

Original Article

Improving Accessibility in Public Spaces for Individuals with Hearing Loss (A Field-Based Study)

Abhinav Raj

Shiv Nadar School, Noida, India.

Corresponding Author : abhinav10.raj@gmail.com

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Abstract - Accessibility to public spaces is a fundamental aspect of social inclusion and equality. Individuals with hearing disability are significantly impacted when it comes to public spaces, and common issues include a lack of visual information systems, ineffective emergency communication, and insufficient training of public service personnel in sign language, which can impact their level of involvement in societal, financial, and cultural pursuits. In the present study, a sample of 31 respondents with hearing disability was selected via purposive sampling to complete a Google Form Survey. Findings from the research reveal no notable disparity across genders in accessibility perception. Among people reporting different levels of hearing loss, there is a significant deviation in their accessibility perception. Even across ages, there was no significant variation in the perception of accessibility. These findings imply that within the respondents, the level of hearing loss was a contributing factor to their different perceptions. However, the same cannot be said for other variables.

Keywords - Hearing Disability, Accessibility, Public Spaces, Hearing Loss, Perception.

1. Introduction

Accessibility to public spaces is a fundamental aspect of social inclusion and equality. For deaf or hard-of-hearing individuals, the design and accessibility of these spaces can significantly impact their ability to participate fully in social, economic, and cultural activities. It is estimated, according to The World Health Organization, that 5% of people, around 466 million people (WHO, 2021), have hearing loss as a disability, highlighting the importance of addressing the unique challenges they face. Despite various legal frameworks and technological advancements aimed at improving accessibility, many public spaces remain inadequately equipped to accommodate the needs of the deaf community. This inadequacy manifests in numerous forms, including lacking visual information systems, ineffective emergency communication, and insufficient training of public service personnel in sign language. While various studies have addressed accessibility challenges faced by individuals with physical disabilities, there is limited research specifically focusing on hearing disabilities in public spaces. This study aims to bridge that gap by exploring the unique barriers faced by individuals with hearing disabilities and proposing solutions that can be implemented in public space design.

This study utilized a survey methodology, collecting data from 31 respondents with varying degrees of hearing disability. Statistical analysis methods, such as t-test and

ANOVA, were employed to identify significant differences in accessibility perception.

Existing literature on deaf accessibility underscores several key issues and potential solutions. Studies have explored the effectiveness of visual and tactile alerts, the integration of assistive technologies, and the role of inclusive design principles in creating more accessible environments (Paula Andrea Rodríguez-Correa et al., 2023). Additionally, a growing body of research advocates for policy changes and increased public awareness to foster more inclusive communities (Fisher & Purcal, 2017).

This paper aims to examine the current state of accessibility for people who are deaf or hard of hearing in public spaces, identify persistable barriers, and propose evidence-based strategies to enhance inclusivity. By synthesizing findings from recent studies and analyzing case examples of successful accessibility initiatives, this research seeks to contribute to the ongoing discourse on disability rights and urban planning.

Understanding the needs and preferences of the deaf population is crucial for developing effective interventions. This research will draw on qualitative and quantitative data, including surveys and interviews with deaf individuals, to gain insights into their experiences and recommendations. Through this comprehensive approach, the paper aims to provide



actionable recommendations for policymakers, architects, and urban planners to create more inviting public spaces that cater to the various needs of all individuals.

1.1. General Problems in Accessing Public Spaces

Accessibility to public spaces is crucial to ensuring that all members of society can participate fully in community life. These spaces, including parks, shopping centers, and government buildings, are often designed with features intended to accommodate a wide range of needs. However, despite these efforts, many individuals still encounter significant barriers that limit their ability to access and enjoy these spaces. Common issues such as inadequate signage, poorly maintained infrastructure, and insufficient information about available accessibility features underscore the need for ongoing improvements.

For individuals with disabilities, these challenges are often more severe. Those with mobility impairments may face physical barriers like stairs without ramps or narrow doorways. People with visual impairments might struggle without tactile guides or audible signals. Among these groups, deaf or hard-of-hearing people face unique and often overlooked obstacles (Smith & Jones, 2020).

1.2. Focus on Hearing Disability

Deafness, whether partial or complete, poses significant challenges in navigating public spaces. Unlike more visible disabilities, the needs of deaf individuals can be less apparent, leading to a lack of necessary accommodations. This can result in feelings of isolation and exclusion, as communication barriers and the absence of visual or textual aids hinder their ability to engage with their environment effectively (Wilson et al., 2021).

