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Accessibility barriers of wheelchair users in public spaces

Tri Budi Santoso *

Department of Occupational Therapy, Surakarta Health Polytechnic of Ministry of Health, Surakarta, Indonesia.

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Abstract

Background: Wheelchair users encounter many barriers when traveling in public spaces. This research aims to explore the experiences wheelchair users have when facing physical and non-physical barriers in public areas.

Methods: This study used qualitative research methods. Data were collected through observation and semi-structured in-depth interviews with six wheelchair users using purposive sampling. First, the data were analyzed using thematic analysis, and then the trustworthiness of the data was checked using triangulation of data sources and member checking.

Results: Three themes were found. The first theme: accessibility barriers, includes two subthemes:

- Physical barriers;
- Non-physical barriers.

The second theme: accessibility barrier strategies, consists of two subthemes:

- Physical barrier strategies;
- Non-physical barrier strategies.

The third theme: the ability level of wheelchair users, consists of two subthemes:

- Level of independence;
- Level of incapacity.

In this study, wheelchair users face accessibility when accessing public spaces. The emergence of barriers makes wheelchair users create strategies to deal with them to make public spaces more accessible for wheelchair users.

Keywords: Wheelchair users; Accessibility barriers; Public spaces; Accessibility strategies

1. Introduction

Accessibility is a fundamental factor in everyone's right to live independently in society, so it's important to encourage participation for wheelchair users (Lid & Solvang, 2016). The notion of 'accessible' does not just mean the location is physically accessible but involves everyone, despite their disability, being able to use the product or service provided (Bindu & Devi, 2016). Accessibility is not only a concern for people with disabilities as its implementation also impacts the convenience of non-disabled people (Buj, 2010).

* Corresponding author: Tri Budi Santoso

The realization of accessibility is essential for wheelchair users. With the completion of facilities for wheelchair users, they can carry out their activities to participate in society independently (O'neill, 2021). Without accessibility in public spaces, it is dangerous for wheelchair users, so a barrier-free environment is essential for them to participate fully (Badawy et al., 2020). Accessibility is not just a right attached to people with disabilities but a means to ensure that people with disabilities can exercise all fundamental rights and freedoms and are empowered to participate fully in society on an equal basis. Accessibility is essential as a process that ensures access by persons with disabilities on an equal basis with others to the physical environment, transportation, information, communication, and facilities and services provided in the community (Wegener, 2010).

People with disabilities who use wheelchairs often have difficulty moving from one place to another because public facilities are not disability-friendly. The results of research by Fatimah & Apsari (2020) mention several public spaces in Indonesia that are obstacles for people with physical disabilities, such as the surface of city roads, ramps, the size of the slope of the ramp, special toilets for disabilities that are not yet available, the size of bathrooms that are not up to standard, the absence of particular stairs, buttons, and doors. Problems often faced are related to society's stigma, where people with disabilities are often seen as disabled, so they cannot fully participate in the community. The environmental barrier needs to be mediated to encourage inclusive access for all. Full inclusion of people with disabilities means increasing their activity in the public sphere (Özcan et al., 2021).

Wheelchair user barriers in Indonesia are written under Law Number 28 in the year 2002 on building requirements. The regulation emphasizes minimum access for people with disabilities to public spaces, but not all provide physical accessibility. Gaps also occur when the surrounding community lacks information about policies related to people with disabilities (Irwanto et al., 2016). Based on the results of a study conducted by the Sub-Directorate of Settlements of the West Java Spatial Planning and Settlement Office, it was found that there was no availability of *assistive devices* or physical accessibility in various public facilities.

Research on accessibility barriers for wheelchair users needs to be conducted to determine the minimum standards for providing access in public spaces. This research is linked to the need for the state to identify and remove barriers to information and communication accessibility, ensuring freedom of expression, opinion, and access to information for people with disabilities (Badawy et al., 2020). Wheelchair users face various barriers, some of which can be overcome and others which cannot. This research was conducted to identify environmental accommodation needs that suit the needs of wheelchair users. This study seeks to reduce and remove barriers and facilitate the social participation of wheelchair users with mobility impairments, focusing on environmental access (Meyers et al., 2002).

The various barriers encountered by wheelchair users are still a challenge that needs to be resolved. Therefore, this research was conducted to reveal how accessibility barriers affect the activities of wheelchair users to play a role as human beings with equal status and rights in society. Furthermore, this research aims to identify and explain the challenges and strategies of wheelchair users when traveling in public spaces in Indonesia.

