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Adequacy of the national building code (2006) in promoting Universal Design practices in Nigeria.

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Abstract: Universal design seeks to develop environments that are accessible to all users, fostering inclusivity and equal opportunity for everyone. Therefore, effective building regulations are essential to support and advance universal design in developing the built environment. This study examined accessibility provisions of Nigeria's National Building Code (2006), which is an extensive document that provides set standards for how buildings should be designed, constructed and maintained in Nigeria. The National Building Code was examined to identify gaps hindering inclusivity in the built environment, thereby determining their adequacy in promoting universal design practices, towards enabling individuals to participate in society without physical barriers. The study is a review article that employed qualitative research methods to gather, analyse, and present data. A systematic textual analysis was conducted using secondary sources, including the NBC (2006), the 7 Principles of Universal Design, and key accessible design standards. The data were grouped into themes, and the content was analysed. A descriptive approach and thematic categories were employed to explain the findings. To achieve its findings, the study used two objectives, it examined the existing accessibility provisions of the National Building Code in relations to the requirements of Universal Design Principles and used the provisions found to determine the adequacy of the Code in promoting universal design practices in the development of the built environment. The findings revealed that although the Code contained some relevant accessibility provisions, several of them were vague, lacked detailed specifications or dimensions needed to ensure inclusivity. The study submitted that in its current state, the National Building Code (2006) operational in Nigeria is inadequate in promoting the ideals of universal design. The study recommends a detailed systematic revision of the code to address the identified shortcomings relating to accessibility.

Keywords: Universal Design, Accessibility, Usability, National Building Code, Physically Challenged, People with Disabilities, Nigeria.

1. Introduction

Studies show that an estimated 1.3 billion people are living with a significant disability, which is about 16% of the world's population, or 1 in 6 people (World Health Organization, 2025). An environment can have a significant impact on a person's experience and extent of disability. An inaccessible environment can create a sense of disability simply by creating obstacles to participation and inclusion (WHO Team, 2011). Inaccessible environments can stand as a

hindrance to the inclusion of people living with disabilities economically and in a social context (Izobo-Martins and Azoom, 2019).

Historically, efforts have been made to improve the built environment for users of all abilities through inclusive design guides and concepts (Olodeoku M. A., 2024)Designing for all addresses inaccessibility by creating inclusive, usable spaces for diverse users (Sharma, 2025), with universal design emerging as a widely adopted approach.

The term “universal design” was coined in the United States by Ron Mace, who was an architect who focused on the design of accessible housing. Mace’s approach to UD made way for accessible building codes, standards and guidelines present in the US. His philosophy stems from the approach of designing an inclusive environment that favours all kinds of people (Centre for Excellence in Universal Design, 2025). The introduction of UD into architecture has transcended barriers and boundaries by adopting a more human-focused perspective. UD has helped to prioritize accessibility and inclusivity in the design process, thereby eliminating barriers and promoting equal opportunities amongst users while fostering social interactions. (UGREEN, 2025).

Disability laws and acts are means through which countries prohibit discrimination against people with disabilities (PWDs) to eliminate barriers, promote inclusion in society and educate these people about their rights to equality (United Nations, 2025). Thus, many countries have enacted regulations and building codes to promote equal opportunities for every individual in society. Some of these regulations include the Americans with Disability Act of 1990 which was amended and revised in 2010 used in the United States; The Equality Act (2010), used in United Kingdom; Services and Supports to Promote the Social Inclusion of Persons with Developmental Disabilities Act (2008), passed into law in Canada; Law of the People’s Republic of China on the Protection of Persons with Disabilities, used in China; Persons with Disabilities Act (2016), in operation in India; Basic Act of Persons with Disabilities (2011), of Japan; Persons with Disability Act (2006) [Act 715], used in Ghana; Code of Good Practice: Key Aspects on the Employment of People with Disabilities (2002), operational in South Africa; and The Discrimination Against Persons with Disabilities [Prohibition] Act (2019), adopted in Nigeria (United Nations, 2025). In countries where disability laws have been enacted, it is illegal to discriminate, segregate or mock anyone on the premise of disability. Such countries must take appropriate measures to ensure that they modify or remove existing laws that may constitute discrimination. There is also a need to create policies that will protect and promote the rights of persons with disabilities (United Nations, 2025).

Nigeria's 2019 Discrimination Against Persons with Disabilities Act mandates accessibility in public buildings, with penalties for non-compliance and a 5-year grace period for retrofitting (Ewang, 2025). While the law supports inclusion, it remains unclear if development laws like the NBC adequately promote UD, as empirical research on this is limited (Sholanke et al., 2019).

Empirical studies continue to reveal that PWDs are widely marginalized in the development of the built environment in Nigeria due to lack of adequate provisions made to accommodate their needs. Such studies include: (Sholanke et al., 2019; Izobo-Martins and Azoom, 2019; Agada, Guobadia and Ojo, 2024; Adewale, Jegede and Sogbetun, 2022; (Maduagwu and Saidu, 2018). In addressing this issue, the starting point would be to critically assess the adequacy of development regulations in promoting social inclusion in Nigeria.

Against this backdrop, the study examined accessibility provisions in Nigeria’s NBC (2006) to identify gaps that may hinder inclusivity and assess their adequacy in promoting Universal Design.

It was guided by two objectives: to review the code's accessibility provisions and evaluate their effectiveness in supporting UD practices.

The study investigation was limited to accessibility provisions of general spaces, including accessible toilets. The study examined 12 key accessibility features of the general spaces commonly used by all individuals while making use of public buildings and environments were investigated. The general spaces refers to spaces commonly used by the occupants or users of the facilities The features include parking, exterior walkways, handrails, stairs, ramps, floor surfaces, entrances, doors, corridors, elevators, escalators, and signage. The Nigeria's NBC that was examined is a document established in 2006 containing laws, guidelines and regulations establishing the minimum standard for the design, construction and maintenance of buildings in Nigeria (National Building Code, 2006).