This research paper aims to investigate the specific encounters of deaf individuals in public spaces, examining the barriers they encounter and identifying potential solutions to enhance accessibility. By reviewing studies, this paper aims to offer a thorough knowledge of the challenges experienced by the deaf community and propose actionable recommendations for creating more inclusive public environments.

Understanding these barriers and proposing actionable solutions is essential to contribute to the ongoing efforts to make public spaces accessible and inclusive for everyone, regardless of their hearing ability (Chen et al., 2024).

1.3. Understanding Disability

Disability, as the World Health Organization (WHO) says, includes a broad spectrum of impairments encompassing physical, mental, sensory, and intellectual limitations that restrict an individual's capacity to participate fully and equitably in society alongside others. As reported by the World Health Organization (WHO) in their 2021 assessments,

an estimated 1 billion individuals worldwide, accounting for approximately 15% of the global population, face some form of disability. In India, estimates suggest that about 2.68% of the population is disabled, which translates to approximately 27 million people based on the population size of around 1.3 billion. This data may vary depending on the source and methodology used for counting disabilities. Disabilities can be congenital or acquired and vary in severity. They are often categorized into several types, including:

1. **Physical Disabilities:** Impairments that limit physical functioning, mobility, dexterity, or stamina. Examples include paralysis, amputations, and muscular dystrophy.
2. **Sensory Disabilities:** Impairments that affect one or more senses. This includes sensory impairments encompassing visual deficits (blindness and low vision) and auditory deficits (deafness and hearing loss).
3. **Intellectual and Developmental Disabilities:** Cognitive impairments that affect learning, problem-solving, and adaptive behavior. Examples include Down syndrome and autism spectrum disorders.
4. **Mental Health Disabilities:** Mental health issues, such as depression, anxiety disorders, and schizophrenia, can significantly impact an individual's cognitive abilities, emotional state, mood, and overall behavior.

1.4. Disability in Public Spaces

Public spaces are designed to be accessible to all members of society, yet many still fall short of accommodating individuals with disabilities. For example, tactile paving helps visually impaired individuals navigate safely, while ramps and elevators assist those with mobility impairments. However, people with hearing disabilities often find public spaces inadequately equipped to meet their needs.

1.5. Hearing Disability

A partial or complete inability to hear sounds is known as hearing disability, hearing loss, or hearing impairment. As of 2021, the World Health Organization (WHO) estimates that out of approximately 1.5 billion people worldwide suffering from hearing loss, 430 million experience severe and disabling hearing loss. In India, recent estimates suggest that about 63 million individuals are estimated to possess some form of hearing loss, including varying degrees of severity. It can vary widely in severity and can affect one or both ears. The condition can impact social relationships, communication, and general well-being. Hearing Disability Types:

- **Conductive Hearing Loss:** When sound cannot effectively reach the eardrum and the tiny middle ear bones through the outer ear canal, it is Conductive Hearing Loss. Ear infections, middle ear fluid, earwax accumulation, or punctured eardrums are some possible causes.
- **Sensorineural Hearing Loss:** Such Hearing Loss is due to damage to the inner ear (cochlea) or the auditory nerve

pathways to the brain. It can be brought on by aging, loud noise exposure, certain drugs, illnesses, or hereditary problems, and it is frequently irreversible.

- **Mixed Hearing Loss:** This happens when a person simultaneously has sensorineural and conductive hearing loss.
- **Auditory Processing Disorder:** In this condition, the auditory system works, but the brain has difficulty processing the sounds.

It can also be categorized based on the degree of hearing loss:

- **Mild Hearing Loss:** Inability to hear quiet noises or comprehend words in loud settings.
- **Moderate Hearing Loss:** Increased difficulty hearing spoken words, particularly in loud environments.
- **Severe Hearing Loss:** Significant difficulty in hearing and understanding speech, often requiring amplification devices.
- **Profound Hearing Loss:** Very little to no hearing ability, typically relying on visual communication methods like sign language.

1.6. Social Issues and Challenges

In India, individuals with hearing disabilities face numerous social challenges. Many families lack the resources to provide essential treatments or hearing aids, leading to neglect or abandonment. In educational settings, students with hearing disabilities often experience social exclusion due to insufficient support systems, such as the lack of visual aids or smart classrooms.

1.7. Educational Barriers

The educational environment in India poses significant challenges for students with hearing disabilities. Without access to smart classrooms or visual aids, these students often cannot fully engage with the curriculum. Additionally, there is a shortage of educators trained to use sign language or other communication methods, which further marginalizes these students and affects their academic performance.

