

Research Article

Gender-Based Water Accessibility Inequalities in Halls of Residence at The University of Ibadan, Nigeria

Samson Adebayo Adejumo ^a, Precious A. Taiwo ^a

^aDepartment of Urban and Regional Planning, Faculty of Environmental Design and Management, University of Ibadan, Nigeria.

ABSTRACT

Disparity in access to water among different genders in tertiary institution hostels is increasing, particularly at the University of Ibadan. This study, therefore, examines gender-based disparities in water accessibility across undergraduate hostels at the institution. A cross-sectional research design was adopted. A structured questionnaire was systematically administered to 2% (157) of 7,618 residents in the nine existing hostels categorised into male (Mellany, Tedder, Kuti, Bello, Independence and Azikiwe) and female (Idia, Elizabeth II and Awolowo) halls. Both quantitative and qualitative methods were used to analyse the data. The proportion of 71.7% depend primarily on boreholes, while only 21.7% relied on institutional pipe-borne water. Only 40.8% are fetching water within their hostel block, 52.6% are fetching water within the hall premises, while only 6.6% source water outside the halls. Idia and Elizabeth II halls spent more than 20 minutes, while Tedder and Bello spent less than 10 minutes to source water. Idia and Elizabeth II halls had the least reliable water supply, while the male hostels had the highest access to water supply. Access to the right quantity of water per person per day varied across halls and between genders, as the male hostels were ranked first to third positions while the female hostels were ranked fifth, sixth and eighth respectively. Reliability gaps existed between the male hostels with an average score of 266.53, and the female hostels with an average score of 235.52. The study concluded that water accessibility was structurally biased against the female hostels; therefore, gender-responsive planning is recommended.

ARTICLE HISTORY

Submitted 10 August 2026
Accepted 12 October 2026
Published 25 October 2026

GUEST EDITOR

A. M. Ahmed

KEYWORDS

Water Accessibility; Gender Disparities; Halls of Residence; University of Ibadan; Nigeria; Tertiary Institutions

1 Introduction

Access to safe, sufficient water is essential for health, well-being, and daily living. The United Nations recognises water as a basic human right (United Nations, 2010), and Sustainable Development Goal 6 calls for equitable access to safe and affordable water for all (United Nations, 2015). Reliable water supply supports hygiene, disease prevention, and domestic activities (WHO & UNICEF, 2023). In university halls of residence, students depend on institutional water systems to meet these needs. When the water supply is inadequate or unreliable, it can affect health, comfort, and academic activities. Water insecurity has been identified at institutional and household levels (Adejumo, 2020; Adejumo & Adelowokan, 2020; Yusufu et al., 2022; Adejumo, 2019), but no adequate solutions exist. Educational institutions have been largely neglected, yet the largest share of the population is teenagers and adults who should have access to water for a conducive learning environment.

University campuses function like small cities, with residential zones and infrastructure networks (Balsas, 2003). However, services are not always evenly distributed. Differences in water infrastructure location, storage capacity, and maintenance can create unequal access among residential units (Graham & Marvin, 2001; Swyngedouw, 2004). As a result, students in different

halls may experience varying levels of water access. Studies show that infrastructure inequalities exist in many residential settings, especially in developing countries (WHO & UNICEF, 2023). These inequalities often have a gender dimension. Male and female students may experience water shortages differently due to biological needs, hygiene requirements, and social roles (Crow & Sultana, 2002; Sommer et al., 2015). Gender is therefore an important factor in understanding water accessibility. Female students may suffer more during periods of water shortage than their male counterparts due to different hygiene requirements of each sex. At the household level, men may appear less concerned about water shortages than women, who are responsible for sourcing water and require water for purposes beyond personal hygiene.

Despite the importance of water for the lives and health of students on university campuses, few studies have examined spatial and gender-based differences in water access within university hostels in Nigeria. Most research focuses on urban water systems and pays little attention to institutional residential settings. This limits planning efforts aimed at improving campus infrastructure. This study, therefore, addresses this gap by examining inter-hall water availability differences and gender-based inequalities in water accessibility across halls of residence at the University of Ibadan. It compares

ease of access, adequacy, and reliability of water supply across the halls and between male and female residents. The study provides evidence to support more equitable and sustainable campus planning.

