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REVIEW

Wheelchair accessibility of public buildings: a review of the literature

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Abstract

Purpose. The purpose of this review was to examine the wheelchair accessibility in public buildings and discuss the role of professional in this practice area.

Method. Of the 85 originally identified publications from a search of major electronic bibliographic databases, 12 studies relating to wheelchair accessibility in public buildings were selected. The compliance rates with wheelchair accessibility in different areas were summarised.

Results. No study reported 100% wheelchair accessibility despite the enforcement of existing laws and regulations. Parking had the lowest compliance rate among all facilities in terms of accessibility, while entrances had the highest.

Conclusions. A global review is needed of both new and old buildings regarding wheelchair accessibility. Professional in this practice area has an important role to play in advocating wheelchair accessibility and assisting wheelchair users to participate fully in all areas of the community.

Keywords: *Wheelchair use, barrier-free environment, community, public buildings*

Introduction

According to the National Health Interview Survey on Disability (NHIS-D) [1], 1.6 million wheelchair users live in the community in the USA. This means that approximately 1 in every 200 community dwellers require the use of a wheelchair. Although no exact figures exist for developing countries, the number of wheelchair users may be similar to or even exceed that of the USA.

Access to public buildings is important for people with disabilities as it could enhance their active participation in the community and allow them to contribute both socially and economically. The term 'accessibility' refers to the degree to which an environment (e.g., a site, facility, workplace, service or programme) can be approached, entered, operated in, or used safely and with dignity by people with disabilities [2]. It is commonly quantified using the percentage of compliance, which is calculated as the number of facilities complying with wheelchair accessibility requirements over the total number of facilities measured. One study that was conducted to identify architectural barriers in public buildings identified three major areas of activities that were affected, namely parking and entrances, goods and services and restrooms [3]. A later study also singled out parking and entrances [4].

In promoting rehabilitation, wheelchair users themselves as well as professional in this practice area strongly advocate wheelchair accessibility in public places [5] through user self-help organisations that promote integration into the workforce. These campaigns have progressively attracted the attention of both the public and the government, leading to the sprouting and implementation of various wheelchair accessibility codes and guidelines. Wheelchair accessibility to public buildings is often regulated by the legal system. An example of this would be the Americans with Disabilities Act (ADA) of 1990, which was an outcome of the independent living movement and the disability rights movement [6]. In 1993, the United Nations General Assembly adopted standard rules to equalise opportunities for persons with disabilities [7]. Rule 5 specifically targets accessibility, declaring that 'states should introduce

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programmes of action to make the physical environment accessible'. In addition, individual governments have taken steps to ensure accessibility for disabled persons, and a gradual reduction in architectural barriers has occurred as a result. However, difficulties still remain for wheelchair users in using public building facilities throughout the world. Transforming public buildings so that they are wheelchair accessible is still in the developmental stages, thus wheelchair users may continue to be prevented from accessing public buildings and hence may often be unable to participate fully in their community. It is important, therefore, for professional in this practice area to have a role in advocating that their clients participate fully in community life and have access to all public buildings.

This article reviews and discusses the published research evaluating wheelchair accessibility in public buildings.

Method

To review the wheelchair accessibility in public buildings, the authors identified relevant studies in the literature and then conducted a review, analysis and classification of these studies. The selected studies were required to (1) be experimental or observational, (2) examine architectural accessibility in urban cities for adult wheelchair users and (3) be published in English. Studies were excluded if they focused only on an individual's performance in a building's environment.

The following combinations of search terms were used: architectural, accessibility, ADA, wheelchairs, and public or urban spaces. Relevant search terms were identified by reviewing the keywords used in related literature and also confirmed by a reference librarian using the title of the present review to cover all possible terms. The authors conducted an electronic search of the literature up to February 2010 using the electronic bibliographic databases MEDILINE (1966–2010) and CINAHL (1982–2010). The retrieved titles and abstracts were reviewed, and papers were selected if they met the inclusion criteria. These were then independently assessed for eligibility by the second author. Data from these studies were collected using a standardised data collection form, and were then collated and summarised in terms of accessibility compliance.

Results

Of the 85 studies that were initially identified using the key word search combinations, 19 met the selection criteria and qualified for the detailed review. seven of these 19 studies were subsequently removed because they did not fulfil the inclusion criteria: two of these were related to developing an accessibility instrument [8,9], two examined the perception of wheelchair users regarding general facilities [10,11], one examined the views of wheelchair users who used health club facilities [12], one looked at a particular diagnostic group that consisted of both wheelchair and non-wheelchair users [13] and one examined the curb ramps in an urban area [14]. Thus, 12 studies were finally selected for the present review. Details of these studies are reported in Table I.

