1: Evaluate the Status of Pedestrian Walkway Challenges in the Built Environment

Survey: A structured questionnaire survey was conducted among 320 residents of Adama Town, determined using Cochran's formula for simple random sampling. The survey focused on collecting data about residents' walking demography, habits, perceived safety, and the condition of pedestrian infrastructure using relevant variables on walkability.

Survey Analysis: The data gathered from the surveys were analyzed using descriptive statistical techniques to summarize key trends and findings. This analysis provided insights into the current effects of the lack of pedestrian-friendly neighborhoods on residents' daily lives.

Field Observations: Systematic field observations were carried out to document the physical state of sidewalks, crosswalks, and other pedestrian facilities. These observations aimed to capture tangible evidence of the infrastructural challenges faced by pedestrians.

.**Objective 2**: Identify the Main Walkability Challenges and Propose solutions supported by 3Ddrawings.

Data Synthesis: The findings from the surveys and field observations were synthesized to identify the most critical issues affecting walkability.

Recommendation Formulation: Based on the synthesized data, a set of recommendations was formulated to address the identified challenges. These recommendations aimed to improve pedestrian infrastructure, enhance safety, and promote a more walkable environment in Adama Town.

2.3. Sampling design

Ideally the purpose of one study is the entire population. However, usually it is impossible or impractical to do this and therefore one must settle for a sample. As it can be noticed from the title, it is designed to be specific at a neighborhood level. Hence the universe is finite and manageable. The research used *convenient places as a* method for the sampling design from the universe or population in the target area. The Simple random sampling (SRS) was employed in this study to ensure that each pedestrian within the selected neighborhoods of Adama had an equal chance of being included. This method reduces selection bias, promoting the collection of a representative sample that accurately reflects the broader population's characteristic (Cochran, 2007; C.R. Kothari, 2004). By implementing SRS, the study maintains objectivity and enhances the credibility

of its findings (Bryman, 2012). Additionally, SRS simplifies the sampling process and facilitates statistical analysis, which is essential for drawing valid and reliable conclusions (Sharma, 2017).

Therefore, the sampling design method for this research implemented a quantitative method for the analysis. The site was selected by inspiring the 15-minute walkable city concept in which the area spans 1km from the origin in four directions. This approach captures spatial variability and ensures that data from diverse urban settings are included (Loukaitou-Sideris & Ehrenfeucht, 2009). The sample size was taken in Four different spots of the target area. Then an average was taken from the four samples for better analysis and getting better result.

By choosing specific points within a 1 km radius, the study effectively assesses the walkability and pedestrian infrastructure in varied contexts without covering the entire site, which is crucial for detailed analysis and practical feasibility (Gehl, 2010). This strategy also facilitates the identification of specific areas requiring intervention, enhancing the potential impact of the study's recommendations (Dowdall et al., 2010).

First, I calculated **the initial sample size (n) using Cochran's formula** for a simple random sample. This formula helps ensure that the sample size is large enough to achieve the desired confidence level and margin of error (Cochran, 2007).

$n=Z^2*p*(1-p)/e^2$

where,

n= sample size

Z= Z-value (the number of standard deviations from the mean corresponding to the desired confidence level, e.g. I considered, 1.96 for 95% confidence level)

p = estimated proportion of the population that exhibits the characteristic of interest (e.g., proportion of walkers in the neighborhood, often set at 0.5 if unknown to be more conservative to maximize the sample size)

e = margin of error (the maximum acceptable difference between the sample statistic and the population parameter, e.g., 0.05 for 5%)

Hence,

$n= \{(1.96)^2*0.5*(1-0.5)\}/(0.05)^2$

n= 384.16

So, the initial sample size calculated was approximately **384.**

To assess pedestrian activity and walkability in my research, I opted for direct observation through pedestrian counts. This method aligns with prior research by (Ewing & Cervero, 2007) who found that pedestrian counts during peak walking times, like mornings and afternoons, provided the most valuable data for understanding walking patterns and infrastructure needs in their study published in Health & Place. By dedicating four hours per day to counts split between morning and afternoon, I aimed to capture these peak periods and gain insights into pedestrian activity levels in Adama.

Hence, I estimated the total number of walkers in the neighbourhood. Through physical observations and on-site counting, I found that the average number of walkers is 50 people per 25 minutes at 4 different observation points.

To convert this to a daily estimate:

In one hour, there are 60/25 intervals. Thus, 50 walkers per 25 minutes converts to 50 walkers×2.4 intervals/hour=120 walkers/hour.

Observing for 4 hours per day (2 hours in the morning and 2 hours in the evening) at 4 points gives: 120 walkers/hour×4 hours/day×4 points=1920 walkers/day

So, the estimated number of walkers per day is **1920.**

Since the population size (N) is finite, I applied the finite population correction (FPC) to adjust the initial sample size. The formula for the adjusted sample size is:

$n_{adj} = n/(1+(n-1)/N))$

$n_{adj} = 384.16/(1+(384.16-1)/1920)$

$n_{adj} =320.26$

For my neighborhood walkability Research, considering a population size of 1920 walkers per day, I should aim for an adjusted sample size of about **320 respondents**. This adjustment ensures the sample accurately represents the population while avoiding unnecessary data collection.

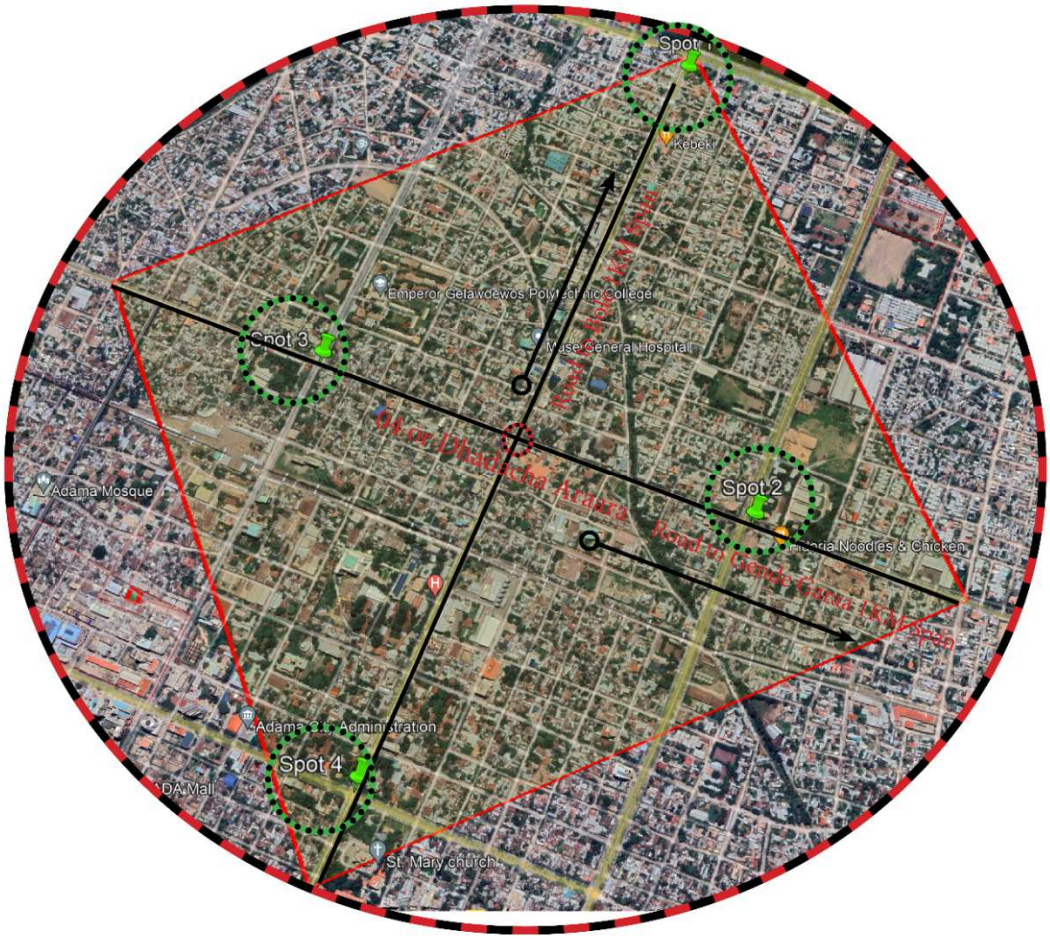

Figure 0-1.2 Four Data Sampling Spots in the target area

Source: Author

2.4. The questionnaire survey

The questionnaire will be designed mainly for two purposes. Firstly, it translates the objectives of the field work into specific questions which help in the collection of necessary data. The data collected through the responses of the questions forms the basis of understanding the problem or explore the idea set by the objective. To achieve these objectives, each question will communicate to the respondent the idea or group of ideas required by the objective and obtain a response which

can be analyzed to fulfill the objectives. The question will be designed to perform these functions with minimum distortion of the response it deals. Secondly, it will be designed to assist interviewer in motivating the respondent to communicate the required information. It is evident that, the quantity and quality of data collected depends largely on the nature of questionnaire, great attention will be given for the questionnaire itself as it does much to determine the nature of interviewer-respondent relationship.

