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Uneven Path in Karachi: Infrastructure Barriers and Vision Impairment

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Abstract

Vision impairment enormously influences people's daily lives. The physical infrastructural limitations and lack of accessibility significantly impact the daily lives of people with vision impairments (VI). Therefore, this essential, qualitative urban sociological research case study was conducted. This study aimed to explain the uneven path due to infrastructure barriers and vision impairment. The researchers considered Social-Ecological Systems (SES) theory as a framework to gain a comprehensive understanding of how the interplay between social and ecological factors contributes to some unequal opportunities, e.g., social opportunities, economic opportunities, educational opportunities, etc. for people with vision impairments (VI) in Karachi, Pakistan. Researchers used the purposive sampling method. The researchers collected the primary data by conducting semi-structured, in-depth interviews with eight people with vision impairments (VI) in Urdu. Then, they transcribed in English, analyzed, organized, and properly stored. The data was analyzed using a thematic analysis method. This study reveals the impacts of current physical infrastructure, inaccessibility, and the cycle of exclusion for people with vision impairments (VI). This study also shows some positive initiatives and examples of accessible infrastructure in Karachi, Pakistan. It is concluded that there is a need to solve infrastructure barriers and vision impairment to create an even path in Karachi, Pakistan.

Keywords: infrastructure barriers, lack of accessibility, vision impairment, daily lives, urban sociology

Introduction

Vision impairment influences people's daily lives (Rahmah, 2020). The physical infrastructural limitations and lack of accessibility in Karachi significantly impact the daily lives of people with vision impairment. *"A person with vision impairment is someone whose sense of vision does not function as channels of information in their activities as normal people"* (Rahmah, 2020). Moreover, in Pakistan, statistics have shown that, by 2025, the vision impairment burden will be increased (Hassan et al., 2019). Participating in community life is a fundamental human right (Kunnath et al., 2023). Although people with visual impairments (VI) also have the same rights as others, e.g., the right to get an education, they also have the right to use the infrastructure and other public services (Oktaferly et al., 2023).

However, the majority of people with vision impairments are deprived of these fundamental human rights. They cannot access the infrastructure, such as road access and easy access to open facilities (Oktaferly et al., 2023). The physical limitations of people with vision impairments (VI) hamper any activities usually carried out by others (Rahmah, 2020). Most people with visual impairments (VI) experience restrictions in their independence and mobility (Ståhl, 2023). They also experience restrictions in educational

achievement (Welp et al., 2016). They also experience an increased risk of falls and injuries (Ståhl, 2023).

Moreover, they also have an increased risk of fractures, poor mental health, cognitive deficits, and social isolation (Welp et al., 2016). Social exclusion of people with visual impairments (VI) is often a result of infrastructure barriers (Park & Chowdhury, 2018). For many reasons, it is tough for people with visual impairments (VI) to navigate around towns and cities (Cushley et al., 2022). Most of the time, the infrastructure design makes it less accessible for people with disabilities (Oktaferly et al., 2023), including people with vision impairment. According to Cushley et al. (2022), some of the most common issues are related to the environment of the street, including:

- Parked car
- Street cafe
- Bollards

There is a need to improve this environment for all. It could be enhanced through a collaborative approach (Cushley et al., 2022). Especially accessibility to public transport is essential (Park & Chowdhury, 2018). Even though public transport options have increased in Karachi after the People's Bus Service launch, differently-abled individuals are still having difficulty accessing such options (Abro, 2023). People with vision impairments (VI) face many limitations in independent travel (Park & Chowdhury, 2018). "***Infrastructural Limitations*** *specifically refer to physical aspects of the environment that create barriers*." Examples include:

- Buildings without ramps or elevators
- Sidewalks with uneven surfaces or lacking tactile paving
- Public transportation lacking features like audio announcements or designated areas for wheelchairs

Infrastructural limitations are a barrier that contributes to a lack of accessibility. Lack of accessibility is the broader concept encompassing all the obstacles that make things difficult or impossible for people with disabilities. "***Lack of Accessibility*** *refers to a broader issue where something is not usable or achievable by people with disabilities*." It can encompass physical barriers (infrastructure limitations) but also intangible ones like:

- Lack of clear instructions or signage in alternative formats (braille, audio)
- Absence of website features that work with screen readers
- Unfamiliarity or lack of training for staff on how to assist people with disabilities

Worldwide, more than 2.2 billion people have some kind of vision impairment issue. Some of them have near vision impairment. Some of them have distant vision impairment. Distance vision impairment is more prevalent in low-income and middle-

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Journal of Law and Social Sciences
University of Turbat

income regions (World Health Organization, 2023). According to Hassan et al. (2019), it was found in 2017 that, out of 207.7 million people, 1.12 million people were blind, 1.09 million people had severe vision impairment, and 6.79 million people had moderate vision impairment in Pakistan. However, several travel aids (ETAs) were proposed by some researchers to guide people with vision impairments (VI) safely through unfamiliar environments. However, those aids were not efficient enough to be in use (Ståhl, 2023).