By examining the accessibility provisions found in the NBC relating to UD principles and then determining if those provisions were adequate in the promotion of UD practices in the built environment, the study was able to highlight areas in Nigeria's NBC (2006) that support inclusivity, identify key gaps, and offer recommendations for improvement. These key gaps in the NBC were the accessibility provisions being vague and a lack of detailed specifications and required dimensions. The study raises awareness among built environment professionals on integrating UD from the design stage and supports advocacy by disability rights groups. The paper contributes to global and local UD knowledge, offers a basis for future research, and aligns with SDG 11, which promotes safe, inclusive, and sustainable cities.

2. Literature Review

2.1. Overview of Universal Design

In the early 1950s, the concepts of accessible design started as a response to a large number of soldiers who returned home from World War II with disabling injuries. The evolving of the accessible design concepts was a driving factor in the introduction of equal rights and anti-discrimination legislation established by the government (Centre for Excellence in Universal Design, 2025). By 1968, the US Congress passed the Architectural Barriers Acts (ABA), which required that public buildings designed, built and altered for the government must be accessible for people with disability (U.S. General Services Administration, 2025). In San Diego, the Congress passed the Rehabilitation Acts of 1973, which prohibits discrimination against PWDs (City of San Diego, 2025).

By 1974, Ron Mace facilitated the movement for a barrier-free environment. Mace was an American architect who coined the term "universal design" in 1985. He advocated for a built environment that was aesthetically pleasing yet usable to a diverse range of people (The UD Project, 2025). Ron Mace had contracted polio as a child and was wheelchair-bound. His personal experiences were a driving force for the accessible building codes and standards in the United States (UGREEN, 2025). His first accessible building code was adopted by North Carolina in 1973. His work later set a guideline for the Fair Housing Amendments Act of 1988 and the Americans with Disabilities Act of 1990. By 1989, Ron Mace had created the Centre for Universal Design in North Carolina, formerly the Centre for Accessible Housing (The New York Time, 2025).

The US Congress passed the Americans with Disabilities Act of 1990 (ADA), which prohibited discrimination and established accessibility requirements for the design, construction and alterations of public buildings (U.S. General Services Administration, 2025). By 1997, the "Principles of Universal Design" were developed at the Centre for Universal Design (Rocky

Mountain ADA Center, 2025). By 2010, the Department of Justice amended the Americans with Disabilities Act of 1990 (ADA) and published the most recent ADA Standards for Accessible Design, which were based on the ADA guidelines (U.S. Department of Justice, 2025)

Universal Design has evolved to emphasize inclusivity and adaptability, prompting global adoption of accessibility policies and smart, barrier-free environments (HEWI, 2025). Innovations like automated doors, sensors, voice controls, and IoT-enabled devices have enhanced responsive design. Features such as adaptive lighting and fall detection systems further support diverse user needs. As technology advances, architects must redefine accessibility to meet evolving standards (Team Kaarwan, 2025)

As a result of the momentous movement of UD, the "7 Principles of Universal Design" were developed in 1997 by Ron Mace in North Carolina State University. These principles were created as guidelines for the design of the built environment, products, learning and communication. The principles can serve as a guide for designers and consumers in the design stage of their environment and products. They can also be used to evaluate and assess existing designs in a bid to make them more usable (Centre for Excellence in Universal Design, 2025; NC State University, 2025; Building and Construction Authority, 2025; UGREEN, 2025; University at Buffalo, 2025). The principles and their guidelines are examined as follows:

The First principle - Equitable Use: For a design to be of great value, there must be equal use opportunities for all users. The design must avoid segregation or stigmatization of any users. Provisions of privacy, security and safety should be equally available to all users. The design must also be equally appealing to all users.

The Second Principle - Flexibility in Use: A design must be able to cater for a diverse set of people, their individual preferences and abilities. For this to be achieved, there must be a variety in the way people can use a design. The design should allow for right or left-handed users to have equal access. It should be adaptable to the user's pace while making it easier for users to be precise and accurate in using it.

The Third Principle - Simple and Intuitive Use: The design must be easy to understand despite the user's background, proficiency in language, literacy or level of focus at the given moment. The design must be void of unnecessary complexity, it must provide a means for effective prompting and feedback during and after use while meeting the users' expectations and intuitions.

The Fourth Principle - Perceptible Information: The design needs to successfully convey adequate information to the user regardless of the environment or the user's sensory capabilities. The use of different modes of presenting essential information, such as pictorial, verbal or tactile formats. The design can be made compatible with different techniques and devices used by users who have sensory limitations.

The Fifth Principle - Tolerance for Error: The design should mitigate risks and negative consequences of inadvertent actions. It should provide fail-safe features, warnings and alerts for errors. An example of such is the undo feature in computer software that allows users to undo and correct their mistakes without consequences.

The Sixth Principle - Low Physical Effort: Designs that can be used easily and effectively with little to no strain are encouraged. The designs should be used with minimal operating force, minimal physical effort, and minimal repetition of actions while allowing the user to maintain a neutral body position, just like the touch sensors on faucets, lamps and switches.

The Seventh Principle - Size and Space for Approach and Use: Irrespective of the size of the user, their posture or mobility, adequate size should be provided for approach, reach and manipulation. To achieve this, there must be a clear line of sight for both seated and standing users. Important elements should be within reach for both seated and standing users. The design should be able to accommodate the varying hand and grip sizes of users, and there should be provisions for sufficient space for assistive devices and personal assistance.

Achieving Universal Design requires understanding the diverse abilities of all user groups. (Building and Construction Authority, 2025) developed guidelines to help designers address the needs of users such as infants, expectant mothers, the elderly, wheelchair users, individuals with mobility, visual, or hearing impairments.