2. Method

2.1. Participant

Table 1 Participant Characteristic

Participants	Gender	Age	Status	Diagnosis	Jobs	Education
R1	Male	32	Married	Paraplegia	Government Employ	Senior High School
R2	Female	47	Single	Paraplegia	Private Business	Senior High School
R3	Male	39	Single	Paraplegia	Jobless	Senior High School
R4	Male	25	Single	Autoimmune	Private Business	Senior High School
R5	Male	52	Divorce	Paraplegia	Private Business	Senior High School
R6	Male	36	Married	Paraplegia	Jobless	Primary School

Six adult wheelchair users selected based on the purposive sampling method participated in this study (table 1). The inclusion criteria were individuals with physical disabilities who require wheelchair aids in their daily activities, wheelchair

users who have traveled to public spaces within the last two years with a traveling intensity of at least once every two months, and willing to become research subjects.

The recruitment of respondents used an invitation letter given to the Klaten wheelchair user community in Central Java, Indonesia. After obtaining respondents, the author explained the purpose and procedures of the study and obtained the respondents' consent to conduct the study voluntarily. Participants filled out the consent form that had been provided. Data collection was conducted through in-depth interviews that were documented using a voice recorder. Additional data was collected through observation.

2.2. Data Collection

The data was collected using in-depth interviews. The in-depth interview process was carried out by contacting online one-by-one participants, a total of 6 participants who use wheelchairs, with a duration of 60-90 minutes for each participant. The interview was conducted using an interview protocol to ensure the consistency of the data to be collected. The researcher asks thirteen questions about their barriers during traveling in a public space and their coping strategies to overcome the obstacle. The researcher explains all research procedures and data collection to all participants. Informed consent was collected before the data collection was conducted. This study was approved by the ethical research committee of Surakarta Health Polytechnic.

2.3. Data Analysis

The thematic data analysis was done using a step-by-step guide to analyzing the data. (Braun & Clarke, 2006). The data collection was first acclimated by repeatedly examining it for significance and pattern. After that, the verbal data was transformed into the text to perform a theme analysis. The next step involves writing the first code to categorize the data into descriptive phenomena categories. Themes were developed in this step based on data gathered from each participant. The next step was to organize all of the pertinent coded data extracts into the subjects that had been established by grouping the different codes into likely themes. The themes were then evaluated and improved to ensure that each appeared coherent. The newly formed theme was then identified and defined to determine its essence.

2.4. Study Rigor

Data saturation is obtained when researchers explore data on participants by asking detailed questions on topics related to wheelchair user accessibility in public spaces. The results of the research themes and subthemes were re-submitted to participants with the aim of checking. Based on the results of member checking, it was found that the things asked back were in accordance with the experiences they faced. No new information emerged so the data was declared saturated and obtained approval by participants from the interpretation of the data that had been submitted.

3. Results

This research was conducted with the aim of exploring the accessibility barriers encountered by wheelchair users. Based on the results of the thematic analysis that has been carried out, three themes related to wheelchair user accessibility emerge, namely:

- Accessibility barriers with two subthemes, namely physical barriers and non-physical barriers,
- Accessibility barrier strategies with two subthemes, namely physical barrier strategies and non-physical barrier strategies, and
- The level of ability of wheelchair users with two subthemes, namely the level of independence and the level of incapacity.

Table 2 Emerged Themes and Sub-Themes

Theme	Sub-Themes
Accessibility Barriers	Physical Barriers
	Non-physical barriers
Accessibility Barriers Strategy	Physical Barriers Strategy
	Non-Physical Barriers Strategy
User Ability Level Wheelchair	Independence Level
	Level of Incapacity

3.1. Accessibility barriers

3.1.1. Physical Barriers

Barriers to the ramp structure that make it difficult for wheelchair users are when the ramp height is too steep. Ramps with too short a distance and no handrails are also dangerous for wheelchair users. In addition, the uneven construction of ramps in public spaces is an obstacle to accessibility for wheelchair users. Usually, in public areas, there are many stairs without the provision of ramps so that wheelchair users cannot enter higher buildings.

