DISABILITY ACCESS AUDIT OF PUBLIC SERVICE FACILITIES

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Abstract

The present investigation adopts cross-sectional comparative case study design to undertake disability access audit on a sample of six representative public utility buildings located in the sprawling campus of All India Institute of Speech and Hearing, Ministry of Health and Family Welfare, Government of India, located in Mysore, Karnataka. After field trials, group discussions, on-site observations, interviews with unaffected and affected users, a final version of the 117-item 'Disability Access Audit Checklist' (DAAC) distributed across 15 domains was developed exclusively for data collection in this study. It was used by three independent and exclusively trained raters in the audit team. Results paint a rather grim picture on available accessibility for persons with disabilities at the studied institute. At the basic or beginning baseline level, it is seen that there is limited structural access score measuring no more than 29.2 % for all the target buildings included in this study. Even wherein few facilities like ramps, railings, furniture, lifts, corridors, lighting or flooring surfaces are available, their accessibility score drops markedly by almost a third to 9.1 % when adequacy criteria is adopted to demarcate 'genuine accessibility'. In conclusion, the study admits that the present endeavor is merely a beginning baseline benchmark for the oncoming alterations that need to be carried out in the relentless pursuit of universal design to provide greater accessibility for persons with disabilities as per the provisions mandated by the United Nations Convention on Rights for Persons with Disabilities (UNCRPD).

The numbers and magnitude of disability in any given constituency continues to be a matter for dispute owing to disparities in definition or their identification. There are people with disabilities affected since birth. Others acquire them later in life. Ageing increases the risk of disability. Some are temporarily disabled, many others are permanently disabled. There are also visible and invisible disabilities. Some are marginally affected, others are severely disabled (Mahal, Debroy and Bhandari, 2010; Venkatesan, 2004; Fujiura and Rutkowski-Kmitta, 2001). Historically persons with disabilities were viewed as a misfortune of their own making. It was thought that the sins, follies or crimes committed in their previous birth were punished by divine forces as disability in the present birth. This 'magico-religious perspective' (Braddock and Parish, 2001) was later replaced by another 'medical model' to explain human disabilities as the consequence of insults in present life rather than retaliatory machinations of errors committed in ones past life. Thus, it was explained, how one becomes disabled owing to a faulty chromosome or an attack of brain fever. In recent times, both, these view points are refuted (Miller, Vandome and Mc Brewster, 2010; Albrecht, Seelman and Bury, 2001; Brisenden, 1998).

In a new revolutionary perspective following human rights movements, there has emerged the 'social model'. Rather than viewing human disability as the making or misfortune of the affected individual (Oliver and Sapey, 2006; Stroman, 2003; Fleischer and Frieda, 2001; 1998; Shapiro, 1993), it is seen as the intended or unwitting consequence of several barriers imposed by the larger system on the affected persons (Silvers, 2010; Fougeyrollas and Beauregard, 2001). The argument is that society is created and operated in a way without taking into account people who do not meet its perceived norm. Society excludes such people and thereby disables them (Ormerod, 2005). If one follows this model, use of the term 'people with disabilities' makes no sense. It views 'barriers' and not the individual per se as the source of the disability. For example, if a dwarf (vertically challenged) cannot operate a switch board at a height, the handicap is more from location of the board than in the individual. The barriers need not be physical alone. It could be attitudinal, systematic and institutionalized. The understanding that barriers are socially created and operated implies that they must be identified and tackled at their source rather than leave them as incidental or insignificant. Such barriers may be present in diverse areas including education, employment, urban design, transport, tourism and travel, leisure and recreation, housing, etc (Burnett and Bender-Baker, 2001).

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egalitarian equality,empowerment, and provision of opportunities to live life to the fullest extent. This approach insists on changes required in society in terms of attitude, supports, information, physical structures of buildings and community at large. This perspective has impacted many international conventions, laws, agreements or charters like Biwako Millennium Framework (BMF)(2003-2012), United Nations Convention on Rights of Persons with Disabilities (UNCRPD), Declaration on Rights of Disabled Persons (2006-07), Salamanca Statement and Framework for Action on Special Needs Education (1994), Standard Rules on Equalization of Opportunities for Persons with Disabilities (1993), Disability Discrimination Act or its newer form as Equality Act (2010) in United Kingdom, Americans with Disabilities Act (2009), Disability Discrimination Act in Australia, and Indian counterpart in Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995; or its ongoing revision as the new rights based Persons with Disabilities Act (2011) (Bagenstos, 2009; Pandey, Chirimar and D'Souza, 2005; Perry, 2004; Brading and Curtis, 2000). Some key terms operationalized by these revised views on persons with disabilities are: 'Universal Design' (Preiser and Ostroff, 2001; Aslaksen et al. 1997), 'Inclusive Design' (Gulatee, 2006; Maisel, 2006; Greed, 2003), 'Access Audit', 'Access Appraisal' (Sawyer and Bright, 2007), 'Visitability' (Cummings et al, 2008; Di Mento et al. 2006), 'Barrier Free Design' (Graafmans and Ikonen-Graafmans, 2003; Kose, 1998) and 'Tourism Access' (Deyer, 2005; Drill, 2005; Shelton and Tucker, 2005).

Need and Focus of Present Study

Among the 50 notified Articles in final text of UNCRPD, for which India is a signatory, 'accessibility' is earmarked as priority area. To ensure its timely implementation in all institutes/departments under its jurisdiction, an official notification (Z.28015/33/2009-MH; dated 10th June, 2010) was issued from Director General of Health Services (Medical Hospital Section-II) to audit and ameliorate disability access at all public service facilities.

