RESEARCH ARTICLE OPEN ACCESS

Assessment of Accessibility of Public Physical Infrastructures for Person's With Disability: The Case of Addis Ababa

Belay Hailu Sugebo, Semer Yilma (Ph.D.)
Department of Construction Technology and Management
Addis Ababa, Ethiopia

1. ABSTRACT

The study examines the accessibility of public physical infrastructures for persons with disabilities in Addis Ababa, addressing a critical issue that affects the ability of disabled individuals to participate fully in society. Despite existing standards and codes intended to promote inclusivity, many public spaces remain inaccessible, limiting opportunities for education and employment. The primary objective of this research is to systematically identify barriers hindering access and evaluate the effectiveness of current accessibility standards. To achieve this, a mixed-method research approach was employed, incorporating surveys, interviews, and site assessments to gather comprehensive data on the accessibility of various public infrastructures. Data analysis involved both qualitative and quantitative methods to assess compliance with established standards and identify specific barriers faced by disabled individuals. Findings reveal significant gaps in the implementation of accessibility standards, with many public facilities lacking essential design features that accommodate individuals with disabilities. Common barriers include poorly designed entrances, inadequate signage, and insufficient transportation options. The study concludes that enhancing awareness among stakeholders and enforcing compliance with accessibility regulations are crucial for improving public infrastructure. Recommendations include developing targeted strategies for urban planners and policymakers to address identified barriers and improve accessibility in public spaces. This research contributes valuable insights into creating more inclusive environments in Addis Ababa, fostering greater participation for persons with disabilities.

Keywords: Accessibility, Compliance with standards, Disabilities, Public Infrastructure, Urban Planning.

2. INTRODUCTION

2.1. Background of the study

The accessibility of public physical infrastructures for persons with disabilities is a critical issue that has gained increasing attention globally. In many urban areas, including Addis Ababa, the built environment often fails to accommodate the needs of individuals with disabilities, creating significant barriers to their full participation in society (Tilahun, 2023). The United Nations has emphasized the importance of universal design and accessibility in its frameworks, advocating for inclusive environments that allow individuals with disabilities to navigate public spaces independently and safely. Despite these global standards, many cities struggle to implement effective accessibility measures, resulting in ongoing challenges for disabled individuals.

In Addis Ababa, the rapid urbanization and development of infrastructure have not sufficiently considered the needs of persons with disabilities. Studies indicate that a significant portion of public buildings and transportation systems remain inaccessible, limiting opportunities for education, employment, and social engagement for disabled individuals (Ministry of Women, 2016). The lack of compliance with established accessibility standards and codes exacerbates these challenges, as many infrastructure projects overlook essential design features that facilitate access. This situation highlights the urgent need for comprehensive assessments of current practices and policies related to accessibility in the city.

The effectiveness of existing accessibility standards and codes in Addis Ababa is a crucial area of investigation. While there are regulations in place intended to promote inclusivity, their implementation often falls short due to inadequate enforcement and a lack of awareness among architects, planners, and contractors (Odame, 2017). Furthermore, existing barriers within public infrastructures such as poorly designed entrances, inadequate signage, and insufficient transportation options continue to restrict access for persons with disabilities. Understanding the extent to which these standards are effectively applied is essential for identifying gaps and areas for improvement.

This study aims to systematically identify and analyze the barriers that hinder access for persons with disabilities in public physical infrastructures across Addis Ababa. By conducting thorough evaluations of various public facilities and transportation systems, the research will provide valuable insights into specific challenges faced by disabled individuals. This analysis will also assess the compliance levels of current infrastructure projects with established accessibility standards and codes, offering a clearer picture of how effectively these regulations are being implemented.

Ultimately, this research seeks to develop actionable recommendations for enhancing accessibility in public infrastructures based on the findings from barrier identification and compliance evaluation. By addressing the shortcomings identified in this study, stakeholders including government agencies, urban planners, and disability advocacy groups can work collaboratively to create more inclusive environments. These efforts will not only improve access for persons with disabilities but also contribute to a more equitable society where all individuals can thrive regardless of their physical abilities.

Therefore, the aim of the study to assess the Accessibility of Public Physical Infrastructures for Person's with Disability: The case of Addis Ababa.

2.2. Statement of the problem

The issue of accessibility in public physical infrastructures for persons with disabilities in Addis Ababa presents a significant challenge that requires urgent attention. Despite the existence of various accessibility standards and codes intended to facilitate inclusion, many public spaces remain largely inaccessible to individuals with disabilities. This situation not only violates their rights but also limits their ability to participate fully in society, affecting their access to education, employment, and social activities (Mwirigi, 2017). The rapid urbanization of Addis Ababa has further exacerbated these challenges, as infrastructure development often overlooks the specific needs of disabled individuals.

A critical aspect of the problem lies in the effectiveness of current accessibility standards and codes. While these regulations are designed to promote inclusivity, their implementation is frequently inadequate. There is a lack of enforcement mechanisms and awareness among stakeholders, including architects, urban planners, and construction firms. As a result, many newly constructed or renovated public facilities do not comply with established accessibility guidelines (Wagner et al., 2019). This gap between policy and practice highlights the need for a thorough assessment of the effectiveness of these standards in real-world applications within the city.

Moreover, existing barriers within public infrastructures contribute significantly to the difficulties faced by persons with disabilities. These barriers include physical obstacles such as stairs without ramps, narrow doorways, and poorly designed transportation systems. Such impediments not only hinder mobility but also create an environment of exclusion that marginalizes disabled individuals. A systematic identification and analysis of these barriers are essential for understanding the specific challenges that must be addressed to improve accessibility in Addis Ababa.

Finally, addressing these issues necessitates the development of actionable recommendations based on comprehensive research findings. By identifying barriers and evaluating compliance with accessibility standards, stakeholders can create targeted strategies to enhance public infrastructures for persons with disabilities. These recommendations should focus on practical solutions that promote inclusivity, ensuring

that all citizens can navigate their environment safely and independently. The urgency of this research cannot be overstated, as it aims to foster an inclusive society where persons with disabilities are empowered to participate fully in all aspects of life in Addis Ababa.

2.3. Objectives of the study

2.3.1. General objective

The general objective of the study is to study the Accessibility of Public Physical Infrastructures for Person's with Disability: The case of Addis Ababa.

2.3.2. Specific objectives

1. To assess the effectiveness of current accessibility standards and codes in public physical infrastructure projects in the case of Addis Ababa
2. To systematically identify and analyze the existing barriers in public physical infrastructures that hinder access for persons with disabilities in Addis Ababa.
3. To assess the extent to which current public infrastructure projects in Addis Ababa comply with established accessibility standards and codes.
4. To develop actionable recommendations for enhancing accessibility in public infrastructures based on the findings from barrier identification and compliance evaluation.

2.4. Research question

1. How effective are the current accessibility standards and codes in public physical infrastructure projects in Addis Ababa?
2. What are the existing barriers in public physical infrastructures that hinder access for persons with disabilities in Addis Ababa?
3. To what extent do current public infrastructure projects in Addis Ababa comply with established accessibility standards and codes?
4. What actionable recommendations can be developed to enhance accessibility in public infrastructures based on the findings from barrier identification and compliance evaluation?

2.5. Scope of the study

The scope of this study, entitled "Accessibility of Public Physical Infrastructures for Persons with Disabilities: The Case of Addis Ababa," focuses on evaluating the accessibility of public infrastructures within the city, specifically targeting facilities that are essential for the daily activities of individuals with disabilities. This research will encompass a variety of public physical infrastructures, including government buildings, educational institutions, transportation systems, and recreational facilities. By assessing the effectiveness of current accessibility standards and codes, the study aims to identify gaps in compliance and implementation that contribute to the ongoing challenges faced by persons with disabilities in navigating these spaces.

Additionally, this study will systematically identify and analyze existing barriers that hinder access for persons with disabilities in Addis Ababa. Through comprehensive evaluations and assessments of selected public infrastructures, the research will highlight specific physical and systemic obstacles that limit accessibility. The findings will inform actionable recommendations aimed at enhancing accessibility in public infrastructures, ensuring that they meet established standards and effectively serve the needs of all citizens. Ultimately, this research seeks to contribute to a more inclusive urban environment in Addis Ababa, fostering greater participation and engagement for persons with disabilities in all aspects of community life.

2.6. Significance of the study

The significance of the study titled "Accessibility of Public Physical Infrastructures for Persons with Disabilities: The Case of Addis Ababa" is profound, as it aims to impact a wide array of stakeholders, including government agencies, urban planners, disability advocacy groups, and the general community. By evaluating the effectiveness of current accessibility standards and codes, the research will provide essential insights into how well these regulations are being implemented in public infrastructure projects. This information is crucial for government officials and policymakers responsible for ensuring compliance with accessibility laws and for fostering inclusive urban environments. Increased awareness and understanding among these stakeholders can lead to improved policies that prioritize the needs of persons with disabilities, ultimately promoting social equity.

Moreover, the study seeks to systematically identify and analyze existing barriers within public physical infrastructures that hinder access for persons with disabilities in Addis Ababa. The findings will inform urban planners and architects about specific design flaws that need to be addressed to enhance accessibility. Disability advocacy groups will also benefit from this research, as it highlights the challenges faced by individuals with disabilities, empowering them to advocate more effectively for necessary changes in policy and practice. By shedding light on these critical issues, the study aims to foster collaboration among stakeholders to create a more inclusive environment.

Ultimately, this research aspires to contribute to a more equitable society in Addis Ababa, where all individuals, regardless of their physical abilities, can access public spaces and participate fully in community life. The actionable recommendations developed from this study will serve as a roadmap for stakeholders to implement necessary improvements in public infrastructures. By addressing these accessibility challenges, the study not only aims to enhance the quality of life for persons with disabilities but also promotes broader societal inclusion and participation.

2.7. Organization of the study

The organization of the study titled "Accessibility of Public Physical Infrastructures for Persons with Disabilities: The Case of Addis Ababa" is structured to systematically address the research objectives and provide a comprehensive understanding of the accessibility landscape in the city. The study will be divided into several key chapters, each focusing on specific aspects of accessibility for persons with disabilities.

The first chapter will introduce the research background, outlining the significance of accessibility in public infrastructures and the challenges faced by persons with disabilities in Addis Ababa. This chapter will also present the research objectives and questions guiding the study. The second chapter will review relevant literature, discussing existing accessibility standards and codes, as well as previous studies on barriers to access in urban environments. This literature review will provide a theoretical framework for understanding the current state of accessibility and inform the subsequent analysis.

In the third chapter, the methodology employed in the study will be detailed, including data collection methods such as surveys, interviews, and site assessments. This chapter will explain how the research will systematically identify and analyze barriers within public physical infrastructures. The fourth chapter will present the findings from the data analysis, assessing compliance with established accessibility standards and codes in current infrastructure projects. Finally, the fifth chapter will conclude with actionable recommendations based on the findings, aimed at enhancing accessibility in public infrastructures. This structured approach ensures that all relevant aspects of accessibility are thoroughly examined, ultimately contributing to a more inclusive environment for persons with disabilities in Addis Ababa.

3. LITERATURE REVIEW

3.1. Introduction

In the fields of architecture, construction, engineering, real estate development, and building technology, the term "building" refers to any human-made structure designed to support or shelter occupants. Buildings fulfill various societal needs, primarily providing protection from the elements and serving as living spaces that offer privacy, storage for personal belongings, and environments conducive to work and leisure. As shelters, buildings create a physical separation between comfortable human habitats and the potentially harsh conditions of the outside world. Therefore, it is essential that these structures are accessible to everyone, particularly individuals with disabilities, who are among the most vulnerable members of society.

3.2. Theoretical review

3.2.1. Definition of Terms

3.2.1.1. Accessibility

Accessibility refers to the design and implementation of physical environments, infrastructure, and services that enable individuals, particularly those with disabilities, to navigate and utilize public spaces without encountering barriers. It encompasses a range of considerations, including mobility, communication, and sensory needs, ensuring that all individuals can independently approach, enter, and use facilities and services (Chen et al., 2022).

