J. Disability Stud. 2017, 3(1), 8-14 Research Article

JOURNAL OF DISABILITY STUDIES

Mobility challenges of persons with disabilities in a university in ghana

Evans Kwaku Yayra Ashigbi [1*], Anthony Kwame Danso[2], Eric Paul Tudzi[3], Eric Lawer Torgbenu [1]

1 Assistant Lecturer/ Physiotherapist, Department of Physiotherapy and Rehabilitation Sciences, School of Allied Health Sciences, University of Health and Allied Sciences, Ho- Volta Region, Ghana

2 Senior Lecturer, Department of Building Technology, College of Architecture and Planning, Kwame Nkrumah University of Science and Technology, Kumasi

3 Lecturer, Department of Land Economy, College of Architecture and Planning, Kwame Nkrumah University of Science and Technology, Kumasi

Received on: 19-07-2017 Accepted on: 27-09-2017

ABSTRACT

The passage of the Persons with Disability Act, 2006 (Act 715) in Ghana was hailed by many as a giant step toward achieving universal designs and consequently social inclusion and access to convenient built environments for all. Years after the passage of the Act, this study sought to find the extent to which access to Persons with mobility disabilities had been enhanced at the University of Ghana, Ghana's premier University. A checklist developed from the BS 8300:2010 was used. The simple random and stratified sampling approaches were used to select the structures/ facilities in 2011. This was supplemented by taking measurements and pictures. The study found out that the built environment of the University presented barriers of varying degrees and types to persons with mobility disabilities and that the principles of universal design had not been largely adhered to. Recommendations were accordingly made to help achieve the realization of universal designs and social inclusiveness on the University's campus.

Keywords: Mobility disabilities, persons with disability act 2006, universal designs, built environment, Ghana

INTRODUCTION

Disability was long considered an individual problem and was treated from a medical and charitable viewpoint, but neglected in terms of equal rights for Persons with Disabilities (PWDs). This view has however changed[1,2]. According to Baris and Uslu[3] PWDs face many physical barriers in accessing the built environment. It is therefore necessary that something be done to eliminate physical or social barriers which prevent the participation of PWDs[4].

In Ghana, the Persons with Disability Act[5] (Act 715), the Ghana National Disability Policy[6] and the Constitution of the Republic of Ghana[7] indicate that students with disabilities should not be discriminated against or substantially disadvantaged by educational institutions. Therefore, these educational institutions need to make the needed adjustments to meet the needs of such students. The study accordingly sought to find out the extent to which the built environment of the University of Ghana is friendly to persons with mobility disabilities, and for that matter encourage equality and social inclusion. This was based on the premise that the physical environment is a major barrier that affects persons with mobility disabilities[8] and the assertion by Danso et al[9] that despite the passage of the Persons with Disability Act[5] (Act 715), little had been done by way of the provision of access to PWDs. The study was deemed relevant because of the fact that higher education in Ghana is heavily dependent on the built environment[10], and the University of Ghana is comparatively leading other public higher education institutions in Ghana in Pro PWDs initiatives.

Disability and Education

Disability refers to difficulties encountered in any or all three areas of functioning which are: impairments (affecting body structure and functioning); activity limitations; and participation

*Corresponding Author
Email: ekyayra@uhas.edu.gh

Cite as: E.K.Y. Ashigbi, A.K. Danso, E.P. Tudzi, E.L. Torgbenu. Mobility challenges of persons with disabilities in a university in ghana. *J. Disability Stud.*, **2017**, 3(1), 8-14.

 http://pubs.iscience.in/jds

restrictions[1,2,11]. According to the Equality Act[12], a person has a disability if the person has a physical or mental impairment that has substantial or long term adverse effect on the person's ability to carry out normal day-to-day activities. The UN General Assembly[13] indicated that PWDs make up an estimated 10 per cent of the world's population of whom 80 per cent live in developing countries. Quinn et al.,[14] also added that only 2 per cent of children with disabilities in the developing world receive any education or rehabilitation. These figures are cause for concern.

In previous decades few PWDs attended universities worldwide but currently the number is growing[15]. Although the number of PWDs in universities is increasing, there seems to be a lack of appropriate action at providing equal opportunities for them. Though most tertiary institutions are not well prepared to accommodate them, many universities are already accommodating PWDs and many others will encounter this challenge in the near future[15].