The questionnaire survey's inclusion of a neighborhood walkability rating to get the perception of residents on a scale of 1 to 10 aids in capturing individuals' subjective assessments, which are essential for comprehending and resolving particular local walkability concerns (Leslie et al., 2005).

The questionnaire would be designed to properly pursue the specific objective and will focus on understanding the real behavior and life style of the dwellers and reveal their experience in the town's walkway condition. It will consist, level ways of measuring their satisfaction and their evaluation of the town walkway infrastructure availability, quality, and all issues pertaining the objectives specified will be included.

2.5. Data analysis method

After the data was collected in the way specified above it was sorted out, processed and analyzed. This means the generated data needs to be processed in the way it is correctly ready as an analysis input to get a reasonable output from the analysis. The processing needed a careful editing, coding, classification and tabulation of collected data to be processed and sorted out using MS Excel 2019. For analyzing the processed data was carefully analyzed using Pivot tables in MS Excel2019 by the author. This allowed the researcher, more time to do the best and identify trends, develop predictive models, and draw informed conclusions. Since the software remembers the location of the variables and cases, it provides quicker and accurate data analysis. For spatial and other related issues ArcGIS 10.7 was used to prepare location map. Google Earth and Adobe InDesign were also used to prepare the map for the designated data collection spots (Spot 1,2,3 and 4). by integrating it with satellite maps and existing previous documents in the town municipality. For generating the recommendation part 3D drawings, Revit 2024 and Lumion11 were used.

2.6. Ethical consideration

Due care was given to the consent of participants involved in this research. From the administration of the surveys to the collection of data through field observations, the confidentiality of participants' responses was handled with utmost care and responsibility. In cases where ethical clearance was required, all necessary procedures were followed, and any associated costs were duly covered to ensure the integrity and ethical soundness of the study.

2.7. Contribution of final outcome of the study

It is intended that the findings of this research project could be used by Adama Town municipality, local and regional authorities, to assess and evaluate the current walkability trends and to gain knowledge on the degree of satisfaction and overall wellbeing of dwellers. Thereby planning and implementing sustainable solutions for the current and future developments of without compromising the town and locality normative values in a win-win manner. This may lead to the mitigation of the existing worse walkability condition which is evident in every corner of the town and bring a pedestrian friendly city circulation as well. These findings could be used for correction of the current walkability development & traffic accident minimization approaches in the area. It is believed that the output will also contribute in creating aesthetically appealing city walk ways which may motivate and attract people for physical movement like walking and contribute in boosting residents' health and decreasing risk of obesity.

CHAPTER FOUR

4. RESULT AND DISCUSSION

4.1. Physical Site Survey Analysis

Adama Town's walking infrastructure has been progressively improved over the years. Significant advancements are evident, particularly in the material and quality of walkways along the main corridors. These improvements have enhanced the overall walking experience and safety for pedestrians in these key areas. However, it is important to note that Adama Town was not originally designed as a planned city, which has resulted in various challenges in developing a cohesive pedestrian network. Despite the enhancements along the main thoroughfares, interior walkways within neighborhoods and less prominent areas still require substantial effort and investment.

During the site study, a number of particular issues were noted, underscoring the need for additional development. Electric poles, ditches, and advertising boards impede pedestrian mobility and accessibility on many paths. For pedestrians, the network of walkways' discontinuities and dead ends cause confusion and annoyance. Furthermore, these walkways' upkeep and neatness are sometimes overlooked. There are not enough pedestrian crossings, which makes crossing roads dangerous. Many areas' horizontal development is not integrated with pedestrian paths, which results in disjointed and disjointed walkability. Moreover, the absence of ramps linking sidewalks and highways makes it especially challenging for individuals with disabilities to move around in cities. In order to build a more inclusive and complete walkability framework throughout Adama Town, it is imperative that these challenges be addressed. Below are pictures taken from the target site:

Figure 0-1.1 Road with no walkway people forced to share the road with the cars

Source: Author

Figure 4.2 The walkway is obstructed trees, vehicles

Source: Author

Figure 4.3. Walkways with poor maintenance and obstruction

Source: Author

Figure 4.4. Walkways lacking continuity and access ramps

Source: Author

Figure 4.5. People and vehicle sharing the road

Source: Author

4.2. Demography

		Age category			
	18-29	30-44	45-64	65+	Total
Frequency	125	110	50	35	320
Percentag	39%	34%	16%	11%	100%

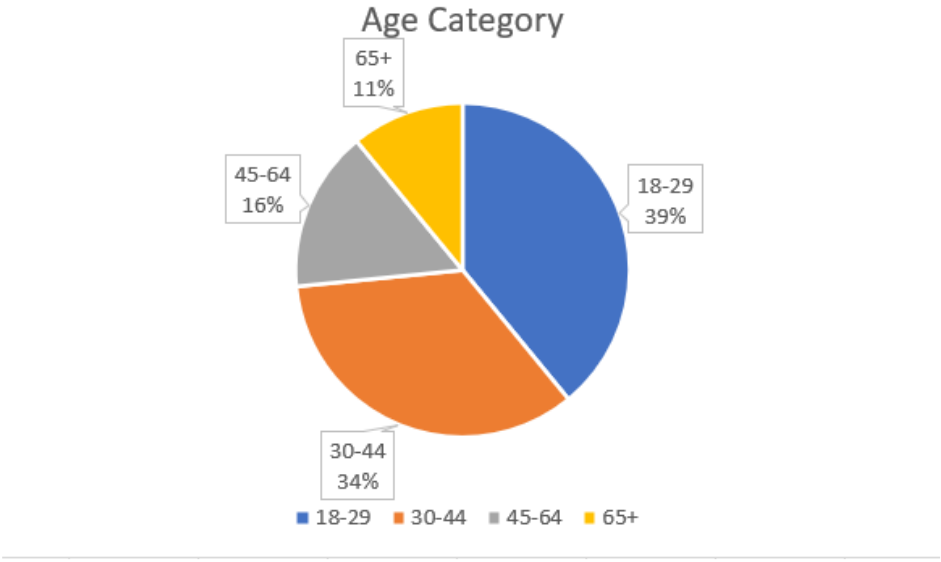

Figure 4.6 Age Category

Source: Author

As it can be seen in Fig 4.6 above, The study sample exhibited a rightward skew in age distribution, with a higher concentration of participants in the younger age groups (18-29 and 30-44). The analysis revealed a notable skew in the age distribution of the participants. There appears to be a higher concentration of respondents in the younger age groups (18-29 and 30-44) compared to the older age groups (45-64 and 65+).