1.1 Theoretical and Conceptual Perspectives

Water accessibility is a multidimensional concept. It refers to the ability of users to obtain sufficient, safe, and reliable water within a reasonable distance and time (WHO & UNICEF, 2023; Jepson et al., 2017). In university settings, access depends not only on infrastructure availability but also on system performance, storage capacity, and maintenance. Water insecurity can occur even where infrastructure exists. Water access varies across space. Infrastructure systems often reflect planning decisions and investment priorities (Graham & Marvin, 2001). Within campuses, halls of residence may differ in supply conditions due to location, elevation, storage facilities, and borehole capacity. These differences can create spatial disparities.

Another key factor is gender. Water needs and experiences differ between male and female students due to biological and social factors (Crow & Sultana, 2002). Female students often require more water for hygiene and may face greater challenges during shortages (Sommer et al., 2015). Ignoring gender can, therefore, hide important inequalities. This study assesses water accessibility using three main indicators: ease of access, adequacy, and reliability. Ease of access refers to distance, time, and the effort required to obtain water. Adequacy refers to whether the quantity of water meets daily needs, while reliability describes the consistency of the water supply.

The study is guided by Equity Planning Theory, which emphasises the fair distribution of infrastructure and services (Krumholz & Forester, 1990). The theory argues that institutions should ensure equal access to essential services. The study also draws on the Human Right to Water Framework, developed by the United Nations and the World Health Organization. This framework defines standards for adequate water access, including availability, accessibility, and reliability (United Nations, 2010; WHO, 2017). These standards provide benchmarks for evaluating water access. Together, these perspectives help to explain and assess spatial and gender inequalities in campus water accessibility.

2 Materials and Methods

2.1 Study Area

The study was conducted at the University of Ibadan, Nigeria's first university, which was established in 1948 and is located in Ibadan, Oyo State. The campus functions as a semi-autonomous settlement made up of academic, administrative, and residential zones supported by centralised infrastructure including water supply. A large number of students live in campus housing, making the University comparable to a small urban system. The University has twelve halls of residence, of which nine are undergraduate halls accommodating over 7,500 students. These halls differ in age, location, building condition, and student population. They are also divided into male and female halls. Their spatial distribution, elevation differences, and infrastructure conditions make them suitable for examining inequalities in water access.