Accessibility refers to the strength and degree to which persons with disability are provided for and enabled to live independently and participate in all aspects of life. Appropriate measures are mandated for and by necessary competent authorities to ensure their access, on an equal basis with others, to the physical environment, transportation, information, and communication, including such technologies and systems, other

facilities and services open or provided to the public in urban and rural areas. These measures include identification and elimination of obstacles and barriers to accessibility. It applies inter alia to buildings, roads, transportation and other indoor and outdoor facilities, including schools, housing, medical facilities and workplaces; as well as information, communications and other electronic and emergency services. It also applies to

(a) developing, promulgating and monitoring implementation of minimum standards and guidelines for accessibility of facilities and services open or provided to the public;

(b) ensuring that private entities that offer facilities and services are open or provided to the public take into account all aspects of accessibility for persons with disabilities;

(c) providing training for stakeholders on accessibility issues facing persons with disabilities;

(d) providing in buildings and other facilities open to public signage in Braille and in easy-to-read and understand forms;

(e) providing forms of live assistance and intermediaries, including guides, readers and professional sign language interpreters to facilitate access to buildings and other facilities open to public;

(f) promoting other appropriate forms of assistance and support to persons with disabilities to ensure their access to information;

(g) promoting access for persons with disabilities to new information and communications technologies and systems, including the Internet;

(h) promote the design, development, production and distribution of accessible information and communications technologies and systems at an early stage, so that these technologies and systems become accessible at minimum cost.

Access audits fall across levels and types based on depth and scope of their applications. A basic structural level covers merely identification ('presence' or 'absence') of the various anatomical components in the facility under audit, such as, external approaches, entrance and reception, horizontal and vertical circulation, internal spaces and rooms, aids to communication, sanitary facilities, means of escape and evacuation, signage and information, care and management (Holmes-Siedle, 1996). The next level then gets into details on quality, strength, or allied dimensions of the targeted facility features. For example, at base level, one is interested in examining merely the presence or absence of ramps at the entrance of a building.

In next level, if the ramp is present, the audit proceeds to ascertain its quality, slope or gradient, flooring, landing area, edges or corners. Usually, such quantitative audits are measured against standards set up for each facility, such as, door width, position of various panels and manifestations, ramp gradients, corridor widths, height of facilities (toilets, basins or counters), circulation space, light or noise levels, door closing resistance, and water temperature. At still higher levels, access audit could focus on issues beyond structures into functional aspects. For example, a ramp might be cluttered with obstructive flower pots which prevent easy traffic flow of individuals. In short, 'structural' access audits assess presence of the facilities for disabled, 'functional' access audits move a step ahead to assess how well the facilities will work for them. This difference relates also to the way in which such access audits are carried out. The former uses tick-box approach to identify the presence/absence of a facility-which is the scope of this study. The latter involves a far more in-depth study into how the buildings actually work for the disabled people. It combines present picture of the building with recommendations on what should be done to improve it. Disability access audits are also differentiated as: 'open' and 'closed' depending on whether open grounds, play areas, parks, sports arenas, swimming pools or community facilities are involved or whether it covers enclosed spaces, indoor facilities, restaurants, etc.

A literature search on disability access audits came up as relatively unexplored arena of research work in South Asia (Gulatee, 2007; Grant, Highman and Tower, 2005; Holmes-Siedle, 1996). Despite legal enactments and right to access for persons with disabilities, their implementation is just beginning in our country. The lone report on disability access by 'National Center for Promotion of Employment for Disabled People' (NCPEDP) targeted five affiliated colleges under Delhi University covering structural points like toilets, library, classrooms, canteen, auditorium, etc. They used 5-point rating scale to evaluate disability friendliness. The scores were added and averaged for ranking the colleges. Results indicated highest score of 26/40 for one college and least score of 11/40 for another. The study also reported that the heads of these institutions were unaware of the special grants available for making educational institutions more accessible for students with disabilities (NCPEDP, 2008). In another unpublished report, a voluntary organization covered nine areas of access under the jurisdiction of Delhi University: parking, building entrances, general circulation area or

corridors, signages, staircases, ramps, toilets, drinking water facility and emergency evacuation (Samarthyam, 2008).

Objectives

It was the aim of this study (a) to develop a preliminary tool to objectively measure the types or extent of structural accessibility; (b) to undertake an access audit of target public utility services with the developed tool for persons with disability; and, (c) to expand the scope of the access audit for examining areas like physical, quantitative, architectural and structural barriers in the adopted sample case studies of public utility services for persons with disability.

Method

The present investigation adopts cross-sectional comparative multi-case-study design to carry out disability access audit on representative sample of public utility buildings in the sprawling campus of All India Institute of Speech and Hearing (AIISH), Ministry of Health and Family Welfare, Government of India, located in Mysore, Karnataka.

Operational Terms

The term 'access audit' as used in this study refers to the exercise of objectively rating existing building or facility against a given criteria for usability and amenability for persons with disabilities. It covers not only issues related to movement in and around the building; but also, their use by people with disability for whom it is provided (NDA, 2002). 'Access audit' is distinguished from 'audit appraisal'. Access audits are undertaken for existing buildings or environments to examine their current situation and to make recommendations for improvements. 'Access appraisals' are carried out as part of the design process of new buildings or environments to make comments at key stages in development of the design which is not the focus of this study (Sawyer and Bright, 2007).