2.2. Overview of Building Code Requirements

Building codes are a set of regulations put in place to specify the minimum requirements for various aspects of the building, which include architectural, structural, plumbing, heating, ventilation and air conditioning (HVAC) systems and accessibility (NIST, 2025). These codes are enacted by the various tiers of government and are established to regulate the design, construction, renovation, repair and maintenance of buildings (Grimsley, 2025). These codes try to mitigate poor designs, structural failure and the use of unregulated materials (Max Migold, 2025). By having codes in place, quality and safety are ensured while promoting Universal Design by mandating an inclusive and barrier-free environment (Perlo Construction, 2025). The goal is to protect the users and occupants of the building, support sustainability and uphold the standards of the building industry (The Builders Association, 2025). The NBC was developed in November 2005 and formally published in August 2006 after deliberations dating back to 1987 when the defunct National Council of Works and Housing requested for it

The NBC is Nigeria's regulatory framework for the design, construction and maintenance of structures, the NBC also covers fire safety, energy efficiency, structural integrity and accessibility. It was created to address poor construction practices and the frequency of building collapses (NHM Staff, 2025).

In evaluating the adequacy of the NBC of Nigeria in promoting Universal design practices, it is essential to compare its relevant provisions with international standards that effectively support inclusivity and usability for all individuals in the built environment. This study identified the building codes of the USA and Singapore as appropriate references and analyses their accessibility provisions. Specifically, it examines the 2010 ADA Standards for Accessible Design issued by the United States Department of Justice (U.S. Department of Justice, 2025) and the 2016 Universal Design Guide for Public Places by Singapore's Building and Construction Authority (BCA) (Building and Construction Authority, 2025). These globally acknowledged standards were employed as benchmarks for evaluating how regulatory frameworks can promote inclusivity in the built environment and guide policy review efforts within the Nigerian context. The accessibility provisions of both building codes are examined as follows:

2.2.1. Accessible Car Park

The BCA (2016) and ADA (2010) recommend that parking spaces should have minimum width of 2440 mm with a provision of an access aisle of 1525 mm minimum. The floor surface should be stable, firm and non-slip. This is in line with the first principle of UD which stipulates that the design should allow for equitable usage for all users.

2.2.2. Accessible Routes, Corridors and Paths

Accessible routes are recommended by the BCA (2016) to be at least a minimum of 1800 mm, this allows for two wheelchairs to pass side by side or for a baby stroller to pass by. The route should also have a waiting area or passing space at every 50 m where users can rest and take a break. The ADA (2010) recommends a minimum of 1525 mm clear width with a passing space at every 61 m. Based on these recommendations, an accessible route should be between 1525 mm to 1800 mm with a passing space of between 50 m to 61 m. The BCA (2016) mandates that access routes should have no protrusions or projections, but ADA (2010) made an allowance of 100 mm for protrusions or projections except for handrails, which can be 115 mm maximum. These guidelines align with the first and seventh principles of UD, which emphasize equitable use and adequate space for approach, reach and manipulation, respectively. Therefore, for a route to be deemed accessible, it needs to be usable and appropriately sized to accommodate all users.

2.2.3. Floor Surfaces

The BCA (2016) and ADA (2010) specify that floor surfaces should be firm, levelled, durable and non-slip without any sudden drop in levels or holes. Floor surfaces are also expected to be non-slip in any condition, either wet or dry. The BCA (2016) specifies that floor surfaces should be completely level, but ADA (2010) provides an allowance of 6.4 mm as the maximum height difference where changes in level are needed. Any change in level greater than 13 mm should be linked with a ramp. Floor surfaces are expected to align with the safety requirement of the UD principles and conform with the sixth principle of UD, which recommends a stress-free usage while maintaining a neutral body position.

2.2.4. Entrances

According to both the BCA (2016) and ADA (2010), all entrances should be levelled and free from any change in level. The BCA (2016) mandates that doors should be automated to help with ease of access for users and should provide a manoeuvring space of 1500 mm by 1500 mm with a 600 mm clearance adjacent to the door for pull doors to allow easy access for wheelchair users in conformity with the first principle of UD that requires equal opportunity use for everyone. But for push doors, the code stipulates a manoeuvring space of 1200 mm by 1200 mm with a 300 mm clearance. Entrances are required to be visible from the exterior and interior and should be provided with signage, directories and tactile indicators. All glass doors should be marked with visible motifs to avoid collisions. ADA (2010) stipulates that at least 60% of all public entrances should be accessible. This allows for equal access opportunity for mobility impaired users alongside abled bodied individuals.

2.2.5. Doors

The minimum effective width for doors as recommended by the BCA (2016) is a minimum of 850mm, while the ADA (2010) stipulates 815 mm as a minimum. This suggests that the minimum effective width of doors should be within 815 mm to 850 mm, which in turn aligns with the first principle of UD This principle promotes accessibility and usability for all users.

2.2.6. Ramps

A gentle gradient of 1:20 to 1:15 is preferred for ramps by the BCA (2016) to avoid users finding it difficult to navigate and manage their balance. Whereas the ADA (2010) stipulates a maximum gradient of 1:12, with 1:10 being the worst possible situation where space limitation exist. To accommodate a wide range of users, the range of the gradient should be between 1:20 and 1:12. This aligns with the first principle of UD, which provides for equal opportunity for all users. Also,

the low ramp gradient makes descending and climbing it convenient for most people, as well as enable the use of minimal physical effort in alignment with the sixth principle of UD.

2.2.7. Elevators

According to the BCA (2016). the preferred size of an elevator car should be 1200 mm width by 1400mm depth. This is large enough to accommodate wheelchair users, older persons with bulky mobility aids or families with children in baby carriages. On the other hand, ADA (2010) specifies that the width of an elevator car should measure at least 915 mm, while the depth should be minimum of 1370 mm, in addition to adhering to the A17.1 safety code. This is to accommodate all users in line with the first principle of UD that entails that a design should make provision for equal use opportunity for all users. ADA 2010 specifies that the lift car control buttons should be 1015 mm minimum height from the finish floor level, whereas BCA (2016) recommends between 900 mm to 1200 mm for easy access for wheelchair users. Both the ADA (2010) and BCA (2016) require that control dimensions, braille, audio and emergency backup systems should be provided. This provides equal usage opportunity for a wider range of people.