Characteristics of the evaluations

Date of publication. Among the 12 wheelchair accessibility studies, the earliest was conducted in 1987, three were conducted between 1990 and 1994, five were conducted between 2000 and 2004, three were conducted between 2005 and 2009 and the most recent was conducted in 2009. Thus, the length of time between the first and last study in this review was 22 years.

Location. Seven of these studies (58%) were conducted in the US. The remaining five were conducted in Mexico, Nigeria (West Africa), Turkey, the United Arab Emirates (Middle East) and Zimbabwe (Africa).

Sample of buildings. In these 12 selected studies, a total of 831 buildings were examined. Six of the studies focused on common public buildings such as government buildings, banks, educational and social centres, hospitals and retail business buildings [7,16,18,19,23], while the other six focused on specific public buildings such as business buildings [3], shopping centres [6], restaurants [20], physical fitness facilities [15], and grocery and convenience stores [21].

Design. All 12 studies adopted a descriptive survey having Level IV clinical evidence. Four used convenience sampling [6,16,20,21], one used purposive convenience sampling [6], two used random sampling [7,18] and one used stratified random sampling [4]. Four studies did not report the sampling method [3,14,17,19].

Instrument. All 12 studies conducted a survey-type assessment based on tailor-made checklists developed from the Americans with Disabilities Act Accessibility Guidelines (ADAAG) or adopted from previous accessibility studies (see Table I for details).

Table I. Compliance rates with regard to the wheelchair accessibility of building facilities in published research (1987–2005).

Study	Country of origin	Study objectives	N = number of buildings assessed	Sampling method	Instrument used	Buildings assessed	Major findings (% compliance)
Ahn et al. (1994) [3]	United States	To determine the frequency of architectural barriers to persons with disabilities in businesses in a small urban community in central Virginia	250	Not reported	Accessibility assessment checklist based on ADAAG	Business buildings	Parking – 65% Routes – 60% Entrances – >50% Restrooms – 40% Water fountains – 40%
Cardinal & Spaziani (2003) [15]	United States	To determine how compliant physical activity facilities in western Oregon were with regard to the ADA	120	Probability sampling	Accessibility assessment checklist modified from Figoni et al. (1998) and based on ADAAG	Physical fitness facilities	Parking – 56% Routes – 58% Entrances – 90% Elevators – 83% Restrooms – 33–50% Water fountains – 55% Telephones – 88%
Crown et al. (2004) [16]	United States, Mexico	To survey and compare the architectural accessibility of community buildings in Albuquerque, New Mexico, United States, and Oaxaca, Oaxaca, Mexico	122	Matched convenience sampling	Accessibility assessment checklist based on ADAAG for Buildings and Facilities (Architectural and Transportation Barriers Compliance Board)	Churches; government agencies; museums; restaurants; stores	Entrances – 100% Restrooms – 33–50%
Evcil (2009) [17]	Turkey	To determine the compliance of of public building in central bussness district of Istanbul in Turkey	26	Not reported	Adapted instrument of usesh et al.	Museum, hotels, shopping center, post office, bank, concert hall, theatre complx, cinema, café, restaurant, universities and stadium	Public transportation – 25% Access to building (route) – 65% Entrance – 73% Accessibility inside building – 52% Toilet – 53% Public telephone – 33% Access to car parking – 53%
Hamzat & Dada (2005) [18]	Nigeria	To assess the wheelchair accessibility of selected public buildings in Ibadan	38	Simple random sampling, purposive non-probability method for a few buildings	Accessibility assessment checklist based on ADAAG	Educational facilities; government agencies; hospitals; recreational and social buildings	Routes – 14–40% (19.4%) Entrances – >50 (45.1%)

(*continued*)

Table I. (*Continued*).