1.8. Employment Challenges

Employment opportunities for individuals with hearing disabilities are limited by discrimination and inadequate accommodations. While some organizations promote diverse hires, implementation is inconsistent, and workplace biases persist. Individuals with hearing disabilities face significant barriers in securing and retaining employment, underscoring the need for more inclusive policies and practices.

1.9. Public Spaces and Assistance

Public spaces like transport hubs and shopping malls often lack tailored assistance for people with hearing disabilities. Providing specific guides, assistance counters, and visual boards can significantly improve their experience

and independence. Implementing these changes requires concerted efforts from policymakers, urban planners, and designers to create inclusive environments.

1.10. Government and Policy Recommendations

Raising awareness about hearing disabilities is essential for fostering an inclusive society. Government initiatives and public policies can be crucial in supporting individuals with hearing disabilities. Key recommendations include:

- **Enhanced Public Awareness Campaigns:** Increase public understanding and awareness of hearing disabilities through educational campaigns.
- **Inclusive Infrastructure:** Develop public spaces equipped with visual aids, clear signage, and dedicated assistance counters.
- **Support in Education:** Implement smart classrooms and train teachers to use visual aids and sign language.
- **Employment Policies:** Strengthen policies to ensure non-discriminatory hiring practices and workplace accommodations.
- **Public Transport:** Equip public transport systems with visual announcements and assistance services to better serve individuals with hearing disabilities.

2. Problem Statement

The lack of representation and advocacy for deaf rights in India contributes to a systemic oversight, where the needs and voices of deaf individuals are frequently ignored in policy-making and urban planning processes. This research aims to explore the specific challenges faced by deaf individuals in accessing public spaces in India. By employing a quantitative approach, this study seeks to assess the accessibility of public spaces in selected urban areas. By highlighting the experiences of deaf people and identifying the barriers they encounter, this research aims to provide actionable recommendations for policymakers, urban planners, and community organizations.

3. Methodology

3.1. Aim of the Study

To investigate and analyze the accessibility issues faced by individuals with hearing disabilities in public spaces

3.2. Objectives of the Study

- To identify the specific barriers and challenges encountered by individuals with hearing disabilities in navigating public spaces.
- To explore gender differences regarding accessibility perception among individuals with hearing disability.
- To identify the accessibility perception among people with different levels of hearing loss.
- To explore age differences regarding accessibility perception among individuals with hearing disability.

3.3. Participant and Sampling Technique

In the present study, 31 respondents with hearing disability belonging to the age range 'Below 18' to '50 and above' were chosen via purposive sampling technique. The sample consisted of 17 Male and 14 Female respondents. Out of the 31 respondents, 32.3% of respondents have Moderately Severe Hearing Loss, 29% have Mild Hearing Loss, and 25.8% have Moderate Hearing Loss.

3.4. Instrumentation

A Survey was designed to assess the Accessibility Perception of people with hearing disability in different public spaces such as railway stations, metros, airports, shopping malls, etc. The survey comprised 35 items, including

demographic questions such as gender, age, level of hearing loss, educational qualification, etc.

3.5. Data Collection Procedure

Google Forms were used to collect responses from the participants. Participants were procured from Delhi, Noida, Pune, and Mumbai via the help of NGOs. Before data collection, each subject gave informed consent, and confidentiality was always upheld.

It is important to note that the data collected is self-reported, which may introduce biases as the participants' experiences and perceptions are subjective. This should be considered when interpreting the findings.