2.2.8. Escalators

The ADA (2010) recommends that escalators should align with the ASME A17.1 safety code and have a minimum clear width of 815 mm. The BCA (2016) mandates that escalators should have a clear width of between 580 mm to 1100 mm, depending on the traffic volume. Moving railings at a height of 900 mm must be provided on both sides of an escalator. Escalator steps should not be more than 210 mm to 240 mm, and three flat steps must be provided at the start and end of escalators. Signage, tactile and visual cues must be provided to indicate headroom warning and directions to align with the first principle of UD which mandates equal use opportunities for everyone.

2.2.9. Stairs

According to the ADA (2010), risers dimension should be between 100 mm and 180 mm, while treads should be 280 mm minimum. Open risers are not permitted, and the maximum projection for stair nosing should be 38 mm. But the BCA (2016) stipulates that a riser should measure 150 mm maximum, while treads should be 300 mm minimum for public buildings. For residential buildings, treads are required to be 275 mm maximum and 165 mm minimum. Open risers are not permitted, and the stair nosing projection should be between 50 mm to 65 mm. These design requirements help ensure minimal operating force, ease of use, and clear communication of information to all users, aligning with the sixth, third, and fourth principles of UD, respectively.

2.2.10. Handrails

The ADA (2010) stipulates that the maximum distance between the top of the handrail to the bottom of the finished floor should be between 865 mm and 965 mm. Handrails should be provided on both sides of stairs and ramps. The regulation also specifies lower railings measuring 710 mm from the finished surface, with a clear space of 230 mm minimum between the railings. BCA (2016) recommends that the height of the handrails should be from 800 mm to 900 mm, and the lower railings should be 600 mm to 750 mm in height from the finished floor level. This helps to accommodate children, persons with short stature, as well as conforms with the first and seventh principle of UD that require equal use opportunities for everyone and for important elements to be equally reached for everyone either in seated or standing positions, respectively.

2.2.11. Signage

Signs should provide direct and clear information, and should have tactile characters, visual cues, braille, pictograms and the symbols of accessibility. Signage must be provided in accessible parking spaces and must be uniform and visible. Signage in elevators must have the international symbol of accessibility, the text telephone symbol (TTY), braille and the volume control telephone symbol as recommended by ADA 2010. BCA 2016 recommends that signage showing the building directory in text, braille and map must be provided and be visible upon entry. These signs must be clear, concise and readable from a distance. They must have good contrast between characters and background and be multilingual. They must be placed at key points such as emergency exits, around elevators, escalators and toilets. Both BCA 2016 and ADA 2010 recommend that signage must show a direct message which aligns with the third and fourth principles of universal design, which are simple and intuitive use and perceptible information, respectively.

2.2.12. Toilets

According to the ADA (2010), the centreline to a wall should be at least 405 mm to 485 mm to the sides of the wall for an accessible toilet compartment, while BCA (2016) stipulates 350 mm to 400 mm to the sides of the space. A clear space of 1420 mm (length) and 1525 mm (width) is required by the ADA (2010) as the minimum size of an accessible toilet. The BCA (2016) recommends a clear internal dimension of at least 1750 mm by 1500 mm which is suitable for all user groups, including PWDs.

The BCA (2016) recommends that grab bars should be provided on both sides of a water closet (WC) in toilet. Urinals are expected to have a clear floor space of 750 mm in width and should be wall-hung with low-lip. The rim should not be higher than 400 mm from the finished floor level. The ADA (2010) recommends that urinals are wall-hung, positioned at 430 mm from the finished floor level and 345 mm deep. ADA (2010) indicates that WCs should be mounted at 430 mm to 485 mm from the finished floor, while BCA (2016) specified between 250 mm to 350 mm for children, but nothing explicitly specified for adults. ADA (2010) recommends 865 mm as the maximum height from the finished floor to the counter surface, while BCA (2016) specified a height of 550mm for children.

Additionally, grab bars are recommended to be installed at a horizontal position of 840 mm to 915 mm. But if the grab bars are to be installed for children's use, ADA (2010) recommends 455 mm to 685 mm. The BCA (2016) mandates that grab bars should be placed at 800 mm, which should make usage easier for wheelchair users and ambulant physically challenged users in line with the first principle of UD which requires equal use opportunities for all user groups.

3. Methodology

This study centred on examining the Nigeria's NBC (2006) to ascertain whether the accessibility provisions of the current code effectively support the promotion of universal design practices. As a review paper, it utilizes qualitative research methods to carry out the investigation. The data utilized for the research were gathered mainly from secondary sources including, Nigeria's NBC (2006) and the globally acknowledged seven principles of universal design. Supportive data were also obtained from development regulations of advanced countries that had integrated accessible standards in their building codes. Such sources include accessible standards published in the 2010 ADA Standards for Accessible Design by the Department of Justice of the United States and the Universal Design Guide for Public places by the Building and Construction Authority of

Singapore (2016). The relevant provisions of these documents along with the seven principles of UD were the principal assessment framework for the study.

To evaluate the adequacy of the NBC (2006) in encouraging UD practices, its accessibility provisions of general spaces were compared with the international accessibility standards to determine their adequacy. The assessment was carried out on accessibility provisions made for general spaces that are commonly used by the occupants or users of the facilities, including lobbies and accessible toilets. The study itemized the 12 key accessibility features in the 7th paragraph of the introduction were critically assessed.

Textual analysis was employed to extract data revealing UD-related provisions in the NBC (2006), to evaluate their sufficiency in promoting UD practices. The extracted data were coded, organized into themes, and subjected to content analysis. The findings were then thematically categorized with clarity and presented descriptively to enhance understanding.