3.2.1.2. Public Physical Infrastructure

Public physical infrastructure includes all government-owned buildings and facilities that serve the general public, such as schools, hospitals, transportation systems, parks, and community centers (Asiva Noor Rachmayani, 2015b). These infrastructures are essential for providing services and opportunities to the community and must be designed to accommodate all users, including persons with disabilities.

3.2.1.3. Universal Design

Universal design is an approach to design that aims to create products and environments that are usable by all people, regardless of their age, ability, or status (Wagle & Tiwari, 2020). This principle emphasizes inclusivity from the outset of the design process, ensuring that accessibility features are integrated into public infrastructures rather than added as an afterthought.

3.2.1.4. Barriers to Accessibility

Barriers to accessibility are obstacles that prevent individuals with disabilities from fully participating in society. These can be physical barriers (such as stairs without ramps), systemic barriers (such as lack of awareness among planners), or social barriers (such as stigma and discrimination) (Venter -CSIR Transportek et al., 2019). Identifying these barriers is critical for improving accessibility in public infrastructures.

3.2.1.5. Compliance with Accessibility Standards

Compliance with accessibility standards refers to the adherence of public physical infrastructures to established guidelines and regulations designed to ensure accessibility for persons with disabilities. This includes national laws, international conventions such as the UN Convention on the Rights of Persons with Disabilities (CRPD), and local building codes that mandate specific accessibility features in public buildings (Dwitami et al., 2018).

3.2.1.6. Stakeholders

Stakeholders in the context of accessibility include all individuals or groups who have an interest in or are affected by public physical infrastructures. This encompasses government agencies responsible for urban

planning and infrastructure development, disability advocacy organizations representing the interests of persons with disabilities, urban planners and architects involved in design processes, and the general public who utilize these facilities (Document, 2019). Engaging stakeholders is essential for creating inclusive environments that meet the diverse needs of all users.

3.2.2. Barriers to Accessibility

3.2.2.1. Physical Barriers

Physical barriers are tangible obstacles that prevent persons with disabilities from accessing public infrastructures effectively. These barriers can manifest in various forms, including inadequate ramps, the absence of elevators, and poorly designed entrances. For instance, many buildings may have steps leading to their main entrances without accompanying ramps or lifts, making it impossible for individuals who use wheelchairs or have mobility impairments to enter. Furthermore, narrow doorways and hallways can restrict movement for those using mobility aids, while inaccessible restrooms can create significant challenges for individuals requiring assistance (ICED, 2019). The lack of accessible features not only limits physical access but also reinforces a sense of exclusion from public spaces.

In addition to structural issues, the condition of surrounding environments plays a crucial role in accessibility. Sidewalks that are cracked or incomplete, along with the absence of curb cuts at intersections, significantly hinder the ability of persons with disabilities to navigate urban areas safely. In many cases, public transportation systems are also inadequately equipped to accommodate disabled passengers, with buses lacking ramps or designated seating areas (Akaateba et al., 2023). These physical barriers collectively create an environment that is not conducive to independence and mobility for individuals with disabilities, ultimately affecting their quality of life.

Addressing these physical barriers requires a comprehensive approach that includes not only the design and construction of new infrastructures but also the retrofitting of existing ones. Governments and urban planners must prioritize accessibility in their projects, ensuring compliance with established standards and codes (Artieda et al., 2022). By implementing universal design principles, cities can create environments that are welcoming and usable for all individuals, regardless of their physical abilities.

3.2.2.2. Social and Cultural Barriers

Social and cultural barriers significantly contribute to the marginalization of persons with disabilities in society. These barriers often stem from prevailing attitudes and misconceptions about disability that can lead to stigma and discrimination (Lawson Anna, 2017). Individuals with disabilities may be perceived as less capable or dependent on others, which can result in exclusion from social activities and community engagement. Such negative perceptions not only affect the self-esteem of persons with disabilities but also limit their opportunities for participation in various aspects of life, including education and employment.

Moreover, a lack of awareness regarding the needs and rights of persons with disabilities can hinder efforts to create inclusive environments. Many people may not understand the importance of accessibility or may be unaware of the specific challenges faced by disabled individuals. This gap in knowledge can lead to inadequate support systems and insufficient advocacy for necessary changes in public infrastructure (William, 2017). To combat these social barriers, it is essential to promote awareness campaigns that educate the public about disability rights and the importance of inclusivity.

Cultural factors also play a role in shaping attitudes toward disability. In some cultures, disability may be viewed as a taboo subject or linked to negative beliefs about fate or punishment. Such cultural perceptions can further isolate individuals with disabilities from their communities and limit their access to resources and support networks (Mun et al., 2019). To foster a more inclusive society, it is crucial to challenge these cultural narratives through education and advocacy while promoting positive representations of disability in media and public discourse.

3.2.2.3. Economic Barriers

Economic barriers encompass financial factors that limit accessibility for persons with disabilities, both at the individual and systemic levels. Funding constraints often affect the ability of local governments and organizations to implement necessary accessibility features in public infrastructures (Terashima & Clark, 2021). For instance, budget limitations may result in prioritizing other projects over those aimed at enhancing accessibility, leaving significant gaps in services for disabled individuals. Additionally, when infrastructure projects do not incorporate accessible design from the outset, retrofitting existing structures can be costly and logistically challenging.

On an individual level, persons with disabilities may face additional financial burdens related to accessing services or facilities that are not adequately designed for their needs. Transportation costs can escalate if accessible public transport options are limited or non-existent. Individuals may need to rely on private transportation services that cater specifically to their needs, which can be prohibitively expensive (Venter et al., 2002). This financial strain can further exacerbate social inequalities and limit opportunities for employment, education, and community participation.

Addressing economic barriers requires a multifaceted approach that includes increased funding for accessibility initiatives at all levels of government. Policymakers must recognize the long-term economic benefits of investing in accessible infrastructures such as improved employment outcomes for persons with disabilities and allocate resources accordingly (Disabilities, 2021). Additionally, creating partnerships between government agencies, private sector stakeholders, and disability advocacy organizations can help leverage funding and expertise to develop more inclusive environments that benefit everyone in society.

3.2.3. Compliance with Accessibility Standards

3.2.3.1. Assessment of Current Compliance Levels

This section will review various studies that evaluate the compliance of public infrastructure projects in Addis Ababa with established accessibility standards. Assessing compliance is crucial for understanding how effectively these regulations are being implemented in practice. Research has shown that many public buildings and facilities fail to meet the required accessibility standards, which can lead to significant barriers for persons with disabilities (Soyingbe et al., 2017). For instance, a recent study highlighted that a large percentage of public schools in Addis Ababa lack essential features such as ramps and accessible restrooms, which are mandated by local and international guidelines. This lack of adherence not only undermines the rights of individuals with disabilities but also reflects poorly on the commitment of authorities to create inclusive environments.

Key findings from compliance assessments often reveal common trends and issues that need addressing. Many infrastructures may have been designed without proper consultation with disability advocacy groups, leading to a disconnect between the intended accessibility features and the actual needs of users. Additionally, studies have indicated that even when accessibility standards are in place, enforcement mechanisms are often weak or nonexistent. This results in a situation where buildings may be constructed without sufficient oversight, leading to non-compliance with established guidelines (Muzemil, 2018). By reviewing these studies, this section will provide a comprehensive overview of the current state of compliance in Addis Ababa and highlight areas that require urgent attention.

Furthermore, understanding the level of compliance is essential for identifying gaps in existing policies and practices. By analyzing data from various assessments, stakeholders can gain insights into specific infrastructure projects that exemplify either successful adherence or notable failures regarding accessibility standards (Danso et al., 2019). This information will be invaluable for policymakers, urban planners, and advocacy groups aiming to improve accessibility in public infrastructures across the city.

3.2.3.2. Factors Influencing Compliance

Several factors influence the level of compliance with accessibility standards in public infrastructure projects. One significant factor is the enforcement of regulations by governmental bodies responsible for urban planning and construction oversight. In many cases, there is a lack of rigorous monitoring and evaluation processes to ensure that new developments adhere to established accessibility guidelines (Pal et al., 2016). This absence of enforcement can lead to a culture where compliance is viewed as optional rather than mandatory. As a result, architects and builders may prioritize cost-cutting measures over inclusive design principles, ultimately compromising access for persons with disabilities.

Another critical factor affecting compliance is the training and education provided to architects, planners, and construction teams regarding accessibility standards. Many professionals may not be adequately informed about the specific requirements outlined in local laws or international guidelines. Without proper training, they may inadvertently design infrastructures that do not meet accessibility needs (Lakew, 2020). Therefore, enhancing educational programs focused on universal design principles and accessibility considerations is essential for fostering a more inclusive approach to urban development.

Community involvement also plays a vital role in ensuring compliance with accessibility standards. Engaging persons with disabilities and their advocacy groups in the planning and design processes can lead to better-informed decisions that reflect the actual needs of users. When stakeholders are included from the outset, it increases accountability and encourages adherence to accessibility regulations (Amin et al., 2019). This section will explore these factors in detail, providing insights into how they collectively impact compliance levels within public infrastructure projects in Addis Ababa.

3.2.3.3. Case Studies of Successful Compliance

Examining case studies from other regions or countries where successful compliance with accessibility standards has been achieved can offer valuable lessons for Addis Ababa. For instance, cities like Barcelona and Melbourne have implemented comprehensive strategies that prioritize accessibility in their urban planning processes (Eric Plantier & Royon, 2019). These cities have established robust regulatory frameworks that not only mandate compliance but also provide incentives for developers who exceed minimum accessibility requirements. By analyzing these successful models, stakeholders in Addis Ababa can identify best practices that could be adapted to local contexts.

One notable example comes from Sweden, where the government has integrated universal design principles into its building codes since the 1990s. This proactive approach has resulted in significant improvements in accessibility across various public infrastructures, including transportation systems and recreational facilities (Wegener, 2016). The success of such initiatives underscores the importance of having clear guidelines and strong enforcement mechanisms to ensure compliance with accessibility standards.

Additionally, case studies highlighting community engagement efforts can demonstrate how involving persons with disabilities in the planning process leads to more effective outcomes. Participatory design workshops held in cities like Toronto have allowed individuals with disabilities to voice their needs directly to architects and planners, resulting in more accessible public spaces (Asiva Noor Rachmayani, 2015a). By presenting these case studies, this section will illustrate how successful strategies from other regions can inform policy development and implementation efforts aimed at enhancing accessibility in Addis Ababa's public infrastructures.

3.2.4. Impact of Accessibility on Community Participation

3.2.4.1. Social Inclusion through Accessible Infrastructure

Improved accessibility in public infrastructures plays a crucial role in fostering social inclusion for persons with disabilities. When public spaces are designed to be accessible, they enable individuals with disabilities to participate fully in community activities, thereby enhancing their sense of belonging. Accessible

infrastructure such as ramps, wide doorways, and tactile signage removes barriers that often isolate disabled individuals from their peers. This inclusion not only allows them to engage in social interactions but also helps combat feelings of loneliness and segregation (Maliszewska-Nienartowicz, 2020). By creating environments where everyone can interact freely, communities can cultivate a culture of acceptance and support, which is essential for the well-being of all members.

Moreover, accessible public spaces encourage active participation in community events and activities, allowing individuals with disabilities to contribute their unique perspectives and talents. This engagement can take many forms, from participating in local governance to joining community organizations or advocacy groups. When persons with disabilities are included in these activities, they not only enrich the community with their diverse experiences but also gain a sense of agency and empowerment. Such involvement fosters a positive self-identity and reinforces their role as valued members of society (Duerstock et al., 2023). Ultimately, accessible infrastructure serves as a foundation for building inclusive communities where diversity is celebrated and every individual has the opportunity to thrive.

3.2.4.2. Economic Empowerment

Accessible infrastructures significantly enhance economic opportunities for persons with disabilities by facilitating their access to employment, education, and essential services. When public transport systems are equipped with features such as low-floor buses and accessible stations, individuals with disabilities can travel independently to job interviews or workplaces without relying on others for assistance (Winarsih et al., 2021). This independence is vital for promoting self-sufficiency and reducing reliance on social welfare programs. Furthermore, when employers recognize that their workplaces are accessible, they are more likely to hire individuals with disabilities, thereby enriching the workforce with diverse talents and perspectives.