It is rare for people with disabilities to complain about the parking area. Even so, if the vehicles are not neatly organized and other users put them carelessly in the parking area, it is difficult for wheelchair users to put their cars in an empty parking lot. For example, the following is a statement from the participant (4): "...if the public parking lot is difficult to fit. Sometimes some motorcycles are parked not so neatly, so what should do is not suitable for parking."

The ground surface also determines the success of wheelchair users when accessing public spaces. If the surface is uneven, there is a risk of harming wheelchair users and making access difficult for wheelchair users. Surface areas in public spaces are sometimes found to be steeper than other surface areas. In addition, surfaces with different heights are also an obstacle when accessing streets in public spaces and risk causing falls.

Public spaces also have doors to enter the building. Wheelchair users complain that the public space doors are too narrow. In addition, the doors are also heavy, which makes it difficult for wheelchair users to push when entering or exiting the room. Some entries in public spaces were found to be inaccessible to wheelchair users. In some public areas, wheelchair users still need assistance to access the door.

Toilet areas provided in public spaces are difficult to access when the width is too narrow, including small doors, little bathroom cubicles, and unavailable toilets that are still squat. Therefore, when wheelchair users cannot access the toilet, they must use Pampers as an alternative. However, there is a risk of using pampers, which causes rashes, according to participant (1): "...the moisture of pampers that have been used for 3-4 hours causes rashes, blisters, wounds."

Another obstacle encountered is the regulations for disabilities. The rules have been included in the law, but the implementation in public spaces has not been appropriately implemented. Principles on accessibility have not been evenly applied to various public areas. There are public areas that have implemented the regulations listed in the law, but there are also areas that still have not implemented them. When building public spaces, wheelchair users feel less involved, and their opinions are still sidelined. One participant stated that many people are already concerned about providing accessibility, but when the construction does not involve wheelchair users. Public space regulations also do not include wheelchair users, as the participant (2) stated: "...there are already many people who care about providing facilities, but during construction, there is a lack of user involvement."

Other public facilities in public spaces are the obstacles encountered on highways, namely highway sidewalks that are actually misused for trading. Transfer activities in public areas can be difficult for wheelchair users, especially if the field between transfers does not meet the prerequisites. Some wheelchair users have difficulty transferring in public spaces when moving from a wheelchair to a vehicle such as a bus or a taxi.

Wheelchair users have difficulty transferring if the transfer field in the form of a bench or chair has a height difference of as much as 30 cm, according to a statement from the participant (4): "...if the seat is less than the height of the wheelchair by 30 cm, it is difficult. If you go to a higher place, it is even more difficult." Stairs are often found in public spaces. Stairs or ramps of a certain height hinder the mobility of wheelchair users. Sometimes there are also stairs without a ramp available.

Public facilities available in public spaces are not entirely accessible to wheelchair users. The development of public facilities in public areas has not been evenly distributed between regions. Sometimes it is also found that the location of public facilities with one another is not balanced in its development. Not all public facilities in public spaces can be visited by wheelchair users. The lack of understanding of the construction of public facilities in public areas and the absence of negotiations with the management makes it difficult to realize accessible public facilities. When public facilities do not support the mobility of wheelchair users, these facilities cannot be called disability-friendly. Another obstacle is the lack of socialization of information about disability-friendly public facilities. In addition, there is only a minimal response to improving public facilities in public spaces.

When accessing public spaces, wheelchair users also need places of worship, especially mosques for Muslims who perform the five daily prayers. However, wheelchair users are concerned about the lack of accessibility in some areas of worship. Many obstacles are encountered, including doors that are not yet accessible, and the construction of interconnected facilities has not been synchronized, especially in the ablution and toilet areas. Places of worship cannot be called accessible because they do not provide facilities for people with disabilities.

3.1.2. Non-physical barriers

Attitudinal barriers that make it difficult are the emergence of public ignorance about the condition of disabilities, which has an impact on the construction of public spaces that are not accessible to them. Organizational barriers are related to the lack of response to improving public facilities after being given input by people with disabilities. The socialization of information about disability-friendly public spaces has also not been realized. Without negotiation with the manager, accessible facilities are challenging to discover. Differences in accessibility needs between disabilities form communication barriers. Poor communication also causes a lack of response to other people's concerns about the needs of wheelchair users when facing difficulties. Meanwhile, the uneven application of technology for various disabilities forms a barrier in terms of technology.