	Male	Female	Total
Frequency	146	174	320
Percentage	46%	54%	100%

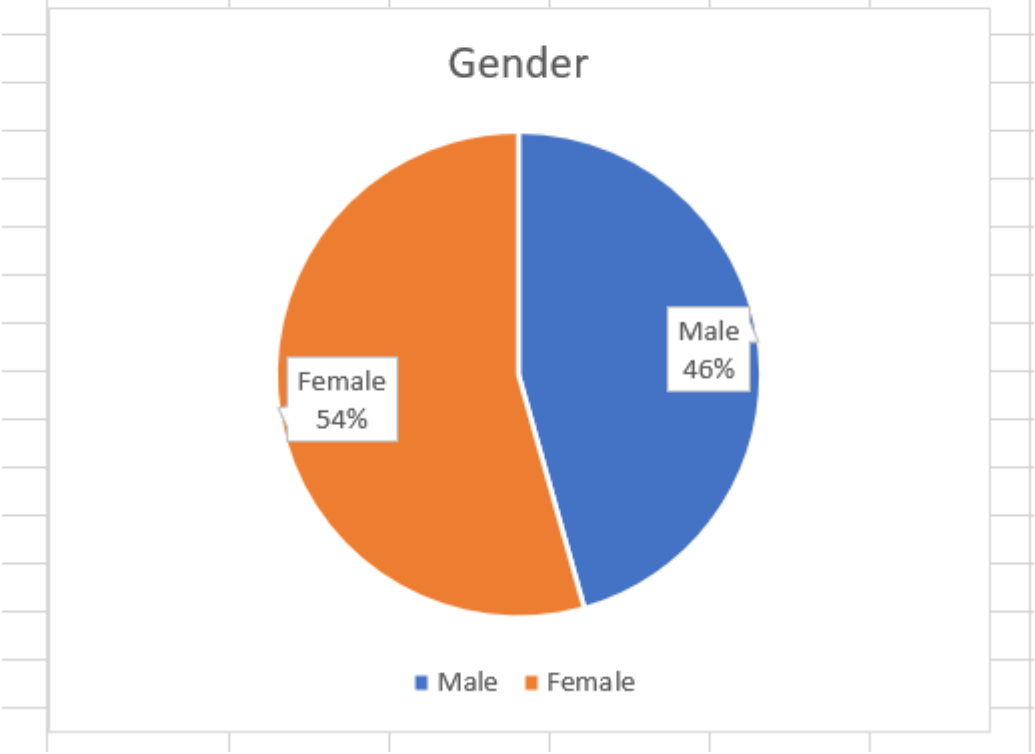

Figure 4.7. Gender Distribution

Source: Author

Fig 4.7 above indicated that the sample included participants from both genders (46% male, 54% female), reflecting the target population's diversity.

	Marital Status				
	Single	Married	Divorced	Widowed	Total
Frequency	212	98	7	3	320
Percentage	66%	31%	2%	1%	100%

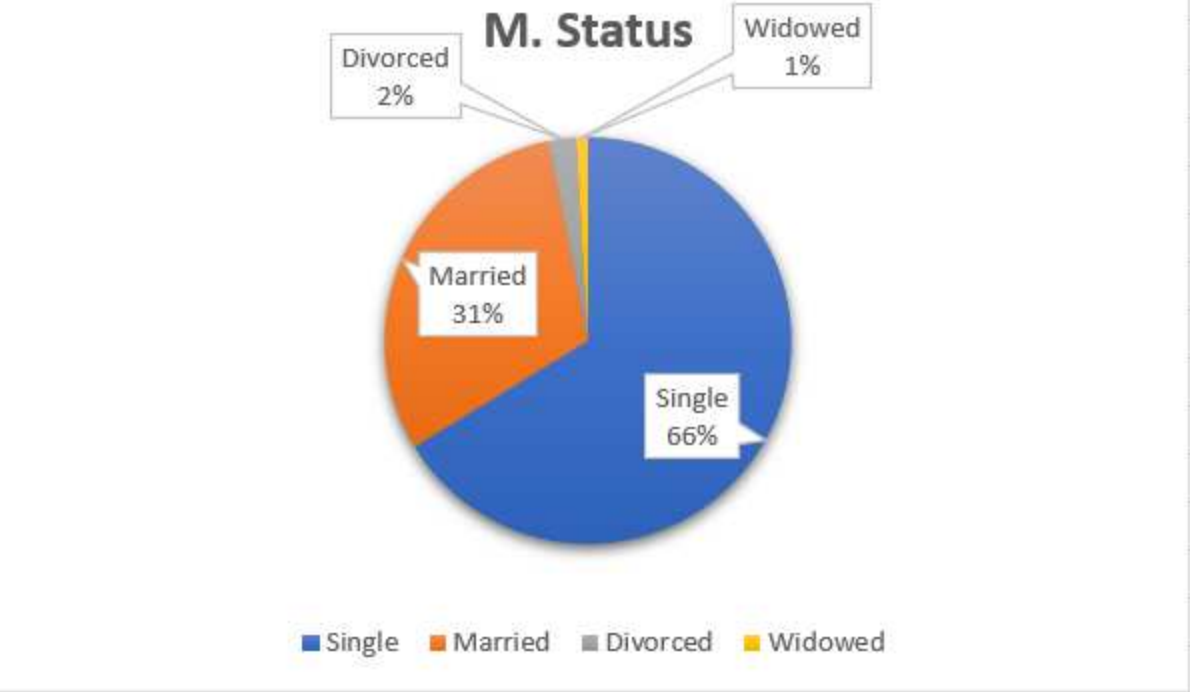

Figure 4.8 Marital Status

Source: Author

The data in Fig. 4.8 showed a varied distribution of marital statuses among the participants, with 66% single, 31% married, 2% divorced, and 1% widowed.

	Employment status		
	Employed	Unemployed	Total
Frequency	214	106	320
Percentage	67%	33%	100%

Figure 4.9. Employment Status

Source: Author

As illustrated in Fig. 4.9 above, 33% of the participants were unemployed, according to the data, while 67% of the participants were employed. Notably, our research topic was centred on walkability of the neighbourhood, and employment status was not a primary variable. The results, however, might be impacted by the larger percentage of employed participants (67%) because social media use for leisure or professional networking may be correlated with employment status. More broadly applicable insights may be obtained from future research considering a more equal range of work statuses.

4.3.Perception of neighborhood walkability

Perception on neighborhood walkability			
rating the neighborhood from 1-10			
V1= not walkable at all, V10= extremely walkable			
Variable	Frequency	Percentage	
V1	16	5%	
V2	46	14%	
V3	78	24%	
V4	64	20%	
V5	83	26%	
V6	17	5%	
V7	6	2%	
V8	4	1%	
V9	3	1%	
V10	3	1%	
Total	320	100%	

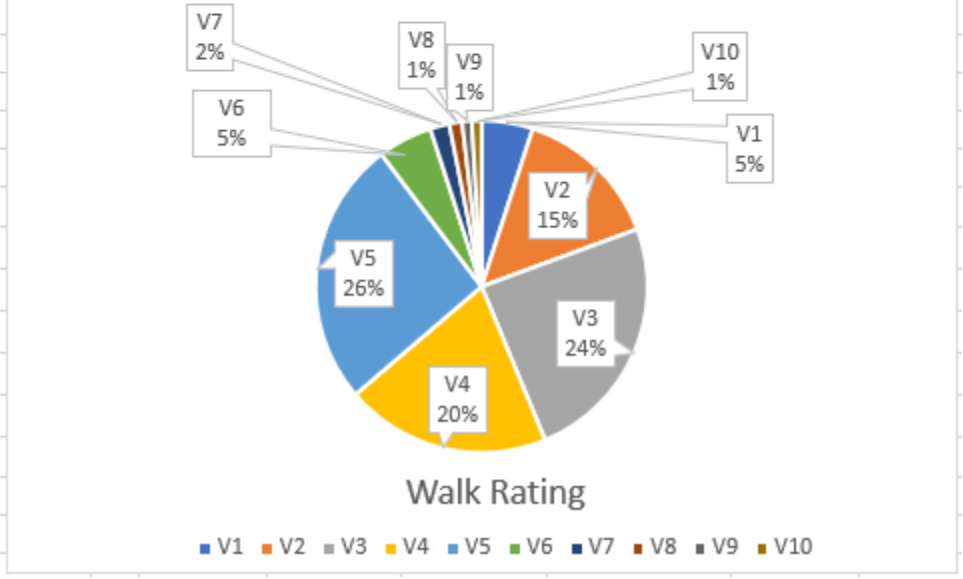

Figure 4.10 Walk Rate

Source: Author

The data analyzed as illustrated on Fig. 4.10 above on walkability revealed that most respondents rated their experience as below 5 on a scale where 1 represents 'not walkable at all' and 10 means 'extremely walkable.' This suggests that the residents perceive the residential area as less walkable.