Another term 'universal design' reflects an 'ambition to create products and environments usable by all people without the need for adaptation or specialized design' (Goldsmith, 2000; Mace et al. 1999). They must be usable regardless of user with abilities or disabilities. Universal design is not quite the same as accessibility for people with disabilities-although the two terms are inter related. Some positive effects, at least in the western world, owing to access mandates in public places are ramps and elevators, as well as stairs, wide corridors and doors, textured walking surfaces, signs with

Braille characters, lowered drinking fountains and sinks, grab bars on walls in bathrooms, and audible crossing signals at street intersections. Thus, proponents of 'universal design' argue that, to be truly universal, environments must be shaped to fit a much broader population including the disabled (Goldsmith, 1997). Although the distinction between 'disability access' and 'universal design' is subtle, it nevertheless leads to different ways of thinking about design, to new principles and outcomes. The seven key principles of universal design with relevance to 'disability access' are as follows:

- Equitable use by all people with diverse abilities without segregating or stigmatizing anyone;

- Flexibility to use in anticipation of range of preferences and skills by providing user adaptability;

- Simple and intuitive use by avoiding unnecessary complexity and making the design comprehensible no matter what are the user's experience, knowledge or language skills;

- Perceptible information means employing multiple modes of expression-graphic, verbal or tactile-to achieve maximum clarity, legibility and speed of comprehension;

- Tolerance for error by minimizing hazards and adverse consequences of accidental or unintended actions;

- Low physical effort by minimizing physiological effort or fatigability in routine use;

- Size and space for approach and use to enable comfortable access, manipulation, use and operation.

Most developed nations have enforced use of 'universal or inclusive design' in any physical development of their cities for purpose of eliminating 'barriers' and enabling 'free access' or 'visitability' to persons with disabilities (Rahim and Abdullah, 2008). There are several western case studies on formal standard access audit systems of different sites (Wu et al, 2004; O'Connor and Robinson, 1999; Sue, 1999), or events (Darcy and Harris, 2003) by agencies for official certification with training programs for town planners, architects, civil engineers, curators, museologists and home builders (Russell, 2003).

Sample

The chosen six building facilities for disability access audit in this study include at AIISH are: Department of Clinical Services (CS); Department of Speech Language Pathology (SLP); Library Information Center (LIC), Academic Block (AB), Administrative Building (ADMN), and Gymkhana Building (GYM) (Table 1). .

Table 1: Comparative Profile of Target Facilities Included in the Present Study.

Variable	CS	SLP	LIC	AB	ADMN	GYM
Date of Construction	25.06.2003	16.10.2004	14.07.2001	10.08.2005	10.10.2005	
Plinth Area (Square Feet)	66000	33000	26000	23000	14000	14000
Parking Lots	1	-	1	-	-	1
Entrances/Exits	2	2	1	1	1	2
Ramps	2	1	1	3	1	1
Layout Maps	1	-	-	-	-	-
Floors	2	3	3	1	2	1
Rooms	179	59	29	27	31	10
Staircases	2	1	1	1	1	1
Lifts	1	1	1	1	1	-
Existing Toilets (HE/SHE)	10	6	2	4	7	5
Modified Toilets	-	-	-	-	-	-
Drinking Water Fountains	7	4	-	2	2	1
Balconies		-	-	-	-	-
Usage Density: Peak	200	150	150	350	75	50
Usage Density: Non- Peak	50	50	25	35	25	15

Clinical Services (CS); Department of Speech Language Pathology (SLP); Library Information Center (LIC), Academic Block (AB), Administrative Building (ADMN), Gymkhana Building (GYM)

The 'Department of Clinical Services' (CS) is nerve center for rendering diagnostic and therapeutic interventions to help-seeking clients by a team of rehabilitation professionals including audiologists, clinical psychologists, medical practitioners (ENT, neurology and pediatrics), occupational therapists, physiotherapists, speech language pathologists and special educators. It houses special clinical units to dispense individual/group counseling, conduct workshops/seminars, or for executing specialized assessment procedures. The average user density ratio per hour during peak and non-peak timings is estimated 200 and 50 for this facility,

The 'Department of Speech Language Pathology' (SLP) is in a multi-storey building with equipment like diagnostic and therapeutic language lab hardware/software. The structure was holding a model 'preschool' (affiliated to another Department of Special Education) at the time of this study. The preparatory school for young children with special needs is a day-care unit combining parent preparation programs in batches during forenoon and afternoon sessions daily. The average user density ratio per hour worked out during peak and non-peak timings at 150 persons and 50 persons respectively.

The 'Library Information Center' (LIC) covers an area of 24000 square feet with ground area housing 'Book Section, Back Volumes of Journals, and Browsing Center', a section for display of new books, current journals and reference books, computer browsing center and spacious reading halls. The building and furniture are purported to be specially designed to meet functional and aesthetic requirements. It is surrounded by green lush lawn, rose garden and ornamental plants. The library is equipped with conventional resources and technology based information services. The average user density ratio per hour during peak and non-peak timings is pegged at 150 and 25 respectively. The 'Academic Block (AB) covers amenities like class rooms, seminar halls, video conferencing system connected across ten centers throughout the country. The average user density ratio per hour during peak and non-peak timings is estimated at 350 and 35 persons respectively. The 'Administrative Building' (ADMN) accommodates ministerial staff. The average user density ratio during peak and non-peak timings is pegged at 75 per hour and 25 per hour respectively. The 'Gymkhana Building' (GYM) is an association of staff and students of the institute. It is a platform for recreational, social and cultural activities. The sports complex has facilities for games, modern gymnasium and library. An open-air theatre is part of this sports complex. There is an auditorium with a seating capacity of 400 with modern audio visual systems. The average user density ratio per hour during peak and non-peak timings is pegged at 50 and 15 persons respectively.

Procedure

The actual access audit process was executed through well planned sequential and inter-related steps. Admittedly, it involved the preparation and participation of many people. Broadly, the audit process was conceptualized and completed in three distinct but inter-related phases between January-March, 2011: (a) Pre-audit Preparation;

(b) Audit Process; and, (c) Post Audit Reporting and Follow up. In the first phase, after obtaining formal permission from competent authorities, indoctrination meetings were held between identified members in the audit team under coordination of the first author. The members in audit team included a clinical psychologist, occupational therapist, and two research assistants including one pursuing doctoral program and another post graduate in psychology. The official photographer was also part of the team. All the team members carried experience in the field of disability rehabilitation for periods ranging 5-25 years and one of the members is physically challenged and has limited mobility.