Several past studies about vision impairment issues were conducted in different cities, for example, Jember City of Indonesia (Okraferly et al., 2023); Popayan City of, Colombia (Manquillo-Manquillo & Pseginnaki, 2020); Seoul in South Korea, San Jose the city of California, Mumbai the city of India, Kigali the city of Rwanda, Freetown the city of Sierra Leone, and Blantyre the city of Malawi (Pal et al., 2016). Similar research in other countries is essential (Cushley et al., 2022). Some studies examined how accessibility is fulfilled, especially in public facilities provided to persons with disabilities (Oktaferly et al., 2023).

On the one hand, a study was conducted to discover the experience of people with vision impairment with haptic tools (Manquillo-Manquillo & Psegiannaki, 2020). On the other hand, a study was conducted to find out the opinions of town planners, architects, ophthalmic professionals, and charities on navigating the built environment with a visual impairment (Cushley et al., 2022). Therefore, there is a need to analyze the influence of existing infrastructure barriers on people with visual impairment to bring positive changes (Popović, 2013). Therefore, this research is conducted to explain the uneven path in Karachi, Pakistan, due to infrastructure barriers and vision impairment.

Objective

- To find out the effects of physical infrastructural limitations and lack of accessibility

Research questions

- How do the physical infrastructural limitations impact daily life in Karachi?
- How does the lack of accessibility impact daily life in Karachi?

Literature Review

The researchers have reviewed past studies in which the primary focus was to examine the challenges faced by people with vision impairments (VI) in urban environments and to identify strategies for improving the inclusion and quality of life of people with vision impairments (VI). Those studies aimed to highlight the systematic barriers that prevent people with vision impairments (VI) from participating in urban life (Franco et al., 2023; Oktaferly et al., 2023; Ståhl, 2023; Cushley et al., 2022; Manquillo-

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Journal of Law and Social Sciences
University of Turbat

Manquillo & Psegiannaki, 2020; Rahmah, 2020; Park & Chowdhury, 2018; Welp et al., 2016; Pal et al., 2016; Popović, 2013).

Previous studies have found several barriers and challenges in urban environments for people with vision impairments (VI), for example, lack of accessibility, insufficient information (Franco et al., 2023), and physical obstacles (Stahl, 2023). Cities are designed with cars in mind. However, it makes navigation difficult for people with disabilities in cities (Franco et al., 2023). Moreover, there is a lack of information on even Google Maps. It hinders independent mobility for people with vision impairments (VI) (Franco et al., 2023). These challenges are increased due to trip hazards, uneven surfaces, and poorly marked areas (Stahl, 2023).

Previous studies also highlighted the social stigma and marginalization of people with vision impairment, for example, negative stereotypes and limited opportunities (Oktaferly et al., 2023). People with vision impairment experience social exclusion because they are considered less capable than sighted individuals. Such marginalization is enough to reduce their access to education, employment, and social interactions (Oktaferly et al., 2023). Previous studies also mentioned the impacts on the mental health of people with vision impairments (VI), for example, low self-esteem, fear, and insecurity.

The challenges faced by people with vision impairments (VI) negatively impact the self-worth and confidence of people with vision impairments (VI). Moreover, uncertainty about their abilities and environment leads them to anxiety and fear (Rahmah, 2020). Previous studies also suggested some technological solutions and their potential; for example, wearable devices, augmented reality, and digital navigation tools would help improve the mobility and independence of people with vision impairments (VI) (Stahl, 2023). However, these technological solutions might face barriers in terms of cost, accessibility, and user acceptance (Park & Chowdhury, 2018).

Previous studies have also discussed policies and infrastructure, such as the need for inclusive design, awareness, and education. Urban planning and infrastructure should prioritize accessibility for people with vision impairments (VI). Moreover, stakeholders should know the benefits of such inclusive design (Cushley et al., 2022). Previous studies have also discussed some intersectionality of disability; for example, other disabilities, socioeconomic factors, and cultural background can increase challenges for people with vision impairments (VI).