Significant Factor influencing walkability rating				
	Frequency	Percentage		
Sidewalk quality	78	24%		
Safety	101	32%		
Traffic conditions	56	18%		
Accessibility to amenities	42	13%		
Presence of greenery	43	13%		
Total	320	100%		

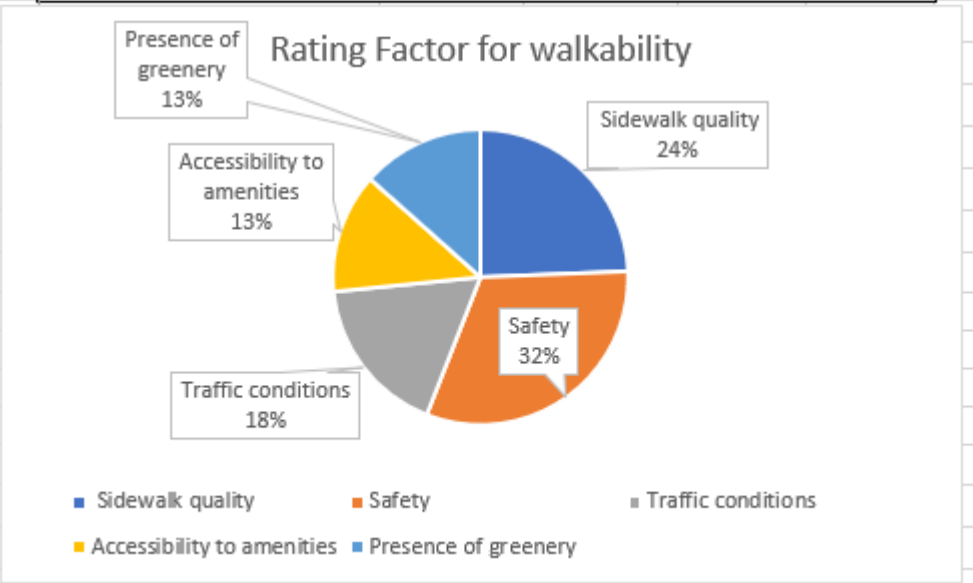

Figure 4.11. Sidewalk condition

Source: Author

As illustrated in Fig. 4.11 above, When compared to other criteria, residents seem to be most concerned about safety, expressing this concern the most frequency of 101. This implies that neighborhood walkers place a high value on feeling safe. Sidewalk condition: With a frequency of 78, the data shows that sidewalk condition is also a major concern. This emphasizes how crucial well-kept sidewalks are to encouraging walkability. Traffic Conditions: With a frequency of 56, traffic conditions are another factor affecting walkability. This implies that a lot of traffic or congestion may discourage locals from walking. Accessibility: With a frequency of 42, accessibility to facilities seems to be a less urgent issue than sidewalk quality and safety, but it is still significant. People may favor walkable communities that provide quick access to stores, places to run errands, or places to relax. According to the research, having greenery around frequency of

43 is a factor, but not the most important one. Even though flora can improve the aesthetics and promote strolling, locals may not think highly of it.

4.4. Sidewalk Quality and Maintenance

	Are there sidewalks on most streets in your neighborhood?					
	Yes	No	Total			
Frequency	142	178	320			
Percentage	44%	56%	100%			

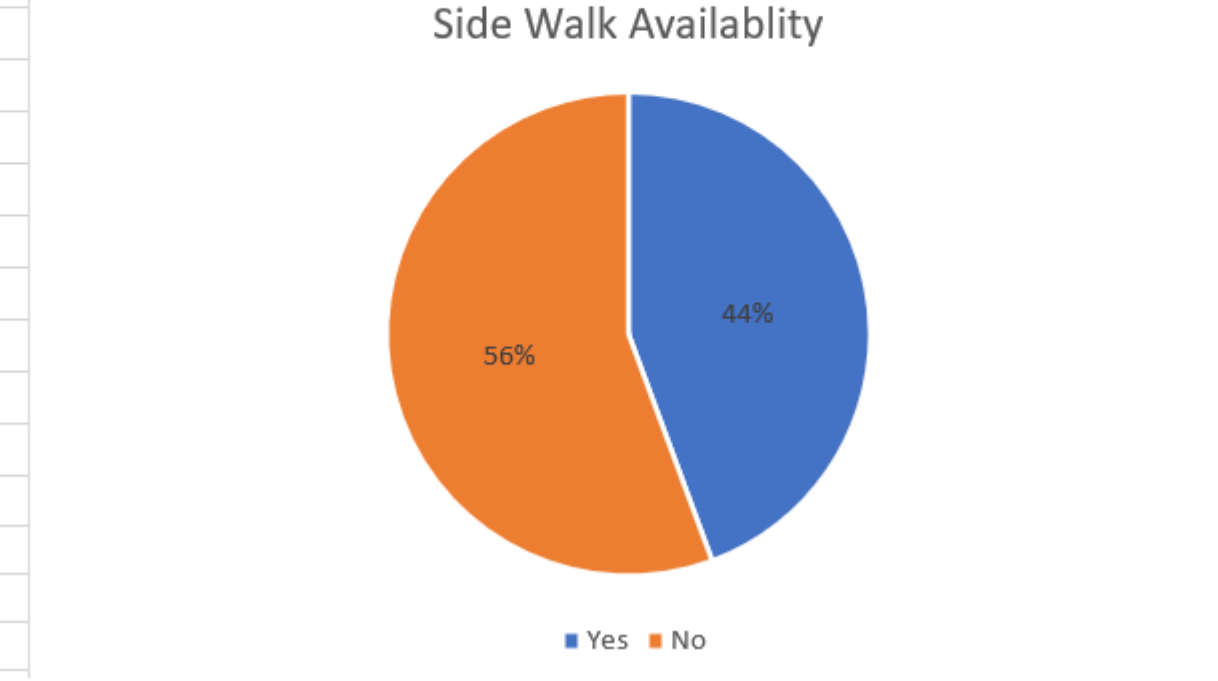

Figure 4.12 Side Walk Availability

Source: Author

According to the data as illustrated in Fig. 4.7 above, a sizable percentage of respondents (44%) said that most of the streets in their neighborhood had sidewalks. This implies that the neighborhood has sidewalks in at least some areas. It is crucial to note, though, that a sizable percentage of respondents (56%) stated that most streets lacked sidewalks. This draws attention to a possible flaw in the infrastructure for pedestrians that could seriously impair walkability. For residents, walking is uneven due to the unequal distribution of sidewalks (44% with sidewalks vs.

56% without). While certain places could be convenient or safe to stroll in because they have sidewalks, other places might not.

	How would you rate the maintenance of sidewalks in your neighborhood?					
	Excellent	Good	Fair	Poor	Total	
Frequency	15	24	124	157	320	
Percentag	5%	8%	39%	49%	100%	

Figure 4.13. Side Walk Maintenance

Source: Author

As illustrated in Fig. 4.13 above, There was a troubling pattern in the statistics on sidewalk maintenance levels. Only 13% of respondents thought the sidewalks were in excellent or good condition, compared to over 88% who said they were either fair or poor. This implies that a considerable segment of the sidewalks inside the community require upkeep or restoration. Making sidewalk upgrades a top priority could greatly improve citizens' ability to stroll and feel safe.

	Are sidewalks free of cracks, obstructions, or obstacles?					
	Always	Most of the Time	Occasionally	Rarely	Never	Total
Frequency	5	14	78	150	73	320
Percentage	2%	4%	24%	47%	23%	100%