4. Results

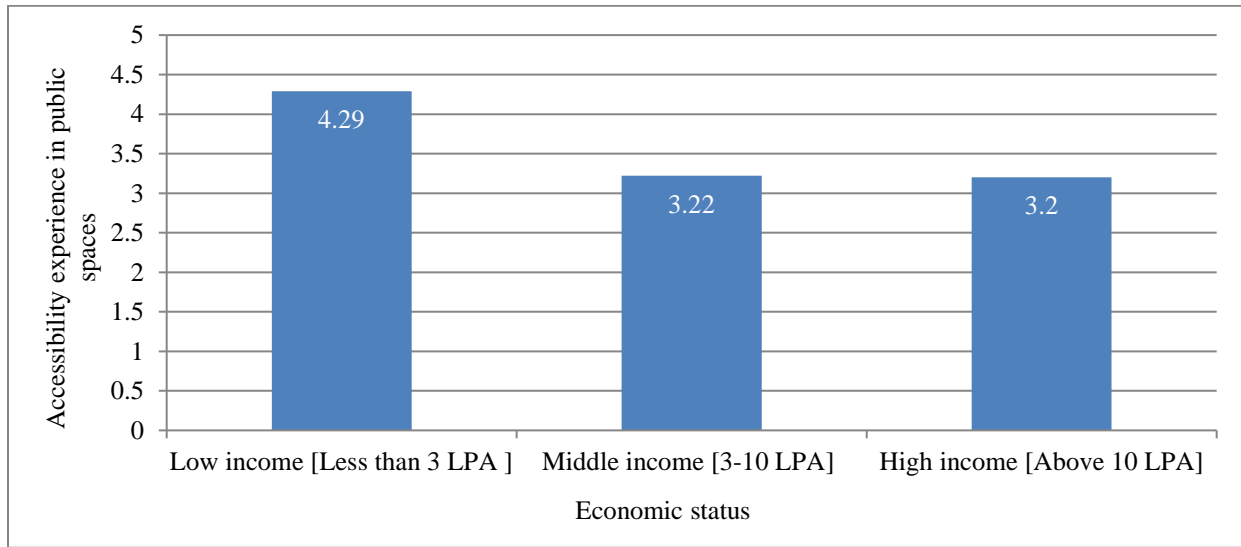


Fig. 1 illustrates the mean score of accessibility experience in public spaces corresponding to income levels (Low Income M=4.29, Middle Income M = 3.22, High-Income M = 3.2)

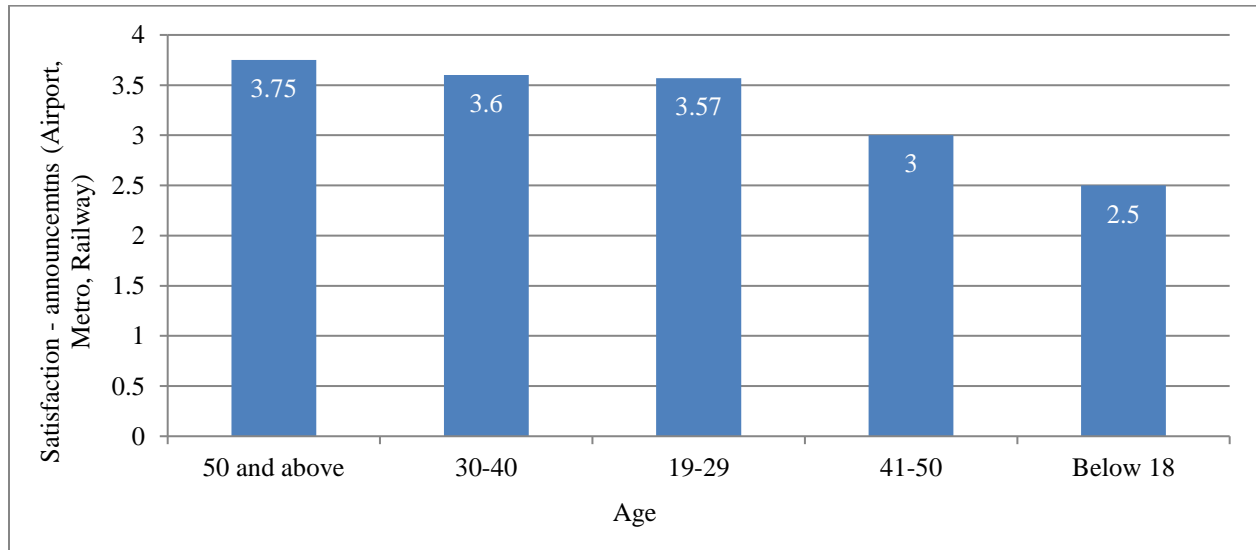


Fig. 2 illustrates the mean score of satisfaction with announcements in public transport across ages.