Moreover, Welp et al. (2016) have focused on economic impacts and discussed overall satisfaction with life. Furthermore, Pal et al. (2016) discussed social components and the gap between policy and infrastructure. Additionally, Popović (2013) has focused on architectural disability as a fundamental factor in excluding people with vision impairments (VI) from society. The researchers have found some limitations in past

studies. Most of the studies included small sample sizes. A small sample size could limit the generalizability.

There is a lack of comparative studies. Most of the past studies focused on a specific city. Cultural factors and societal attitudes towards people with vision impairments (VI) may vary across cities. The studies about technological advancement may be outdated now as new technologies emerge. Different methodologies were employed in different past studies. However, most of the studies were qualitative (Park & Chowdhury, 2018; Rahmah, 2020; Manquillo-Manquillo & Psegiannaki, 2020; Cushley et al., 2022; Franco et al., 2023; Oktaferly et al., 2023).

After reviewing past studies, the researchers have recommended addressing these limitations in future research. The researchers have recommended using mixed methods. The researchers have recommended doing longitudinal studies to track changes over time. The researchers have recommended developing evidence-based policy recommendations. Focus on emerging technologies and their potential impacts. The researchers have recommended conducting studies with more extensive and more diverse samples. The researchers have recommended considering cross-cultural perspectives. The researchers have recommended examining a more comprehensive range of geographical areas.

Research Methodology

It is basic research. It is urban sociological research. This research used a qualitative approach to explain the uneven path due to infrastructure barriers and vision impairment. The researchers considered Social-Ecological Systems (SES) theory as a framework to gain a comprehensive understanding of how the interplay between social and ecological factors contributes to some unequal opportunities, for example, social, economic, and educational opportunities, etc., for people with vision impairments (VI) in Karachi, Pakistan.

Reasoning: The reasoning of this study was inductive reasoning.

Philosophy: The philosophy of the study was interpretivism.

Time horizon: The time horizon of the study was cross-sectional.

Universe: The universe of the study was Karachi, Pakistan.

Population: The population of this research was people with vision impairment (VI).

Sample Size: The sample size was eight people with vision impairment in Urdu and **the**n transcribed in English, analyzed, organized, and properly stored.

Sampling Method: The purposive sampling method was used in this study.

ISSN (Print): 2959-9970 ISSN (Online): 2959-877X
Journal of Law and Social Sciences
University of Turbat

Data Collection Method: The researchers considered the in-depth interview the data collection method.

Data Collection Tool: The researchers used the semi-structured interview guide as a data collection tool.

Data Analysis: The data was analyzed using a thematic analysis method.

Result and Discussions

This study reveals how the physical infrastructural limitations and the lack of accessibility impact the daily lives of people with vision impairments (VI) in Karachi, Pakistan. All of the respondents were from Generation Z, and all of them were Muslims. Four of them were male. The remaining of them were female. Three of them had master's degrees. Two of them had bachelor's degrees. Three of them had an intermediate/A level degree. The respondents were of different ethnicities. Four of them were Urdu-speaking. Two of them were Sindhi. One of them was Punjabi. One of them was Baloch.

Table 1: *Details of the respondents*

Respondent no.	Gender	Education	Ethnicity
Respondent 1	Male	Bachelor's degree	Sindhi
Respondent 2	Male	Intermediate/A-level degree	Urdu speaking
Respondent 3	Male	Master's degree	Sindhi
Respondent 4	Female	Bachelor's degree	Punjabi
Respondent 5	Female	Intermediate/A-level degree	Urdu speaking
Respondent 6	Female	Intermediate/A-level degree	Urdu speaking
Respondent 7	Female	Master's degree	Baloch
Respondent 8	Male	Master's degree	Urdu speaking

Themes: The researchers analyzed the data and developed three themes, which are as follows:

- Impacts of current physical infrastructure
- Inaccessibility and cycle of exclusion
- Existence of accessible infrastructure

ISSN (Print): 2959-9970 ISSN (Online): 2959-877X

Journal of Law and Social Sciences
University of Turbat

Impacts of Current Physical Infrastructure: The respondents described their experiences navigating the physical infrastructure. They shared some specific challenges they encountered due to the current infrastructure. These challenges impacted their ability to access essential services. These challenges limit their ability to **navigate safely, access essential services, live independently, and pursue education.** Responses regarding the impacts of current physical infrastructure are shown in Table 2.