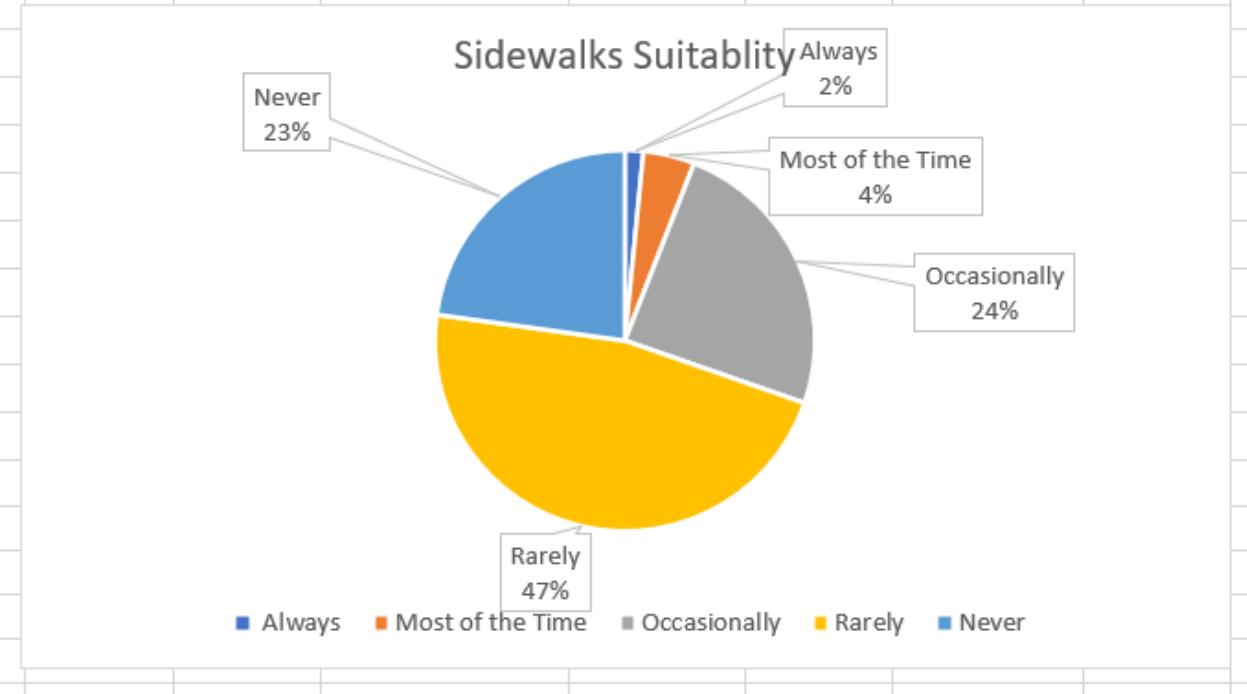

Figure 4.14 Sidewalks Suitability

Source: Author

As illustrated in Fig. 4.14 above, A combined total of 6% (2% + 4%) of respondents indicated that sidewalks are free of cracks, obstructions, or obstacles "always" or "most of the time." This suggests that sidewalks are at least somewhat usable for a significant portion of the time for some residents. However, a much larger proportion of respondents (24% + 47% + 23%) reported encountering cracks, obstructions, or obstacles occasionally, rarely, or never. This highlights that these issues are prevalent and can hinder walkability.

4.5.Safety and Crime

Have you witnessed or experienced any safety concerns while walking on the streets (e.g., accidents, crime)?						
	Yes	No	Total			
Frequency	214	106	320			
Percentag	67%	33%	100%			

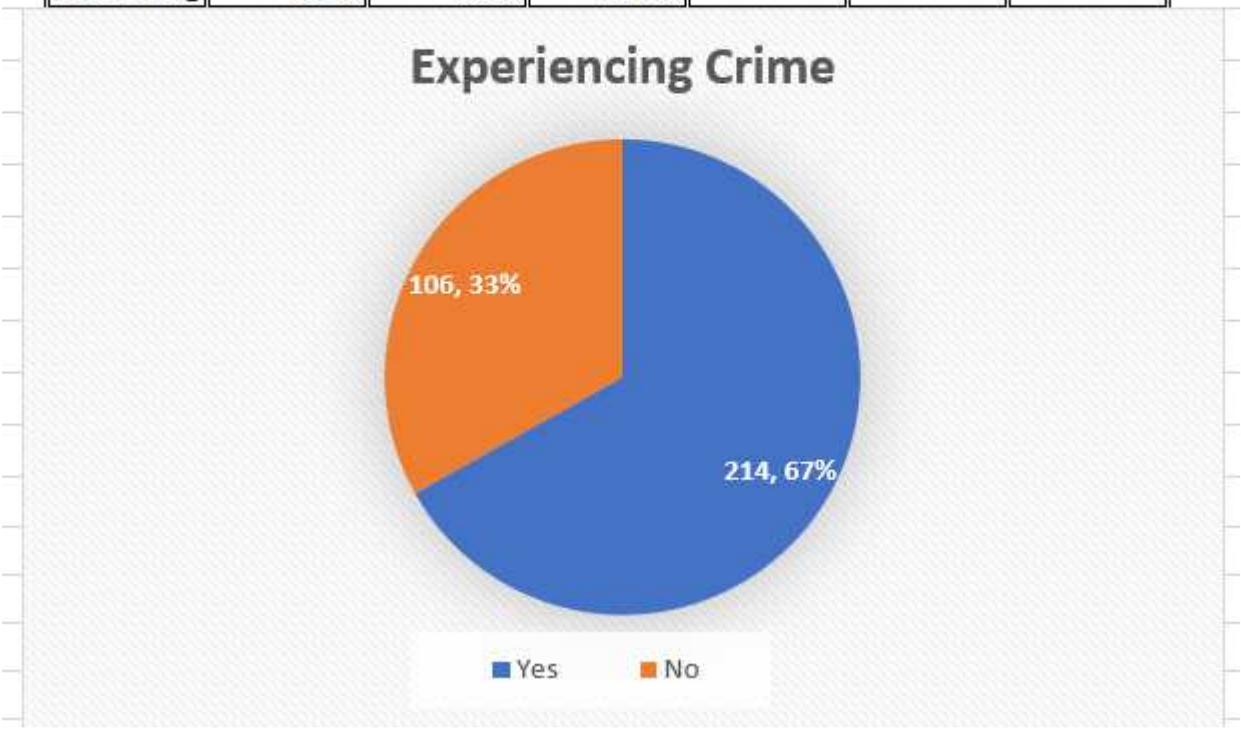

Figure 4.15 Experiencing Crime

Source: Author

As illustrated in Fig. 4.15 above, The vast majority of responders (67%) said they have seen or worried about their safety when out and about. This demonstrates that a significant percentage of the locals feel insecure while they walk.

4.6.Traffic and Speed Limits

	Is traffic volume or speed on the streets a barrier to walking?					
	Frequency	Percentage				
Strongly Agree	139	43%				
Agree	120	38%				
Neutral	40	13%				
Disagree	13	4%				
Strongly Disagree	8	3%				
Total	320	100%				

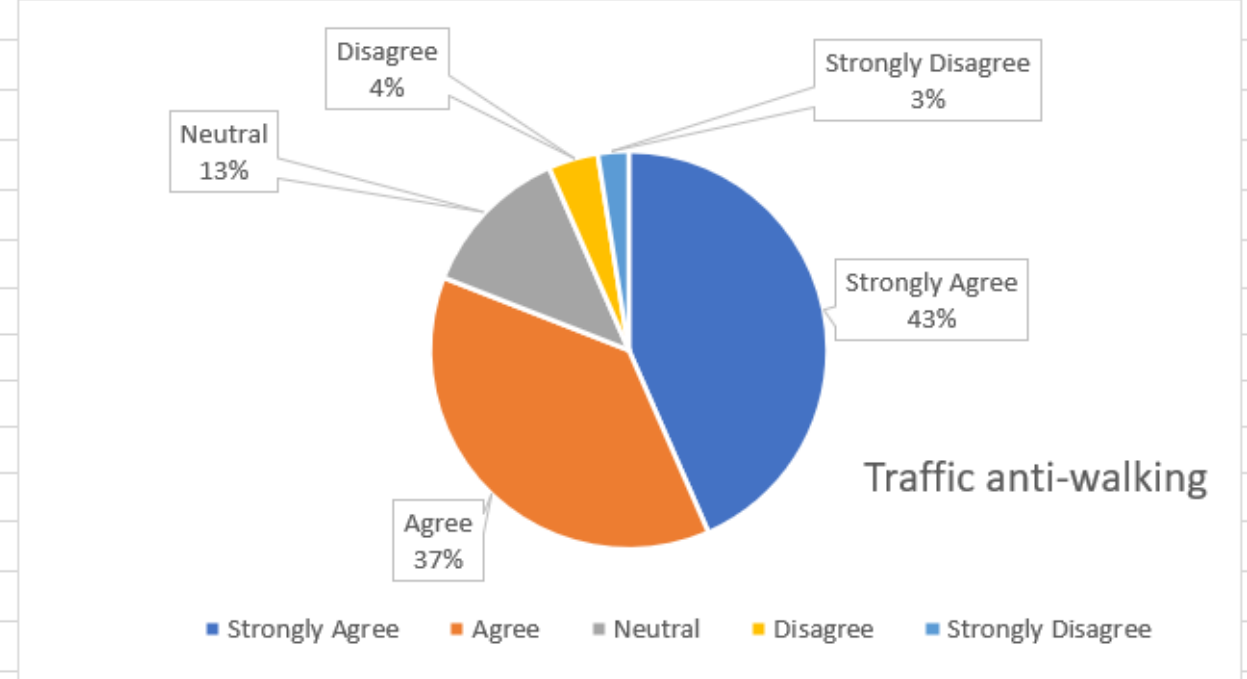

Figure 4.16 Traffic vs Walking

Source: Author

As illustrated in Fig. 4.11 above, The data on traffic volume or speed as a barrier to walking reveals a clear concern for residents. A combined total of 81% (43% strongly agree + 38% agree) of respondents indicated that traffic volume or speed is at least somewhat of a barrier. This suggests that a substantial portion of the neighborhood perceives traffic as a deterrent to walking. With only a small minority (7% disagree + strongly disagree) feeling otherwise, the findings highlight the need to address traffic concerns to promote walkability.