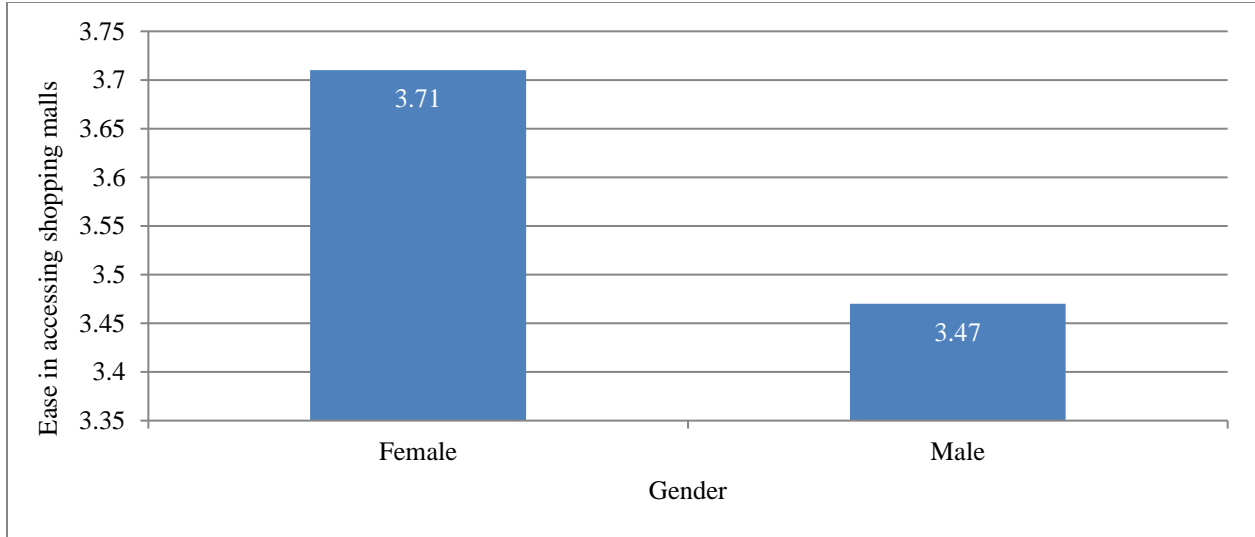


Fig. 3 illustrates the mean score of ease in accessing shopping malls across gender (Male M=3.47, Female M=3.71)

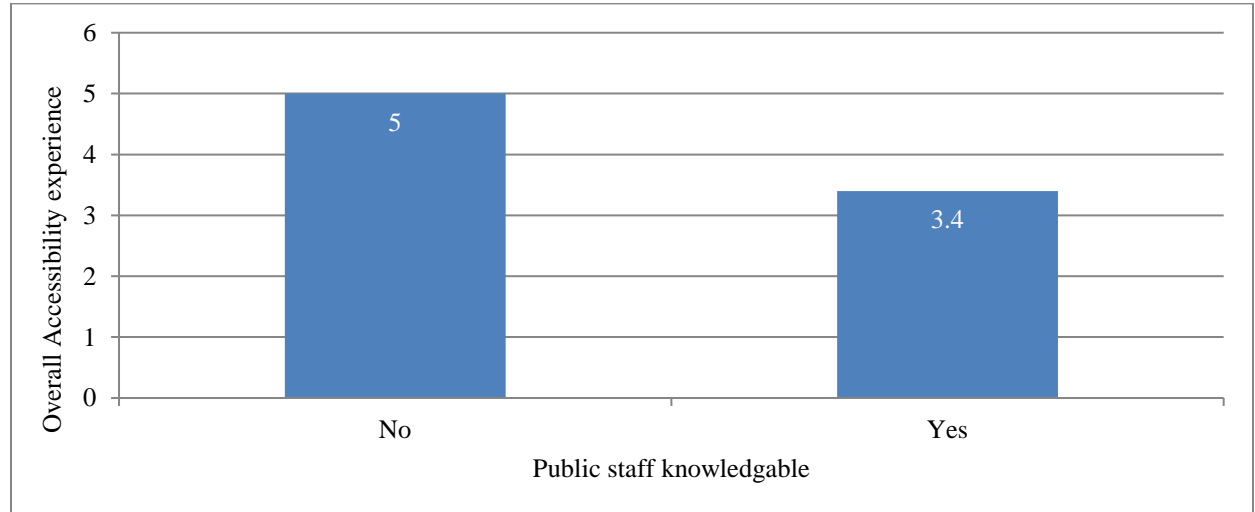


Fig. 4 illustrates the mean score of respondents in overall accessibility experience and public staff knowledge