In addition to employment opportunities, accessible infrastructures also play a key role in enabling individuals with disabilities to pursue educational goals. Schools that are designed with accessibility in mind can accommodate students with various needs, providing them equal opportunities to learn and succeed academically. Access to education not only empowers individuals but also contributes to long-term economic growth by equipping them with the skills necessary for competitive job markets (Babinard et al., 2018). By investing in accessible public infrastructures, communities can create pathways for economic empowerment that benefit both individuals with disabilities and society as a whole.

3.2.4.3. Quality of Life Improvements

Increased accessibility positively impacts the overall quality of life for individuals with disabilities by promoting greater independence and enhancing mental well-being. When public spaces are designed to be inclusive, individuals can navigate their environments without constant assistance from caregivers or family members (Damastuti & Dhafiya, 2024). This newfound independence fosters a sense of control over one's life and decisions, which is crucial for personal development and self-esteem. Moreover, accessible infrastructures facilitate participation in recreational activities and social gatherings, contributing to improved physical health through increased mobility and engagement.

Furthermore, the mental health benefits associated with increased accessibility cannot be overstated. Individuals who experience social inclusion through accessible environments often report lower levels of anxiety and depression (Mulubiran, 2021). The ability to participate in community life reduces feelings of isolation and enhances social connections, leading to a more supportive network of relationships. By creating an environment where persons with disabilities feel valued and included, communities can significantly improve their residents' overall quality of life. This holistic approach not only benefits individuals but also strengthens community ties and promotes a culture of empathy and understanding among all members of society.

3.3. Empirical review

3.3.1. Current State of Accessibility in Public Infrastructure

The current state of accessibility in public infrastructures in Addis Ababa has been the subject of numerous empirical studies that highlight significant gaps and challenges faced by persons with disabilities. Research indicates that many public facilities, including schools, parks, and transportation systems, are inadequately designed to accommodate individuals with mobility or visual impairments. For instance, a study assessing the accessibility of recreational parks found that numerous facilities were either damaged or poorly managed, leading to limited access for disabled individuals (Lelan et al., 2019). This lack of proper maintenance and design not only restricts physical access but also diminishes the overall utility of these spaces for all community members. The findings underscore an urgent need for comprehensive assessments and improvements in the design and management of public infrastructures to ensure they are inclusive.

Moreover, an evaluation of public buildings revealed that approximately 70% of work and public places remain inaccessible despite a high level of awareness among service providers regarding the importance of inclusivity. This disconnect between awareness and implementation highlights a critical gap in the enforcement of accessibility standards. Many public buildings lack essential features such as ramps, accessible restrooms, and clear signage, which are necessary for facilitating movement and navigation for persons with disabilities (Amoah et al., 2023). The empirical evidence suggests that while there may be policies in place aimed at promoting accessibility, their actual impact is limited due to insufficient compliance and oversight.

Additionally, studies have shown that the lack of compliance with established accessibility standards is a pervasive issue in Addis Ababa. A survey conducted by the Disability Development Initiative indicated that over 75% of primary schools had inaccessible routes to essential facilities like toilets and classrooms (Ajayi et al., 2020). This lack of access not only affects educational opportunities for children with disabilities but also perpetuates social exclusion. The empirical evidence highlights a critical gap between policy intentions and actual implementation, necessitating targeted interventions to enhance accessibility across various public sectors.

3.3.2. Barriers to Accessibility

Empirical research has identified multiple barriers that hinder accessibility for persons with disabilities in Addis Ababa. Physical barriers, such as inadequate ramps, narrow doorways, and the absence of elevators, are prevalent in many public infrastructures. These structural shortcomings create significant obstacles for individuals who rely on mobility aids or have difficulty navigating traditional building layouts (Bini et al., 2024). Furthermore, studies have pointed out that design flaws in transportation systems contribute significantly to the challenges faced by individuals with disabilities. Unsuitable vehicular designs and poorly maintained streets create obstacles that limit mobility and independence. These physical barriers not only restrict access but also diminish the overall quality of life for disabled individuals.

Social and cultural barriers also play a crucial role in limiting accessibility. Research has shown that societal attitudes toward disability can lead to stigma and discrimination, further marginalizing individuals with disabilities (Grisé et al., 2019). A lack of awareness among community members and service providers about disability rights and needs exacerbates these issues, resulting in environments that are not conducive to inclusion. Moreover, economic barriers such as funding constraints for infrastructure projects hinder the implementation of necessary accessibility features. These combined factors create an environment where persons with disabilities face significant challenges in accessing public services and participating fully in community life.

In addition to these barriers, systemic issues within governmental agencies can impede progress toward greater accessibility. Ineffective communication between stakeholders involved in urban planning can lead to fragmented efforts that fail to address the comprehensive needs of persons with disabilities (Bill, 2019).

The absence of a coordinated approach often results in missed opportunities for integrating accessibility features into new developments or renovations. Addressing these barriers requires a multifaceted strategy that includes raising awareness, improving infrastructure design, and fostering collaboration among various stakeholders.

3.3.3. Successful Models and Best Practices

Examining successful models from other regions can provide valuable insights into improving accessibility in Addis Ababa (Asiva Noor Rachmayani, 2015a). Case studies from cities that have effectively implemented inclusive design principles demonstrate the positive impact of comprehensive planning on accessibility outcomes. For instance, cities like Barcelona have developed robust regulatory frameworks that mandate compliance with accessibility standards while providing incentives for developers who exceed minimum requirements. Such approaches have led to significant improvements in public infrastructure accessibility, serving as a potential blueprint for Addis Ababa.

Moreover, community engagement has proven to be an effective strategy for enhancing accessibility (Damastuti & Dhafiya, 2024). In Toronto, participatory design workshops involving persons with disabilities have resulted in more inclusive urban environments tailored to their needs. By incorporating feedback from disabled individuals during the planning process, stakeholders can ensure that public infrastructures meet their requirements more effectively. These successful models highlight the importance of collaboration among government agencies, urban planners, and disability advocacy groups in creating accessible environments that promote social inclusion and economic empowerment for persons with disabilities in Addis Ababa.

Furthermore, the implementation of technology-driven solutions has emerged as a best practice in enhancing accessibility. Smart city initiatives that utilize data analytics can help identify areas where accessibility is lacking and prioritize improvements accordingly (Ajayi et al., 2020). Mobile applications designed to provide real-time information about accessible routes or facilities can empower individuals with disabilities to navigate urban environments more confidently. By adopting such innovative approaches alongside traditional infrastructure improvements, Addis Ababa can create a more inclusive city that caters to the diverse needs of all its residents.

3.4. Research gap

Despite the growing body of literature on accessibility in urban environments, there remains a significant research gap concerning the specific challenges faced by persons with disabilities in accessing public physical infrastructures in Addis Ababa. While some studies have focused on the accessibility of recreational parks and public transportation systems, comprehensive assessments that encompass a wide range of public facilities—such as schools, government buildings, and healthcare centers—are limited. Existing research often highlights the presence of physical barriers but fails to provide an in-depth analysis of how these barriers interact with social, cultural, and economic factors that contribute to the overall accessibility landscape. This gap indicates a need for empirical investigations that holistically examine the state of accessibility across various public infrastructures in Addis Ababa.

Moreover, there is a lack of studies that evaluate the effectiveness of current accessibility standards and codes specifically within the context of Addis Ababa. While international frameworks and national policies exist, there is insufficient empirical evidence to determine how well these standards are being implemented in practice. Previous research has pointed out compliance issues; however, it has not sufficiently addressed the mechanisms through which these standards are enforced or the factors that influence compliance among stakeholders. Understanding these dynamics is crucial for identifying barriers to effective implementation and for developing targeted interventions that can enhance accessibility in public infrastructures.

Additionally, while some literature discusses successful models and best practices from other regions, there is limited exploration of how these models can be adapted to the unique socio-economic and cultural context of Addis Ababa. The existing studies often overlook local community engagement processes that are essential for ensuring that public infrastructures meet the needs of persons with disabilities. There is a pressing need for research that not only assesses current conditions but also actively involves stakeholders—including persons with disabilities—in the design and planning processes. This participatory approach can lead to more effective and sustainable solutions that promote inclusivity in public spaces. Addressing these research gaps will contribute to a more comprehensive understanding of accessibility issues in Addis Ababa and inform policy development aimed at improving the quality of life for persons with disabilities.

3.5. Conceptual frame work

The conceptual framework for this research is designed to systematically analyze the accessibility of public physical infrastructures for persons with disabilities in Addis Ababa. It integrates various components that influence accessibility, including standards and codes, barriers to access, compliance mechanisms, and stakeholder engagement. The framework is structured around four main dimensions that align with the specific objectives of the study.

1. Accessibility Standards and Codes

This dimension focuses on the existing accessibility standards and codes that govern public infrastructure projects in Addis Ababa. It examines the effectiveness of these regulations in promoting inclusivity and ensuring that public spaces are designed to accommodate individuals with disabilities. This component will assess how well these standards are communicated and enforced among architects, planners, and builders. By evaluating the current legal frameworks, the research aims to identify gaps in policy implementation and areas for improvement.

Key elements within this dimension include:

Regulatory Frameworks: Analysis of national and local laws that mandate accessibility features in public infrastructures.

Universal Design Principles: Examination of how universal design concepts are integrated into planning and construction processes.

Enforcement Mechanisms: Evaluation of the effectiveness of monitoring systems that ensure compliance with accessibility standards.

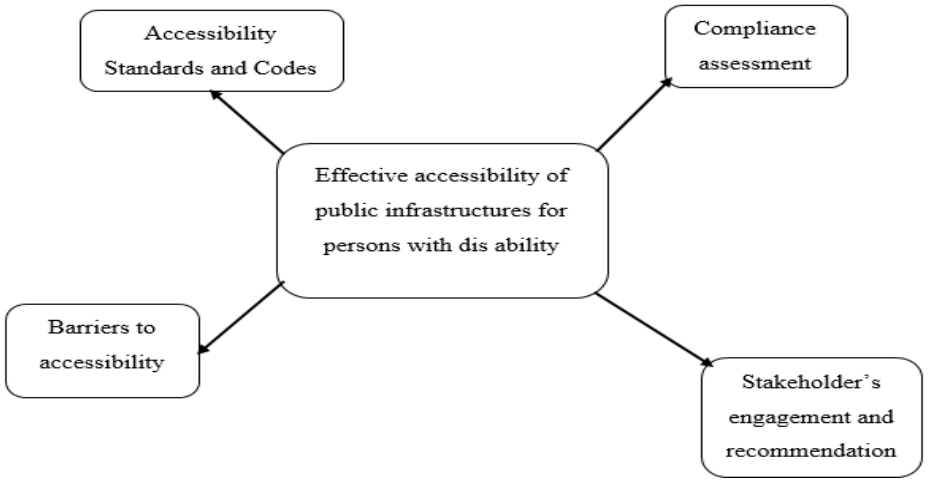

Figure 3.1 Conceptual framework

Source, (Akaateba et al., 2023)

2. Barriers to Accessibility
This dimension identifies and categorizes the various barriers that hinder access for persons with disabilities in public infrastructures. It encompasses physical barriers, social barriers, and economic barriers. Understanding these barriers is crucial for developing targeted interventions aimed at improving accessibility.
Key elements within this dimension include:
Physical Barriers: Assessment of structural inadequacies in public buildings and transportation systems.
Social and Cultural Barriers: Exploration of societal attitudes towards disability that contribute to marginalization.
Economic Barriers: Analysis of financial constraints affecting the implementation of accessibility features.
3. Compliance Assessment
This dimension focuses on assessing the extent to which current public infrastructure projects comply with established accessibility standards and codes. It involves evaluating specific case studies of public facilities to determine adherence to regulations and identifying factors influencing compliance levels.
Key elements within this dimension include:
Compliance Monitoring: Review of existing studies that measure compliance rates in various public infrastructures.
Factors Influencing Compliance: Exploration of issues such as regulatory enforcement, training for professionals, and community involvement in the design process.
Case Studies: Presentation of successful compliance examples from other regions or countries that can inform best practices in Addis Ababa.
4. Stakeholder Engagement and Recommendations
The final dimension emphasizes the importance of stakeholder engagement in enhancing accessibility in public infrastructures. This component will explore how involving persons with disabilities and advocacy groups in planning processes can lead to more effective solutions tailored to their needs.
Key elements within this dimension include:
Community Involvement: Strategies for engaging persons with disabilities in needs assessments, design reviews, and project evaluations.
Collaborative Approaches: Identification of partnerships between government agencies, urban planners, and disability organizations to promote inclusive practices.
Actionable Recommendations: Development of specific recommendations based on findings from barrier identification and compliance evaluation aimed at improving accessibility.