4.7.Access to Amenities

	How accessible are amenities such as grocery stores, parks, schools, and healthcare facilities from the streets in your neighbourhood?						
	Frequency	Percentage					
Very Accessible	45	14%					
Somewhat accessible	76	24%					
Not very accessible	174	54%					
Not at all accessible	25	8%					
Total	320	100%					

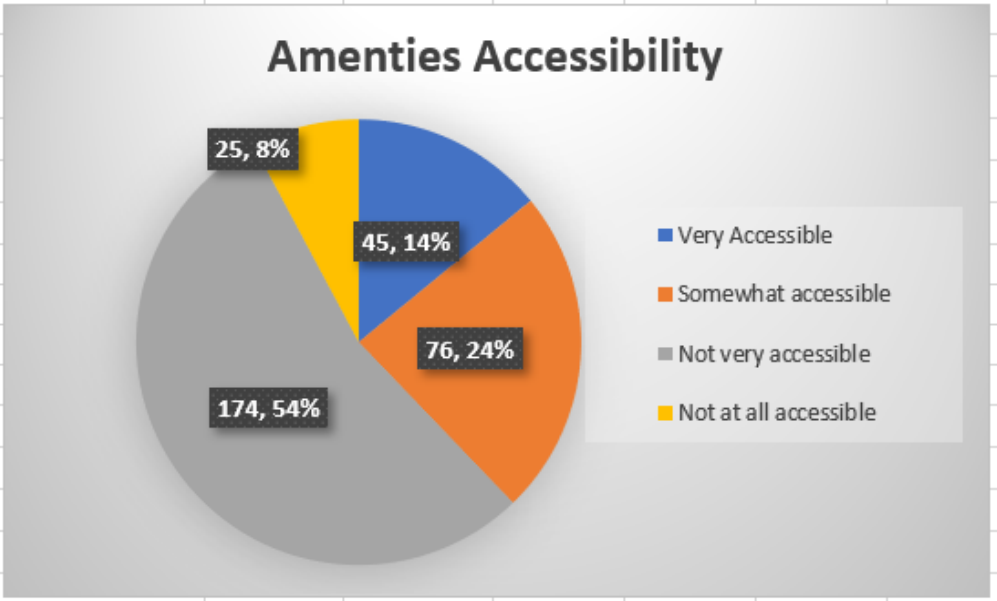

Figure 4.17 Amentias Accessibility

Source: Author

As illustrated in figure 4.12 above, A significant challenge to walkability in the neighborhood is the limited accessibility of amenities by walking. Only 38% (14% very accessible + 24% somewhat accessible) of respondents felt that amenities are very or somewhat accessible on foot. The majority (54%) indicated that amenities are not very accessible or not accessible at all. This suggests that residents might need to rely on cars or other forms of transportation to reach essential places, hindering the walkability of the neighborhood.

4.8. Greenery and Environmental Factors

	Are there green spaces, trees, or landscaping along the streets in your neighborhood?							
	Yes	No	Total					
Frequency	189	131	320					
Percentage	59%	41%	100%					

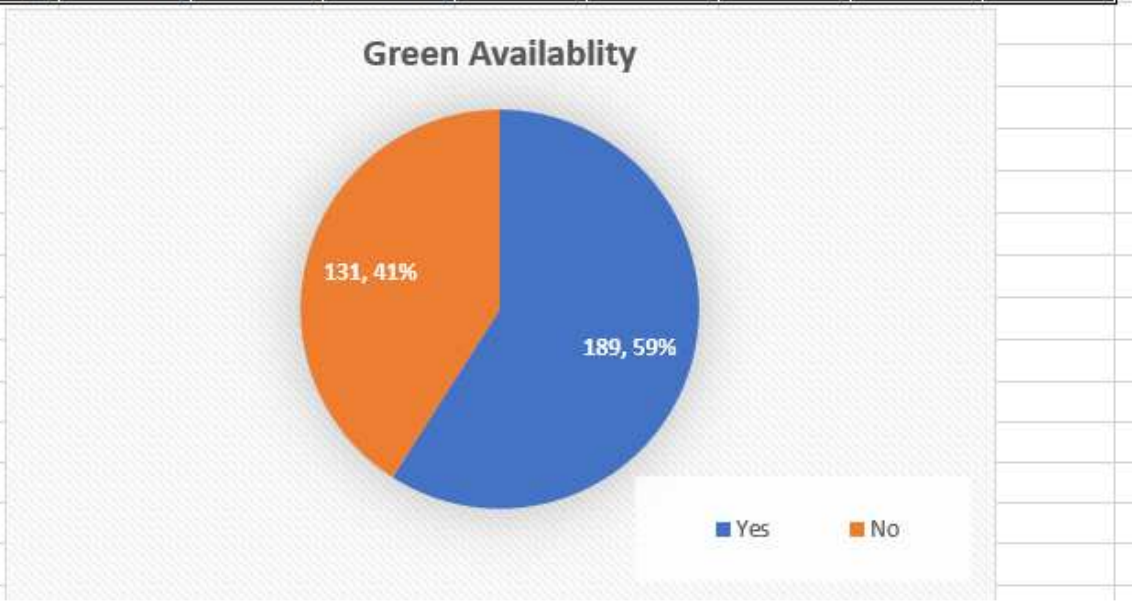

Figure 4.18. Green Availability

Source: Author

As illustrated in Fig. 4.18 above, The neighborhoods' supply of trees, greenery, and other streetscape elements paints a mixed picture. Although a sizable minority of respondents (41%) stated that such components were absent, a sizable majority of respondents (59%) indicated their presence. This implies that not every street in the community benefits from the visual and practical benefits of green spaces.

4.9.General Walking Behaviour

	1. How often do you walk on the streets for transportation (e.g., to work, school, shopping)?						
	Frequency	Percentage					
Daily	25	8%					
Several times a week	44	14%					
Once a week	55	17%					
Rarely	69	22%					
Never	127	40%					
Total	320	100%					