Standard disability access formats, some computerized, although available and merchandized in the west by accredited auditing firms, are generally need based inventories. They are often copyrighted, and not made available for outside use. Gulatee (2007) addresses accessible homes in a standard checklist along with possible solutions covering home style, entry, porches, hallways, kitchens, bathrooms, and closets. In another three part folder-cum-guide, a set of disability access audit checklists are made available (Feams, 1993). There are location specific access checklists for public buildings and environments (Flanagen et al, 2004), homes (Russell, 2003; Mace et al. 1999), library (Forrest, 2006), tourism and travel (Daniels, Drogin and Wiggins, 2005; Darcy, 2002), Universities or colleges (O'Connor and Robinson, 1999), hotels/ motels (Darcy, 2007), sports stadia or events like Paralympics (Darcy, 2003; Darcy and Harris, 2003). While checklists are often used initially, they must be viewed merely as aides-memoire rather than to be rigidly, routinely or ritually completed. They also serve as a common platform for comparison of various audit points within an estate or a given campus.

Based on literature search and through several in-house group discussions, brain storming, field observation and interviewing of clients with disabilities, an initial 'Disability Access Audit Checklist' was drawn with item pool of 96 items spread over 15 domains. After field trials, continued group discussions, on-site observations, interviews with non-affected and affected users, final version of the tool with 117 items distributed across 15 domains was developed. Care was taken to ensure that each item in the checklist was worded in observable and measurable terms. An access audit kit or tool box was also prepared comprising scoring sheets, measurement conversion tables, ruler, torch,

string, compass, calculator, spring balance, digital camera, pressure gauge, light meter, sound meter, temperature recording devices, grad level to measure gradients of ramps, etc. (IPF, 2005). The scoring format involved marking each item as 'present' or 'absent'. If 'present', it was to be marked further as 'present adequately' or otherwise. Scores were nominated 'zero' for 'absent', 'one' for 'present' and 'two' for the feature 'present adequately' (Table 2).

Results

The overall results in terms of score as given by the three independent observers for all the six targeted access audit points included in the present study show an obtained mean score of 410 out of 1404 (Mean: 29.2 %). This implies a limited structural access of the buildings for persons with disabilities. On a further analysis of these obtained scores only for items 'present', it

is seen that the access score drops to 128 out of 1404 marks (9.1 %). Therefore, truly speaking, 'genuine accessibility' of those structures in terms of they being 'present adequately' is found to be only 282 out of 1404 (20.1 %) (Table 2).

Among the six building structures audited in this study, the 'Library Information Center' (LIC) (Mean Score: 77 out of 234; 32.9 %), and another facility marked as 'Clinical Services' (Mean Score: 76 out of 234; 32.5 %) is 'more accessible' compared to 'Administrative Building' (Mean Score: 67 out of 234; 28.6 %), 'Academic Block' (Mean Score: 67 out of 234; 28.6 %), and 'Speech Language Pathology Building' (Mean Score: 66 out of 234; 28.2 %). The 'Gymkhana' (Mean Score: 57 out of 234; 24.4 %) is least accessible for persons with disabilities. These trends are similar even after discounting the 'merely present' factor.

Table 2: *Mean Raw Scores across various Audit Points.*

		Access Audit Scores						
Code	Buildings	Max	Obtained	%	P	%	PA	%
A	Clinical Services	234	76	32.5	24	10.3	52	22.2
B	Speech Language Pathology	234	66	28.2	22	9.4	44	18.8
C	Library Information Center	234	77	32.9	25	10.7	52	22.2
D	Academic Block	234	67	28.6	23	9.8	44	18.8
E	Administrative Building	234	67	28.6	19	8.1	48	20.5
F	Gymkhana Building	234	57	24.4	15	6.4	42	17.9
	Overall	1404	410	29.2	128	9.1	282	20.1

(P: Present; PA: Present Adequately)

A second level analysis of disability access scores across the 15 audit locations in the six facilities (Table 3) shows that all buildings have adequate corridors with maximum width to enable wheel chair movement and without obstructions (Mean Score: 23 out of 24; 95.8 %), followed by 'seating systems' with arm rests, proper heights, or space for wheel chair bound (Mean Score Range: 31-44 out of 72; Percentage Range: 43.1-61.1 %), 'elevators/lifts' (Mean Score Range: 74-77 out of 168; Percentage Range: 44.0-45.8 %) with no obstacles in landing area, or non slippery lift floor surface. However, even in these moderate scoring items, for example, it is noted that lifts/elevators do not have 'audio system', 'space inside to facilitate wheel chair maneuverability', 'grab bars in the lift', 'lift door transparency', etc. Low scoring items on access for persons with disability cutting across all the audited buildings in this study include 'counters' (Mean Score: 9 out of 48; Percentage Range: 18.8 %) and 'canteen, cafeteria and food courts' (Mean Score: 5 out of 48; Percentage Range: 10.4 %). The 'counters' are reported as not having an 'adjustable height', 'lacking in across communicability', having no 'dropped reception desk area for wheelchair

users', or a 'place to stand walking aids by the reception counter'. Similarly, the 'canteen, cafeteria and food courts' lacks 'adjustable height for communication across counters' and 'proper lighting system'.