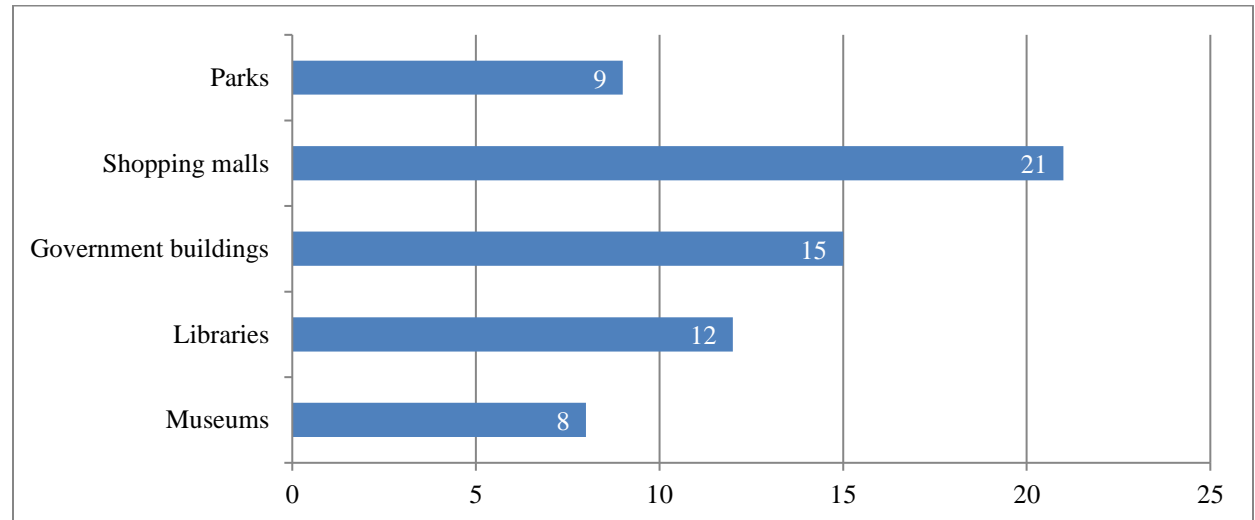


Fig. 5 illustrates the type of spaces the respondents find the most accessible (N=31)

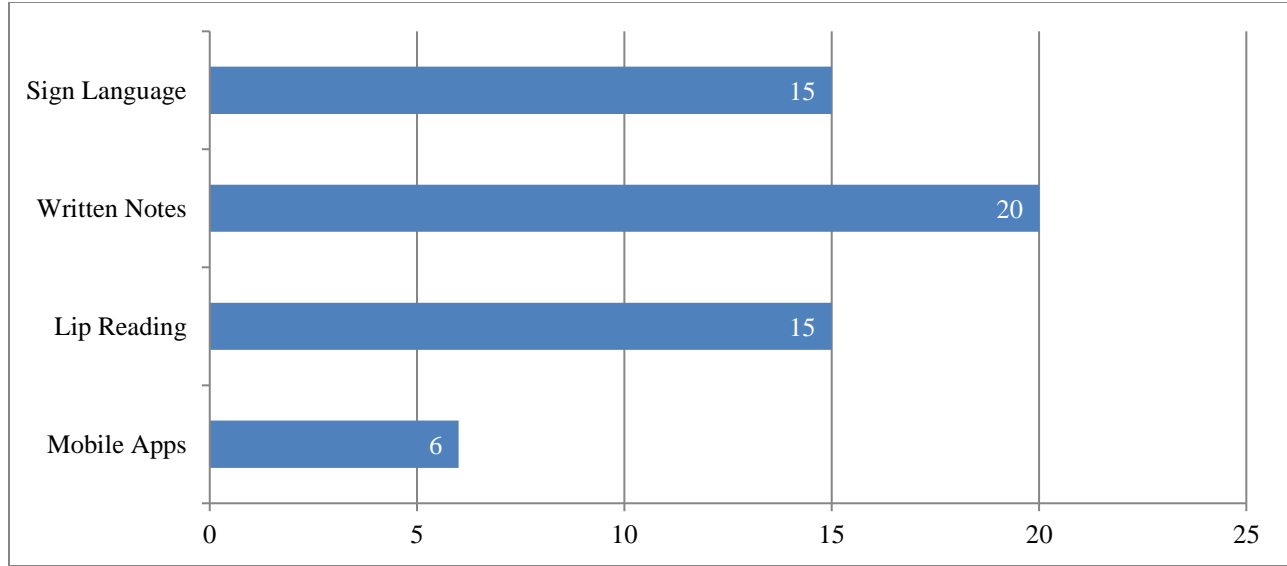


Fig. 6 illustrates the most used methods of communication in public spaces by the respondents (N=31)

Table 1. The descriptive statistics and t-test for Accessibility Perception among gender

		N	Mean	SD	T	Df	P	Cohen's d
Total Accessibility Perception	Male	17	28.94	2.28	0.44	29	.66	0.16
	Female	14	28.64	1.15				

Table 1 indicated no significant mean differences in Total Accessibility Perception ($t=0.44$, $p = 0.66$, $p>0.05$). The findings indicate no meaningful deviation between males ($M= 28.94$, $SD = 2.28$) and females ($M= 28.64$, $SD= 1.15$) on Total Accessibility Perception. The Cohen's d value was 0.16, which indicates a small effect size.