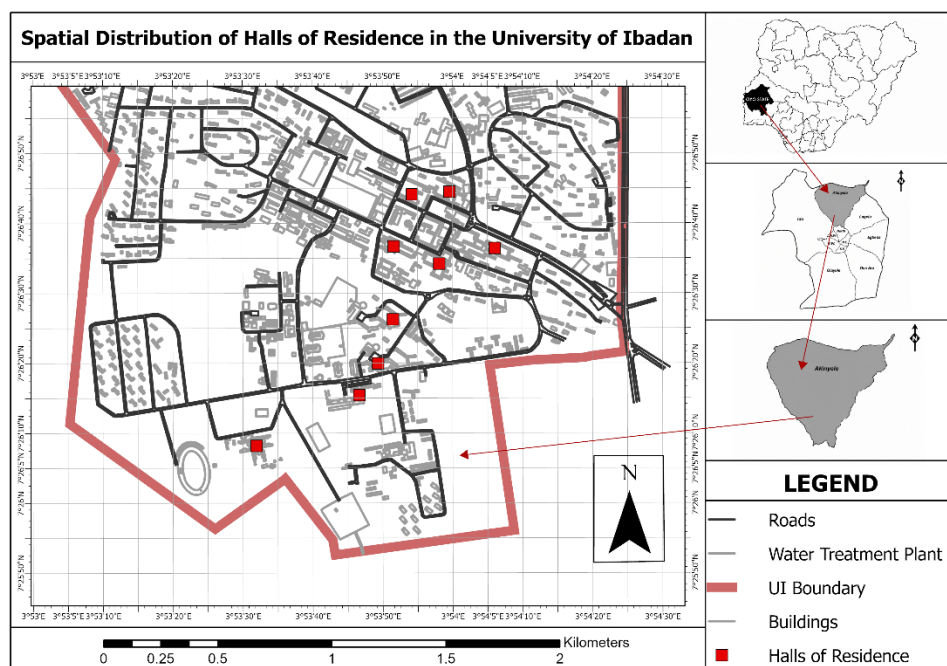


Figure 1: Study Area

The University operates a centralised pipe-borne water system intended to serve the entire campus, but it has become increasingly unreliable. As a result, most halls depend on boreholes as their main source of water. Each hall has dedicated boreholes connected to overhead and ground storage tanks. Water is pumped into these tanks and distributed through internal pipe networks to students. However, water supply is often affected by power failures, limited pumping capacity, storage constraints, and ageing infrastructure. These conditions make the University an appropriate setting for examining spatial and gender differences in water accessibility.

2.2 Data Sources

The study used a cross-sectional survey design to examine water accessibility across halls of residence in the University. A structured questionnaire was designed and administered to the residents in the halls to collect data. The questionnaire contained information such as sources of water, time taken and distance covered by residents to fetch water, and physical stress. Furthermore, adequacy and reliability (frequency and duration of supply) were examined to determine the water supply situation. A stratified random sampling method was used. Each hall formed a stratum, and further grouping was done by gender. Respondents (students) were systematically sampled per block from each hostel. A total of 152 questionnaires representing 2% of 7,618 residents were systematically sampled among the residents in the halls of residence.

2.3 Data analysis

Quantitative data were analysed using descriptive statistics, particularly frequency and mean scores. Water accessibility indices were completed for ease, adequacy, and reliability to allow comparison across halls. Comparative analysis was used to examine variations across the halls and gender differences.

3 Results

3.1 Dominant Sources of Water in Halls

Water supply across the halls of residence at the University of Ibadan is dominated by boreholes. The study revealed that 71.7% of students depended primarily on boreholes, while only 21.7% relied on institutional pipe-borne water (Table 1). A smaller proportion, 5.3%, used wells, and only 0.65% depended on vendors (tankers) or sachet and bottled water. The University's central pipe-borne water system is mainly managed through the Department of Works and Maintenance. The current Water Treatment Plant was commissioned in 1991 and was designed as the main source of water for the campus. The Plant mainly sources water from Awba Dam located on the University campus and Eleyele Dam, situated on Ona River outside the

University premises. The study revealed that Eleyele Dam supplied about 75% of the raw water required, while only about 25% was sourced from Awba Dam. Eleyele Dam belongs to the Oyo State Government. Therefore, the University pays for the raw water supplied by the Eleyele waterworks. About a year before this study, raw water supply from Eleyele Dam was inactive due to mechanical faults. Treated water is distributed through Amina, Kurumi, and Stadium stations, with Lander Storage Bay serving as a booster station. Despite this network, municipal water supply is now unreliable due to power failure, equipment breakdown, chemical shortages, and limited storage capacity. As a result, boreholes have become the main source of water across the halls. Each hall has its own borehole facilities connected to storage tanks of varying capacities and a central water system. This structure has reduced the hall's total dependence on centralised water supply. The low reliance on vendors (less than 1%) implies that commercial sources are not major sources of water because of their cost and limited practicality. Overall, the dominance of boreholes reflects a major functional shift in campus water supply and highlights the growing dependence on localised groundwater systems.

Table 1: Dominant Sources of Water Across Halls

Primary water source	Frequency	Percent
Borehole	109	71.70
UI Pipe-borne Water	33	21.70
Well Water	8	5.30
Vendors/Tankers	1	0.65
Sachet/Bottled Water	1	0.65
Total	152	100

3.2 Location and Distribution of Water Infrastructure

Water infrastructure varies significantly across the halls, affecting water supply conditions. Female halls generally have higher infrastructure capacity. For example, Queen Idia Hall operates five boreholes, supported by multiple storage tanks and regular pumping. Obafemi Awolowo Hall operates five boreholes and 30 storage tanks of different capacities ranging from 1500 to 4000 liters, which improve supply stability. In contrast, some male halls have fewer water sources relative to their population. Kuti Hall has two boreholes and one well serving about 561 students, resulting in a borehole-to-student ratio of approximately 1:280 students per borehole. Independence Hall operates three boreholes and one well, together with about 40 storage tanks, but still experiences supply pressure due to high demand.