Study	Country of origin	Study objectives	N = number of buildings assessed	Sampling method	Instrument used	Buildings assessed	Major findings (% compliance)
Martin (1987) [19]	United States	To review 13 public buildings for accessibility to wheelchair-bound consumers in Utica, New York	12	Not reported	Items based on the American National Standards Institute	Educational facilities; government agencies; retail business buildings	Entrances – >50%
McClain (2000) [6]	United States	To determine if three shopping centres in one city in the Southwest of the USA met the ADA requirements	3	Purposive and convenience sampling	Accessibility assessment checklist based on ADAAG for Building and Facilities	Shopping centres	Parking – 71–95% Routes – 60% Ramps – 0%- 100% Entrances – 95%–100% Elevators – 100% Restrooms – 42% Telephones – 100%
McClain et al. (1993) [20]	United States	To determine the compliance of restaurants in three Midwestern states of the USA to the wheelchair accessibility standards set forth in the ADA	120	Convenience sampling	Modified wheelchair accessibility checklist based on McClain and Todd (1990)	Restaurants	Parking – 53% Routes – 60% Ramps – 66% Entrances – >50% Restrooms – 60% Water fountains – 100%
McClain & Todd (1990) [21]	United States	To investigate the wheelchair accessibility of 20 grocery and convenience stores in rural and urban cities in the USA	20	Convenience sampling	Accessibility assessment checklist based on the Architectural and Transportation Barriers Compliance Board's guidelines	Grocery and convenience stores	Parking – 16–70% Routes – 60% Entrances – 100% Ramps – 56–100%
Mojtahedi et al (2008) [22]	United states	To assess the impact of the built environment on access to healthy foods for people with mobility disability by measuring wheelchair accessibility of grocery stores and availability of healthy affordable foods.	82	–	ADA checklist for readily achievable Barrier Removable, version 2.9 was adapted	Super markets, non-chained and chained grocery stores, no chained and chained convenience stores, gas station convenience stores (food marts), specialty stores such as bakeries.	Total entrance accessibility – 63% Among entrance accessible stores- Parking – 40% Ramp – 40 Entrance – 50%
Rivano-Fischer (2004) [7]	United Arab Emirates	To assess the accessibility to public buildings for wheelchair users in Al Ain	17	Random sampling using telephone directory	Accessibility assessment checklist based on ADAAG	Banks; cinemas; fitness centers; government agencies; health care centers; hotels; libraries;	Parking – 18% Routes – 76% Entrances – 68% Elevators – 48% Ramps – 47% Restrooms – 35%

(*continued*)

Table I. (*Continued*).

Study	Country of origin	Study objectives	*N* = number of buildings assessed	Sampling method	Instrument used	Buildings assessed	Major findings (% compliance)
							Water fountains – 59% Telephones – 67%
Useh et al. (2001) [4]	Zimbabwe	To evaluate accessibility of wheelchairs into public buildings in the central business district of Harare and to identify architectural barriers faced by wheelchair users in public buildings	20	Stratified random sampling using a map with stand (plot) numbers with street names	Modified wheelchair accessibility checklist based on McClain and Todd (1990)	Banks; educational facilities; government agencies; hotels; retail business centers	Parking – 19% Entrances – 71% Elevators – 83% Ramps – 38% Restrooms – 51% Water fountains – 40%

ADAAG = Americans with Disabilities Act Accessibility Guidelines.

The studies reported the percentages of compliance by calculating the number of facilities complying with wheelchair accessibility requirements over the total number of facilities measured.

Areas assessed. All 12 studies evaluated wheelchair accessibility in different areas of public buildings, and most assessed parking, routes, ramps, entrances, restrooms, phones, water fountains and elevators, which are the facilities most commonly used by visitors, including both wheelchair users and the general population. The results are summarised in Table I.

Major findings

Parking. Nine studies examined parking facilities, which were found to have the least degree of compliance with wheelchair accessibility requirements (with regard to the number of parking slots for wheelchair users, the location and the display of the international symbol of access) among the areas assessed. The percentage of compliance was better in the US (65%, 71–95%, 56%, 53%, 16–70%, 40%) [3,6,15,19,15,21,23] and Turkey 53% [17] than in Zimbabwe (19%) [4] and the United Arab Emirates (18%) [7], although the sample sizes for different countries were not similar so comparisons may not reflect the true picture. The reason why parking facilities had the least degree of compliance could be due to the need for driving or taking public transportation that creates a different demand of parking space. It could also be due to the spaces available in the city that parking space is limited. These possible reasons might affect the compliance rate as parking space is not many in the first place. Other possible reason might be related to the understanding of the needs of wheelchair users. It would be essential to involve wheelchair users or professional in this practice area in designing and constructing buildings [4]. The situation could also possibly be rectified by providing feedback to building management. For example, McClain and Todd [21] reported that modifications to parking facilities were made following a recommendation by users.