4. RESEARCH METHODOLOGY

4.1. Introduction

In this chapter, the most appropriate research method was chosen for this study to produce results for research questions and attain research goals and objectives. Also, the key role is to explain the preference of the research methodology system and the understanding of the relevant methodology. It then explores areas of the study field. It also defines the style of research design used to analyze this research project and lists all data sample instruments, sampling procedures, data sources, and presentation. The research design includes details of the chosen study population and sample, the design for data collection instruments and methods for data collection.

4.2. Research design

To accomplish its stated objectives, the study uses an explanatory and descriptive research approach. Descriptive research design use to explain and discuss the findings using descriptive statistics like mean and

standard deviation, while explanatory research design have been used to address research objectives to systematically identify and analyze the existing barriers in public physical infrastructures that hinder access for persons with disabilities in Addis Ababa.

4.3. Research approach

The researcher employed a combination of quantitative and qualitative study methods. Both quantitative and qualitative data are utilized, with the former being more important. Using a quantitative research methodology makes it possible to collect data using a variety of techniques and produces trustworthy results. The most popular methodologies in the social sciences nowadays are quantitative and qualitative methods, which are both included in mixed-method research. The study found strategies to balance the drawbacks of a single technique with the advantages of a quantitative approach, as well as ways to neutralize biases related to the use of a single strategy.

4.4. Target Population, sample size and sampling technique

4.4.1. Target population

The target population for this study encompasses a diverse group of participants, crucial for gaining a comprehensive understanding of the accessibility challenges faced by persons with disabilities (PWDs) in Addis Ababa. This population will include PWDs who represent various types of disabilities, such as mobility impairments, visual impairments, and hearing impairments. By including participants with different disabilities, the study aims to capture a broad spectrum of experiences and perspectives, highlighting the unique barriers each group faces in navigating public infrastructures. This diversity is essential not only for understanding the specific challenges associated with different disabilities but also for identifying common themes that may emerge across various user experiences.

No.	Classification	Source	Total Population
1	Professionals	Addis Ababa City administration Construction and Design Bureau	143
2	Disabilities	Addis Ababa City administration disability association	40
3		Total	183

From the target populations included key stakeholders (respondents) participated in the survey data were urban planners, architects, engineers, and policymakers. Participating these professionals is vital, as they play a significant role in the design and implementation of infrastructure projects. Their insights will provide valuable context regarding the technical and regulatory challenges faced in creating accessible environments. Moreover, including the perspectives of both users and designers facilitates a more holistic understanding of accessibility issues, bridging the gap between lived experiences and professional practices. This dual focus aims to foster dialogue between PWDs and infrastructure stakeholders, ultimately contributing to more informed and inclusive design solutions.

4.4.2. Sampling Techniques

To ensure a representative sample that captures the diversity of experiences among PWDs and stakeholders, the study employed stratified random sampling. This technique involves dividing the target population into distinct subgroups, or strata, based on specific characteristics such as type of disability, age, gender, and socio-economic status. Stratification is particularly beneficial in this context, as it allows for targeted sampling that acknowledges the varying needs and experiences of different demographic groups.

4.4.3. Sample Size Determination

Determining an appropriate sample size is a critical aspect of the research design, as it directly influences the validity and reliability of the study's findings. The sample size for this research will be calculated based on

the total population of PWDs in Addis Ababa, utilizing statistical formulas to achieve a desired confidence level and margin of error. A confidence level of 95% is standard in social research, providing a high degree of assurance that the results will be representative of the larger population. Additionally, a margin of error of 5% will be targeted to ensure that the estimates are precise enough to draw meaningful conclusions.
The study followed the formula as was used by Yamane (1967) to draw the samples from the population, assuming the level of precision or sampling error (e) to be 5%, and, desired a confidence level of 95%, while expecting a margin of error to be 5%.
Accordingly, from the total population of N, with precision level (e = 5%=0.05), the below formula was applied to determine sample size.
n = N / 1+N (e) 2
Where, n - is the sample size
N - Is the population size?
e - Is the level of precision or sampling error = (0.05)
n = 217/1+217(0.05) ^2
n = 217/1+217(0.0025)
n = 217/1.5425
n =141

4.5. Data collection

The study used both primary and secondary data. The major sources of data in this study, the primary data which have been collected through questionnaires and interviews (site checklist) with targeted project staff and key personnel found. This data also have been supplemented by data to be obtained from various sources like project data books published documents, and various relevant reports of the projects. With a combination of these two data sources, the researcher obtained the required information that was essential to reach a sound conclusion about the study and answer the research questions.

4.6. Method of Data analysis

Data analysis is the way of analyzing the collected data depending up on the collected information and communicating the findings appropriately. After the questionnaires have been collected, the researcher checks if there unintended participants, who fills the questionnaire distributed to the samples and had organized the returned questionnaire accordingly. Then after, the researcher performed the analysis process for the collected valid data using Statistical Package for Social Science (SPSS). The descriptive statistics have been employed that includes frequencies, percentages, means and standard deviation.

4.7. Data Reliability and Validity

4.7.1. Reliability

Before the questionnaire is distributed to the respondent, the validity of the instrument have been checked by the advisor and experienced professionals as to whether it measures what it purported to measure. Accordingly based on the approval obtained from the advisor and experienced professionals the questioner have been used to consider that they are valid. Validity is concerned with the degree to which the designed questionnaire items fairly and accurately represent the main variable (dependent and independent) discussion in literature review.

4.7.2. Validity

The reliability test is an important instrument to measure the degree of consistency of an attribute which is supposed to be measured. As stated in scholars, the less variation of the instruments to be produced in repeated measurements of an attribute the higher its reliability. Reliability can be equated with the stability, consistency, or dependability of a measuring tool. Cronbach's Alpha is one of the most commonly accepted

measures of reliability. It measures the internal consistency of the items in a scale. It indicates the extent to which the items in a questionnaire are related to each other. A score of .70 or greater is generally considered to be acceptable

- 0.90 or > = high reliability - 0.80-.89 = good reliability
- 0.70-79 = acceptable reliability - 0.65-.69 = marginal reliability

As shown in Table 3.1, the provided data reveals high levels of internal consistency across all variables related to accessibility. Each variable: Current Practice, Accessibility Standards and Codes, Barriers to Accessibility, Compliance Assessment, and Stakeholder Engagement and Recommendations—consists of five items and demonstrates excellent reliability as indicated by their Cronbach's alpha values. Specifically, the alpha values range from .975 for Barriers to Accessibility to .984 for Current Practice. These high values suggest that the items within each variable are highly consistent with each other, effectively measuring similar constructs. Overall, this analysis indicates that the scales used are well-defined and robustly measure their respective aspects of accessibility.

Table 4.1 Cronbach's Alpha

No.	Variables	Cronbach's Alpha	No. of items	Remark
1	Current practice	.984	5	High
2	Accessibility Standards and Codes	.976	5	High
3	Barriers to Accessibility	.975	5	High
4	Compliance Assessment	.978	5	High
5	Stakeholder Engagement and Recommendations	.983	5	High

4.8. Ethical Consideration

Every person involved in the study will be entitled to the right of privacy and dignity of treatment, and no personal harm will be caused to subjects in the research. Information obtained will be held in strict confidentiality by the researcher. All assistance, collaboration of others and sources from which information shall be acknowledged.

5. DATA PRESENTATION AND ANALYSIS

5.1. Introduction

This chapter presents the findings from the comprehensive evaluation of public physical infrastructures in Addis Ababa regarding their accessibility for persons with disabilities. This chapter systematically analyzes the data collected through surveys and site assessments, focusing on the effectiveness of current accessibility standards and codes. By identifying specific barriers that hinder access, it highlights the discrepancies between policy intentions and real-world implementations.

5.2. Data response rate

Table 5.1 Questionnaire response rate

Distributed questionnaire	Returned questionnaire	Valid questionnaire
141	135	124
100%	96%	92%

Source, own survey (2024/25)

The analysis of the distributed, returned, and valid questionnaires provides valuable insights into the response rate and data quality for the study on accessibility in public physical infrastructures for persons

with disabilities in Addis Ababa. Out of a total of 141 questionnaires distributed, 135 were returned, resulting in a high response rate of 96%. This indicates strong engagement from participants, suggesting that the topic resonates with the stakeholders involved. However, only 124 of the returned questionnaires were deemed valid for analysis, yielding a validity rate of approximately 92%. This slight reduction in valid responses may be attributed to incomplete answers or inconsistencies in the data provided. Overall, the high return and validity rates reflect effective data collection methods and participant interest, which are crucial for ensuring that the findings accurately represent stakeholder perspectives on accessibility issues in public infrastructures. The results will serve as a solid foundation for further analysis and recommendations aimed at improving accessibility for individuals with disabilities in Addis Ababa.

5.3. Demographic background of the respondents

Table 5.2 Gender of respondents

Gender	Frequency	Percentage
Male	83	67%
Female	41	33%
Total	124	100%

Source, own survey (2024/25)

The analysis of gender distribution among the respondents in the study on accessibility of public physical infrastructures in Addis Ababa reveals a significant disparity between male and female participation. Out of a total of 124 valid questionnaires, 83 respondents identified as male, accounting for 67% of the sample, while 41 respondents identified as female, representing 33%. This gender imbalance indicates that male voices are more prominently represented in the data collected, which could potentially influence the findings and recommendations of the study. The predominance of male respondents may reflect broader societal trends in participation or engagement in discussions around disability and accessibility issues. To ensure a more balanced perspective in future research, it is essential to actively encourage female participation and consider gender-specific barriers and experiences related to accessibility. This approach will enhance the comprehensiveness and inclusivity of the findings, ultimately contributing to more effective recommendations for improving accessibility for all individuals, regardless of gender.

Table 5.3 Age of respondents

Age	Frequency	Percentage
Below 25	10	8%
25-30	13	10%
25-35	52	42%
35-45	37	30%
Above 45	12	10%
Total	124	100%

Source, own survey (2024/25)

The analysis of the age distribution among respondents in the study on accessibility of public physical infrastructures in Addis Ababa reveals a diverse range of perspectives. Out of a total of 124 valid questionnaires, the majority of respondents (42%) fall within the 25-35 age group, indicating a strong representation of younger adults who may have different experiences and expectations regarding accessibility compared to older generations. The next largest group is aged 35-45, comprising 30% of respondents, which suggests that a significant portion of the feedback comes from individuals who are likely

to be active in their careers and community engagement. Conversely, only 8% of respondents are below 25 years old, while those above 45 years old account for 10%. This age distribution highlights a predominance of middle-aged individuals in the data collection, which could influence the findings and recommendations related to accessibility. It is essential for future research to consider engaging younger participants and those from older demographics to ensure a more comprehensive understanding of the accessibility challenges faced by individuals across all age groups. By including a broader spectrum of ages, the study can better capture diverse experiences and perspectives, ultimately leading to more inclusive recommendations for enhancing accessibility in public infrastructures.