Other halls have moderate infrastructure levels. Nnamdi Azikiwe Hall operates five boreholes and about 48 storage tanks, while Tedder Hall operates three boreholes, 21 overhead tanks, and three pumping systems. Infrastructure is also distributed at the block

level. Queen Elizabeth II Hall provides one 3,000 litres overhead tank per block, while Sultan Bello Hall operates five surface pumps and multiple tanks across its five blocks. These facilities improve local storage and supply. These differences show that halls with more boreholes and storage facilities experience a more stable water supply, while halls with fewer facilities face greater water stress.

3.3 Spatial Variations in Proximity to Water Points

Access to water points varies across halls and affects ease of access. These differences exist both between blocks and between floors. Halls with more water points provide easier access. Nnamdi Azikiwe Hall has about seven major water points, while Sultan Bello Hall has three main points and additional outdoor taps. Tedder Hall has four water collection points, which improve accessibility. In contrast, Kuti Hall has only three water points serving about 561 students, giving a water point-to-student ratio of approximately 1:187 students per water point. This results in congestion, especially during peak periods (early morning). Vertical access to water across the floors of the halls also varies. In halls with effective surface pumping systems, water reaches the upper floors more easily. For example, Obafemi Awolowo Hall, the highest high-rise hostel on campus, supplies water to all floors. However, in Queen Elizabeth II Hall and some blocks in Obafemi Awolowo Hall, water supply to the upper floors is often inconsistent during low-pressure periods.

Similarly, Independence Hall has about 40 storage tanks, while Nnamdi Azikiwe Hall has about 48 tanks, which help to maintain a regular water supply. However, water supply duration remains limited. For example, in

Independence Hall, water is pumped about three times daily, but the stored water is often exhausted within five to six hours, creating periods without access. These differences force some students to fetch water from other halls during shortages. These findings reflect clear spatial inequality in water accessibility across campus.

3.4 Hall-Level differences in water accessibility

Water availability varies across the halls of residence on campus. The variation exists along with the location of the hostel and the facilities provided. Similarly, the physical structure and layout of the hostel significantly determine the location of the water infrastructure and consequently account for distance to the water collection point.

i. Proximity to the nearest water point by hall

Ease of water access varies considerably across halls of residence, reflecting differences in water infrastructure provision and distribution, outlet density and system efficiency. Proximity to water points is most favourable in Tedder Hall (Table 2), where 90.9% of the residents accessed water within their blocks, followed by Obafemi Awolowo Hall, where 56.7% accessed water within blocks. Also, in Kuti Hall, as high as 72.7% fetch water within the hall premises. Similarly, respondents in Queen Elizabeth II (68.8%), Queen Idia (65.4%), and Nnamdi Azikiwe (57.9%) relied mainly on compound water sources, while Sultan Bello recorded the weakest proximity, with only 11.1% in-block access and 11.1% trek beyond the hostel. Independence Hall showed moderate performance, although 15.8% of the residents still depended on distant water sources.

Table 2: Proximity to the nearest water point by hall

Distance to water point	Tedder (%)	Kuti (%)	Mellanby (%)	Sultan Bello (%)	Indep. (%)	Nnamdi Azikiwe (%)	Obafemi Awolowo (%)	Idia (%)	Elizabeth (%)
Outside hall (> 5 minutes' walk)	0	0	0	11.1	0	5.3	3.3	0	0
Outside hall (< 5 minutes' walk)	0	0	0	11.1	15.8	5.3	0	3.8	6.2
Within the hall premises	9.1	72.7	54.5	66.7	42.1	57.9	40	65.4	68.8
Within the block	90.9	27.3	45.5	11.1	42.1	31.5	56.7	30.8	25

ii. Time spent to fetch water

Disparity exists in time spent on fetching water. Tedder Hall recorded the least time taken, with 81.8% of the residents spending less than 10 minutes, compared with Sultan Bello (66.7%), Kuti (63.6%), Mellanby (63.6%), and Independence Hall (57.9%). This revelation showed that water facilities in Tedder Hall are located very close to the blocks where students live, and the facilities are sufficient to serve the residents in a short time. However, delays were common in some hostels like Nnamdi Azikiwe Hall,

where only 31.6% fetch water within 10 minutes and 63.1% spend 10 to 20 minutes fetching water, and Queen Elizabeth II Hall, where 50.0% of the residents spent 10 to 20 minutes fetching water. Prolonged delays exceeding 20 minutes occurred in Queen Idia Hall, where a proportion of 11.6% spent above 30 minutes. The worst situation is often noticed during the examination period when all students usually rush to reach the examination hall in time.