Table 2. The descriptive statistics of Mean and SD on the level of hearing loss.

	n	Mean	Std. Deviation
Moderate Hearing Loss [35 to <50 dB]	8	28.25	1.67
Severe Hearing Loss [65 to <80 dB]	3	31.67	2.31
Moderately Severe Hearing Loss [50 to <65 dB]	10	28.5	1.51
Mild Hearing Loss [20 to <35 dB]	9	28.89	1.54
Total	30	28.87	1.83

Table 3. One Way ANOVA to compare means for the level of hearing loss

	Sum of Squares	df	Mean Square	F	p	η^2
Level of hearing loss	27.91	3	9.3	3.48	.03	0.29

Findings from Table 2 reveal the Mean and Standard Deviation across levels of hearing loss. Table 3 revealed a significant mean difference across respondents on the level of hearing loss and Total Accessibility Perception ($F =3.48$, $p <0.05$). The value of η^2 is 0.29, which indicates a moderate effect size.

Table 4. The descriptive statistics for age

	n	Mean	SD
30-40	10	28.4	2.32
19-29	7	29.57	1.9
41-50	8	29	1.51
Total	25	28.92	1.96

Findings from Table 4 reveal the Mean and Standard Deviation across age. Table 5 revealed no significant mean difference across respondents on age and Total Accessibility Perception ($F = 0.73$, $p = 0.493$, $p > 0.05$). The value of η^2 is 0.06, which indicates a small effect size.

Table 5. One-way ANOVA to compare means for accessibility perception

	Sum of Squares	df	Mean Square	F	p	η^2
Age	5.73	2	2.86	0.73	.493	0.06
Residual	86.11	22	3.91			
Total	91.84	24				

4. Discussion

The present study has examined the accessibility problems faced by people with hearing disability by utilizing statistical measures such as t-tests and ANOVA. In the demographic information (Figure 5), it was seen that respondents find public spaces, particularly shopping malls (N=21), government buildings (N=15), and libraries (N=12) the most accessible.

Malls have been becoming more friendly for the disabled by adding braille signage, wheelchairs, disabled-friendly washrooms, and allocated parking spaces, as The Hindu Business Line (2015) reported. Despite the increase in accessibility for people with hearing disability, research by Aini, Marlina, & Nikmatullah (2019) has shown that in their evaluation of 10 public buildings in India, key facilities were lacking for people with hearing and physical disabilities.

Figure 6 reveals that the most common methods of communication in public spaces, according to the respondents, are written notes (N=20), sign language (N=15), and lip reading (N=15). Similarly, research by Haynes (2014) on 161 adults with limited hearing ability reported that participants found text-based communication the least frequented in group scenarios but the most expressive and effective communication medium. Considering we live in an era of technology, it is fascinating to note that in the present, the least number of respondents (N=6) selected Mobile Apps for effective communication. According to research conducted in several nations, it has been found that the use of information technology by people with hearing disability contributes to increasing their participation in various activities, such as communication with friends and relatives (Lersilp & Lersilp, 2019).

The findings from the present research also revealed that there was not any significant difference across age and gender. Lesch et al. (2019) found that older deaf people visiting healthcare facilities have experienced a lack of cultural competence among providers. Specifically, they are faced with a lack of interpreters and have been given inadequate treatment without consent. Additionally, Cheung and Zhang (2022) researched Americans aged 65 and above with hearing loss, and they found that this age group had a much lower chance of attending any recreational or organized events and clubs.

These findings underscore the need for public space designers and policymakers to prioritize accessibility features that cater to hearing disabilities. The use of visual aids and improved communication methods can greatly enhance the inclusivity of public spaces. Successful examples include implementing visual public transport systems in cities like Tokyo and Stockholm, which have been recognized for their inclusivity.

Regarding gender differences, Kisch (2007) talked about Bedouin deaf men having more opportunities to be a part of deaf organizations and participate in events organized by deaf clubs compared to females. Turunen-Taheri et al. (2018) found that more women than men have received extended audiological rehabilitation and communication rehabilitation and have visited technicians hearing rehabilitation educators.

However, a significant difference was reported across levels of hearing loss. Dalton et al. (2003) talked about how, out of their survey sampling, 24% of people who had moderate to severe hearing loss experienced more communication barriers, resulting in a more reduced quality of life compared to 28% of the participants with mild hearing loss. Polku et al. (2015) found that elderly individuals with major hearing loss have reduced life-space-mobility when assessed across older people's opportunities to participate in out-of-home activities and access to public amenities.