Table 2: *Responses regarding impacts of current physical infrastructure*

Respondent no.	Responses
Respondent 1	*"Roads are not friendly for people with vision impairments (VI). There is unplanned urbanization and huge traffic that disturbs special people like me. Most of the time, I collide with bikes and buildings. Sometimes, I reach university or employment place late due to these hurdles on my way."*
Respondent 2	*"It is a helpless system. For us, there is no special public transportation and no public footpath available, no public based information, and no public guidance and support from the government, public sector, private sector, and citizens."*
Respondent 3	*"Being a person with vision impairments (VI), I had faced difficulties due to infrastructure. I would also like to suggest that the infrastructure be rebuilt. There should be separate roads for the disabled, as they can easily roam."*
Respondent 4	*"It is quite poor. It impacted my educational achievements. I have limited ability to learn eventually."*
Respondent 5	*"Navigating physical infrastructure is difficult. It involves understanding signage, spatial orientation, and potentially interacting with tactile elements like stairs, ramps, and doors."*
Respondent 6	*"The roads in Karachi are bustling. Plus, there is occasional road maintenance. Due to traffic, it can take much time to reach places, especially hospitals, etc."*
Respondent 7	*"Yeah, so many challenges. No proper road manufacture. There are so many unnecessary barriers. People are scared of roads. We know how we work individually and how we go to departments."*
Respondent 8	*"There are no zebra crossings and no proper transportation for us. There are open main holes and puddles everywhere. I faced a lot of difficulties in my daily life due to poor physical infrastructure. I fall into puddles, and no lightning is due, which makes moving impossible. It wastes time, which eventually leads to me being late in class and missing half of my lecture."*

ISSN (Print): 2959-9970 ISSN (Online): 2959-877X

Journal of Law and Social Sciences
University of Turbat

Inaccessibility and Cycle of Exclusion: The respondents shared their opinions about how the lack of accessibility in public spaces and buildings affects their daily lives. Accessibility barriers limited their participation in the economy. It created physical obstacles and employment challenges. It reduced independence. They shared some examples of how this lack of accessibility has hindered their ability to pursue economic opportunities. According to them, by improving accessibility and shifting societal attitudes, policies, and support, the government could empower people with vision impairments (VI). Responses regarding inaccessibility and the cycle of exclusion are shown in Table 3.

Table 3: *Responses regarding Inaccessibility and Cycle of Exclusion*

Respondent no.	**Responses**
Respondent 1	*"People with vision impairments (VI) struggle to reach these places and find offices. Most of the time in these places, employment opportunities for people with vision impairments (VI) are inadequate."*
Respondent 2	*"No work on the rules of citizens' rights from the government. I have examples of a university examination process system. The exam candidate cannot take help from any blood relation or other relatives. First, people should acknowledge that people with vision impairments (VI) are as talented and hardworking as they are, and they can manage things and do even better than them."*
Respondent 3	*"As far as my opinion is concerned, lack of accessibility in the public sectors means we are striving to survive. Poverty makes life more hindered for us, as well as instead of having facilities that the government provides, people have misconceptions regarding our personalities and that we lack the ability and confidence. Proper guild lines need to be introduced for special people in these places. Separate pathways and vehicles should be provided."*
Respondent 4	*"Increase in risk of injuries. Due to infrastructure limitations, we cannot move properly without others' assistance as we are dependent on others."*
Respondent 5	*"The lack of accessibility in public spaces and buildings in Karachi hampers economic opportunities for us. It creates barriers to employment, education, and social participation. Due to this, I cannot participate in the activity I want to do. So that is a difficult thing for me."*
Respondent 6	*"I have an eyesight problem, so when I do not have my glasses on, it is tough to access the classroom, library, or participate in extracurricular activities."*

ISSN (Print): 2959-9970 ISSN (Online): 2959-877X

Journal of Law and Social Sciences
University of Turbat

Respondent 7	*"In Karachi, there is no facility for the people with vision impairments (VI). Some companies have accessibility, but many do not. They think that he cannot do any work."*
Respondent 8	*"There are no such opportunities for people like us. One of my blind teachers died crossing the road while going for his job interview. There are no accessible paths for us. I am hopeful that small businesses and young businessmen can provide some space with the help of technology!"*

Existence of Accessible Infrastructure: Some talked about some positive initiatives and examples of accessible infrastructure in Karachi, Pakistan, such as the RedBus Project, some accessible institutes, and the Dream World Hotel. Responses regarding the existence of accessible infrastructure are shown in Table 4.