Mobility Disability and the Built Environment

According to the social model of disability, disability results from interactions between individuals and the environment[1, 2], which in turn, consist of complicated arrays of social, cultural, political, climatic, topographic, architectural, and technologic components.[16]

Mobility defined as the ability to walk safely and independently, is a critical requirement for the performance of Activities of Daily Living and Instrumental Activities of Daily Living[17]. Mobility disability according to Clarke et al[18] relates to difficulty in walking and that is the working definition adapted in this paper. Mobility disability can either be in-born or acquired[11] and the nature of the built environment is very critical for persons with such disabilities.

The built environment is generally defined as all buildings, spaces and products that are created or modified by people. It includes schools, workplaces, greenways and transportation systems. The role of accessible, safe, well-designed built environments for optimal health and education is increasingly being recognized[19,20]. This is because surrounding social and physical environments are likely to be consequential for independence and individuals can experience a variety of conditions as they move in and out of different environments over the life course[21]. Uneven or discontinuous sidewalks, heavy human traffic, and inaccessible public transportation, are some of the built environment characteristics that can create barriers for outdoor mobility, which can have spill over effects on a person's ability to function independently in a given community (e.g. access shops, banks, lecture halls and health services). Restrictions placed on mobility and access by a poorly designed environment is more obvious than the institutional discrimination in the lives of PWDs[22].

With respect to students, poorly designed school communities can make it difficult for people with mobility disabilities to move about in their environment. Limitation to mobility has been identified as the most common handicap among PWDs[23]. Hence making university campuses disability friendly will ensure effective participation and social inclusion of persons with various degrees of mobility disabilities.The lack of ramps, barrier-free sidewalks, pedestrian amenities and curb cuts are some of the environmental barriers that can prevent independence[24, 25]. Quality of life is typically diminished among persons who experience restrictions in independence[26, 27]. These make universal designs very relevant in the context of PWDs especially those with mobility disability.

Universal Design

Universal design also known as barrier-free building is the design of products and environments to be usable by all people to the greatest extent possible without the need for adaptation or specialized design[28]. The intent of universal design is to simplify life for everyone by making products, communication and the built environment more usable by as many people as possible at little or no extra cost. Universal design recognizes that people have a range of capabilities and therefore need designs (building and tools) to include them. Universal design is beneficial to people of all ages and abilities. It is predominantly disability focused and uses building codes, regulations and guidelines to achieve designs and features that are usable by people with disabilities. The idea of Universal Design grew out of the recognition that because most of the features needed by people with disabilities were useful to others, there was justification to make their inclusion common practice[29, 30].

Even though it is impossible to accommodate all people all the time, the ultimate objective of Universal design is to consider as many people in diverse situations as possible. As a result, seven principles of Universal design to guide decision makers as they seek to create communities that are as inclusive as possible have been proposed. According to Connell et al,[31] these seven principles are: Equitable Use; Flexibility of use; Simple and intuitive use; Perceptible information; Tolerance for error; Low physical effort; and Size and space for approach and use. According to the Waterloo Region Trends Research Report[28], Universal design has a lot of ethical and economic benefits which include: Increased marketability; Economic cost and benefits; Accessible places are safer places; Inclusion and provision of choices; and Decreased modification and compensation costs.

Best practices in universal design are building practices and procedures that comply with universal design principles and provide affordable design practices that meet the needs of the widest possible range of people who use a facility[32].The report of the UN Secretary General recommends that accessibility should be a central consideration in the emerging post-2015 development agenda, and regarded as an essential investment for sustainable development, advancing accessibility and the progressive removal of barriers to the physical environment, transportation and information and communications, incorporating the principle of universal design[33].

METHODOLOGY

The study essentially involved the use of observation and a checklist (data sheet) that is based on the British Standards (BS

8300:2010) since it is often used as a guide for building design in Ghana in addition to Ghana's National Building Regulations (LI 1630, 1996)[34] which is currently under review[35]. The list of items was prepared to cover various facilities in the University which were to be accessible to PWDs. These were supplemented with some interviews where it was deemed necessary to create further insights. The study was conducted at the main campus of the University of Ghana in 2011.