Routes. The common access pathways are defined as routes. Eight of the selected studies assessed wheelchair routes. In the United Arab Emirates study, 76% of routes were found to comply with wheelchair accessibility requirements [7]. In Turkey it is 65% [17] while in the Nigeria study, 40% of routes in hospitals, 22% in educational institutions, 18.2% in social recreation facilities and 14% in government agencies were found to comply with

the requirements [18]. Five of the six US studies found compliance rate approaching 60%, though one study [19] did not report the percentage of compliance.

Thus, the compliance rates with regard to wheelchair routes (including the width of route turns and curbs) ranged from 14% to 76% among the studies, which can be explained by the different types and purposes of the buildings in different countries. For example, in Nigeria, since it is considered essential for wheelchair users to be able to visit hospitals regularly, hospital access had a higher compliance rate than social recreational access [18]; however, this would not help wheelchair users to achieve full social participation.

Ramps. Ramps are an important element of building accessibility and their absence obviously makes it much harder for wheelchair users to enter buildings and perform required activities. A ramp slope should have a 1:12 gradient for independent wheelchair propelling, and a level landing area at both the top and bottom is essential [24]. Six studies [4,6,7,20,21,22] examined wheelchair ramp accessibility. In general, ramps were found to moderately comply with wheelchair accessibility requirements, but there were wide differences between studies. In the United Arab Emirates study, 11 of 17 buildings provided ramps for wheelchair users and the compliance rate was 47% [7]. In the Zimbabwe study, the compliance rate was 38% [4]. The US studies found various compliance rates in different types of public buildings, and as with wheelchair routes, compliance depended greatly on the utility of the buildings. For shopping centres, the compliance rate ranged from 0 to 100% [6], for restaurants it stood at 66% [20], and for food stores it stood at 100% at grocery stores and ranged from 40 to 100% at convenience stores [21,22]. This was further evidence that places which provided basic necessities tended to have higher compliance rates.

Entrances. All 12 studies examined accessibility to building entrances. This area had the highest level of compliance, with all studies finding a rate of over 50%. The mean compliance rate reported in the studies conducted in the United Arab Emirates, Zimbabwe and Turkey were quite similar, 68%, 70% and 79%, respectively [4,7,17], while those conducted in Mexico and the US reported 100% compliance for public buildings in general, and for grocery and convenience stores [6,16]. The other seven studies found a compliance rate of over 50% [3, 15,18–22]. In some studies, it was mentioned that doors were often too heavy, or in the case of double doors, the width of one leaf was less than the ideal width of 32 inches [19,24].

Restrooms. Eight studies examined accessibility to restrooms [3,4,6,7,15–17,20], the compliance rate for which ranged from 33 to 60%. The major problems were narrow doorways, narrow spaces for wheelchair maneuvering, lack of grab bars or reachable hand driers, and lack of designated restrooms.

Elevators. Five of the studies examined accessibility to elevators for wheelchair users [4,6,7,15,23]. In the US studies, the rate of compliance with wheelchair accessibility requirements was reported as 90% in physical fitness facilities and 100% in shopping centres [6,15]. In the Zimbabwe study, the compliance rate was found to be 83% [4], in the United Arab Emirates it was found to be 48% [7], and in the study from Turkey, compliance was 59% [15]. Though these were relatively high compliance rates, they may not have resulted from efforts to meet wheelchair accessibility requirements but rather from the need for spacious elevators in tall buildings that were used by many people. Many of the elevators in Martin's (1987) study, for example, were freight elevators, so their locations were not convenient for wheelchair users or passengers in general. These elevators usually had several unsatisfactory features; for example, they frequently had heavy manual doors, and the height of the controls, the entrances, and the levelling of the elevator to the outside area were often not suitable for wheelchair users.

With advances in technology, features suitable for wheelchair users can be built in, such as automatic doors and spacious room inside the elevators. Issues with space and accessibility were reported to undermine the wheelchair users' participation in community activities [25]. With the added features as mentioned above, it may result in elevators with greater compliance.

Telephones. The United Arab Emirates study found a compliance rate of 67% for telephone facilities [7], while one US study noted that shopping malls successfully met the criteria for telephone accessibility with a compliance rate of 100% [6]. Compliance rate in Istanbul, Turkey was reported to be 33% [17]. Several studies, however, did not include results on telephone accessibility [16,19,21], while others in Zimbabwe, Nigeria, and the US did not assess telephone accessibility [4,18,20].