Table 5.4 Educational background of respondents

Educational background	Frequency	Percentage
Below Diploma	23	19%
Diploma certificate	18	15%
Bachelor degree	45	36%
Master's degree and above	38	31%
Total	124	100%

Source, own survey (2024/25)

The analysis of the educational background of respondents in the study on accessibility of public physical infrastructures in Addis Ababa reveals a diverse range of qualifications. Among the 124 valid questionnaires, 36% of respondents hold a bachelor's degree, indicating a significant representation of individuals with higher education who may possess a more informed perspective on accessibility issues. Additionally, 31% of respondents have attained a master's degree or higher, suggesting that a considerable portion of the sample is well-educated and potentially knowledgeable about the complexities surrounding accessibility standards and codes. Conversely, 19% of respondents have an education level below a diploma, and 15% possess only a diploma certificate, indicating that there are also voices from individuals with varying educational experiences included in the data. This diversity in educational backgrounds is essential for capturing a comprehensive understanding of accessibility challenges, as it allows for multiple perspectives on the effectiveness of current standards and the barriers faced by persons with disabilities. The insights gained from this varied educational representation can inform more targeted recommendations and strategies for enhancing accessibility in public infrastructures, ensuring that they meet the needs of all community members.

Table 5.5 Experience of respondents

Experience	Frequency	Percentage
Less than 5 years	16	13%
Between 5 and 10	23	19%
Between 10 and 15	50	40%
More than 15 years	35	28%
Total	124	100%

Source, own survey (2024/25)

The analysis of the experience levels of respondents in the study on accessibility of public physical infrastructures in Addis Ababa reveals a diverse range of professional backgrounds. Out of a total of 124 valid questionnaires, 40% of respondents reported having between 10 and 15 years of experience in their respective fields, indicating a substantial representation of individuals with considerable expertise. Additionally, 28% of respondents have more than 15 years of experience, further contributing to the depth of

knowledge within the sample. Meanwhile, 19% have between 5 and 10 years of experience, and only 13% reported having less than 5 years of experience.

Table 5.6 Job position of respondents

Position	Frequency	Percentage
Project Manager	12	10%
Site Engineers	19	15%
Resident Engineer	23	19%
Urban planner	23	19%
Policy makers	15	12%
Disable	32	26%
Total	124	100%

Source, own survey (2024/25)

The provided data outlines the distribution of various job positions within a workforce of 124 individuals, revealing interesting insights into the organizational structure. The largest group is comprised of individuals classified as "Disable," totaling 32 members, which represents 26% of the workforce. This significant proportion suggests a strong commitment to inclusivity and possibly reflects roles specifically designed to support or integrate individuals with disabilities. Following this, both "Resident Engineer" and "Urban Planner" positions are equally represented, with 23 individuals each, accounting for 19% of the total. This indicates a robust focus on engineering and urban development within the organization.

"Site Engineers" make up 15% of the workforce with 19 individuals, while "Policy Makers" represent 12% with 15 members. Lastly, "Project Managers," at 10%, constitute the smallest group with only 12 individuals. The overall distribution highlights a diverse range of roles, particularly emphasizing technical and planning positions, while also showcasing a notable commitment to disability inclusion. This analysis may guide future recruitment efforts and inform strategies for enhancing workforce diversity and representation across different job functions.

This distribution suggests that the majority of respondents possess significant professional experience, which is likely to enhance the quality and relevance of their insights regarding accessibility issues. The presence of experienced professionals in the dataset can provide valuable perspectives on the effectiveness of current accessibility standards and codes, as well as the barriers faced by persons with disabilities. However, it is also important for future research to include voices from less experienced individuals to capture a broader range of insights and experiences related to accessibility in public infrastructures.

5.4. Descriptive analysis of data

The analysis of the responses regarding the effectiveness of current accessibility standards in public infrastructure projects in Addis Ababa reveals a mixed perception among participants. The mean score for the statement "The current accessibility standards effectively address the needs of individuals with disabilities in public infrastructure projects in Addis Ababa" is 2.98, indicating a slight disagreement overall. A significant portion of respondents (37%) disagreed, while only 4% strongly agreed, suggesting that many feel the standards do not adequately meet the needs of individuals with disabilities. The standard deviation of 0.98 indicates a moderate level of variability in responses, reflecting diverse opinions on this issue.

Regarding compliance with established accessibility codes, the mean score is slightly lower at 2.91, with 35% of respondents disagreeing and only 1% strongly agreeing that public infrastructure projects consistently adhere to these codes. This suggests a prevalent concern about the enforcement and application of accessibility regulations within public projects. The standard deviation of 0.97 further emphasizes the

variability in perceptions, indicating that while some respondents may see compliance as satisfactory, many others do not.

Table 5.7 Current practice

Current practice	1	2	3	4	5	Mean	Std. Deviation
The current accessibility standards effectively address the needs of individuals with disabilities in public infrastructure projects in Addis Ababa	4	51	33	46	5	2.978	0.98148
	3%	37%	24%	33%	4%		
Public infrastructure projects in Addis Ababa consistently comply with the established accessibility codes.	7	49	34	47	2	2.914	0.97417
	5%	35%	24%	34%	1%		
The implementation of accessibility standards has significantly improved physical access to public buildings and transportation in Addis Ababa	13	38	44	40	4	2.885	1.02207
	9%	27%	32%	29%	3%		
Awareness and training regarding accessibility codes among architects and urban planners in Addis Ababa are sufficient to ensure compliance in public projects	3	58	26	38	14	3.014	1.09004
	2%	42%	19%	27%	10%		
Feedback from individuals with disabilities is adequately considered in the planning and execution of public infrastructure projects in Addis Ababa	18	33	37	34	17	2.993	1.22472
	13%	24%	27%	24%	12%		

Source, own survey (2024/25)

The perception of improvements in physical access due to the implementation of accessibility standards is similarly cautious, with a mean score of 2.88. Here, 27% remained neutral, while 29% agreed that there have been improvements, but 9% strongly disagreed. The standard deviation of 1.02 suggests that opinions are quite spread out, reflecting uncertainty about the actual impact of these standards on physical access to buildings and transportation.

Awareness and training regarding accessibility codes among architects and urban planners received a more favorable assessment, with a mean score of 3.01 indicating a slight agreement overall. However, 42% of respondents disagreed that awareness and training are sufficient, while only 10% strongly agreed. The higher standard deviation of 1.09 indicates considerable variability in responses, suggesting that while some believe training is adequate, many others feel it falls short.

Lastly, when assessing whether feedback from individuals with disabilities is adequately considered in planning and execution processes, the mean score stands at 2.99, reflecting a neutral stance overall. With 24% agreeing and 13% strongly disagreeing, this highlights concerns about inclusivity in decision-making processes related to public infrastructure projects. The standard deviation of 1.22 indicates significant variability in responses, pointing to differing experiences and perceptions regarding stakeholder engagement in these projects.

Table 5.8 Accessibility Standards and Codes

Accessibility Standards and Codes	1	2	3	4	5	Mean	Std. Deviation
To what extent do you believe that the current accessibility standards and codes in Addis Ababa effectively promote inclusivity in public infrastructure projects?	22	26	34	46	11	2.986	1.21575
	16%	19%	24%	33%	8%		
How strongly do you agree that architects and planners are adequately informed about the existing accessibility standards and codes?	14	37	39	43	6	2.928	1.07434
	10%	27%	28%	31%	4%		
How strongly do you agree that architects and planners are adequately informed about the existing accessibility standards and codes?	15	21	6	64	33	3.568	1.29688
	11%	15%	4%	46%	24%		
How effective do you believe the current regulatory frameworks are in addressing the needs of persons with disabilities in public infrastructure design?	7	49	34	47	2	2.914	0.97417
	5%	35%	24%	34%	1%		
To what extent do you agree that universal design principles are adequately integrated into the planning and construction processes of public infrastructures in Addis Ababa?	8	47	26	48	10	3.036	1.09947
	6%	34%	19%	35%	7%		

Source, own survey (2024/25)

In summary, while there are some positive perceptions regarding awareness and training related to accessibility standards in Addis Ababa's public infrastructure projects, significant concerns persist about compliance with codes and the effectiveness of current standards in meeting the needs of individuals with disabilities.

The analysis of responses regarding the effectiveness of current accessibility standards and codes in promoting inclusivity in public infrastructure projects in Addis Ababa indicates a moderate level of skepticism among participants. With a mean score of 2.99, the responses suggest that while there is some agreement (33%) that the standards promote inclusivity, a significant portion (35%) disagreed or strongly disagreed. The standard deviation of 1.22 reflects a wide range of opinions, highlighting that many respondents feel the existing standards may not sufficiently address the needs of individuals with disabilities.

When assessing whether architects and planners are adequately informed about existing accessibility standards and codes, the mean score is slightly lower at 2.93. Here, 27% of respondents disagreed with the statement, while only 4% strongly agreed. This suggests a general perception that knowledge about accessibility codes among professionals involved in public infrastructure projects is lacking. The standard deviation of 1.07 indicates moderate variability in responses, pointing to differing levels of confidence in the awareness and understanding of these standards among architects and planners.

The statement regarding architects and planners being adequately informed about existing accessibility standards received a higher mean score of 3.57, indicating a more favorable view overall. With 46%

agreeing and 11% strongly disagreeing, this response suggests that many believe there is sufficient knowledge among professionals concerning accessibility codes. However, the standard deviation of 1.30 indicates some variability in perceptions, suggesting that while a majority feel positively, there remains a notable minority with concerns.

In terms of the effectiveness of current regulatory frameworks in addressing the needs of persons with disabilities in public infrastructure design, the mean score stands at 2.91, indicating a slight disagreement overall. A significant portion (35%) disagreed with the effectiveness of these frameworks, while only 1% strongly agreed. The standard deviation of 0.97 suggests limited variability, indicating a consensus among many respondents that current regulations may not adequately meet the needs of individuals with disabilities.

Lastly, when evaluating the integration of universal design principles into planning and construction processes, the mean score is slightly more favorable at 3.04. This indicates that respondents generally agree (35%) that universal design principles are being adequately integrated into public infrastructure projects in Addis Ababa. However, the standard deviation of 1.10 shows some variability in opinions, suggesting that while many see progress in this area, others remain unconvinced about the effective application of universal design principles.

In summary, while there are some positive perceptions regarding awareness and integration of accessibility standards among professionals involved in public infrastructure projects in Addis Ababa, significant concerns persist regarding overall effectiveness and compliance with these standards to promote inclusivity for individuals with disabilities.

Table 5.9 Barriers to Accessibility

Barriers to Accessibility	1	2	3	4	5	Mean	Std. Deviation
How strongly do you agree that physical barriers significantly hinder access for persons with disabilities in public infrastructures?	22	35	34	44	4	2.806	1.13494
	16%	25%	24%	32%	3%		
To what extent do you believe societal attitudes and stigma towards disability create additional barriers to accessibility in public spaces?	24	34	31	45	5	2.806	1.17262
	17%	24%	22%	32%	4%		
How effective do you think current funding levels are in supporting the implementation of necessary accessibility features in public infrastructures?	36	38	26	36	3	2.511	1.19399
	26%	27%	19%	26%	2%		
To what degree do you agree that a lack of awareness among community members about disability rights contributes to barriers in accessing public facilities?	7	50	34	46	2	2.899	0.97278
	5%	36%	24%	33%	1%		
How strongly do you agree that economic constraints limit the ability of local governments to implement accessibility improvements in public infrastructures?	5	4	48	72	10	3.561	0.81752
	4%	3%	35%	52%	7%		

Source, own survey (2024/25)

The analysis of responses regarding barriers to accessibility in public infrastructure reveals significant concerns among participants. When asked about the impact of physical barriers, such as inadequate ramps

and narrow doorways, the mean score is 2.81, indicating a general disagreement with the statement that these barriers significantly hinder access for persons with disabilities. While 32% agreed with the statement, a notable 41% either disagreed or strongly disagreed, suggesting that perceptions of physical barriers vary widely. The standard deviation of 1.13 reflects this variability, indicating differing experiences and opinions regarding the adequacy of physical infrastructure.

In addressing societal attitudes and stigma towards disability, the mean score remains at 2.81, revealing a similar level of concern. Here, 32% of respondents agreed that societal attitudes create additional barriers to accessibility in public spaces, while 41% disagreed or strongly disagreed. This indicates that while some respondents recognize the impact of societal perceptions on accessibility, others do not see it as a significant barrier. The standard deviation of 1.17 further emphasizes the mixed feelings surrounding this issue.