The accessibility of the built environment (car parks, lecture halls, halls of residence, sanitary areas, libraries, sporting facilities, offices etc) was evaluated using the checklist and their various degrees of restriction determined. Through the simple random and stratified sampling approaches, various lecture halls, halls of residence, sporting facilities and offices among others were observed and the required measurements taken. Car parks, access routes, building entrances, doors, ramps (horizontal circulation), stairs (vertical circulation), surface finishes, signage, and the availability of lifts were checked. The stratification was used purposely to reflect the various categories of properties/ facilities in the Institution. The checklist was used to collect the data since it makes data collection easier and quicker and allows for ease of comparison and analysis. A measuring tape was used to measure the length, width and height of steps, ramps, thresholds, doors, corridors etc. Personal observations were used to buttress information in the checklist. Photographs were used to capture some relevant details of the study where explanations alone were seen to be insufficient and also to supplement written information.

In all, 44 facilities/structures of the University were used for the purpose of this study. These were the Business School; School of Nursing; Degraft Hansen Building; MensahSarbah Hall (main); MensahSarbah Hall Annex A; MensahSarbah Hall Annex B; K.A. B. Jones-Quartey Building; Department of Archaeology; Faculty of Law ; School of Communication Studies; Kwame Nkrumah Institute of African Studies; School of Performing Arts; Information Studies Department; Department of Animal Science; Department of Physics; Department of Chemistry; Frank Torto (New Chemistry) Building; Legon Centre for International Affairs and Diplomatic Studies; Registry (University Administration); Great Hall; Commonwealth Hall; Volta Hall; Central Cafeteria; Athletic Oval; Swimming Pool; Akuafo Hall (main); Akuafo Hall Annex A; Akuafo Hall Annex C; Legon Hall Annex C(Graduate Students Hostel); Balme Library; ICT Centre ; Balme Annex; Department of Statistics; Department of Botany; Centre for Social Policy Studies; Department of Biochemistry (main); Department of Biochemistry (Annex); Department of Food Science and Nutrition; Department of Crop Science; College of Agriculture and Consumer Sciences ; Department of Geography and Resource Management; Computer Science Department; Efua Sutherland Drama Studio; and the University Information Centre.

In all a total of 46 car parks, 40 access routes, 36 entrances, 78 doors, 33 stairs, 47 corridors and 15 sanitary areas (toilets and bathrooms) were surveyed in the structures/ facilities. Also, 42 places were checked for appropriate signage.

RESULTS AND DISCUSSION

From the study, it was observed that almost half (47.8%) of the car parks evaluated were found to be severely restrictive to PWDs. More than half of the access routes (55%) were mildly restrictive to use by PWDs. Only 25% of entrances and 39.7% of the doors evaluated had no restriction and therefore could be easily accessed by PWDs. 66% and 30.3% of the corridors and stairs respectively had no restrictions to the free movement of PWDs. All the sanitary areas examined had restrictions to the free movement of PWDs with 66.7% being severely restrictive to the free movement of study participants and therefore not very safe for their use. Signage was considered appropriate (54.8%) in the facilities surveyed as shown in Table 1.

Table 1: Accessibility of the Built Environment

Facility	%	No Restriction		Mild Restriction		Moderate Restriction		Severe Restriction		Total
		No.	%	No.	%	No.	%	No.	%	
Car Parks	11.9	-	-	9	19.6	15	32.6	22	47.8	46
Access Routes	10.4	7	17.5	22	55	10	25	1	2.5	40
Entrances	9.3	9	25	5	13.9	14	38.9	8	22.2	36
Doors	20.2	31	39.7	13	16.7	28	35.9	6	7.7	78
Vertical Circulation	8.5	10	30.4	8	24.2	7	21.2	8	24.2	33
Horizontal Circulation	12.2	31	66	7	14.9	8	17	1	2.1	47
Signage	10.9	23	54.8	9	21.4	7	16.7	3	7.1	42
Sanitary Areas	3.9	-	-	1	6.7	4	26.7	10	66.6	15
Lift	-	-	-	-	-	-	-	-	-	0

Car Parks and Setting Down Points

Parking spaces in the institution were devoid of any international access symbol and only a few had demarcated bays. These were so narrow that movement of the driver or passenger into and out of the vehicle was restricted. From Table 1, all the 46 car parks surveyed had one form of restriction or the other. Almost all the car park surfaces were uneven which did not allow for the smooth transfer of a passenger or driver into or out of a wheelchair from the parking bay and also requires extra effort by wheelchair users in order to move towards access routes en-route to their destinations (Plate 1).