Table 3: Time spent to fetch water

Variables/ Hall	Tedder (%)	Kuti (%)	Mellanby (%)	Sultan Bello (%)	Indep. (%)	Nnamdi Azikiwe (%)	Obafemi Awolowo (%)	Queen Idia (%)	Queen Elizabeth (%)
> 30 Minutes	0	0	0	11.1	5.3	5.3	0	0	6.3
21 to 30 Minutes	0	9.1	9.1	0	0	0	6.7	11.6	0
10 to 20 Minutes	18.2	27.3	27.3	22.2	36.8	63.1	43.3	34.6	50
< 10 Minutes	81.8	63.6	63.6	66.7	57.9	31.6	50	53.8	43.7

iii. Physical stress encountered from fetching water

The physical stress experienced by residents as a result of the heights of the halls further highlighted inequality in water accessibility. Tedder Hall recorded the least stress (Table 4), with 100% of the sample students reporting no or slight stress, followed by Mellanby Hall, where 45.5% reported no stress, and next is Kuti Hall (36.4%). In contrast, respondents of Queen Idia Hall experienced the highest burden, with 61.5% reporting moderate to severe stress, while 50.1% of respondents of Queen Elizabeth II Hall had moderate to high stress. The proportion of 36.6%

and 31.6% of respondents from Obafemi Awolowo Hall and Nnamdi Azikiwe Hall, respectively, ranked their experience as very stressful and moderately stressful. The distribution of water infrastructure facilities reinforced these patterns.

Table 4: Physical stress to fetch water

Degree of stress	Tedder (%)	Kuti (%)	Mellanby (%)	Sultan Bello (%)	Indep. (%)	Nnamdi Azikiwe (%)	Obafemi Awolowo (%)	Queen Idia (%)	Queen Elizabeth (%)
Very stressful	0	0	9.1	11.1	5.3	5.3	13.3	34.6	18.8
Moderately stressful	0	9.1	18.0	0	15.8	26.3	23.3	26.9	31.2
Slightly stressful	54.5	54.5	27.3	55.6	57.9	52.6	36.7	15.4	37.5
Not stressful	45.5	36.4	45.5	33.3	21.1	15.8	26.7	23.1	12.5

3.5 Reliability of water supply in Hall of residence

Water reliability was measured by the duration of daily and weekly water supply. Similarly, the duration of stored water in storage devices across the halls of residence was examined. In Kuti Hall, the study recorded the highest daily reliability, with 72.7% of respondents reporting an all-day water supply, which was followed by 68.9% of respondents in Sultan Bello Hall (Table 5). In contrast, Nnamdi Azikiwe Hall faced severe constraints, with 68.4% of respondents receiving water for less than eight hours daily, while Independence Hall recorded only 16.3% of respondents reporting an all-day water supply. Similarly, in Kuti Hall, 90.9% of respondents reported a daily water supply, while 88.9% of respondents in Sultan Bello Hall revealed daily water supply. The proportion of 81.8% and 72.7% of respondents in Mellanby and Tedder Halls disclosed daily water supply. However, there is a sharp contrast in Independence Hall and Nnamdi Azikiwe Hall, where only 36.8% of residents received a daily water supply,

while Queen Idia Hall recorded 34.6%, indicating frequent water shortages.

Recurrent water shortages have prompted each hall to devise water storage measures with varying capacities to store water for a short period. These devices have been very helpful when water supply fails for a relatively short period. In Kuti Hall, 45.5% of respondents reported that stored water lasted two to three days, compared with Tedder Hall, where only 27.3% of respondents reported that stored water lasted for a day to two days. In contrast, 89.5% of respondents in Nnamdi Azikiwe Hall exhausted their stored water within 24 hours, followed by Independence Hall (73.7%), Queen Idia Hall (73.1%), and Obafemi Awolowo Hall (70.0%). The revelation is noteworthy because there is an association between the population of the residents and the duration of the stored water. Obafemi Awolowo Hall has the largest number of occupants in the university, where the stored water served the shortest duration.