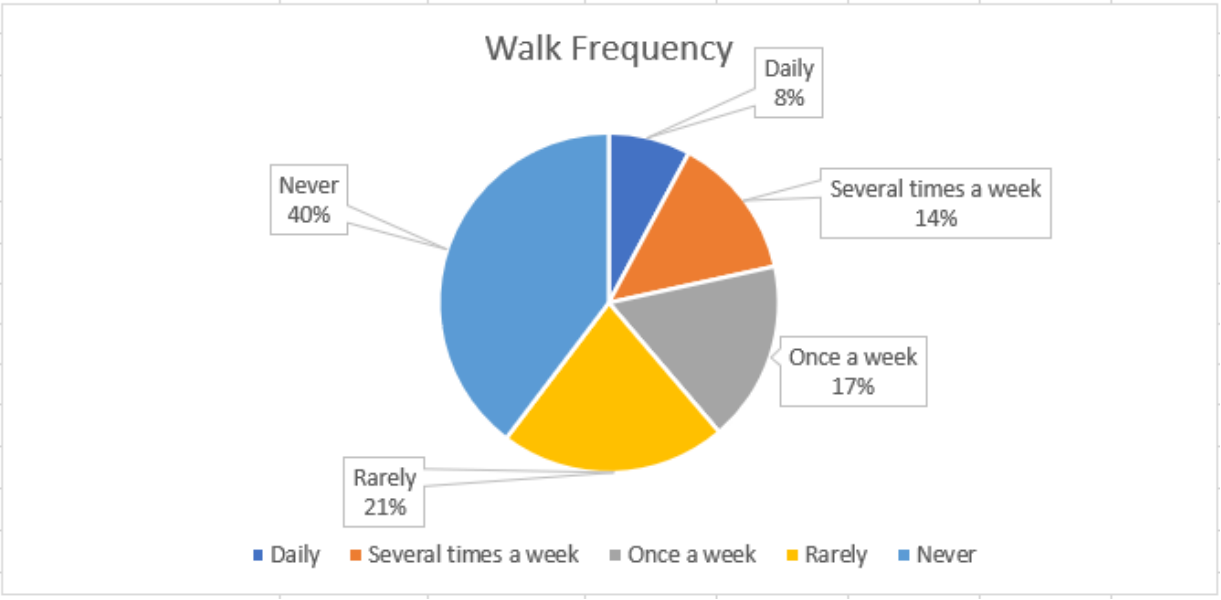

Figure 4.19. Walk Frequency

Source: Author

As illustrated on Fig 4.19 above, The data on walking frequency for transportation reveals a low overall prevalence of walking in the neighborhood. Only a combined total of 39% (8% daily + 14% several times a week + 17% once a week) of respondents reported walking for transportation at least occasionally. The large majority (62% - rarely + never) indicated walking rarely or never for errands, work, or school. This suggests that the current environment might not be conducive to walking for transportation, potentially due to factors like limited sidewalk availability, safety concerns, or lack of accessible amenities.

4.10. Accessibility for All

	Does your neighborhood have any problems with accessibility for those with disabilities?					
	Yes	No	Total			
Frequency	265	55	320			
Percentage	83%	17%	100%			

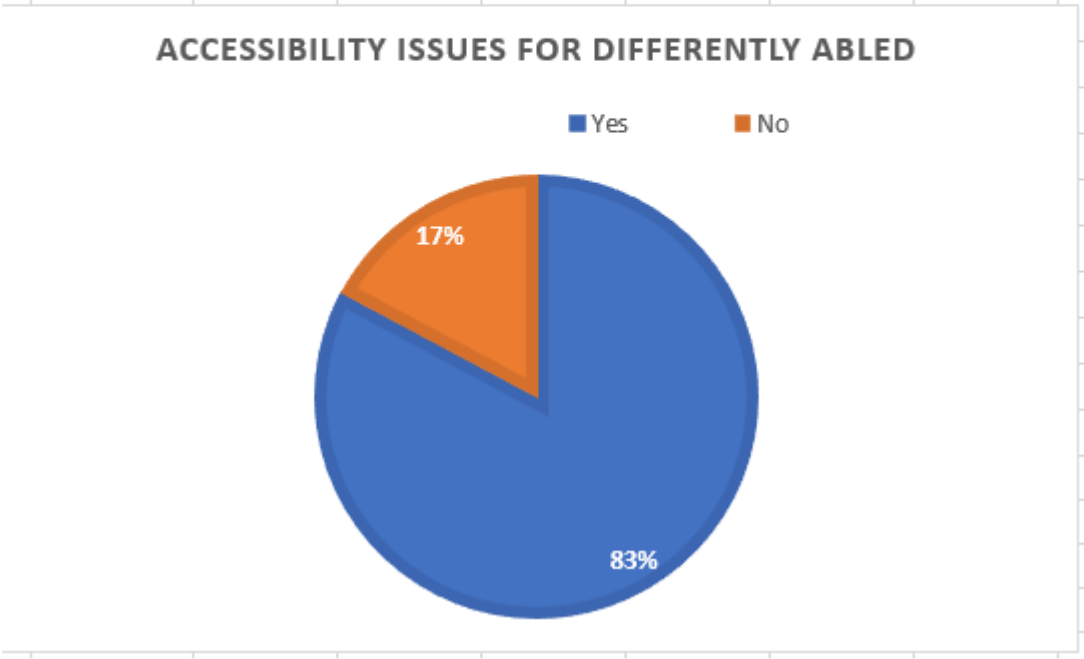

Figure 4.20 Accessibility Issues for Differently Abled

Source: Author

As Illustrated in Fig. 4.20 above, The lack of accessibility for individuals with disabilities is a significant issue for the neighborhood's walkability. The majority of respondents (83%) said there are accessibility issues in the neighborhood. This implies that physical barriers that impede the mobility of individuals who use wheelchairs or walkers or have other restrictions may be present in sidewalks, crosswalks, public areas, or buildings.

Discussion Summary:

The Status of Pedestrian Walkway Challenges in the Built Environment

Survey Findings: The structured questionnaire survey among 320 residents of Adama Town revealed critical insights into pedestrian walkway challenges. Only 39% of respondents reported walking for transportation at least occasionally, indicating a low overall walking frequency. Safety concerns were a major deterrent, with 67% of respondents feeling unsafe due to high traffic volume, lack of street lighting, and potential crime. Additionally, 56% reported the absence of sidewalks in their neighborhoods, and of those with sidewalks, 88% rated them as fair or poor in terms of maintenance, with common issues such as cracks, uneven surfaces, and obstructions like parked vehicles.

Field Observations: Systematic field observations corroborated the survey findings, providing tangible evidence of the infrastructural challenges faced by pedestrians. Numerous instances of damaged or poorly maintained sidewalks were documented, including broken pavement, overgrown vegetation, and debris. Sidewalks in many areas were narrow and insufficient to accommodate pedestrian traffic, leading to overcrowding and forcing people to walk on the streets. Many intersections lacked marked crosswalks, making it difficult for pedestrians to cross safely, and pedestrian signals were either absent or malfunctioning in several locations. The lack of ramps and other accessibility features made it challenging for people with disabilities to navigate the pedestrian infrastructure, with sidewalks often ending abruptly or being blocked by physical barriers.

The combination of survey data and field observations provides a comprehensive understanding of the challenges pedestrians face in Adama Town's built environment. The low frequency of walking among residents is due to significant safety concerns and inadequate pedestrian infrastructure. It is essential to address these issues through targeted interventions, such as improving sidewalk maintenance, enhancing crosswalks, and ensuring accessibility, in order to create a pedestrian-friendly environment in Adama Town.

The results of this study complement and add to the body of knowledge on urban pedestrian infrastructure, offering important new insights into the walkability issues in Adama Town. An important consideration in urban planning is walkability, which has been linked to a number of

advantages like increased physical activity, better mental health, less traffic, and less environmental effect ; (Frank et al., 2006; Gehl, 2010). These conclusions are supported by our data, which show that better pedestrian infrastructure can greatly improve locals' quality of life.

The significance of continuous, well-maintained pedestrian routes in enhancing walkability has been noted in earlier research (T. Litman, 2013). According to our study, 67% of locals feel uncomfortable when they walk. These findings are in line with those of other research that highlight the significance of perceived safety in encouraging pedestrian activity (Gehl, 2010). This is further corroborated by field observations, which point out particular obstructions like power poles, ditches, and billboards that block walkways. These are important difficulties in our situation, but they are not covered in detail in the larger literature. These results imply that in order to improve the pedestrian environment in Adama Town, these specific challenges need to be addressed in urban design.

The report also emphasizes particular difficulties that are peculiar to Adama Town. Due to the town's previous lack of planning, it has historically had infrastructure flaws that are uncommon in planned cities. For example, our survey shows that 88% of places with sidewalks are classified as fair or bad, indicating serious maintenance difficulties, and 56% of regions lack sidewalks. These findings offer a more thorough local viewpoint while yet being consistent with Litman's (2013) discussion of the shortcomings of infrastructure in developing nations. Furthermore, as field surveys have shown, the horizontal development that permeates many areas has resulted in discontinuities and dead ends in the walkway network, confusing and inconveniencing walkers.

It is especially alarming that this study did not find any pedestrian crossings or ramps accessible to individuals with disabilities. Our survey shows that 83% of respondents reported issues with accessibility, aligning with global concerns about inclusivity in urban environments (Frank et al., 2006). Field observations confirmed these findings, noting the absence of ramps connecting roads and walkways, which severely limits mobility for people with disabilities. Addressing these concerns is crucial for ensuring that all inhabitants can navigate the city securely and comfortably.