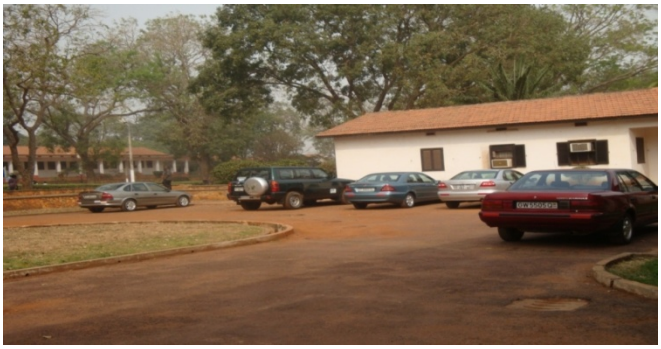

Plate 1: An uneven surface car park without markings at the College of Agriculture and Consumer Sciences

Car parks with weather protection were reserved for only employees of the University and as a result PWDs encountered difficulties in protecting themselves in adverse weather conditions especially when they were alone.

Access routes to and around buildings

The study revealed that all access routes leading to principal entrances were clearly identifiable, adequately lit and slip resistant (See Plate 2). Widths of routes were wide enough, approximately 2000mm as required by (BS8300:2010) to allow two wheelchair users pass by each other and also prevent unnecessary traffic build-up along the access route in emergency situations. From Table 1, only 1 out of the 40 access routes surveyed at the University was severely obstructed.

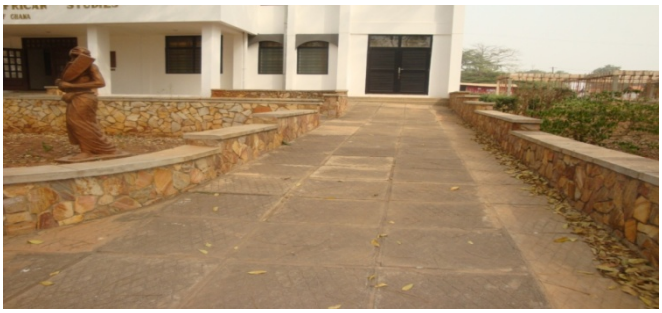

Plate 2: An unobstructed Access Route at the main entrance of the Kwame Nkrumah Institute of African Studies

Ramps

It was observed that most of the new buildings had appropriate slopes for the ramps and minor changes had also been made to some of the old structures to provide ramped access for PWDs in accordance with BS8300:2010. Some of the ramps evaluated however did not have the appropriate slope and therefore made climbing difficult for wheelchair users and mobility impaired individuals (See Plate 3). Widths of a few ramps were wide enough to allow usage by two-way traffic at the same time. Surface finishes of all the ramps observed were slip resistant when wet reducing the risk of wheelchair users and ambulant PWDs slipping.

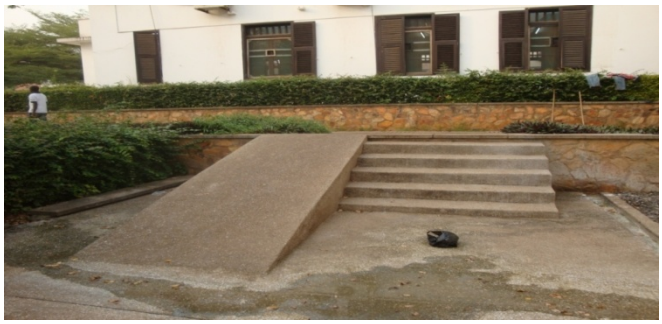

Plate 3: A steep and narrow ramp at Legon Hall

90 % of ramps did not have handrails to support ambulant PWDs and wheelchair users. The few provided could also not be griped easily. As a result ascent and descent of ramps was strenuous to PWDs using ramps. All the ramps observed were provided with landings giving PWDs adequate space to stop on landings, open and pass through doors without facing the risk of rolling down ramps. Ramps were located at the main entrance of buildings with the exception of the Balme Library which had its ramp at the back even though the building is mainly accessed from the front. Most users of the facility were therefore oblivious of the presence of the ramp.