It is also seen that at present all the buildings have received 'nil' score for 'designated parking lots', 'toilets, wash rooms, change rooms and bathrooms' and 'evacuation, emergency and egress facilities' meant exclusively for persons with disabilities. There are no exclusive earmarked parking lots labeled for disabled in the campus. Further, the mean distance between the places identified for parking are far away from the main buildings and posing challenges for persons with mobility impairment. There is no designated drop off points and the flooring remains uneven between parking lot and the main buildings. The 'public telephones, electrical fittings and fixtures' audited across buildings also receive 'nil' scores either for want of such a facility, or the available official ones having raised number boards or not having knee space or being amenable to wheel chair users, or individuals hard of hearing. The need and importance of 'evacuation, emergency and

egress facilities' has not yet been recognized as evidenced by the nil score allotted across all buildings for the absence of 'safe refuge area', 'audible or visual fire alarm systems', 'safety protocol', 'evacuation chairs' at times of emergency. Even for the apparently available disability access amenities at 'entrance and reception area' (Mean Score Range: 123-138 out of 408; Percentage Range: 30.2-33.8 %) of the buildings under audit, it is important to note that there are several shortcomings. The ramps are unavailable on both sides of entrance, or they are measured to have steep gradients, lack railings on one or both sides, have sharp and unprotected edges, have obstructive decorative plants or there is no stand for wheelchair or crutches, or the steps in the stairways have nosing. The insides of the building have no signages. There are no exclusive toilets for the disabled (Table 3 & 4).
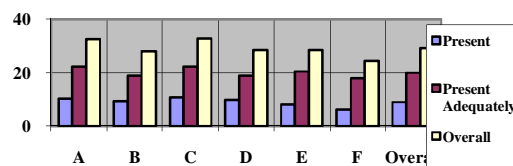

Table 3: Mean Raw Scores across Examiners for various Audit Points.

Location	Items	Max Marks	Rater	Audit Points						Total Score	Access %
				A	B	C	D	E	F		
Entrance & Reception Area	34	68	ONE	24	22	24	22	22	24	138	33.8
			TWO	24	20	22	20	20	22	128	31.4
			THREE	20	19	23	20	20	21	123	30.2
Insides/ Interna7	7	14	ONE	5	5	6	3	3	7	29	34.5
			TWO	5	5	6	3	3	7	29	34.5
			THREE	5	5	6	3	3	4	26	30.9
Elevators/ Lifts	14	28	ONE	14	17	14	14	18	-	77	45.8
			TWO	13	16	14	14	17	-	74	44.0
			THREE	14	17	13	14	18	-	76	45.2
Parking Lots	6	12	ONE	-	-	-	-	-	-	-	-
			TWO	-	-	-	-	-	-	-	-
			THREE	-	-	2	-	-	-	2	2.7
Public Telephone/ Electrical Fittings & Fixtures	6	12	ONE	-	-	-	-	-	-	-	-
			TWO	-	-	-	-	-	-	-	-
			THREE	-	-	-	-	-	-	-	-
Counters	4	8	ONE	1	-	4	-	-	4	9	18.8
			TWO	1	-	4	-	-	4	9	18.8
			THREE	1	-	4	-	-	4	9	18.8
Toilets/ Wash or Change Rooms/ Bathrooms	11	22	ONE	-	-	-	-	-	-	-	-
			TWO	-	-	-	-	-	-	-	-
			THREE	-	-	-	-	-	-	-	-
Drinking Water Facilities	3	6	ONE	1	1	1	3	1	1	8	22.2
			TWO	1	1	1	3	1	1	8	22.2
			THREE	2	1	-	3	1	-	7	19.4
Canteen, Cafeterias & Food Courts	4	8	ONE	5	-	-	-	-	-	5	10.4
			TWO	5	-	-	-	-	-	5	10.4
			THREE	5	-	-	-	-	-	5	10.4
Stairways	9	18	ONE	9	9	10	10	9	10	57	52.8
			TWO	9	9	10	10	9	10	57	52.8
			THREE	8	8	10	10	6	7	49	45.4
Corridors	2	4	ONE	3	4	4	4	4	4	23	95.8
			TWO	3	4	4	4	4	4	23	95.8
			THREE	4	3	4	4	4	4	23	95.8
Seating Systems	6	12	ONE	7	7	8	9	6	7	44	61.1
			TWO	7	7	8	9	6	7	44	61.1
			THREE	7	6	5	4	5	4	31	43.1
Flooring/ Surfaces	3	6	ONE	2	2	4	1	2	-	11	30.6
			TWO	2	2	4	1	2	-	11	30.6
			THREE	2	2	4	2	2	-	12	33.3
Lighting, Alarms & Acoustics	3	6	ONE	2	2	2	2	2	2	12	33.3
			TWO	2	2	2	2	2	2	12	33.3
			THREE	2	2	2	2	2	2	12	33.3
Evacuation, Emergency & Egress Facility	5	10	ONE	-	-	-	-	-	-	-	-
			TWO	-	-	-	-	-	-	-	-
			THREE	-	-	-	-	-	-	-	-
Total	117	234	ONE	73	69	77	68	67	59	413	29.4
			TWO	72	66	75	66	64	57	400	28.5
			THREE	70	63	73	62	61	46	375	26.7

(A: Clinical Services: B: Speech Language Pathology; C: Library Information Center; D: Academic Block: E: Administrative Building; F: Gymkhana Building)

Table 4: *Summary Table of Items in Final Version of Disability Access Audit Checklist*