The offers useful information for policymakers and urban planners in Adama Town and other similar contexts. The problems of obstruction, discontinuity, and poor maintenance that we found indicate the need for focused interventions. Physical barriers should be removed, continuous

walkways should be created, and existing infrastructure should be maintained. Safety measures must also be improved, as many residents feel unsafe when walking. More pedestrian crossings and ramps should be installed in order to improve accessibility for individuals with disabilities. Finally, walkability should be further improved by encouraging traffic management and increasing access to amenities that are within walking distance.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

This study investigated the walkability of Adama Town, focusing on pedestrian challenges, resident experiences, and the overall walking environment. The findings reveal a clear need for improvements to create a more walkable and pedestrian-friendly neighborhood.

The combination of survey data and field observations provides a comprehensive understanding of the pedestrian walkway challenges in Adama Town's built environment. The low walking frequency among residents can be attributed to significant safety concerns and inadequate pedestrian infrastructure. Addressing these issues through targeted interventions, such as improving sidewalk maintenance, enhancing crosswalks, and ensuring accessibility, is essential for creating a pedestrian-friendly environment in Adama Town.

Residents generally perceive the area as less walkable due to various factors. Safety concerns are a major issue, with a significant portion (67%) feeling unsafe while walking. This highlights the need for measures to address security and create a more secure environment for pedestrians.

The uneven distribution of sidewalks (44% with sidewalks vs. 56% without) and their poor maintenance condition (88% rated fair or poor) create significant obstacles for walkers. This not only discourages walking but also creates an uneven experience - some streets might be suitable for walking, while others might be hazardous.

Traffic volume and speed also emerged as major barriers to walkability. A large majority of residents (81%) expressed concerns about traffic, suggesting a need for traffic management strategies. These could involve reducing speed limits, creating designated pedestrian zones, or improving signage to enhance safety and encourage walking.

Limited accessibility for residents with disabilities (83% reported issues) is another crucial aspect. This indicates that physical barriers might be present in sidewalks, crosswalks, public spaces, or buildings, hindering mobility for this population. Addressing these accessibility issues is essential for creating a truly inclusive walking environment.

Finally, the data on walking frequency highlights the overall low prevalence of walking for transportation (only 39% reported walking at least occasionally). This suggests that the current environment discourages walking, potentially due to the abovementioned factors.

In conclusion, Adama Town faces several challenges in creating a walkable environment. The primary challenges to walkability in Adama Town include inadequate pedestrian infrastructure, significant safety concerns, poor sidewalk maintenance, insufficient crosswalks, lack of accessibility for people with disabilities, and encroachments on pedestrian pathways. However, by implementing the recommendations outlined below, the town can significantly improve its walkability and reap the associated benefits for residents and the community.

5.2. Recommendations

To create a more pedestrian-friendly environment in Adama Town, the following recommendations are suggested:

A) **Prioritize Sidewalk Improvements**: Invest in sidewalk construction in areas currently lacking them (56%). Focus on repairs and maintenance to improve the condition of existing sidewalks (88% rated fair or poor).

Figure 5. 1 Well Defined Walways and Bicycle lanes to promote walkability

Source: Author

B) **Enhance Safety Measures**: Implement measures to address safety concerns raised by residents (67% felt unsafe). This could involve improved lighting, increased security patrols, or traffic calming measures.

Figure 5. 2 Neighborhood with Speed bump, visible signage & lighting

Source: Author

C) **Promote Traffic Management**: Explore strategies to address traffic volume or speed as a barrier to walking (81% agreed). This might involve reduced speed limits, designated pedestrian zones, or improved signage.

Figure 5. 3 Astreet Scape with Appropriate Speed Limit, well connected pedestrian and biking zones and proper signage

Source: Author

D) **Increase Accessibility**: Identify and address accessibility barriers for people with disabilities (83% reported issues). This could involve modifications to sidewalks, crosswalks, public spaces, and buildings.

Figure 5. 4 Buildings and Amenties connected with appropriate slpe ramp to walkways

Source: Author

E) **Improve Access to Amenities**: Promoting compact and mixed-use development is recommended to improve access to essential amenities within walking distance for residents. This approach can maximize space for amenities and open areas, ensuring that people have convenient access to everything they need within a short walk. By fostering such development, the reliance on cars for daily needs can be significantly reduced, thereby encouraging walking and contributing to a more pedestrian-friendly environment.

Figure 5. 5 Compact and mixed-use development allowing amenities to be within walking distance in the illustration pedestrian crossings, central parking, biking lanes, outdoor cafe, green spaces etc. incorporated.

Source: Author

By implementing these recommendations, Adama Town can cultivate a more walkable environment that not only encourages physical activity and enhances resident well-being but also fosters a more vibrant and connected community. This holistic approach will contribute to a healthier lifestyle, promote social interactions, and create a more dynamic and lively urban space.

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APPENDIX 1

Adama Science and Technology University
School of Civil Engineering and Architecture
Architecture and Urban Planning & Design Department
Questionnaire Survey on Pedestrian-friendly Sidewalk Development in Adama Town

Dear Participant,

My name is Kibreab Eyob, and I am currently pursuing a Master's degree in Urban Planning and Design at Adama Science and Technology University. As part of my thesis research, I am conducting a study on the walkability of neighborhoods. Your valuable insights and experiences are crucial to the success of this research.

Purpose of the Survey: This survey aims to understand the factors that contribute to or hinder walkability in our neighborhoods. By gathering information from residents like you, we hope to identify key areas for improvement and propose strategies to create more walkable, livable communities.

Your Participation: I kindly request your cooperation in participating in this questionnaire survey. Your responses will be instrumental in shaping the future of urban planning and design in our community. The survey should take approximately 10-15 minutes to complete.

Instructions for Responding:

Read each question carefully: Take your time to understand each question before responding.

Be honest and thoughtful: Your genuine responses are critical to the accuracy of this study.

Confidentiality assured: All responses will be kept confidential and used solely for academic purposes.

Completion: Ensure you answer all questions to the best of your ability.

Your participation is entirely voluntary, and you can choose to withdraw at any time without any consequences. However, we highly value your input and would appreciate your full cooperation.

If you have any questions or need further information about this survey, please do not hesitate to contact me at kibrie24.ab@gmail.com or +251910780470.

Thank you very much for your time and contribution.

Kibreab Eyob
Master's Student in Urban Planning and Design
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Section 1: Demographics

1. Age Category; A) 18-29 B) 30-44 C) 45-64 D) 65 and Above
2. Gender; A) male B) Female
3. Marital Status; A) Single B) Married) C) Divorced D) Widowed
4. Employment status; A) Employed B) Unemployed

Section 2: Perceptions of Neighborhood Walkability

5. On a scale of 1 to 10, how would you rate the walkability of the streets in your neighborhood?

A-1 {Not Pedestrian Friendly at all} B-2 C-3 D-4 E-5 F-6 G-7 H-8 I-9 J-10 {Extremely Pedestrian Friendly}

6. What is the most significant factor influencing your walkability rating for the streets?

A) Sidewalk quality B) Safety C) Traffic conditions
D) Accessibility to amenities E) Presence of greenery

Section 3: Sidewalk Quality and Maintenance

7. Are there sidewalks on most streets in your neighborhood?

A) Yes B) No

8. How would you rate the maintenance of sidewalks in your neighborhood?

A). Excellent B) Good C) Fair D) Poor

9. Are sidewalks free of cracks, obstructions, or obstacles?

A). Always B) Most of the Time C) Occasionally D) Rarely E) Never

Section 4: Safety and Crime

10. Have you witnessed or experienced any safety concerns while walking on the streets (e.g., accidents, crime)?

A) Yes B) No

Section 5: Traffic and Speed Limits

11. Is traffic volume or speed on the streets a barrier to walking?

A) Strongly agree B) Agree C) Neutral D) Disagree E) Strongly disagree

Section 6: Access to Amenities

12. How accessible are amenities such as grocery stores, parks, schools, and healthcare facilities from the streets in your neighbourhood?

A) Very accessible B) Somewhat accessible C) Not very accessible D) Not at all accessible

Section 7: Greenery and Environmental Factors

13. Are there green spaces, trees, or landscaping along the streets in your neighborhood?

A) Yes B) No

Section 8: General Walking Behavior

14. How often do you walk on the streets for transportation (e.g., to work, school, shopping)?

A) Daily B) Several times a week C) Once a week D) Rarely E) Never

Section 10: Accessibility for All

15. Does your neighborhood have any problems with accessibility for those with disabilities?

A) Yes B) No