4. Results and Discussion

This study was conducted to ascertain the adequacy of Nigeria's NBC (2006) in promoting UD practices towards ensuring that everyone can participate fully in society without encountering design solutions that constitute physical barriers or obstacles. To accomplish the aim, two specific objectives were established, as outlined in the seventh paragraph of the introduction. The findings are presented in alignment with the objectives in the following sections.

4.1. Accessibility Provisions of Nigeria's National Building Code (2006)

The first objective of this study is to examine the accessibility provisions of the Nigeria's NBC (2006) in relation to the requirements of UD principles. The features investigated are car parks, exterior walkways, handrails, ramps, stairs, floor surfaces, entrances, doors, corridors, elevators, escalators, signage and toilets. The findings are outlined in the subsequent sections.

4.1.1. Car Parks

All parking materials are expected to be non-combustible to prevent fire hazards. Parking spaces are specified to have at least 20% of the exterior walls open to bring in natural ventilation, and if enclosed, mechanical ventilation must be provided. In a multi-tier parking lot, a minimum height clearance of 2.1m is required. Each tier must have at least two exit stairways for emergencies and safe evacuation. Guardrails are mandated to be installed on all open edges in the parking decks unless there is a loading deck.

4.1.2. Exterior Walkways

The minimum width stated for all walkways is 1100 mm to accommodate pedestrian movement, including wheelchair users. The maximum stretches the walkway is allowed to span is 91.4 m to the nearest exit. But if there is a sprinkler system available along the walkway, it can extend to 122 m. The walkways are required to be constructed from non-combustible materials unless in the case of low-risk buildings. Walkways serving as emergency exits are required to lead to public areas entirely void of obstructions, protrusions and obstacles.

4.1.3. Handrails

Handrails are stipulated to be between 864 mm and 965 mm from the finished floor level or up to 1067 mm if they are part of a protective guard. To avoid obstruction, handrails are not allowed to project more than 89 mm beyond a ramp or stair width. For additional support, handrails are

required to extend beyond the last stair tread or ramp edge. The handrail's cross-section is specified to be 67 mm maximum for a comfortable and firm grasp.

4.1.4. Stairs

The minimum width for exit stairway is required not to be less than 914 mm. Riser heights are to be between 100 mm to 180 mm, while the minimum allowable tread depth is 280 mm. Stairways are to have continuous guards and handrails on both sides. Stairways that are more than 2235 mm in width are required to have an intermediate handrail in between. Each division should not be less than 1118 mm. Minimum headroom clearance of 2100 mm is allowable to accommodate all users. Treads and risers are mandated to be consistent throughout the building with a maximum tolerance of 10 mm. Materials used in the construction of the stairs are required to be consistent with the main building structure. All staircases are to lead to open spaces with direct access to exits in the event of emergencies.

4.1.5. Ramps

Ramps are expected to be at least the width of the corridors they are connected to. The maximum gradient of a ramp is specified to be 1:12 unless a shorter ramp below 150 mm is necessary. A landing is required to be provided at all ramps turns and at doorways for users to rest, including wheelchair users. The landings are required to have a flat surface. The minimum headroom clearance of 2100 mm is allowable to accommodate all users.

4.1.6. Floor Surfaces

Toilet floor surfaces are required to be smooth, hard, non-slip and non-absorbent and must extend at least 127 mm up the wall for splash protection; similar for the shower walls. They are expected to extend at a height of at least 1.8 m.

4.1.7. Entrances and Doors

There should be at least 813 mm clear width for door openings. The entrance doors are also to comply with the required width, in addition to being unobstructed and opened in the direction of high-traffic areas. Thresholds should be bevelled or low enough to allow wheelchair access. In public and institutional buildings, automated doors or wide double-leaf doors are recommended.

4.1.8. Corridors

Corridors are stipulated be wide enough to allow simultaneous movement of users in two different directions. Their minimum width is specified to be 1100 mm or the same as the width of the ramp connected to it.

4.1.9. Elevators

Elevators are required to comply with international codes such as the ASME A17.1 safety code. Elevators are mandated to have braille signage, auditory floor indicators, emergency power backup and sufficient manoeuvring space for wheelchairs.

4.1.10. Escalators

Escalators are also expected to comply with international codes like the ASME A17.1 safety code and must not be the main means of emergency exit. Escalators must have emergency stop buttons, non-slip steps, non-slip handrails and visual contrast strips on step edges.

4.1.11. Signage

Signage is required to display its use, occupancy classification, fire grading, floor load limits, and installer or owner's information. Signage is required to be available in braille, pictograms and high contrast in toilets, elevators and egresses. Signage is also required to follow zoning and permit requirements.

4.1.12. Toilets

Toilet stalls are required to have a clearance space of at least 762 mm side space and 600 mm in front of fixtures. These stalls must be able to accommodate the manoeuvring of wheelchairs. All accessories must be sealed to the walls to prevent water damage and mole. Toilets are required to be provided on every floor of public buildings and must be accessible to physically challenged users.

4.2. Adequacy Level of Accessibility Provisions of Nigeria's National Building Code (2006) in Promoting Universal Design Practices

This second objective was to determine how adequate are the relevant provisions of the NBC (2006) in promoting UD practices in the development of the built environment. To achieve this, accessibility provisions of the NBC were compared with established and widely recognised standards including BCA (2016), ADA (2010) and UD principles. The outcome of the comparative analysis revealed notable limitations in several areas. The result of the analysis is presented in the subsequent sections.

4.2.1. Car Parks

The NBC recommends that accessible parking should be provided to accommodate PWDs but gave no specifications on the dimensions as recommended by the ADA (2010) and BCA (2016). These codes specify 2440 mm width for parking lots and an accessible aisle of 1525 mm wide in-between car parks. The absence of specific details, such as car park dimensions, may result in poorly designed parking spaces that do not accommodate all user groups, thereby conflicting with the first principles of UD that stipulates "equal opportunity use" and the seventh principle that mandates "adequate size and space for approach and use."