3.2. Accessibility Barriers Strategy

3.2.1. Physical Barriers Strategy

Wheelchair users' strategy to deal with architectural barriers in the form of toilets to urinate or defecate is to find a closed place. In addition, it is to use Pampers while traveling to public spaces. Pampers are an alternative solution to inadequate bathrooms for the needs of people with disabilities. Another architectural problem that wheelchair users encounter is when transferring. To reduce the risk due to transfer activities, wheelchair users choose not to share and remain in the wheelchair. Then, they decide to keep exercising in a wheelchair to maintain their health and reduce the risk of pressure sores. Another obstacle encountered by wheelchair users is related to the building structure or physical architecture that hinders the wheelchair mobility process. Wheelchair users usually bring a companion to help them if they experienced difficulties accessing public facilities. However, when they do not get a companion, wheelchair users will ask for help from others when in a problem.

The physical strategy to deal with architectural barriers carried out by wheelchair users is to pay attention to wheelchair-use paths. Another physical strategy to deal with architectural barriers is for the management to provide accessible public facilities for wheelchair users. The construction of public facilities should include the needs of users with disabilities. Wheelchair users are also asked to give suggestions for developing public facilities. Improvements in agencies and public spaces are also needed to make the buildings disability-friendly. Proper measurement of facilities is also required so that wheelchair users can use them independently, according to participant (3): "So, the most appropriate, for example, if you want to make a ramp, the size must be right so that users with disabilities can apply it independently without the help of other people or other assistive devices except wheelchairs."

Transportation barriers faced by wheelchair users in public spaces include when accessing land transportation (cars, taxis, motorbikes, buses, trains) and air transportation (planes). When boarding a car or bus, the strategy used so that wheelchair users do not have difficulties is to ask for help from others to lift the user to the seat on the transportation.

While the strategy when boarding an airplane is that wheelchair users also ask for help to be lifted up to the seat. Train transportation is already accessible because wheelchairs can pass the train aisle. Most wheelchair users travel using private vehicles rather than riding public transportation that is not yet accessible. Here is the reason from the participant (2): "We have a 3-wheeled motorcycle because there is no public transportation that makes it easy for us."

3.2.2. Non-physical barrier strategies

Non-physical accessibility is divided into four categories: attitudinal, organizational, communication, and technology. Attitudinal barriers include the behavior, perceptions, and assumptions of people who view disabilities differently. The strategy that wheelchair users use to deal with these barriers is to be sincere and accept the rules that already apply in society. Another approach is to provide an understanding to the surrounding people, starting from the officers, regarding the lack of conditions experienced by wheelchair users. By giving knowledge to the surrounding people, it is hoped that wheelchair users will get equal accessibility rights between disabled and non-disabled people. Furthermore, with an understanding of disability, it will realize the creation of accessible and friendly facilities for wheelchair users.

Organizational barriers are unfair policies, procedures, or practices for people with disabilities. The strategy to deal with this is to approach the relevant agencies to make public facilities disability-friendly. Wheelchair users can also communicate with the authorities to procure adequate facilities for disabilities. Furthermore, unique role collaboration can be carried out with the management. This role collaboration will create a cooperative relationship that facilitates the realization of accessible facilities. Finally, an appropriate recommendation must be given to all stakeholders and policymakers to facilitate an accessible environment for all.

Communication barriers are interruptions in the communication process that involve sending and receiving information from the environment. This can be overcome by providing visitors with a suggestion box on the construction of public facilities in public spaces. Wheelchair users can also communicate in the form of proposing suggestions for making public facilities accessible and accessible for various disabilities in public areas. Another way to overcome communication barriers is by exchanging experiences and supporting each other with disabilities. The following is the participant's opinion (3): "...wheelchair users also exchange experiences with each other if there are shortcomings, tell each other what is wrong, and give each other support."

Technology barriers relate to devices that are not accessible to users. The strategy that can be done to overcome this is to provide a variety of adaptive aids for people with disabilities to support accessibility. In addition, modify wheelchair adaptive service technology such as bearings, pedals, and brakes. Modifying wheelchair technology according to the needs of people with disabilities. As well as informing the condition of disabilities through social media (gadgets) so that facility improvements are made (2): "Well, during the meeting, there was a leader who found out after that one of the employees circulated it in the office group. Finally, the meeting room was moved downstairs."

3.3. Wheelchair user ability level

3.3.1. Level of independence

Various factors determine wheelchair users' freedom when navigating public spaces, including skill proficiency, courage, and confidence. A strong belief in independence as long as the safe environment is also a driver. The majority of participants stated that they were 70%-80% independent in mobility.