In one study, it was found that telephone features all met ADA criteria [6]. As there are only a few manufacturers and designers of public telephone equipment, when these few manufacturers adopt similar designs, it could create a high rate of compliance and facilitate use by wheelchair users [6]. However, wheelchair accessibility to public telephone facilities is less essential today given the widespread use of cellular telephones.

Water fountains. Five of the studies assessed accessibility to water fountains. There was a compliance rate of 59% for water fountains in public buildings in general in the United Arab Emirates [7]. The accessibility to water fountains was also found to have a compliance rate of 40% in public buildings in Zimbabwe [4]. In another study, a compliance rate of 100% was found for water fountains in US urban fast food restaurants [20], whereas the compliance rates of US business buildings and US physical fitness centres were 40% and 55%, respectively [3,15].

Other facilities. Other relevant areas of interest were reviewed beside those mentioned above. One study assessed areas such as food courts and dressing rooms in shopping centres [6], while another one assessed restaurant accessibility by examining table height and knee clearance [20]. Another study also evaluated the accessibility of grocery and convenience stores by assessing the height of racks and the width of aisles [21], while the accessibility of churches was also assessed [16].

Most of the studies took into account the year the buildings were constructed [4,6,7,15,17,19] (Table II). Four studies found that recently constructed buildings were more compliant with wheelchair accessibility requirements than were older buildings [4,7,17,19]. First, a study in the USA found a compliance rate of 78% for buildings constructed in 1950s compared to a rate of 97% for buildings constructed in 1980s [19]. Second, the Zimbabwe study [4] found a progressive improvement in the compliance rate over time for buildings constructed between 1930 and 1998 (1930–1950: 36%; 1957–1988: 53%; 1989–1993: 58%; 1994–1998: 62%). Third, the Turkey study [17] reported a compliance rate of 34.5% before 1990, 51% between 1990 and 2000, 74% between 2000 and 2005 and 73% after 2005. The study in United Arab Emirates [7] found an increase in the compliance rate from 47.7% in 1970s to 70% in 2002. All these four studies showed the trend of increasing compliance rate when buildings were constructed in recent years. However, we could not identify a particular time period that the accessibility reached the highest compliance rate. They also did not report the reason why there was

Table II. Compliance rates and year of building construction.

Study	Year of building construction studied	% compliance during the particular year range	Authors' comment
Ahn et al. (1994) [3]	Not reported		
Cardinal and Spaziani (2003) [15]	1968–1981	Not reported	42 out of 50 were remodeled between 1983 and 2001
Crowe et al. (2004) [16]	Not reported		
Evcil (2009) [17]	Before 1990	34.5%	Showed improvement in compliance on wheelchair users accessibility in public buildings
	1990–2000	51%	
	2000–2005	74%	
	After 2005	73%	
Hamzat & Dada (2005) [18]	Not reported		
Martin (1987) [19]	1958 (before ABA was established)	78%	Showed a trend towards increased accessibility in recent years
	1969 (ABA was established)	79%–81%	
	1980–1987 (with revised ABA)	97%	
McClain (2000) [6]	1961 (last renovation done in 1993)	67%/100%/100%	Not commented
	1976 (renovated in 1995)	71%/7%/100%	
	1996	95%/0%/95% (Parking/ramp/entrance)	
McClain et al. (1993) [20]	Not reported		
McClain & Todd (1990) [21]	Not reported		
Mojtahedi et al. (2008) [22]	Not reported		
Rivano-Fischer (2004) [7]	1970–1979	47.7%	Showed an overall compliance increased slightly from 52% for all 17 building constructed in earlier years to 58% for 10 buildings constructed in more recent years between 1994–2002
	1980–1989	40.5%	
	1990–1999	51%	
	2000–2002	70%	
Useh et al. (2001) [4]	1930–1950	36%	Showed a trend of improved compliance for the buildings constructed in the recent years
	1957–1961	53%	
	1971–1988	53%	
	1989–1993	58%	
	1994–1998	62%	

ABA = Architectural Barriers Act.

such an increase. Only in the study conducted in the USA [19], it reported the slight increase in compliance rate during the time periods when the Architectural Barriers Act (ABA) was established and revised.

In two of the studies [6,21], it was encouraging to see that action was taken by building management when they were notified of the identified deficiencies: 25% of the buildings underwent renovation based on the studies' suggestions and recommendations. Thus, professional in this practice area and/or designers such as architects or urban planners can play a key role in advocating the importance of a barrier-free environment to the lives of people with disabilities and thus help to bring about change.