Table 4: *Existence of accessible infrastructure*

Respondent no.	**Responses**
Respondent 1	*"No."*
Respondent 2	*"I have not found any yet."*
Respondent 3	*"I have never experienced it."*
Respondent 4	*"The New Project transportation of RedBus has no experience."*
Respondent 5	*"No accessible travel service inside Karachi for people with visual impairment."*
Respondent 6	*"Yeah, I found a lot, and after seeing them, I dare to face all the challenges."*
Respondent 7	*"In Karachi institute, they have all accessibility needs they care for disabled people."*
Respondent 8	*"Karachi is a big city, and the dream world hotel in Karachi is fully accessible."*

In this study, the researchers have discovered how the physical infrastructural barriers and lack of accessibility impact the daily lives of people with vision impairments (VI) in Karachi, Pakistan. It is found that there is a lack of accessible public facilities. This finding is consistent with a study conducted in Jember, Indonesia, which highlighted the inadequacy of public facilities for people with vision impairments (VI) (Oktaferly et al., 2023). It is found that there are some architectural barriers. This finding is consistent with a previous study that emphasized the impact of architectural barriers on the mobility of people with vision impairments (VI) (Popović, 2013).

ISSN (Print): 2959-9970 ISSN (Online): 2959-877X

Journal of Law and Social Sciences
University of Turbat

Moreover, a previous study identified poor information presentation and obstructions as significant barriers for people with vision impairments (VI) (Park & Chowdhury, 2018). No pathways or information is available, even on Google Maps, to help people with vision impairments (VI). It is found that people with vision impairments (VI) experience a negative attitude and lack of services. This finding is consistent with a previous study highlighting the prevalence of negative attitudes and limited services in low and middle-income countries. It affects economic opportunities for people with vision impairments (VI) (Morwane et al., 2021).

The respondents suggested some solutions in this study. Some of them suggested innovative technologies. Similarly, some studies have discussed the solutions to vision impairment. A study discussed the potential of sensor-equipped smartphones. Such smartphones can improve interaction with the physical environment, social inclusion, and the quality of life of people with vision impairments (VI) (Franco et al., 2023). However, a study highlighted the drawbacks of using haptic tools to aid people with vision impairments (VI) locate designated areas (Manquillo-Manquillo & Psegiannaki, 2020).

A neurotechnology company named "Neuralink" was founded by Elon Musk in 2016. There is hope that Neuralink's "Blindsight" product will be helpful for people with vision impairments (VI) in the future. This product had some initial success on monkeys. It helps restore vision (Waisberg et al., 2024). However, only technological solutions are not enough. There is a need to bring about a change in social infrastructure, too. Similarly, a study highlighted the role of social infrastructure in facilitating meaningful accessibility. It also emphasized the importance of examining the gap between technological capabilities and real-world possibilities for people with vision impairments (VI) (Pal et al., 2016).

Conclusion and Recommendations:

This study was conducted to determine the impacts of physical infrastructural limitations and lack of accessibility on the daily lives of people with vision impairment (VI). This study reveals the impacts of current physical infrastructure, inaccessibility, and the cycle of exclusion for people with vision impairments (VI). This study also reveals some positive initiatives and examples of accessible infrastructure in Karachi, Pakistan. It is concluded that there is a need to solve infrastructure barriers and vision impairment to create an even path in Karachi, Pakistan. The government should create a vision to empower people with vision impairments (VI) and pave the way for their independent living in a developing society. The government should apply a universal design that facilitates the mobility of people with vision impairments (VI) and contributes to their independence, improving their quality of life (Popović, 2013). Artificial intelligence technologies should be used to enhance construction risk management and safety management (Usama et al., 2024).

People with vision impairments (VI) should be included in urban infrastructure developments and policy-making. Moreover, suppose Neuralink's technology allows people with vision impairments (VI) to mobilize or restore vision for blind individuals independently. In that case, efforts must ensure that people with vision impairments (VI) in underserved and marginalized communities can access this technology. Notably, a significant proportion of the world's vision impairment is in developing countries (Waisberg et al., 2024). Therefore, it will be unaffordable for them due to the low education and high unemployment ratio. In developing countries, traditional gender stereotypes also affect education and employment (Hashmi et al., 2024). Therefore, further research is recommended to analyze unequal economic opportunities for people with vision impairments (VI) of both genders.

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ISSN (Print): 2959-9970 ISSN (Online): 2959-877X

Journal of Law and Social Sciences
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