3.3.2. Level of incapacity

Wheelchair users require assistance when encountering difficulties in public spaces such as stairs, inclines, or steep areas. Service is obtained from a companion or another person to help them access. Companions are usually volunteers, family, or friends. The disabilities encountered in public spaces for wheelchair users are more or less the same as the difficulties faced by other disabilities.

4. Discussion

4.1. Accessibility Barriers

People with disabilities are often concerned about accessibility because of the many barriers they face (O'Neill, 2021). Unfortunately, people with disabilities also have too many barriers related to accessibility issues (Özcan *et al.*, 2021). For example, physical accessibility barriers for wheelchair users include difficulty accessing ramps, parking lots, ground level, door design, and restrooms. This finding is consistent with research that reveals that *physical access* challenges faced by wheelchair users include essential elements of the physical environment (e.g., sidewalks, ramps, stairs, parking areas) that are still not accessible (Evcil, 2018). Wheelchair users mostly complain about the condition of sidewalks (inadequate width and uneven surfaces), the improper slope of ramps, car parking accessibility, unavailability of accessible facilities, and face problems when encountering stairs (Evcil, 2018).

The level of participation in physical activity among people with disabilities is influenced by a multifactorial set of barriers (architectural, social, policy/organizational, and attitudinal) (Rodríguez, 2014). Based on research Evcil (2018) generally describes barriers as two-dimensional, relating to individuals (physical and psychological aspects) or barriers relating to the social and physical environment (interactions between individuals, inaccessibility of buildings). Attitudinal barriers are behaviors, assumptions, and perceptions toward people with disabilities. They are disabled through active or passive discrimination as a barrier and deterrent to full and equal participation in society (Bridger & Evans, 2020). Organizational barriers relate to non-governmental organizations, and society should fulfill its duties and responsibilities to integrate people with disabilities back into society and support them to overcome the difficulties faced in their daily lives (Özcan *et al.*, 2021). Interactive barriers relate to communication barriers that interfere with personal and community interactions. Many people with disabilities decide to stay home and not travel to public spaces due to inadequate communication

information barriers (Evcil, 2018). The technological barriers faced by people with disabilities include the need for facilities with specialized infrastructure design and specialized technology and service provision (Kamyabi & Alipour, 2018).

4.2. Accessibility Barriers Strategy

Various obstacles are encountered by people with disabilities ranging from physical and non-physical barriers. To realize travel for people with disabilities, architectural or spatial and organizational services are needed, such as adequate transportation, accessibility, comfort in accommodation, and the availability of professional services suitable for individuals with special needs. (Özcan *et al.*, 2021). According to research, some people with disabilities are limited in their choice of transportation modes (Bromley, Matthews, and Thomas 2007). Wheelchair users tend not to use public transportation, relying instead on cars/taxis or private vehicles (Bromley, Matthews, and Thomas 2007). The reason wheelchair users do not use public transport is due to various obstacles, one of which is the inability of public transport related to not only the physical design of the vehicle but also the accessibility of the station and platform locations. As a result, public transport trips often take longer for people who use wheelchairs (Ferrari *et al.*, 2014). Some regulations specifically affect people with disabilities, and the application of these regulations may vary from country to country. Authority constraints can be laws and regulations that limit a person's travel (Hägerstrand, 1970).

Factors in the environment can limit functioning and create disability. These include aspects such as inaccessible environments, lack of relevant assistive technologies (assistive, adaptive, and rehabilitative devices), negative attitudes of people toward disability, and the absence of policies or the existence of policies that hinder the involvement of all people (Potic *et al.*, 2014). Creating social contact is crucial in changing attitudes toward disability and reducing attitudinal barriers (Shakespeare, 1994). Education about disability issues through increasing social contact with people with disabilities and representing disability are strategies to overcome organizational obstacles. The existence of organizational approaches to support people with physical disabilities should not create other barriers. How professional services and advocacy groups engage and include people with disabilities in policy is necessary to reduce barriers (Potic *et al.*, 2011). Overcoming communication barriers involves making products and services suitable for people with disabilities. For wheelchair users, information about the accessibility of the area they are visiting is critical to deciding whether or not to visit the site (McKercher *et al.*, 2003; Yau *et al.*, 2004).