In the light of the evaluation, the provisions made in the NBC largely fail to meet standard and accessible parking requirements, hence adjudged largely inadequate in promoting UD practices.

4.2.2. Exterior walkways

The NBC specifies that the width of pedestrian walkways should not be less than 1100 mm, and the maximum length should be 91.4 m. This is less than the recommended width of between 1525 mm to 1800 mm, with a passing space at 50 m to 61 m intervals, stipulated by BCA (2016) and the ADA (2010) standards. A walkway width of 1100 mm is barely adequate for a wheelchair user but not sufficient for two wheelchair users to pass side by side. This is inconsistent with the first UD principle guideline that promotes "equitable opportunity uses" and the seventh principle that advocates for "adequate size and space for approach and use."

In addition, there is no mention of passing spaces or resting areas where users can stay to rest after a long stretch of travel on a lengthy walkway in the NBC guidelines. The maximum length recommended by the NBC is 50% more than what was recommended by BCA (2016) and ADA (2010). Walking on a lengthy walkway without provisions for resting areas at suitable intervals could be tiring for certain categories of people, including the aged, pregnant women and

individuals with heart conditions. This violates the sixth principle of UD, which emphasizes "low physical effort."

Based on the evaluation, the external walkway guidelines of the NBC are considered largely inadequate for supporting the practice of UD.

4.2.3. Handrails

The NBC recommends that handrail heights should be between 864 mm to 965 mm from the finished floor level, which is reasonably within the range of 800 mm to 900 mm recommended by ADA (2010) and 865 mm to 965 mm recommended by BCA (2016). This allows for the reach and protection of users of different heights including the physically challenged such as wheelchair users. However, no mention was made of the height or provision of a lower handrail for children or people with short stature in alignment with accessible design standards. ADA (2010) recommends a lower handrail of 710 mm height from the finished surface, with a minimum clear space of 230 mm between the two handrails. Whereas the BCA (2016) stipulates that the height of the lower handrail should be 600 mm to 750 mm from the finished floor level. Not making provisions for a lower handrail in the NBC violates the first principle of UD which advocates for "equal use opportunities" and the seventh principle which emphasizes "accommodating the varying hand and grip sizes of users."

According to the evaluation, the NBC handrail provisions are to a large extent judged inadequate for encouraging UD practices.

4.2.4. Stairs

The NBC specifies that step risers should be between 100 mm to 180 mm and have a minimum tread depth of 280 mm. This aligns with the dimensions of the riser and tread recommended by ADA (2010) and within the range of the dimensions specified by BCA (2016) which stipulates the height of risers to be between 150 mm to 165 mm and the depth of threads to be between 275 mm to 300 mm. These dimensions make climbing and descending stairs not only convenient for most people but also enable the use of "minimal physical effort," aligning with the sixth principle of UD.

In light of the analysis, the stairs guidelines in the NBC are considered reasonably adequate towards promoting UD practices.

4.2.5. Ramps

The maximum gradient of a ramp stipulated by the NBC is 1:12 with an expectation of a shorter ramp. This conforms with 1:20 specified by ADA 2010. BCA 2016 recommends a gradient of 1:20 to 1:15. Just like the stairs, the gradient specified for ramps make descending and climbing it not only convenient for most people but enable the use of "minimal physical effort" in alignment with the sixth principle of UD. The low gradient ensures usability for a wider range of users, in alignment with the first principle of UD, which advocates for "equal opportunity for all users."

Based on the evaluation, the provisions made for ramp in the NBC are adjudged adequate enough to support UD practices.

4.2.6. Floor Surfaces

The NBC recommends that floor surfaces are levelled, non-slip and non-absorbent. This conforms with the recommendations of the BCA (2016) and ADA (2010), in alignment with the safety requirement of the principles of UD, particularly the sixth principle which emphasizes a "stress-free usage while maintaining a neutral body position."

In the light of the analysis the floor surface provisions stipulated in the NBC meets standard requirements, hence adjudged reasonably adequate for promoting UD practices.

4.2.7. Doors

The minimum door width specified by the NBC is 813 mm. This is slightly lower than 815 mm specified by the ADA (2010) and 850 mm recommended by BCA (2016). Nevertheless, the difference is marginal and insignificant. The door size is adequate to accommodate a wide range of users, including people on wheelchair, aligning with UD first principle that promotes "equal opportunities use" for everyone.

The evaluation indicates that the door guidelines of the NBC are reasonably adequate for supporting UD practices.

4.2.8. Corridors

The NBC recommends that corridors should have a minimum width of 1100 mm, which falls short of the 1525mm recommended by ADA (2010) and 1800 mm mandated by BCA (2016) which is suitable for two wheelchair users to pass side by side or a baby stroller to pass by. A minimum of 1100 mm allows just a wheelchair user to pass at a time, hence not adequate towards aligning with the requirement of the seventh principle of UD that emphasizes the need for "adequate size and space to approach and use" a facility comfortably.

The analysis points that the existing corridor provisions within the NBC are largely inadequate for supporting UD practices.

4.2.9. Elevators

There are no specific dimensions in the NBC for elevators, except that they should adhere to the ASME A17.1 safety code for such devices. However, the NBC specifies that provisions should be made for braille signage, auditory floor indicators, emergency power backup and sufficient manoeuvring space for wheelchairs. This is in alignment with the requirements of both the BCA (2016) and ADA (2010).