This topic is particularly relevant to discussing accessibility issues faced by individuals with hearing disabilities in public spaces. Despite the growing recognition of accessibility as a right, people with hearing impairments still encounter significant barriers, such as limited auditory information, inadequate sign language services, and insufficient awareness of their needs by public service providers.

The findings from this research underscore the importance of addressing these challenges by improving public space designs to cater to diverse accessibility requirements. Ensuring proper communication methods and accessibility features can foster inclusivity and enable people with hearing disabilities to participate fully in social, economic, and cultural activities, thereby improving their overall quality of life.

5. Conclusion

In conclusion, this study brings attention to the critical issue of accessibility in public spaces for individuals with hearing disabilities. The research highlights key preferences in terms of frequently visited places and the communication methods most effective for this group. Additionally, the study explores how various factors, including the extent of hearing loss, age, and gender, influence perceptions of accessibility. These findings contribute to existing knowledge, reinforcing the need for a more inclusive approach to designing public spaces. It is evident from the results that accessibility challenges are not uniform and must be addressed holistically.

However, to obtain a more thorough comprehension of the barriers faced by individuals with hearing disabilities, future research should involve a larger and more diverse population. The limited sample size and specific regional focus of this study limit the capacity to extrapolate results to a larger population. Expanding the study to include individuals from different geographic areas and demographic backgrounds would enable a more in-depth analysis of accessibility issues across varied contexts.

Future studies should consider expanding the sample size and including participants from various geographic regions to provide a more comprehensive understanding of accessibility challenges. Additionally, further research could explore how technology, such as mobile apps, could be better leveraged to enhance accessibility for individuals with hearing disabilities.

Limitations

This study's primary disadvantage is its small sample size, which might not adequately reflect the range of experiences that people with hearing impairments have. Additionally, the age range of respondents was not broad enough to capture the full spectrum of accessibility needs across different life stages. The research was also restricted to regions, such as the National Capital Region (NCR), which tends to be more developed compared to other parts of the country. As a result, the findings may not fully reflect the experiences of people in less urbanized or economically disadvantaged areas, restricting the generalizability of the study's findings.

References

- [1] Q. Aini, H. Marlina, and A. Nikmatullah, "Evaluation of Accessibility for People with Disability in Public Open Space," *1st South Aceh International Conference on Engineering and Technology, Politeknik Aceh Selatan Campus*, Indonesia, vol. 506, pp. 1-11, 2019. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [2] Dayna S. Dalton et al., "The Impact of Hearing Loss on Quality of Life in Older Adults," *The Gerontologist*, vol. 43, no. 5, pp. 661-668, 2003. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [3] Karen R. Fisher, and Christiane Purcal, "Policies to Change Attitudes to People with Disabilities," *Scandinavian Journal of Disability Research*, vol. 19, no. 2, pp. 161-174, 2017. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [4] Scott Hayness, "Effectiveness of Communication Strategies for Deaf or Hard of Hearing Workers in Group Settings," *WORK: A Journal of Prevention, Assessment & Rehabilitation*, vol. 48, no. 2, pp. 193-202, 2014. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [5] Shifra Kisch, "Disablement, Gender, and Deafhood among the Negev Arab-Bedouin," *Disability Studies Quarterly*, vol. 27, no. 4, 2007. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [6] Theeratorn Lersilp, and Suchitporn Lersilp, "Use of Information Technology for Communication and Learning in Secondary School Students with a Hearing Disability," *Education Sciences*, vol. 9, no. 1, pp. 1-14, 2019. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [7] Heather Lesch et al., "Barriers to Healthcare Services and Supports for Signing Deaf Older Adults," *Rehabilitation Psychology*, vol. 64, no. 2, pp. 237-244, 2019. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [8] Paula Andrea Rodríguez-Correa et al., "Benefits and Development of Assistive Technologies for Deaf People's Communication: A Systematic Review," *Frontiers in Education*, vol. 8, pp. 1-10, 2023. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [9] Hannele Polku et al., "Self-Reported Hearing Difficulties and Changes in Life-Space Mobility among Community-Dwelling Older Adults: A Two-Year Follow-Up Study," *BMC Geriatrics*, vol. 15, pp. 1-7, 2015. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [10] Turunen-Taheri et al., "Severe-to-Profound Hearing Impairment: Demographic Data, Gender Differences and Benefits of Audiological Rehabilitation," *Disability and Rehabilitation*, vol. 41, no. 23, pp. 2766-2774, 2019. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [11] Deafness and Hearing Loss, World Health Organization, 2021. [[Google Scholar](#)] [[Publisher Link](#)]