Item	ENTRANCE
1	Color of entrance stands out
2	Alternative Entrance
3	Are there steps: If 'YES' how many
4	Are there steps in contrast color
5	Do the steps have railings
6	Railings on one side
7	Railings on both sides
8	Adjustable Height of Railings(Multiple)
9	Is there a ramp?
10	Ramp on one side
11	Ramp on both sides
12	Gradient/Slope of Ramp
13	Railings for Ramp on one side
14	Railings for Ramp on both side
15	Edge Protection for Ramp
16	Edge Protection for Ramp on one side
17	Edge Protection for Ramp on both side
18	Ramps within the building
19	Turnings in ramp
20	Is there intermediate landing area at the turnings
21	Surface of ramp
22	Is there landing area in top and bottom of the ramp
23	Width of Entrance
24	Type of Door: Circle Type: Automatic/Swing/Sliding; Door Closers/Bi-Divided/Unidirectional/Revolving/Bidirectional/Push-Pull Type
25	Door Handle: Circle Type: Lever/Knob/Latch/No Handle
26	Height of Door Handle
27	Any Decorations at Entrance: Permanent/Temporary
28	Wheel-chair Stand
29	Crutches Stand
30	Firm and even paths leading to Entrance from Parking Point
31	Tactile surfaces near curbs, doors and steps
32	Signs at entrance in Braille
33	Entrance door width
34	Layout map of the building
	INSIDES
1	Internal Doors width
2	Tactile Signage
3	Internal/External Signage is easy to read
4	Colors of walls contrasting doors and door frames
5	Control switch boards contrast doors & door frames
6	Height of Switch Boards
7	Transparent door system (vision panels)
	ELEVATOR/LIFTS
1	Entrance lead conveniently to lifts/elevators?
2	Audio system (Talking Lift) Installed
3	Space inside lift enough for wheel chair maneuverability?
4	Height of Call Buttons inside/outside Lift
5	Grab bars in the lift
6	Emergency Intercom in Lift
7	Lift Floor Non-Slippery
8	Opening/Closing Intervals Long Enough
9	Sufficiency of Entrance Landing Area
10	No obstacles in Landing Area
11	Availability of Audio Emergency Exit
12	Availability of Visual Emergency Exit
13	Lift area
14	Lift door transparency
	PARKING LOTS
1	Availability of Lot for Disabled
2	Distances between Lot and Building
3	Signboard Available indicating Parking for Disabled
4	Indicative/Directional Sign Boards in contrast colors
5	Flooring at Park Lot: Gravel/Smoothened/Anti-Skid/Sand/Others
6	Specific car drop off points
	PUBLIC TELEPHONE/ELECTRICAL FITTINGS & FIXTURES
1	Availability of Telephone
2	Height amenable for wheel chair Bound/Low height

3	*Phone with Hearing Aid*
4	*Knee Space Available*
5	*Number board on phone raised*
6	*Text phone or type talk phone*
	COUNTERS
1	*Height of Counters for persons with disability*
2	*Communicability across*
3	*Dropped reception desk area for wheelchair users*
4	*Place to stand walking aids by reception & wash basins*
	TOILETS, WASH OR CHANGE ROOMS & BATHROOMS
1	*Separate toilets made available*
2	*Entrance accessible*
3	*Door width amenable for wheel chair*
4	*Floor space for Maneuverability*
5	*Faucets/Flush*
6	*Type of toilet: Indian/Western/Both*
7	*Height of Toilet Seat*
8	*Wash Basins*
9	*Doors lockable form in-released from out in emergency*
10	*Grab Bars; Slip Resistant/Load Bearing*
11	*Gender based toilet system*
	DRINKING WATER FACILITIES
1	*Water Faucet Height*
2	*Floor Area Dry*
3	*Mirrors at size and height*
	CANTEENS, CAFETERIAS & FOOD COURTS
1	*Table/Chair Provided*
2	*Leg Clearance Space Below Table*
3	*Is there proper lighting system*
4	*Counters height communicability across*
	STAIRWAYS
1	*Handrails Available*
2	*Height of Handrails*
3	*Grip available on the rail between for safe use?*
4	*Will it support at any point*
5	*Handrails continuous*
6	*No Nosing in stairs*
7	*Height of steps*
8	*Are there stairs in contrast color*
9	*Non slippery surface of stairs*
	CORRIDORS
1	*Maximum width to Enables wheel chair*
2	*No obstructions in the corridors*
	SEATING SYSTEMS
1	*Seating Heights*
2	*Supported with Arm Rests*
3	*No bucket type seating*
4	*Is seating system contrast in color*
5	*Reserved seats for PWD*
6	*Empty space for wheelchair bound*
	FLOORING SURFACES
1	*Slip resistant/Anti-Skip*
2	*No Gravel, Uneven & Carpeted*
3	*Tactile Ground Surface Indicators*
	LIGHTINGS, ALARMS & ACOUSTICS
1	*Visibility Friendly*
2	*Emergency Alarms*
3	*Sound Acoustics*
	EVACUATION, EMERGENCY & EGRESS FACILITY
1	*Safe refuge areas*
2	*Audible Fire Alarms*
3	*Visual Fire Alarms*
4	*Protocol in place for emergency*
5	*Evacuation chairs for emergency*

Inter-Observer Reliability: To determine the extent of agreement or concordance between the three raters using the 'Disability Access Audit Checklist' for the various points included in this study, inter-correlations between their ratings was estimated as index of reliability or consistency (Table 4). The results show consistently high inter-observer correlation coefficient ranging between 0.975-0.999. The Cronbach's alpha correlation coefficients of

reliability of the sub-scales vary around 0.98 (range: 0.97-0.99) and internal consistency of the total scale is 0.98. This implies that the scales are not independent of one another.

Table 5: *Inter-Correlation Matrix across Examiners for various Audit Points.*

Buildings	Raters		
	A-B	B-C	C-A
Clinical Services	0.993	0.999	0.989
Speech Language Pathology	0.995	0.999	0.996
Library Information Center	0.989	0.998	0.985
Academic Block	0.978	0.998	0.975
Administrative Building	0.993	0.999	0.990
Gymkhana Building	0.987	0.999	0.981

In sum, the result of the present investigation paints a rather grim picture on accessibility for persons with disabilities in the studied institute. At the first level, it is seen that there is limited structural access score measuring 29.2 % for all target buildings included in this study. Even wherein few facilities like ramps, railings, furniture, lifts, corridors, lighting or flooring surfaces are available, their access score drops markedly to 9.1 % when adequacy criteria is adopted to demarcate 'genuine accessibility'. It is also seen that at present all the buildings have no 'designated parking lots', 'toilets, wash rooms, change rooms and bathrooms' and 'evacuation, emergency and egress facilities' exclusively for persons with disabilities. In conclusion, the present endeavor must be viewed as a beginning baseline or benchmark and harbinger for the oncoming alterations that is needed to be carried out in the institute and later throughout the country in the relentless pursuit of universal design to provide greater access for persons with disabilities.