When evaluating the effectiveness of current funding levels in supporting accessibility features, the mean score drops to 2.51, indicating a strong disagreement overall. A substantial 26% of respondents strongly disagreed with the notion that funding is adequate, while only 2% strongly agreed. This suggests a widespread belief that financial resources are insufficient to implement necessary accessibility improvements in public infrastructure projects. The standard deviation of 1.19 indicates considerable variability in responses, reflecting diverse opinions on funding adequacy.

Regarding community awareness about disability rights and its contribution to barriers in accessing public facilities, the mean score is slightly higher at 2.90. Here, 33% agreed that a lack of awareness contributes to accessibility barriers, while 41% disagreed or strongly disagreed. This suggests that while many recognize awareness as a potential issue, there is also significant skepticism about its impact on actual accessibility challenges. The standard deviation of 0.97 indicates a moderate level of consensus among respondents.

Finally, when assessing economic constraints as a limiting factor for local governments in implementing accessibility improvements, the mean score stands at an encouraging 3.56, indicating strong agreement overall. A majority (52%) agreed with this statement, and only 7% disagreed or strongly disagreed. The lower standard deviation of 0.82 suggests a high level of agreement among respondents regarding the financial limitations faced by local governments in enhancing accessibility.

In summary, while there are varied perceptions regarding physical barriers and societal attitudes towards disability in public infrastructure projects in Addis Ababa, there is a clear recognition of economic constraints as a significant barrier to implementing necessary improvements. Additionally, concerns about funding levels and community awareness highlight areas where further attention and action may be needed to enhance accessibility for individuals with disabilities.

Table 5.10 Compliance Assessment

Compliance Assessment	1	2	3	4	5	Mean	Std. Deviation
To what extent do you believe that current public infrastructure projects in Addis Ababa comply with established accessibility standards and codes?	1	4	36	84	14	3.763	0.69764
	1%	3%	26%	60%	10%		
How strongly do you agree that there are effective monitoring systems in place to assess compliance with accessibility standards in public infrastructures?	4	4	29	83	19	3.784	0.82324
	3%	3%	21%	60%	14%		
To what degree do you think training for professionals is sufficient to ensure compliance with accessibility standards?	2	3	28	71	35	3.964	0.82013
	1%	2%	20%	51%	25%		
How effective do you believe community	3	5	29	75	27	3.849	0.85052

involvement is in influencing compliance with accessibility standards in public infrastructure projects?	2%	4%	21%	54%	19%		
To what extent do you agree that successful case studies from other regions can inform better compliance practices in Addis Ababa?	5 4%	5 4%	37 27%	65 47%	27 19%	3.748	0.93323

Source, own survey (2024/25)

The analysis of responses regarding compliance assessment in public infrastructure projects in Addis Ababa indicates a generally positive perception among participants. The mean score for the statement "To what extent do you believe that current public infrastructure projects in Addis Ababa comply with established accessibility standards and codes?" is 3.76, suggesting a tendency towards agreement, with 60% of respondents agreeing and 10% strongly agreeing. This reflects a belief that many projects are adhering to established standards, although the presence of 26% neutral responses indicates some uncertainty among participants. The standard deviation of 0.70 suggests a relatively low variability in responses, indicating a consensus on the perceived compliance levels.

When evaluating the effectiveness of monitoring systems to assess compliance with accessibility standards, the mean score is slightly higher at 3.78. A significant majority (74%) agreed or strongly agreed that effective monitoring systems are in place, while only 6% disagreed. This suggests confidence in the existing oversight mechanisms; however, the standard deviation of 0.82 indicates some variability in opinions, signaling that while many respondents feel positively about monitoring efforts, there are still concerns among others.

In terms of training for professionals such as architects and planners, the mean score stands at 3.96, indicating strong agreement that training is sufficient to ensure compliance with accessibility standards. Here, 76% of respondents agreed or strongly agreed, reflecting a positive perception of professional preparedness in this area. The lower standard deviation of 0.82 reinforces this consensus, suggesting that most participants believe training effectively equips professionals to uphold accessibility standards.

The effectiveness of community involvement in influencing compliance with accessibility standards received a mean score of 3.85. With 73% of respondents agreeing or strongly agreeing that community engagement plays a significant role, this highlights the importance of public participation in ensuring adherence to accessibility codes. The standard deviation of 0.85 indicates moderate variability, suggesting that while many recognize the value of community input, others may not see it as impactful.

Lastly, when assessing whether successful case studies from other regions can inform better compliance practices in Addis Ababa, the mean score is 3.75. A majority (66%) agreed or strongly agreed with this statement, indicating that there is optimism about learning from external examples to enhance local practices. The standard deviation of 0.93 reflects some diversity in responses but generally supports the notion that existing successful models can provide valuable insights for improving compliance in Addis Ababa.

In summary, there is a generally favorable perception regarding compliance with accessibility standards in public infrastructure projects in Addis Ababa, particularly concerning professional training and community involvement. However, while monitoring systems are viewed positively, ongoing attention to variability in perceptions and potential areas for improvement remains essential for enhancing overall compliance and accessibility outcomes.

The analysis of responses regarding stakeholder engagement and recommendations for improving accessibility in public infrastructure projects in Addis Ababa reveals a strong consensus on the importance of involving individuals with disabilities in the planning process. The mean score for the statement "Involving persons with disabilities in the planning process leads to more effective accessibility solutions" is 3.85,

indicating a significant level of agreement, with 70% of respondents agreeing or strongly agreeing. This suggests that participants recognize the value of direct input from affected individuals in crafting solutions that genuinely address their needs. The standard deviation of 0.89 indicates a moderate level of agreement among respondents, reflecting a shared belief in the benefits of inclusive planning.

Table 5.11 Stakeholder Engagement and Recommendations

Stakeholder Engagement and Recommendations	1	2	3	4	5	Mean	Std. Deviation
How strongly do you agree that involving persons with disabilities in the planning process leads to more effective accessibility solutions?	2	8	31	66	32	3.849	0.8921
	1%	6%	22%	47%	23%		
To what extent do you believe that collaboration between government agencies and disability organizations enhances the effectiveness of accessibility initiatives?	1	6	41	64	27	3.791	0.82948
	1%	4%	29%	46%	19%		
How effective do you think community feedback mechanisms are in identifying accessibility issues within public infrastructures?	2	3	31	83	20	3.835	0.74792
	1%	2%	22%	60%	14%		
To what degree do you agree that actionable recommendations based on stakeholder input can significantly improve accessibility in public infrastructures?	4	3	28	71	33	3.906	0.88377
	3%	2%	20%	51%	24%		
How strongly do you agree that ongoing awareness campaigns about disability rights are essential for improving stakeholder engagement in accessibility initiatives?	3	6	29	75	26	3.827	0.85912
	2%	4%	21%	54%	19%		

Source, own survey (2024/25)

When examining the collaboration between government agencies and disability organizations, the mean score is slightly lower at 3.79. Here, 65% of respondents agreed or strongly agreed that such collaboration enhances the effectiveness of accessibility initiatives, while only 5% disagreed. This indicates a positive perception of partnerships between these entities, though the standard deviation of 0.83 suggests some variability in opinions, highlighting that while many see collaboration as beneficial, there may be differing views on its current effectiveness.

The effectiveness of community feedback mechanisms in identifying accessibility issues received a mean score of 3.83, indicating strong agreement among participants. A majority (74%) agreed or strongly agreed that these mechanisms are crucial for recognizing barriers within public infrastructures. The lower standard deviation of 0.75 reflects a high level of consensus on the importance of community input in addressing accessibility challenges.

Regarding actionable recommendations based on stakeholder input, the mean score stands at 3.91, suggesting robust agreement that such recommendations can significantly improve accessibility in public infrastructures. With 75% of respondents agreeing or strongly agreeing, this highlights the perceived value of incorporating stakeholder insights into decision-making processes. The standard deviation of 0.88 indicates a moderate level of agreement among participants, reinforcing the idea that actionable feedback is essential for effective improvements.

Finally, when assessing the necessity of ongoing awareness campaigns about disability rights for enhancing stakeholder engagement in accessibility initiatives, the mean score is 3.83. Here, 80% of respondents agreed or strongly agreed with this statement, emphasizing the critical role that awareness campaigns play in fostering engagement and understanding among stakeholders. The standard deviation of 0.86 indicates some variability but generally supports the notion that increased awareness is vital for promoting inclusive practices.

In summary, there is a strong consensus among participants regarding the importance of stakeholder engagement in enhancing accessibility in public infrastructure projects in Addis Ababa. Involving individuals with disabilities, fostering collaboration between government and disability organizations, and implementing community feedback mechanisms are all viewed as essential strategies for improving accessibility outcomes. Additionally, actionable recommendations and ongoing awareness campaigns are recognized as crucial elements for driving meaningful change and ensuring that accessibility initiatives effectively meet the needs of all community members.

5.5. Qualitative analysis of data (Interview and site checklist)

The descriptive analysis of the site checklist questions for assessing the accessibility of public physical infrastructures for persons with disabilities in Addis Ababa reveals critical insights into the current state of accessibility features across various facilities. Starting with Building/Facility Access, it is essential to evaluate whether there is at least one accessible entrance that is clearly marked and equipped with necessary features such as ramps and automatic doors. The presence of well-maintained pathways leading to entrances, free from obstacles, and designed with tactile paving for visually impaired individuals is crucial for ensuring safe access. The interior access assessment focuses on the width of hallways, ease of door operation, availability of elevators in multi-story buildings, and the presence of handrails on stairs, all of which contribute to a comprehensive understanding of how well these facilities accommodate individuals with mobility challenges. According to the site observation (site checklist) and interview, some buildings have access to disabilities. However, most of the buildings have not been considered to have ramp (disability access).

In terms of Restroom Accessibility, the analysis must determine if there is at least one accessible restroom that meets essential criteria such as door width, installation of grab bars, and sufficient maneuvering space. These features are vital for ensuring that persons with disabilities can use restrooms independently and comfortably. The Signage and Information section emphasizes the importance of clear, readable signage that includes Braille and tactile formats, as well as appropriately positioned directional signs to aid navigation. Accessible information regarding available services for persons with disabilities and staff training to assist these individuals are also critical components in fostering an inclusive environment. In commercial buildings like hotels, based on the analysis made from the data obtained by observation (site checklist and interview), even if some buildings considers restrooms for disabilities, and most buildings dos not considered.

The evaluation extends to Transportation Facilities, where public transport accessibility is assessed through the availability of accessible platforms, ramps or lifts for boarding vehicles, and priority seating areas. Additionally, bus and train accessibility must consider whether announcements are made in both visual and auditory formats and if there are clear pathways to transport vehicles. The Parking Accessibility checklist examines designated accessible parking spaces located near building entrances, ensuring that signage is clear and visible. Maintenance and condition assessments focus on the upkeep of accessible features such as ramps, elevators, and restrooms, as well as the surrounding areas being free from debris or hazards. Finally, community feedback mechanisms are evaluated to understand user experiences better; this includes visible signs of user feedback opportunities like suggestion boxes and active community engagement in utilizing accessible features. Overall, this comprehensive checklist serves as a foundational tool for identifying gaps

in accessibility within public infrastructures in Addis Ababa, facilitating targeted interventions for improvement. Based on the analysis, there is a limitation of accessibility for disabled persons.

5.6. Summary of results and discussion

The analysis of the research findings regarding the accessibility of public physical infrastructures for persons with disabilities in Addis Ababa highlights significant challenges and areas for improvement. The study aimed to assess the effectiveness of current accessibility standards and codes, identify existing barriers, evaluate compliance levels, and develop actionable recommendations to enhance accessibility.

5.6.1. Summary of Results

Effectiveness of Accessibility Standards: The findings indicate that while there are established accessibility standards in place, their implementation is often inadequate. Many respondents expressed skepticism about whether these standards effectively promote inclusivity, with a mean score of 2.99 indicating a neutral stance on their effectiveness. This suggests that while some believe improvements have been made, a considerable number feel that the standards do not sufficiently address the needs of individuals with disabilities.