Building entrances

The study revealed that most entrances at the University had steps (as seen in Plate 4). Some of the entrances had their changes in levels (steps) bridged by the use of ramps thereby making them accessible to wheelchair users. Door widths were 1800mm wide and mostly left open for easy access into the main halls of residence. Door controls were located at suitable heights for reach by all users and could easily be operated by persons with limited strength. Furthermore there was no revolving door in the University which could cause harm to wheelchair users, visually impaired users and people using canes or crutches.

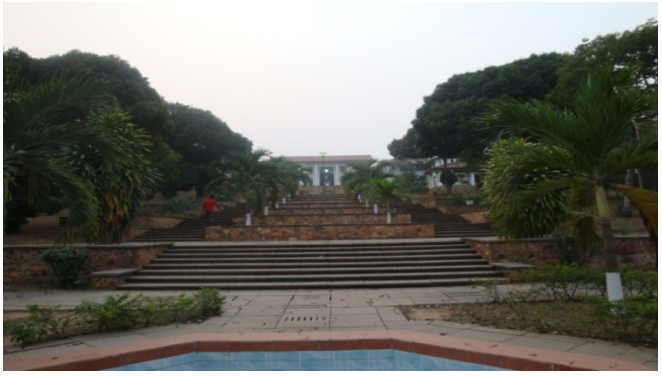

Plate 4: Stepped Access at the Entrance of Commonwealth Hall

Doors

From the observations and measurements, all manual door furniture (handles, locks, pulls) were at approximate heights of 1000mm (BS 8300:2010), within reach of wheelchair users and ambulant PWDs, and could be griped easily and hence operated without much effort. Doors along corridors did not obstruct users since all doors opened inwards.

Horizontal and Vertical Circulation

The study revealed that most corridors were spacious with widths of more than 1500mm and were therefore wide enough to allow 180 degree turns by wheelchair users. Obstructions and projections such as drying lines, dustbins and concrete pillars in corridors were very common.

All storey buildings surveyed at the University had staircases as a means of access to their various floors. Staircases in the various buildings could be clearly identified. From the observations and measurements, all staircases were wider than the minimum width of 900mm with landings at the top and bottom of stairs servings as rest points and points of turn. Nosing of some stairs was not flush or round to prevent the risk of tripping but the surfaces of the treads were non-slip. All stairs were fitted with handrails which extended beyond the first and last step and could be griped easily to maintain balance of the individual before ascent or descent. In most of the relatively new buildings, handrails were continuous at both sides throughout the full length of the stairs to serve as a support for people with mobility impairments. As a public facility, buildings in the University had low risers that were 12 but less than 16 to avoid straining legs and knees of the user. This ensures the equitability and flexibility of use of these buildings (Connell, 1997)[28] and also requires low physical effort from all users especially PWDs since these facilities can be assessed effectively, efficiently and comfortably with minimal fatigue. A major concern however that is contrary to BS 8300:2010, is access to higher floors without the benefit of a lift. This was a major challenge to PWDs with mobility impairment. The main Mensah Sarbah Hall (Plate 5) too had long winding helical stairs which were very difficult to climb.

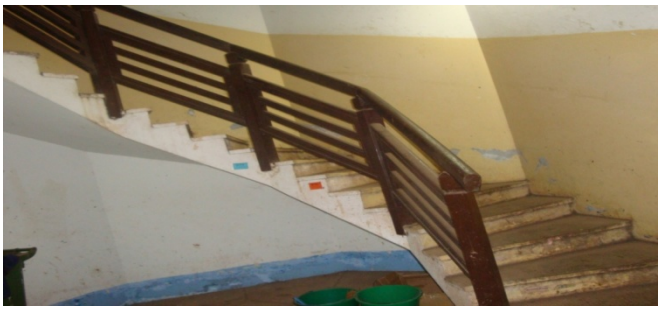

Plate 5: A Helical Staircase with only one hand rail at the main Mensah Sarbah Hall

Signs and information

Signs and information were provided to help students familiarise with the orientation of spaces and buildings within the University campus. In accordance with the principles of universal design,[31] the design should communicate necessary information effectively to all users regardless of the user's sensory abilities. From the observations made, more than 90% of the facilities evaluated had adequate signs and information to enhance accessibility for PWDs as seen in Plate 6.