Acknowledgements

References

Albrecht, G.L., Seelman, K.D., & Bury, M. (Eds.). (2001). *Handbook of Disability Studies.* California: Sage Publications. Americans with Disabilities Act (2009). Washington, DC: US Department of Justice http://www.ada.gov/new.htm [accessed 26 November 2012]

Aslaksen, F., Bergh, S., Bringa, O. R., & Heggem, E. K. (1997). *Universal Design: Planning and Design for All.* Oslo: The Norwegian State Council on Disability.

Bagenstos, S. (2009). *Law and the Contradictions of the Disability Rights Movement.* London: Yale University Press.

Biwako Millennium Framework For Action Towards An Inclusive, Barrier Free And Rights Based Society For Persons With Disabilities In Asia And The Pacific. (2003-2012). Economic and Social Commission for Asia and Pacific, Geneva: United Nations Economic and Social Council, available at: http://www.unescap.org/esid/psis/disability/index.asp [accessed 26 November 2012].

Braddock, D.L., & Parish, S.L. (2001). 'An Institutional History of Disability'. Chapter 1 under Part 1: *The Shaping of Disability Studies as a Field.* In Albrecht, G. L., Seelman, K. D., & Bury, M. (Eds.). Handbook of Disability Studies. California: Sage Publications. Pp. 11-68.

Brading, J., & Curtis, J. (2000). *Disability Discrimination: A Practical Guide to the New Law.* London: Kogan Page Limited.

Bright, K., & Sawyer, A. (2004). *The Access Manual: Auditing and Managing Inclusive Built Environments.* Oxford: Blackwell.

Brisenden, S. (1998). Independent Living and the Medical Model of Disability. Chapter 2 under Part 1: From Activism to Academia. In Shakespeare, T. (Ed.). *The Disability Reader: Social Science Perspective.* London: Continuum. Pp. 20-27.

Burnett, J. J., & Bender-Baker, H. (2001). Assessing the Travel–Related Behaviors of the Mobility–Disabled Consumer. *Journal of Travel Research,* 40(1): 4-11.

Cummings, S., Oreskovich, J., Ravesloot, C., Seekins, T., & Traci, M.A. (2008). Assessing Environmental Factors that Affect Disability: Establishing a baseline of visitability in a rural state. *Rehabilitation Psychology,* 53(1): 80-84.

Daniels, M. J., Drogin, R.E.B., & Wiggins, B. P. (2005). Travel Tales: An Interpretive Analysis of Constraints and Negotiations to Pleasure Travel as Experienced by Persons with Physical Disabilities. *Tourism Management*, 26(6): 919-930.

Darcy, S. (2002). Marginalized participation: Physical disability, high support needs and tourism. *Journal of Hospitality and Tourism Management,* 9 (1): 61-72.

Darcy, S. (2003). The politics of disability and access: the Sydney 2000 Games experience. *Disability & Society*, 18 (6): 737-757.

Darcy, S. (2007). *A Methodology for Testing Accessible Accommodation Information Provision Formats.* Sydney: University of Technology. Pp. 1-18.

Darcy, S., & Harris R. (2003). Inclusive and Accessible Special Event Planning: An

Australian Perspective. *Event Management.* 8(1): 39-47

Declaration on the Rights of Disabled Persons: Proclaimed by General Assembly resolution 3447 (xxx) of 9.12.1975 (2006-07), available at:

http://www2.ohchr.org/english/law/res3447.htm [accessed 26 November 2012]

Deyer, J.W. (2005). Decoding accessible design terms. *Paraplegia News,* 59(1): 24-28.

Di Mento, J.F.C.; Geis, G., Kaminshi, S.E., & Mazumdar, S. (2006). The viability of voluntary visitability: A case study of Irvine's approach. *Journal of Disability Policy Studies,* 17(1): 49-56.

Drill, H. (2005). A closer look: A move toward accessible hotels. *Paraplegia News,* 59(1): 53-55.

Feams, D. (1993). *Access Audits: A Guide and Checklist for Appraising the Accessibility of Buildings for Disabled Users.* London: Center for Accessible Environments

Flanagen, S., Cook, G., Embleton, J., Bright, K., & Selbekk, L. (2004). *Buildings for all to Use: Improving the Accessibility of Public Buildings and Environments.* London, UK: CIRIA

Fleischer, D.Z, & Frieda, Z. (2001). *The Disability Rights Movement: From Charity to Confrontation. Philadelphia:* Temple University Press,

Fleischer, D.Z., & Frieda, Z. (1998). Disability Rights. *Social Policy* 28(1): 52-55.

Forrest, M.E.S. (2006). Towards an Accessible Academic Library: Using the IFLA checklist. *IFLA Journal*. 32(1): 13-18.

Fougeyrollas, P., & Beauregard, L. (2001). Disability: An Interactive Person-Environment Social Creation. Chapter 6 under Part 1: The Shaping of Disability Studies as a Field. In Albrecht, G. L., Seelman, K. D., & Bury, M. (Eds.). *Handbook of Disability Studies.* California: Sage Publications. Pp. 171-194.

Fujiura, G.T., & Rutkowski-Kmitta, V. (2001). 'Counting Disability'. Chapter 2 under Part 1: The Shaping of Disability Studies as a Field. In Albrecht, G. L., Seelman, K. D., & Bury, M. (Eds.). *Handbook of Disability Studies*. California: Sage Publications. Pp. 69-96.

Fuller, C. (2008). *Fire and Disability 2008: A Special Report*. Cambridge: Workplace Law Publishing

Goldsmith, S. (1997). *Designing for the Disabled: The New Paradigm*. Boston: Architectural Press.

Goldsmith, S. (2000). *Universal Design: A Manual of Practical Guidance for Architects*. Burlington: Architectural Press.

Graafmans, J.A.M., & Ikonen-Graafmans, T.S.K. (2003). The barrier-free suburb of Marjala in Finland: The city for all - the Marjala Model. *Technology and Disability,* 15(3): 201-204.