Barriers to Accessibility: The analysis revealed multiple barriers hindering access for persons with disabilities, including physical obstacles like inadequate ramps and narrow doorways, as well as societal attitudes that perpetuate stigma. The mean scores for physical barriers and societal attitudes were both around 2.81, reflecting concerns about their impact on accessibility. Economic constraints also emerged as a significant barrier, with a mean score of 3.56 indicating strong agreement that financial limitations restrict local governments' ability to implement necessary improvements.

Compliance Assessment: The assessment of compliance with accessibility standards showed a more positive outlook, with mean scores ranging from 3.76 to 3.91 across various statements regarding compliance and monitoring systems. This indicates that many respondents believe current public infrastructure projects largely adhere to established standards and that effective monitoring systems are in place. However, the presence of neutral responses suggests some uncertainty regarding the consistency of compliance.

Stakeholder Engagement: The importance of stakeholder engagement was underscored throughout the findings. High mean scores (above 3.80) for statements about involving persons with disabilities in planning processes and collaboration between government agencies and disability organizations indicate a strong belief in the value of inclusive practices. This highlights the need for ongoing community involvement to ensure that accessibility initiatives are effective.

5.6.2. Discussion

The results underscore the urgent need for comprehensive reforms in Addis Ababa's approach to accessibility in public infrastructures. While there is recognition of existing standards and some positive perceptions regarding compliance, significant gaps remain in their implementation and enforcement. The mixed perceptions about physical barriers and societal attitudes suggest that awareness campaigns and training for professionals involved in urban planning are essential for fostering a more inclusive environment.

Moreover, economic constraints must be addressed through increased funding and resource allocation to ensure that accessibility improvements are prioritized in public infrastructure projects. Collaboration among stakeholders including government agencies, disability advocacy groups, and community members will be crucial in developing actionable recommendations that effectively address identified barriers.

In conclusion, this study highlights the critical need for continued efforts to enhance accessibility in Addis Ababa's public physical infrastructures. By implementing the recommendations derived from this research, stakeholders can work towards creating an inclusive urban environment where individuals with disabilities can navigate public spaces independently and participate fully in all aspects of community life.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusions

Based on the analysis conducted regarding the accessibility of public physical infrastructures for persons with disabilities in Addis Ababa, the following conclusions have been drawn:

The assessment of the effectiveness of current accessibility standards and codes in Addis Ababa revealed a mixed perception among stakeholders. While some respondents acknowledged the existence of these standards and their intended purpose to promote inclusivity, the overall evaluation indicated that many believe these regulations are inadequately enforced and often overlooked in practice. The mean scores from the survey suggested that participants felt the standards do not fully address the needs of individuals with disabilities, highlighting significant gaps between policy and implementation. This underscores the necessity for a thorough review of existing standards to ensure they are not only relevant but also effectively integrated into public infrastructure projects.

The systematic identification and analysis of existing barriers in public physical infrastructures illustrated a range of challenges faced by persons with disabilities in Addis Ababa. The findings indicated that physical barriers, such as inadequate ramps, narrow doorways, and poorly designed transportation systems, significantly hinder access. Additionally, societal attitudes and economic constraints emerged as critical factors contributing to these barriers. The survey results showed a consensus among respondents regarding the urgent need to address these obstacles to enhance accessibility. This analysis serves as a foundational step toward understanding specific issues that must be tackled to create a more inclusive urban environment.

The assessment of compliance levels with established accessibility standards revealed that while many public infrastructure projects in Addis Ababa are perceived to comply with these regulations, there remains considerable uncertainty among stakeholders. The mean scores indicated a general agreement that monitoring systems are in place; however, concerns about their effectiveness were prevalent. Respondents expressed doubts regarding the consistency of compliance across various projects, suggesting that although some progress has been made, significant work is still required to ensure all public infrastructures meet established accessibility codes. This highlights the need for strengthened oversight mechanisms and regular evaluations to enforce compliance effectively.

Based on the findings from barrier identification and compliance evaluation, actionable recommendations were developed to enhance accessibility in public infrastructures in Addis Ababa. These recommendations emphasize the importance of involving persons with disabilities in the planning process, fostering collaboration between government agencies and disability organizations, and implementing comprehensive training programs for professionals involved in urban planning and construction. Additionally, enhancing community feedback mechanisms and increasing funding for accessibility initiatives were highlighted as critical steps toward improving compliance with established standards. By adopting these recommendations, stakeholders can work collaboratively to create more inclusive environments that empower individuals with disabilities.

6.2. Recommendations

Based on the analysis conducted regarding the accessibility of public physical infrastructures for persons with disabilities in Addis Ababa, the following recommendations have been made:

6.2.1. Recommendation on the study

Enhance Awareness and Training: It is crucial to implement ongoing training programs for architects, urban planners, and construction professionals focused on current accessibility standards and universal design principles. Increased awareness will ensure that all stakeholders understand their roles in promoting inclusivity within public infrastructure projects.

Strengthen Compliance Monitoring: Establishing robust monitoring systems is essential for assessing compliance with accessibility standards. Regular audits should be conducted on public infrastructure projects to ensure adherence to established codes, with clear consequences for non-compliance.
Foster Stakeholder Collaboration: Encouraging collaboration between government agencies, disability advocacy groups, and community members can lead to more effective accessibility initiatives. Joint efforts should focus on gathering input from persons with disabilities during the planning stages of infrastructure projects to ensure their needs are adequately addressed.
Increase Funding for Accessibility Initiatives: Allocating additional financial resources towards enhancing accessibility features in public infrastructures is vital. This funding should prioritize projects that directly address identified barriers and facilitate greater access for individuals with disabilities.
Promote Community Engagement: Developing effective community feedback mechanisms will allow individuals with disabilities to voice their experiences and challenges related to accessibility. This engagement is essential for identifying specific issues that need addressing and ensuring that solutions are informed by those directly affected.
By implementing these recommendations based on the research findings, stakeholders can significantly improve the accessibility of public physical infrastructures in Addis Ababa, fostering an inclusive environment where all individuals can participate fully in society.

6.2.2. Recommendations for Future Work

Longitudinal Studies on Accessibility Improvements: Future research should consider conducting longitudinal studies to assess the long-term effectiveness of implemented accessibility standards and codes. By tracking changes in accessibility over time, researchers can evaluate whether interventions lead to sustained improvements in public infrastructure and how these changes impact the daily lives of individuals with disabilities.
Expanded Stakeholder Engagement: It is crucial to expand stakeholder engagement efforts beyond just government agencies and disability organizations. Future studies should actively involve persons with disabilities in all phases of research, from design to implementation, ensuring that their voices are central in shaping accessibility initiatives. This participatory approach can lead to more effective and relevant solutions.
Comparative Studies with Other Cities: Conducting comparative studies between Addis Ababa and other cities that have successfully implemented accessibility measures can provide valuable insights. These studies could identify best practices and innovative strategies that could be adapted to the local context, enhancing the effectiveness of accessibility initiatives in Addis Ababa.
Focus on Technology Integration: Future research should explore the role of technology in improving accessibility. Investigating how digital tools and smart technologies can facilitate access to information and services for persons with disabilities will be essential in creating inclusive environments. This could include mobile applications for navigation or online platforms for reporting accessibility issues.
Policy Analysis and Advocacy: There is a need for comprehensive policy analysis to identify gaps in existing legislation related to accessibility in public infrastructures. Future work should focus on advocating for stronger enforcement mechanisms and more robust policies that prioritize accessibility in urban planning and development processes.
Community Awareness Programs: Future initiatives should also emphasize the importance of community awareness programs aimed at reducing stigma and promoting understanding of disability rights. Research could evaluate the effectiveness of these programs in changing societal attitudes toward individuals with disabilities, thereby fostering a more inclusive community environment.

7. REFERENCES

Ajayi, J., Aworemi, R., Wojuade, C., & Adebayo, T. (2020). Problems Affecting the Accessibility of Physically-Challenged Individuals to Intermediate Public Transport Services in Oyo State, Nigeria. *Logistics & Sustainable Transport*, *11*(1), 114–120. https://doi.org/10.2478/jlst-2020-0008

Akaateba, M. A., Adumpo, E. A., & Yakubu, I. (2023). Towards inclusive transport: The responsiveness of intercity bus services to the needs of people with disabilities in Tamale, Ghana. *Geo: Geography and Environment*, *10*(2), 1–17. https://doi.org/10.1002/geo2.131

Amin, A. S., Zuki, S. Z. M., & Akhir, N. M. (2019). Accessibility to facilities for persons with disabilities at public institutes of higher learning. *International Journal of Recent Technology and Engineering*, *8*(2 Special Issue 10), 21–37. https://doi.org/10.35940/ijrte.B1004.0982S1019

Amoah, C., Bamfo-Agyei, E., & Simpeh, F. (2023). Disable access compliance to university infrastructure: built environment students' perceptions. *Property Management*, *41*(5), 681–697. https://doi.org/10.1108/PM-01-2023-0004

Artieda, L., Enabled, W., Allan, M., Global, I., & Cruz, R. (2022). *ACCESS FOR ALL POLICIES FOR INCLUSIVE TOD SERIES Access and Persons with Disabilities in Urban Areas*.

Asiva Noor Rachmayani. (2015a). *Division for Social Policy Development (DSPD)*. 6.

Asiva Noor Rachmayani. (2015b). *Making Schools Accessible to Children with Disabilities*. 6.

Babinard, J., Wang, W., Bennett, C., & Mehndiratta, S. (2018). Accessibility of Urban Transport for People with Disabilities and Limited Mobility – Lessons from East Asia and the Pacific -. *Transport Notes*, *April*, 1–9. http://siteresources.worldbank.org/INTTRANSPORT/Resources/336291-1227561426235/5611053-1231943010251/TRN-44Accesssibility-of-Urban-Transport-for-People-with-Disabilities-final-2May2012.pdf

Bill. (2019). *The physically challenged (infrastructure for accessibility to public areas)*. *Lxvi*.

Bini, R., Collins, B., Hunter, J., Hunter, N., McVicar, J., Gordon, B., & Kingsley, M. (2024). Associations between e-bike travel distance and changes in health. *Journal of Transport and Health*, *39*(May), 101925. https://doi.org/10.1016/j.jth.2024.101925

Chen, G., Shu, C., & Xuan, C. (2022). A Case Study of Disability-Friendly Community Infrastructure Design. *Highlights in Science, Engineering and Technology*, *18*, 310–317. https://doi.org/10.54097/hset.v18i.2689

Damastuti, E., & Dhafiya, F. (2024). The Need for Accessibility of Public Infrastructure for People with Physical Disabilities in Pelambuan, Banjarmasin City. *Journal of ICSAR*, *8*(1), 44. https://doi.org/10.17977/um005v8i1p44

Danso, A. K., Atuahene, B. T., & Agyekum, K. (2019). Accessibility of Built Infrastructure Facilities for Persons With Disabilities. *ANNALS of Faculty Engineering Hunedoara-International Journal of Engineering Tome*, 185–192.

Disabilities, W. (2021). Cities as Spaces for Opportunities for All: Building Public Spaces for People with Disabilities, Children and Elders. *Cities as Spaces for Opportunities for All: Building Public Spaces for People with Disabilities, Children and Elders*. https://doi.org/10.18235/0003064

Document, A. M. (2019). *Disability Inclusion through Infrastructure and Cities Investments – Roadmap ICED Briefing : Disability Inclusion through Infrastructure and Cities Investments*. 1–23.

Duerstock, B. S., Mesa, J. C., Author, E., Aldoukhi, M., Angel, M., Bare, L., Blacher, D., Cawi, J., Chabanel, T., Ciccone, M., Clapper, K., El Jai, S., Ferrer, A., Figueroa, P., Fraticelli, K., Freudenthal, B., Glime, M., Gupta, M., Henley, I., … Zurawski, E. (2023). Access of Persons with Disabilities to Public Ground Transportation and Roadways. *Purdue University, West Lafayette, IN, USA*.

Dwitami, M., Zakiah, W. G., Putranto, G., & Himawanto, D. A. (2018). Identification of Problems in Accessibility of Public Facilities for Disabled Persons. *International Journal of Medical Science*, *5*(12),

5–7. https://doi.org/10.14445/23939117/ijms-v5i12p101

Eric Plantier, & Royon. (2019). *Policy Paper Accessiblity*. *November*.