General discussion

With the enforcement of international disability acts, public buildings are undergoing gradual renovations to become more wheelchair accessible. To take entrances as an example: for studies conducted in the USA, the compliance rates increased from the reported $<50\%$ in 1987 [19], 1993 [20], 1994 [3] and 2000 [6], to 90% in 2003 [15], and then to 100% in 2004 [16]. The only exception to this trend was the compliance rate of 100% found in McClain and Todd's study [21], and this was because they investigated the wheelchair accessibility of grocery and convenience stores, in which convenience stores are comparatively a newer developed mode of industry and thus could incorporate newly built facilities. For the old public buildings, they might need to be gradually renovated and modified in order to meet the ADA guidelines.

Nevertheless, the findings of this review show that architectural barriers to wheelchair users persist in public buildings despite wheelchair accessibility being a legal requirement in many countries. Knowledge on the provision of accessibility to wheelchair users among public buildings is inadequate [17]. Although regulations have been set forth, for examples in the USA and Mexico, compliance with these wheelchair accessibility standards is an ongoing concern. According to Crown et al. [16], enforced accessibility guidelines would be necessary to ensure that wheelchair users have the opportunity for social integration and access to community resources.

Five major areas have been identified as important areas of accessibility [24], namely parking, routes, ramps, entrances and restrooms. These areas are essential for wheelchair users to be able to enter buildings and participate in required activities [3], thus it is important that professional in this practice area promote wheelchair accessibility modifications in all of these areas. Because of the gap between needs and reality, professional in this practice area such as rehabilitation professionals, architects, urban planners, interior architects can serve as mediators through which individuals with disabilities can contact and negotiate with authorities. This could include joining public concern groups and holding public conferences together with wheelchair users to promote their needs. Furthermore, professional in this practice area like occupational therapists can provide accessibility advice when new buildings are constructed or existing ones are renovated. To complement the efforts of wheelchair users themselves, their own self-help organisations, as well as all relevant professional in this practice area can act as advocates for persons with disabilities and strive to influence building managers, architects and engineers in order to bring about important changes. Liaisons among these parties are critical to remove present environmental barriers [4]. Advocacy lies in promoting not only the integration of people with disabilities into workplace settings but also their integration into the global community. This latter concern will help to more fully expand the scope of environmental accessibility so that people with disabilities can approach public buildings and settings, enter them, operate in them, and use them safely and with dignity [2,3].

As long as these facilities are not completely wheelchair accessible, for example in Hong Kong, professional in this practice area will have to assist clients to access buildings by providing direct services or alternative solutions to alleviate specific problems, such as overcoming barriers to parking or travelling through buildings using selected routes built with suitable ramps and accessible entrances [19]. Community integration programmes can include social outings for groups of wheelchair users that have different objectives, such as instructing individuals how to use bank facilities or public transportation. Through such outings, therapists can expose clients to the different architectural barriers and help them to find ways of overcoming these barriers.

Rehabilitation technology has greatly improved the quality of wheelchairs, but the value of even a state-of-the-art, well-fitted wheelchair is greatly diminished when wheelchair access to buildings is inadequate. Therefore, wheelchair accessibility must be improved alongside the development of high-tech assistive technology so that wheelchair users can fully participate in the community. To achieve this goal, professional in this practice area must increase their own involvement in the early stages of building construction and modification [18].

Community integration involves multiple concerns, including environmental, psychological and social factors. In terms of environmental factors, restrictions on mobility may be the most common

way of handicapping individuals with disabilities [13,18]. To create a barrier-free environment is not only important for wheelchair users but also for other people with disabilities, as well as the elderly population, pregnant women and mothers with infants.

Conclusion

This review is limited by the few search terms used and the small number of available studies. However, it has provided an overview of the current state of wheelchair accessibility development in public buildings. It was found that newly developed facilities had often already adopted the requirements stated in international disability acts, while for old buildings, gradual modifications were being introduced to meet the requirements. Professional in this practice area have the important task of helping to improve building users' lives through promoting the construction of barrier-free environments as well as through assisting clients to overcome existing barriers. Besides highlighting the need for all professional to develop strategies and clinical programmes to work in this direction, this review may also encourage researchers to review wheelchair accessibility in other buildings and in more countries as well as develop the needs of wheelchair users in terms of their perception of accessing and using the public buildings to gain more understanding on the building modification priorities. By knowing what wheelchair users think should be the priorities, builders and administrators will be better able to create barrier-free environments.

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