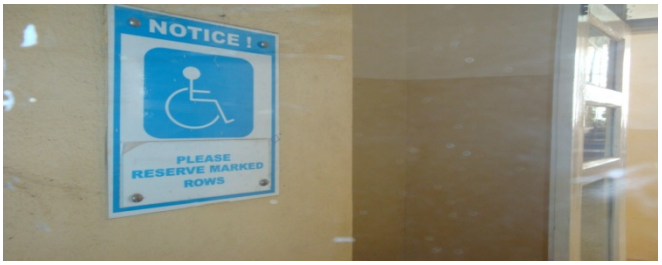

Plate 6: The International Accessibility Symbol at the entrance of a Hall within the K.A.B. Jones Quartey Building (TingiTingi)

Sanitary Accommodation

From the study, most of the sanitary facilities provided were not accessible to PWDs as can be seen in Plate 7. Where washrooms were accessible, horizontal grab rails were not provided for usage by PWDs. Wash hand basins were generally isolated from the WCs and those that had the WC and wash hand basin near each other did not have enough space for PWDs especially those in wheelchairs to manoeuvre (Plate 8). Shower controls were available at the right height in some instances to make it easier for use especially for individuals with mobility impairments but the sanitary accommodations that house these facilities were not accessible to PWDs due to the absence of grab rails, slippery nature of walls and raised floors. This made it difficult particularly for wheelchair users since the raised floors prevented their smooth entry into the shower trays. The absence of grab rails increased the difficulty in moving from the wheelchair into the shower independently. Fittings and locks to wash rooms were easy to grip with good colour contrast.

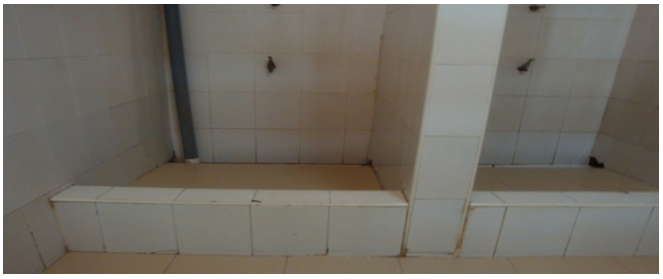

Plate 7: An in-accessible bathroom at Mensah Sarbah Hall

Plate 8: An accessible Washroom at the School of Communication Studies with a Grab Rail

CONCLUSIONS

This study concludes that, the built environment of the University of Ghana presents major barriers to PWDs with mobility disabilities. This has the potential of adversely affecting the provision of inclusive and equal access to higher education in this renowned Institution. Almost all areas of the built environment evaluated had varying degrees of restriction. Paradoxically, the Institution is seen as one of the most pro-disability institutions among the other public higher education institutions in Ghana. This gives cause for concern in the light of the imminent full implementation of the provisions of the Persons with Disability Act, 2006 (Act 715) in Ghana.

The outcome of this study points to the fact that the principles of universal design, have to a large extent not been adhered to. When these principles are implemented, they lead to the creation of communities that are as inclusive as possible. Most facilities surveyed had little or no provision in terms of accessibility for students with mobility disabilities. The study establishes that the University still has a very long way to go in order to ensure a barrier free and socially inclusive university environment for all categories of students.

RECOMMENDATIONS

The findings of this study are intended to provide a better understanding of the challenges of the students who have mobility disabilities at the main campus of the University of Ghana, and to use this information to help advocate making educational institutions (especially university campuses) in Ghana friendly to PWDs. The following recommendations are therefore made:

a) The University should establish a Facilities Management Board (FMB). The FMB will among others issues in the built environment, have oversight responsibility to ensure that various legislation like the Persons With Disability Act 2006 and others related to Health and Safety in the Built Environment are adhered to. It will be ideal if PWDs are represented on the Board.

b) All stakeholders including relevant Ministries, Departments, Agencies, NGO and the various Organizations of PWDs especially the National Council for PWDs, the Federation of PWDs and students' associations need to work together to ensure that the provisions made in the Persons With Disability Act 2006 are implemented appropriately. This will call for lobbying, constructive engagement with people who wield power to take such decisions, advocacy and public education.

c) Service Level Agreements with professionals (Architects, Building Technologists, Planners, and Engineers, Estate / Facility Managers and all other related professionals) should place special emphasis on provision of access to PWDs.

d) The Ghana Education Trust Fund (GETFund) Administrators and Donor organisations that usually finance construction activities on the campuses of higher education institutions in Ghana should make the provision of Universal designs a pre-condition to the grant of such funds.