In addition to specifying that elevators should align with the ASME A17.1 safety code, the BCA (2016) recommends that the minimum width of elevator should be 1200 mm while the depth should not be less than 1400 mm. The ADA (2010) stipulates a minimum width and depth of 915 mm and 1370 mm, respectively. These extra specifications help to ensure a universally accessible built environment through accommodating a broader range of user needs, to enhance, safety, comfort, and independence for everyone, including PWDs in alignment with the requirements of the UD principles, particularly the first and seventh principles that advocate for designs to provide "equal opportunity use" and "adequate size and space for approach and use," respectively.

Given the analysis, the NBC guidelines for elevators are viewed as fairly adequate for promoting universal design practices due to the minor shortcomings that calls for improvements.

4.2.10. Escalators

Again, just like the elevator, the NBC clearly specifies that escalators should adhere to the ASME A17.1 safety code for escalators, in conformity with the recommendations of both the BCA (2016) and ADA (2010). However, other requirements specified by these regulations such as minimum width size, moving handrail heights, step requirements, the provision of signage, tactile and visual cues, are all not specified in the NBC. These additional specifications help to provide enhanced safety, accessibility, and usability for a wider range of users, including the physically challenged in conformity with the UD principles.

According to the analysis, the NBC guidelines for escalators are also judged to be fairly adequate for promoting UD practices as there appears to be room for improvement.

4.2.11. Signage

The NBC guidelines indicate that signage must be direct, concise and clear. It should also be available in multiple languages, braille, pictograms and symbols. This aligns with the guidelines of both BCA (2016) and ADA (2010), as well as in alignment with the fourth principle UD that recommends the "use of different modes of presenting essential information, such as pictorial, verbal or tactile formats," ensuring wider reach.

In the light of the analysis, the signage guidelines of the NBC are considered sufficient for purpose, hence adjudged adequate for supporting UD practices.

4.2.12. Toilet

According to the NBC requirements toilet floors should be smooth, hard and non-absorbent. A minimum width of 1100 mm and length of 1250 mm should be provided for users with disabilities. This falls short of the recommended width of 1420 mm to 1750 mm and length of 1500 mm specified by ADA (2010) and BCA (2016). The dimensions specified by the NBC though adequate to accommodate most user groups, is not sufficient to for a wheelchair user that requires at least a clear space of 1500 mm by 1500 mm to conveniently turn around to navigate to use a facility, based on accessible design standard requirement. This contravenes the seventh principle of UD that advocates for "adequate size and space to approach and use" facilities and the first principle that requires "equal opportunity use" for everyone.

However, with regards to provision of grab bars in accessible toilets, the NBC guidelines align with the standards of ADA (2010) and BCA (2016). The NBC specifies that grab bars shall be 850 mm to 950 mm from the finished floor level and 1200 mm long with a diameter of 35 mm. According to the BCA 2016, towel and disposable fixtures should be between 1000 mm and 1200 mm from the finished floor surface and a minimum diameter of 380 mm.

From this analysis, it appears that the NBC toilet guidelines are sufficient in portions but have notable gaps, hence adjudged partially inadequate for promoting universal design practices.

4.3. Discussion

This study was conducted to examine relevant portions of Nigeria's NBC (2006) that relates to accessibility, to determine any gap or limitation that could hinder inclusivity in the built environment, thereby determining their adequacy in promoting UD practices, towards ensuring that all individuals can fully take part in society without encountering physical barriers or obstacles.

The first objective involves a critical evaluation of the accessibility provisions of the building code through the lens of universal design principles, focusing on key architectural elements such as car parks, external walkways, ramps, stairs, handrails, floor surfaces, entrances, doors, corridors, elevators, escalators, signage, and toilets. The results reveal that despite the fact the NBC comprises explicit technical and dimensional specifications intended to enhance accessibility, such as maximum slopes, minimum widths, and safety standards, these elements usually prioritize structural integrity and adherence to functionality, rather than holistic accessibility, usability and practical inclusiveness. When compared to the BCA (2016) and ADA (2010) standards, the NBC falls short in terms of specifications and essential detailed guidelines. This affirms UGREEN (2025) position that UD requires more than minimum compliance in terms of

regulations and codes. This finding also supports the criticism of previous studies like those of (Olodeoku M. A., 2024) and Sholanke, Opoko, Akpan, and Adigun (2019) that criticized public environments in Nigeria for limited integration of UD. The result buttresses the opinion that instead of approaching accessibility as an integral design ideology, it is often viewed as a secondary consideration. Although the NBC specifies requirements for features such as the heights of handrails and ramp gradients in alignment with international norms, it insufficiently promotes three essential UD principles usually identified in global best practices: "flexibility in use, perceptible information, and intuitive use" (Story, Mueller and Mace, 1998).

The finding that the NBC includes some components of UD criteria, but not sufficient enough to maintain consistency and coordination to fully ensure accessibility for all users, supports the position of Sholanke et al., (2019) and Izobo-Martins and Azoom (2019) that the NBC lacks adequate direction with limited provisions, capable of marginalizing PWDs in the built environment. This position is also similar to the view canvassed by Ikudayisi and Taiwo (2022)) that the compliance of buildings with accessibility requirements was uneven and often weakly enforced in urban centres in Nigeria.

The outcome of this study indirectly substantiates these highlighted concerns through its revelation of code standards that are not adequately contextualized for universal accessibility. Particularly, features such as toilet layouts and signage, while partially compliant, do not completely provide for the various user abilities, particular in terms of sensory and cognitive impairments. This deficiency also aligns with the observation made by Agada et al. (2024) and Maduagwu and Saidu (2018), that there is a lack of critical accessibility standards in Nigeria, as well as ineffective enforcement regulatory bodies.