Grant, A., Highman, P., & Tower, B. (2005). *Access Audit Handbook: A Planning Tool for Appraising the Accessibility of Public Buildings.* London, UK: Riba Enterprises.

Greed, C. (2003). *Inclusive Urban Design: Public Toilets.* Oxford: Architectural Press.

Gulatee, R. (2006). Designing your accessible home: Working with a specialized architect. *Exceptional Parent,* 36(7): 26.

Gulatee, R. (2007). Creating Accessible Homes: A Checklist for Accessibility. *Exceptional Parent,* 37(11): 52-54.

Holmes,-Siedle, J. (1996). *Barrier Free Design: A Manual for Building Designers and Managers.* Oxford, UK: Butterworth-Heinemann. IPF. (2000). *CIPFA Property Consultants Disability Access Audit Tool Kit: Version 1.1, Users Manual.* Paris: Institute of Public Finance.

Kose, S. (1998). From barrier-free to universal design: An international perspective. *Assistive Technology,* 10(1): 44-50.

Mace, R.L., Pace, R.J., Trachtman, L.H., & Young, L.C. (1999). The universal design home: Are we ready for it? *Physical and Occupational Therapy in Geriatrics,* 16(3-4): 1-18.

Mahal. A., Debroy, B., & Bhandari, L. (Eds.). (2010). *India: Health Report-2010.* New Delhi: Business Standard Books. Pp. 42.

Maisel, J.L. (2006). Toward inclusive housing and neighborhood design: A look at visitability. *Community Development: Journal of the Community Development Society,* 37(3): 26-34.

Miller, F.P., Vandome, A.F., and Mc Brewster, J. (2010). *Medical Model of Disability.* Germany: VDM Publishing.

National Center for Promotion of Employment for Disabled People. (2008). http://www.dnis.org/Employment.pdf [accessed 26 November 2012]. NDA (2002). *Building for Everybody.* Dublin: The National Disability Authority.

O'Connor, U., & Robinson, A. (1999). Accession or Exclusion? University and the disabled student: A Case study of Policy and Practice. *Higher Education Quarterly.* 53(1): 88-103.

Oliver, M., & Sapey, B. (2006). *Social Work with Disabled People.* Palgrave: Macmillan.

Ormerod, M. (2005). Understanding access audits and appraisals: An inclusive design approach. *Journal of Building Appraisal,* 1(1): 140-152

Pandey, S., Chirimar, P., and D'Souza, D. (2005). *Disability And The Law: Human Rights Law Network, India.* New Delhi: Human Rights Law Network.

Perry, P. (2004). *Winning with the Disability Discrimination Act: A Guide for Business.* London: Business Information. Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act. (1995). Government of India: Ministry of Social Justice and Empowerment. http://socialjustice.nic.in/pwdact1995.php [accessed 26 November 2012]

Preiser, W. F. E., & Ostroff, E. (2001). *Universal Design Handbook.* New York: McGraw-Hill.

Rahim, A.A., & Abdullah, F. (2008). Access Audit on Universal Design: The Case of Kota Kinabalu Water Front. *The International Journal of Interdisciplinary Social Sciences,* 4(4): 49-58.

Russell, P. (2003). Access and Achievement or social exclusion?' Are the government's policies working for disabled children and their families. *Children and Society.* 17(3): 215-225.

Samarthyam: National Center for Accessible Environments (2008). *Access Audit Report under the Project Accessible University of Delhi.* New Delhi: Samarthyam Trust.

Sawyer, A. & Bright, K. (2007) 'Access Audits and Appraisals'. In '*The Access Manual: Auditing and Managing Inclusive Built Environments*', Second Edition. Oxford, UK: Blackwell.

Shapiro, J.P. (1993). *No Pity: People with Disabilities Forging a New Civil Rights Movement.* New York: Times Books.

Shelton, E. J., & Tucker, H. (2005). Tourism and disability: issues beyond access. *Tourism Review International*, 8(3): 211-219.

Silvers, A. (2010). An Essay on Modeling: Their Social Model of Disability. Chapter 2 under Part 2 on 'Concepts and Theories of Disability'. In Ralston, D.C., and Justin Ho. (Eds.). *Philosophical Reflections on Disability.* London: Springer. PP. 19-36.

Smith, M. (2006). *Using the Building Regulations: Part M Access*. Burlington: Butterworth-Heinemann.

Standard Rules on Equalization of Opportunities for Persons with Disabilities. (1993). http://www.un.org/documents/ga/res/48/a48r096. htm [accessed 26 November 2012]

Stroman, D. (2003). *The Disability Rights Movement: From Deinstitutionalization to Self-Determination. Maryland;* University Press of America.

Sue, W. (1999). *Access for Disabled People to School Buildings: Management and Design Guide*. London, UK: Publications Centre. The Disability Discrimination Act of United Kingdom. (2007). http://www. legislation.gov.uk/uksi/2007/2405/contents/made [accessed 26 November 2012]

United Nations General Assembly, Convention on the Rights of Persons with Disabilities: Resolution adopted by the General Assembly, 24 January, 2007, A/RES/61/106, available at: http://www.unhcr.org/refworld/docid/45f973632. html [accessed 26 November 2012]

Venkatesan, S. (2004). *Children with Developmental Disabilities: A Training Guide for Parents, Teachers and Caregivers.* New Delhi: Sage..

Waterman, I., & Bell, J.A. (2004). *Disabled Access Facilities: A Practical and Comprehensive guide to a service Provider's duties under Part III of the Disability Discrimination Act 1995.* London: Butterworths.

Wu, S., Lee, A., Koh, W.W.I., Aouad, G., & Fu, C. (2004). An IFC-based space analysis for building accessibility layout for all users, Construction Innovation: Information, *Process, Management,* 4(1): 129 – 141.