This study revealed that the passage of the Persons with Disability Act, 2006 has not automatically resulted in barrier-free designs at the University of Ghana. The desire to ensure inclusive and equal access to education for all will therefore under achieve if efforts are not put in at the strategic, tactical and operational levels for purposes of implementation and monitoring. The findings and recommendations of this study will be very handy in this regard. It is nonetheless conceded that this study focussed specifically on one University Campus. Further research involving other campuses will help bring out a broader picture which will most likely better engage the attention of Government officials, professionals and others in positions of responsibility.

REFERENCES

1. World Health Organization (WHO). *The International Classification of Functioning. Disability and Health* (ICF). Geneva. WHO Press **2001**.
2. World Health Organization (WHO).*World Report on Disability*. Geneva, WHO Press. **2011**
3. M. E. Baris, A. Uslu. Accessibility for the disabled people to the built environment in Ankara, Turkey. *African Journal of Agricultural Research* **2009;** *Vol. 4 (9): 801-814*, Available online at http://www.academicjournals.org/AJAR
4. United Nations: *Standard Rules on the Equalization of Opportunities for Persons with Disabilities*: United Nations General Assembly, forty-eighth session, resolution 48/96 annex of 20 December, 1993. **1994.**
5. *Persons With Disability Act. Act715*, Accra: Ghana Publishing Company. **2006**
6. *Ghana National Policy on Disability.* Ghana Publishing Company, Accra. **2000**
7. *Constitution of the Republic of Ghana*. Accra: Ghana Publishing Company. **1992**
8. A. Salvage, G. Zarb. 'Gaining access: Disabled people and the physical environment' *Measuring disablement in society-Working paper 2. UK*. **1995**
9. A. K. Danso, J. Ayarkwa, A. Dansoh. State of Accessibility for the Disabled in selected Monumental Public Buildings in Accra, Ghana. *The Ghana Surveyor,* **2011;** 4 (1):1-19
10. E. P. Tudzi. Educational Property and Facilities Management in Ghana: A NewDawn. In: A. Ahmed, ed. *World Sustainable Development Outlook 2006: Global and Local Resources in Achieving Sustainable Development* Switzerland: Inderscience Enterprises Ltd, **2006;**pp 116-125
11. Disabled World News, (n.d) - Definition of disability including types of disabilities and the social model of disabilities: Available at: http://www.disabled-world.com/disability/types/#ixzz2QNasLjkF [Accessed 13 April 2013]
12. British Standard. *Design of Buildings and Their Approaches to Meet the Needs of Disabled People – Code of Practice*, BSI, London. BS Code 8300: **2010**.
13. United Nations: *Realizing the Millennium Development Goals for persons with disabilities towards 2015 and beyond*: United Nations General Assembly, sixty-fifth session, resolution 65/186; **2011**