Wheelchair users may decide not to visit an area if there is a lack of accessibility information (Evcil, 2018). Accessibility in technology and communication is integral to enhancing inclusive and sustainable development for everyone, including people with disabilities. Public spaces must provide accessible portals and present vital information to inform, increase understanding, and raise user awareness (Wegener, 2010). According to the United Nations (2014), all objects open to the public or providing information services should ensure full access for people with disabilities, including access to the Internet and information communication technology (Evcil, 2018).

4.3. Wheelchair User Ability Level

Research Kirby *et al.* (2016) examined self-efficacy in wheelchair use. Self-confidence is defined as a belief in one's ability to perform each activity comfortably and independently. Wheelchair use skills enable manual wheelchair users to mobilize safely and effectively. Wheelchair user skills are also beneficial to overcome mobility challenges they face in the environment. (Oyster *et al.*, 2012). Therefore, the need to train wheelchair use skills is considered important enough to encourage them to participate fully. Based on the results of the study, it was found that there is a need to improve the skills of wheelchair users through training with more duration and require more time to conduct training. More wheelchair skills training can improve wheelchair users' participation and quality of life (Kirby *et al.*, 2016).

Other constraints encountered refer to constraints of an individual scope, which can be certain biological/physical limitations or internal barriers, such as the perception of anxiety in a person. These constraints may take different forms for each individual (Hägerstrand, 1970). For example, congenital or acquired problems in the body of wheelchair users result in decreased daily activities or loss of ability to perform activities, so they have to use additional mobility aids to achieve accessibility, relationships, and social participation. Some problems that arise include decreased physical strength, the whole or part of the body becoming paralyzed; functions may be reduced or lost; the brain's control ability for coordination and balance decreases; lower limbs such as the waist or lower limbs becoming disabled (Xiang *et al.*, 2016).

On the other hand, many factors hinder wheelchair users' abilities. Wheelchair users may not perform skills that they are capable of for various reasons, including low confidence, lack of opportunity, or lack of need (Kirby *et al.*, 2016). (Kirby *et al.*, 2016). Several factors lead to wheelchair users not receiving adequate wheelchair use training during rehabilitation due to reduced training time, wheelchair users only learning basic mobility skills, and the type of wheelchair they use not be suitable for their needs (Oyster *et al.*, 2012). In addition, other barriers, such as the lack of

physical access to the environment, make people with disabilities feel helpless, ostracized, and inconvenienced (Rodríguez, 2014). Wheelchair users often prefer to be accompanied by a partner, either a family member or friend, as this creates a sense of security (Evcil, 2018). The needs of people with disabilities are highly dependent on accessibility; they often need caregivers, assistants, or companions to help them with access (Özcan et al., 2018).

4.4. Research Limitations

The research cannot be said to be perfect because there are several limitations. The limitations that exist in this study include: (1) The research data collection time is relatively short, so the depth of information obtained is not satisfactory. (2) Not all participants felt the same obstacles when going through certain public facilities. Differences in motivation and persistence cause different answers from each participant. (3) Observations were not in-depth because researchers participated in wheelchair users' *traveling* activities limited to only one meeting. (4). Some participants did not understand the meaning of the questions asked, so the researcher needed to repeat the questions until they got the answers they needed.

4.5. Implication for Occupational Therapy Practice

Based on the results of the research, occupational therapy practitioners can carry out a comprehensive, holistic application related to wheelchair user accessibility issues, including:

- Provide education and advocacy on the principle of accessibility of public spaces to policymakers and stakeholders
- Provide understanding and education to wheelchair users to increase their capacity to be able to move in public spaces and maximize the assets of wheelchair users to be actively involved in accessibility independence.
- Provide education or socialization to families, *caregivers*, wheelchair users, and stakeholders to support the development of accessible public spaces for all wheelchair users and the general public.

5. Conclusion

Accessibility in accessing public spaces is important for wheelchair users, but they encounter many barriers. These barriers can be resolved with support from various parties, especially from *caregivers* and families as companions who help to reach access public spaces. In addition, wheelchair users also have strategies to deal with physical or non-physical barriers. Creating a barrier-free environment is the goal of wheelchair users to realize independence in accessibility. Wheelchair users also have a level of ability when facing barriers in the form of independence and incapacity. When wheelchair users have adequate accessibility, they will be more able to participate as part of society actively.

Compliance with ethical standards

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Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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