Grisé, E., Boisjoly, G., Maguire, M., & El-Geneidy, A. (2019). Elevating access: Comparing accessibility to jobs by public transport for individuals with and without a physical disability. *Transportation Research Part A: Policy and Practice*, *125*(March 2018), 280–293. https://doi.org/10.1016/j.tra.2018.02.017

ICED. (2019). Delivering Disability Inclusive Infrastructure in Low Income Countries. *Department for International Development*, *June*, 1–39.

Lakew, D. (2020). Factors Affecting Accessibility of Public Transportation for People Living with Disabilities: Evidence from Bahir Dar City Administration, Ethiopia. *Journal of Business and Administrative Studies*, *12*(2), 38–86. https://www.ajol.info/index.php/jbas/article/view/269173%0Ahttps://www.ajol.info/index.php/jbas/article/download/269173/254074

Lawson Anna. (2017). *Accessibility of information, technologies and communication for persons with disabilities*. 56.

Lelan, J. K., Rono, Y. K., & Sang, J. K. (2019). Infrastrural Access Challenges and Their Effects on Enrolment of Physically Challenged Learners Integrated Into Public Primary Schools In Uasin. *International Journal of Research and Innovation in Social Science (IJRISS)*, *III*(V), 145–155. https://www.rsisinternational.org/journals/ijriss/Digital-Library/volume-3-issue-5/145-155.pdf

Maliszewska-Nienartowicz, J. (2020). Accessibility for Persons with Disabilities as an Important Element of Economic and Social Development: The European Union Case. *European Research Studies Journal*, *XXIII*(Special Issue 1), 1084–1099. https://doi.org/10.35808/ersj/1872

Ministry of Women, F. and C. D. (2016). *A Review of International Best Practice in Accessible Public Transportation for Persons with Disabilities*. 1–74.

Mulubiran, T. (2021). Livelihood assets and strategies of people with disabilities in urban areas of ethiopia. *Scandinavian Journal of Disability Research*, *23*(1), 63–73. https://doi.org/10.16993/sjdr.692

Mun, L. Y., Xin, W. K., & Rajendran, S. D. (2019). A study on the Barriers in Accessibility for the Disabled at Bus Terminal. *E3S Web of Conferences*, *136*, 0–5. https://doi.org/10.1051/e3sconf/201913604084

Muzemil, A. (2018). Campus Physical Environment Accessibility for Person with Disabilities in the Ethiopian Public Universities. *International Journal of Multicultural and Multireligious Understanding*, *5*(5), 286. https://doi.org/10.18415/ijmmu.v5i5.455

Mwirigi, J. G. (2017). *Factors Affecting Accessibility of Building Infrastructure by Physically Handicapped Persons: The case of Meru town Meru county Kenya*. 1–81.

Odame, P. K. (2017). *Road Transport Infrastructure and Mobility : Views of*.

Pal, J., Chandra, P., O'neill, T., Youngman, M., Jones, J., Song, J. H., Strayer, W., & Ferrari, L. (2016). An accessibility infrastructure for the global south. *ACM International Conference Proceeding Series*, *03-06-June-2016*. https://doi.org/10.1145/2909609.2909666

Soyingbe, A., Ogundairo, A. M., & Adenuga, O. A. (2017). *A Study of Facilities for Physically Disabled People in Public Buildings in Nigeria*.

Terashima, M., & Clark, K. (2021). Measuring Economic Benefits of Accessible Spaces To Achieve 'Meaningful Access' in the Built Environment: a Review of Recent Literature. *Journal of Accessibility and Design for All*, *11*(2), 195–231. https://doi.org/10.17411/jacces.v11i2.274

Tilahun, S. (2023). *Assessment of the Challenges of Persons with Physical Disabilities in the Work Places: the Case of Selected Ministries in Addis Ababa*. *June*, 1–71.

Venter -CSIR Transportek, C., Africa Bogopane -Makwetla, S. H., Africa Rickert -, S. TE, Maunder, D., Savill, T., & Stone -, J. (2019). *Improving accessibility for people with disabilities in urban areas Améliorer l'accésibilité du milieu urbain aux personnes handicapées*.

Venter, C., Savill, T., Rickert, T., Bogopane, H., Venkatesh, a, Camba, J., Mulikita, N., Khaula, C., Stone, J., & Maunder, D. (2002). Enhanced Accessibility for People with Disabilities Living in Urban Areas. *Knowledge Creation Diffusion Utilization*, 1–41. http://www.globalride-sf.org/images/DFID.pdf

Wagle, K., & Tiwari, S. R. (2020). Proceedings of 8 th IOE Graduate Conference Accessibility in Public Spaces for Persons with Disability-A Case of Kathmandu Metropolitan City. *Month*, *8914*(8), 2350–8906.

Wagner, M. P. C. M., Shirgaokar, M., Marshall, W., & Wagner, M. (2019). *TRAVEL EXPERIENCES OF PERSONS WITH DISABILITIES : INVESTIGATING NAVIGATION CHALLENGES POSED BY*.

Wegener, M. (2016). Accessibility and Development Impacts. *Transport and Urban Development*. https://doi.org/10.4324/9780203451328_chapter_11

William, M. M. (2017). *School Infrastructures And Inclusive Education: An Analysis Of The Case Of The Physically Impaired Students In Lycee Bilingue Etoug-Ebe, Yaounde*. 122. https://dicames.online/jspui/bitstream/20.500.12177/7237/1/ENSET_EBO_BC_21_0004.pdf

Winarsih, A. S., Kencono, D. S., & Iqbal, M. (2021). *Accessibility of Disabled-Friendly Public Services: A Case Study in Bantul District Police*. *518*(ICoSIHESS 2020), 111–116. https://doi.org/10.2991/assehr.k.210120.113

8. APPENDIX

Questionnaire

First of all, I would like to say thank you for your kind cooperation in completing the questionnaire sparing from your precious time. The study aims to assess Accessibility of Public Physical Infrastructures for Person's with Disability: The case of Addis Ababa. Achievement of this aim is expected to contribute to access of buildings for disabilities. Your response to the questionnaire is anonymous, and you will not be identified as a respondent without your consent.

Thank you,

Belay Sugebo

Contact me: **+251910715224**

General instruction: You are kindly requested to make a tick mark in the boxes provided. Your honest answers are appreciated.

Section 1: Demographic background of respondents

1. Gender

☐ Male

☐ Female

2. Age of respondents

☐ Below 25

☐ 25-30

☐ 30-35

☐ 35-45

☐ Above 45

3. Education of respondents

☐ Below diploma

☐ Diploma Certificate

☐ Bachelor degree

☐ Master's Degree and above

4. Experience of respondents

☐ Less than 5 years

☐ 5-10 years

☐ 10-15 years

☐ More than 15 years

5. Position of respondents

☐ Project manager

☐ Site engineer

☐ Resident engineer

☐ Urban planner

☐ Policy maker

Section Two: Objective questions

Where, Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

No.	Current practice	1	2	3	4	5
1	The current accessibility standards effectively address the needs of individuals with disabilities in public infrastructure projects in Addis Ababa					
2	Public infrastructure projects in Addis Ababa consistently comply with the established accessibility codes.					
3	The implementation of accessibility standards has significantly improved physical access to public buildings and transportation in Addis Ababa					
4	Awareness and training regarding accessibility codes among architects and urban planners in Addis Ababa are sufficient to ensure compliance in public projects					
5	Feedback from individuals with disabilities is adequately considered in the planning and execution of public infrastructure projects in Addis Ababa					

No.	Accessibility Standards and Codes	1	2	3	4	5
1	To what extent do you believe that the current accessibility standards and codes in Addis Ababa effectively promote inclusivity in public infrastructure projects?					

2	How strongly do you agree that architects and planners are adequately informed about the existing accessibility standards and codes?					
3	How strongly do you agree that architects and planners are adequately informed about the existing accessibility standards and codes?					
4	How effective do you believe the current regulatory frameworks are in addressing the needs of persons with disabilities in public infrastructure design?					
5	To what extent do you agree that universal design principles are adequately integrated into the planning and construction processes of public infrastructures in Addis Ababa?					

No.	Barriers to Accessibility	1	2	3	4	5
1	How strongly do you agree that physical barriers significantly hinder access for persons with disabilities in public infrastructures?					
2	To what extent do you believe societal attitudes and stigma towards disability create additional barriers to accessibility in public spaces?					
3	How effective do you think current funding levels are in supporting the implementation of necessary accessibility features in public infrastructures?					
4	To what degree do you agree that a lack of awareness among community members about disability rights contributes to barriers in accessing public facilities?					
5	How strongly do you agree that economic constraints limit the ability of local governments to implement accessibility improvements in public infrastructures?					

No.	Compliance Assessment	1	2	3	4	5
1	To what extent do you believe that current public infrastructure projects in Addis Ababa comply with established accessibility standards and codes?					
2	How strongly do you agree that there are effective monitoring systems in place to assess compliance with accessibility standards in public infrastructures?					
3	To what degree do you think training for professionals is sufficient to ensure compliance with accessibility standards?					
4	How effective do you believe community involvement is in influencing compliance with accessibility standards in public infrastructure projects?					
5	To what extent do you agree that successful case studies from other regions can inform better compliance practices in Addis Ababa?					

No.	Stakeholder Engagement and Recommendations	1	2	3	4	5
1	How strongly do you agree that involving persons with disabilities in the planning process leads to more effective accessibility solutions?					
2	To what extent do you believe that collaboration between government agencies and disability organizations enhances the effectiveness of accessibility initiatives?					
3	How effective do you think community feedback mechanisms are in identifying accessibility issues within public infrastructures?					

4	To what degree do you agree that actionable recommendations based on stakeholder input can significantly improve accessibility in public infrastructures?					
5	How strongly do you agree that ongoing awareness campaigns about disability rights are essential for improving stakeholder engagement in accessibility initiatives?					

Section Three: Interview and Checklist questions

A. Building/Facility Access

1. Entrance Accessibility

☐ Is there at least one accessible entrance?
☐ Are entrances clearly marked as accessible?
☐ Are there ramps available at entrances? (Check slope and surface)
☐ Are automatic doors present? (If applicable)

2. Exterior Pathways

☐ Are pathways leading to the entrance paved and even?
☐ Are there any obstacles blocking pathways?
☐ Are tactile paving surfaces available for the visually impaired?

3. Interior Access

☐ Are hall ways wide enough for wheelchair access?
☐ Are doors easy to open?
☐ Are there elevators available if the building has multiple floors?
☐ Are stairs equipped with handrails?

B. Restroom Accessibility

4. Accessible Restrooms

☐ Is there at least one accessible restroom available?
☐ Is the restroom door wide enough for wheelchair access?
☐ Are grab bars installed near toilets?
☐ Is there sufficient space for maneuvering within the restroom?

C. Signage and Information

5. Signage

☐ Is signage clear and easy to read?
☐ Are signs available in Braille and tactile formats?
☐ Are directional signs placed at appropriate heights for visibility?

6. Information Access

☐ Is there accessible information regarding services available for PWDs?
☐ Are staff trained to assist individuals with disabilities?

D. Transportation Facilities

7. Public Transport Accessibility

- ☐ Are transport stations equipped with accessible platforms?
- ☐ Are there ramps or lifts for boarding vehicles?
- ☐ Are priority seating areas marked and available?

8. Bus/Train Accessibility

- ☐ Are announcements made in both visual and auditory formats?
- ☐ Are there clear pathways to and from transport vehicles?

E. Parking Accessibility

9. Accessible Parking

- ☐ Are designated accessible parking spaces available?
- ☐ Are parking spaces located near building entrances?
- ☐ Are the signs for accessible parking clear and visible?

F. Maintenance and Condition

10. Maintenance

- ☐ Are accessible features (ramps, elevators, restrooms) well-maintained?
- ☐ Are there any visible repairs needed for accessibility features?
- ☐ Is the surrounding area?

G. Community Feedback

11. User Experience

- ☐ Are there any visible signs of user feedback?
- ☐ Are community members actively using the accessible features provided?