On the second objective of the study which involves determining the adequacy of the relevant accessibility provisions of the NBC in supporting UD practices, the outcome reveals that although the code attempts to include accessibility features, the provisions prove inadequate in effectively promoting UD practices in the development of the built environment. This aligns with the revelation from prior studies such as Aniekan (2021) and Adewale and Odewumi (2024), which discovered significant shortcomings in the NBC's ability to satisfy the demands of diverse user groups, especially PWDs. The comparative analysis of the relevant provisions of the NBC with internationally accepted benchmarks, such as the BCA (2016) and ADA (2010), further reinforces that the NBC lacks precise and comprehensive dimensional guidelines, which are central for ensuring accessibility, usability, comfort and safety for everyone. For instance, the lack of specific dimensions for accessible car parks in the NBC corroborates Olodeoku, Adegboye, and Johnson (2024), a study which exposed that due to non-existent or poor technical guidance, public buildings fail to make provisions for usable car parks for wheelchair users in Nigeria. On the contrary, the BCA (2016) and ADA (2010) clearly specify dimensions and guidelines that ensure seamless access. This limitation has wide-ranging implications, potentially preventing mobility impaired users from accessing to use public buildings and their facilities independently and with dignity.

Likewise, the guidelines on corridors and external walkways of the NBC, also reveal a limited interpretation of accessibility, focusing just on minimum passage width. The widths of the walkways and absence of resting or passing spaces, fail to consider the needs of people who are mobility impaired or lack stamina, such as pregnant women or the aged. This agrees with (Anunobi, Folaranmi, Philip, and Omachoko, 2015). The study found that walkways in Nigerian public buildings rarely meet international accessibility standards, leading to discomfort, fatigue, and reduced use of facilities by vulnerable users.

The results on toilets and handrails also reinforce these apprehensions. While the NBC specifies guidelines for grab bars in toilets, and recommends standard height dimensions for handrails, it fails to include critical considerations like adequate turning radii within toilet cubicles and lower handrails for the use of children. Similar issues were reported by Oloruntoba and Adewunmi (2020). The study emphasized that many buildings partially complied with accessibility provisions. This results in partially complaint spaces that lack adequate functionality, and compromises UD principles in the promotion of usability for all users. .

In contrast, some guidelines of the NBC, such as the standards specified for ramps, stairs, signage, and floor surfaces, align reasonably with globally recognised benchmarks. Similarly, an earlier study identified these components as the more developed features of accessibility code in Nigeria, indicating that where detailed guidance is provided in the NBC, such features are more likely to be compliant and functional. However, Anunobi, Folaranmi, Philip, and Omachoko (2015)argued that even in these areas, practical application is not consistent as a result of poor enforcement and low-level awareness among building professionals.

The findings of this study have far-reaching implications which are multidimensional in nature. Firstly, there appears to be a significant deficiency between policy and practice in the built environment regulatory framework in Nigeria. Although as currently formulated, the NBC framework, partially aligns with globally recognised standards, it does not adequately prioritize user experience across all the diverse range of abilities. The potential impact of the NBC's accessibility provisions is further weakened because of limited implementation framework and compliance mechanism. Whereas the NBC promotes accessibility theoretically, it hinders effective implementation of the principles of UD because of its vague and inadequate guidelines.

Secondly, Gaps in the NBC risk excluding people with disabilities and turning the built environment into a barrier rather than an enabler. This also threatens Nigeria's commitments under international frameworks like the United Nations Convention on the Rights of Persons with Disabilities (CRPD). Strengthening the NBC with clear, enforceable universal design standards is therefore essential.

Therefore, there is an urgent need for a strategic reorientation from compliance with minimum code standards to comprehensively integrate UD strategies in building regulations in Nigeria. Such amendments should align with best practices integrated in globally acknowledged accessibility codes and the UD principles. Embedding human-centred design approaches into domestic policy and promoting awareness among stakeholders in the building industry are necessary towards ensuring a built environment that is truly inclusive. For the NBC to reflect the principles of UD in a more precise and context-sensitive terms, policymakers, disability advocates and the built environment design professionals such as, architects and urban planners, must jointly participate to revise and enlarge the scope of the code. This should include not only technical amendments, but training development programmes, compliance assessment mechanisms, and public sensitization efforts to ensure environments designed for inclusivity. In the long run, integrating the ideals of UD into the building code system in Nigeria, will likely result in more equitable access, promote social inclusivity, and foster independence and dignity for a wider range of citizens, including individuals with disabilities.

5. Conclusion

The study was conducted to examine the current NBC of Nigeria, which was passed into law in 2006, with the aim of identifying the gaps and limitations that could hinder the promotion of

inclusivity in the development of the built environment in relation to the principles of universal design. The objectives of the study focused on the assessment of the accessibility provisions in the NBC and evaluated their adequacy in supporting universal design practices.

The study observed disparate adequacy and conformity across the accessibility provisions. Provisions such as staircases, ramps, doorways, floor surfaces, and signage were found to be adequate in terms of promoting universal design practices, while other provisions such as parking, exterior walkways, internal corridors, handrails, and toilets were found to have substantial deficiencies. But most significantly were the deficiencies found in the car park design, outdoor circulation pathways, and toilets. This underscores major barriers to achieving full inclusivity. Due to these findings, there is a crucial need for a major change in just complying with the minimum standards to broadly integrating the universal design strategies. This study recommends that the NBC undergo a centred, and deliberate improvement to address all the shortcomings identified. These specific improvements include amending accessible parking and toilet specifications, improving external walkways and signage provisions to reflect universal design best practices. In addition, improvements should be made to the enforcement mechanisms and compliance monitoring of the guidelines to ensure consistent application. As a literature review, this study is limited to a textual analysis of the NBC without empirical validation. However, it offers a structured, evidence-based evaluation of the code's accessibility elements, highlighting misalignments with universal design principles and emphasizing the need for inclusive strategies in national standards to ensure access for all, especially people with disabilities.

Consequently, future studies should examine how the code is implemented in the development of the built environment, assess user experiences, and compare the framework in Nigeria with international standards such as the Americans with Disabilities Act (ADA) or ISO 21542. Ultimately, achieving a built environment that is universally inclusive in Nigeria entails not only improving building codes but also promoting a broader institutional and cultural commitment to accessible and user-centred design.

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