14. G. Quinn, T. Degener, A. Bruce, C. Burke, J. Castellino, P. Kenna, U. Kilkelly, S. Quinlivan. Human Rights and Disability: The current use and future potential of United Nations human rights instruments in the context of disability. United Nations New York and Geneva. **2002.** Available at http://www.ohchr.org/Documents/Publications/HRDisabilityen.pdf [Accessed 17 November 2010]
15. UNESCO. *Disabled students at Universities in Africa,* UNESCO Sub-Regional Office for Southern Africa Harare, Zimbabwe. **1997.** Available at: http://unesdoc.unesco.org/images/0011/001102/110282eo.pdf (Accessed on 17July 2013)
16. A.R. Meyers, J.J. Anderson, D.R. Miller, K. Ship, H. Hoeing. Barriers, Facilitators and Access to Wheelchair users: Substantive and methodological lessons from a pilot study of environmental effects. *Social Science in Medicine*, **2002;** 55(8):1435 -1346.
17. A. Shumway-Cook, M. Woollacot. Motor Control: Theory and Practical Applications, Baltimore, MD: Williams and Wilkins. **1995**
18. P. Clarke, J. A. Alshire, P. Lantz. Urban built environments and trajectories of mobility disability: Findings from a national sample of community-dwelling American adults (1986–2001). *Social Science and Medicine* **2009;**69(6):964-970.
19. R. J. Jackson, C. Kochtitzky. Creating a healthy environment: impact of the built environment on public health. *Sprawl Watch Clearinghouse monograph series*. **2001.** Available at: http://www.cdc.gov/healthyplaces/articles/Creating%20A%20Healthy%20Environment.pdf. [Accessed on 17 July 2013)
20. J. P. Koplan, D. W. Fleming. Current and future public health challenges. *JAMA* **2000;** 284(13): 1696- 1698
21. R. J. Sampson, J. D. Morenoff, T. Gannon-Rowley. Assessing 'neighborhood effects': social processes and new directions in research. *Annual Review of Sociology*, **2002;** 28: 443–478.
22. C. Barnes. Disabled people in Britain and discrimination; A Case for Anti Discrimination Legislation, London, C Hurst. **1991**
23. J. T. Lysack, U. P. Wyss, T. L. Packer, S. J. Mulholland, V. Panchal. Designing appropriate rehabilitation technology: a mobility device for women with ambulatory disabilities in India. *International Journal of Rehabilitation Research*, **1999;** 22(1): 1-9.
24. J. R. Beard, S. Blaney, M. Cerda, V. Fryel, G. S. Lovasi, D. Ompad, A. Rundle, D. Vlahov. Neighborhood Characteristics and Disability in Older Adults. *The Journal of Gerontology : Series B*, **2009;**Volume 64B, Issue 2, pp 252-257.
25. A. Bowling, M. Stafford. How do Objective and Subjective Assessments of Neighbourhood Influence Social and Physical Functioning in Older Age? Findings from a British Survey of Aging. *Social Science and Medicine*; **2007;** 64(12), 2533–2549.
26. P. J. Clarke, J. M. Lawrence, S. E. Black. Changes in quality of life over the first year after stroke: Findings from the Sunnybrook stroke study. *Journal of Stroke & Cerebrovascular Diseases,* **2000;** 9 (3): 121-127
27. P. Clarke, V. W. Marshall, S. E. Black, A. Colantonio. Well-being following stroke in Canadian seniors: Findings from Canadian Study of Health and Aging. *Stroke*, **2002;** 33(4):1016-1021.
28. D. Vandebelt. Disabilities Universal Design (Waterloo Region Trends Research Project). Social Planning Council of Cambridge and North Dumfries. **2001;** pp 1-11.
29. Center for Universal Design. About the center, The center for universal design, NC State University, Available at: http://www.ncsu.edu/ncsu/design/cud/about_us/usronmace.htm [Accessed 4 July 2013]
30. J. Reagan. A Perspective on Universal Design. Excerpt of a presentation made by Ronald L. Mace, FAIA, at *Designing for the 21st Century: An International Conference onUniversal Design*, June 19, 1998, Hofstra University, Hempstead, New York. **1998.** Available at http://www.ncsu.edu/ncsu/design/cud/about_us/usronmacespeech.htm [Accessed 24 July 2013]
31. B. Connell, M. Jones, R. Mace, J. Mueller, A. Mullick, E. Ostroff, J. Sanford, E. Steinfeld, M. Story, G. Vanderheiden. The principles of universal design: Version 2.0. Raleigh, NC: *The Center for Universal Design*. **1997.** Available at: http://www.ncsu.edu/ncsu/design/cud/about_us/usronmace.htm [Accessed 15 July 2013]
32. Canadian Human Rights Commission (CHRC). International best practices in universal design, a global review. **2006.** Available online at http://www.gaates.org/documents/BP_en.pdf [Accessed 22 July 2013]
33. United Nations: *The way forward: a disability-inclusive development agenda towards 2015 and beyond:* **2013.** United Nations General Assembly, Report of the Secretary-General, Sixty-eighth session, A/68/95, 14 June 2013.
34. *National Building Regulations*. LI 1630, Accra: Ghana Publishing Company. **1996**
35. S. Syme. New Building Code at Draft Stage. *Daily Graphic*, 12 May, **2011;** p16.

ACKNOWLEDGEMENT

The authors acknowledge the assistance of staff and students of the University of Ghana during the data gathering.

Conflict of interest: None **Source of Funding:** None