Table 5: Variations in Reliability of Water Supply

Water supply duration	Tedder (%)	Kuti (%)	Mellanby (%)	Bello (%)	Indep. (%)	Nnamdi Azikiwe (%)	Obafemi Awolowo (%)	Queen Idia (%)	Queen Elizabeth (%)
Hours per day									
Supply less than 8 hours	9	9.1	18.2	0	15.8	68.4	26.7	26.9	0
8 to 16 hours	30.2	18.2	28.2	31.1	67.9	21.1	60	52.4	48.5
Supply all hours of the day	60.8	72.7	53.6	68.9	16.3	10.5	13.3	20.7	51.5
Weekly Reliability									
2 to 4 days	9.1	9.1	0	0	15.8	10.5	3.3	15.4	0
4 to 5 days	9.1	0	0	0	15.8	31.6	20	7.7	18.7
5 to 6 days	9.1	0	18.2	11.1	31.6	21.1	16.7	42.3	18.8
Everyday	72.7	90.9	81.8	88.9	36.8	36.8	60	34.6	62.5
Duration of stored water									
Less than 1 day	45.5	36.3	27.3	44.4	73.7	89.5	70	73.1	50
Last 1- 2 days	27.3	9.1	36.3	44.5	15.8	5.2	16.6	15.4	43.8
Last 2 to 3 days	27.2	9.1	27.3	11.1	10.5	5.3	6.7	11.5	6.2
Last 4 to 5 days	0	45.5	9.1	0	0	0	6.7	0	0

3.6 Water Accessibility by Hall and Gender

The composite Water Accessibility Index (WAI) showed water availability disparities across the halls of residence using the combination of ease of accessibility, adequacy, and reliability. Kuti Hall ranked first with an overall score of 315.67, reflecting strong adequacy (286.35, 1st), the highest reliability (324.27, 1st), and a high score (336.47, 3rd) for ease of access. This indicated that most residents could obtain sufficient water consistently and with minimal effort. The largest proportion of the residents obtained water within their hostel blocks.

Among the halls, Tedder Hall was ranked 2nd (308.67) and recorded the highest (372.73) for ease of access, with 72.7% of students spending less than 10 minutes on fetching water (Table 6). However, water adequacy put Tedder at (277.40, 3rd), and reliability of water supply (275.87, 4th) was slightly lower, showing that convenient access does not always guarantee a consistent water supply. Mellanby Hall ranked 3rd (304.07) among the halls. It maintained balanced performance in terms of adequacy (281.75) and reliability (293.90), while Sultan Bello Hall ranked 4th (292.58) with strong reliability (299.97, 2nd), supported by 88.9% of respondents receiving water daily. Queen Elizabeth II Hall was ranked

5th (272.31), despite having the lowest ease of access (298.07), indicating longer collection distances and greater effort, which could have caused stress and fatigue.

Lower-ranking halls faced multiple deficits and hardship in the collection of water. Obafemi Awolowo Hall was ranked 6th (266.18), with weak adequacy (245.10, 8th), reflecting severe water shortage due to its large population of about 1,500 students. Independence Hall ranked 7th (264.05) with poor reliability (213.97). Next was Nnamdi Azikiwe Hall, which ranked 8th (250.49) and recorded the lowest reliability score (191.20). Queen Idia Hall ranked 9th (249.73) as the lowest, reflecting the most severe water access challenges. It recorded the lowest adequacy score (236.55) and the highest weak reliability (213.97), with only 34.6% of respondents receiving a daily water supply. Overall, the findings showed that while halls such as Kuti and Tedder provided relatively regular access to water, Queen Idia, Nnamdi Azikiwe, and Obafemi Awolowo faced persistent water insecurity due to insufficient water infrastructure, poor maintenance, and population pressure. Variations in gender inequalities revealed that male halls supplied water more regularly than female hostels.

Table 6: Comparative assessment of water accessibility by hall and gender

Hall of Residence	Ease Average	Adequacy Average	Reliability Average	Average per hall	Average Gender	Position	Population
Kuti	336.47 (3rd)	286.35 (1st)	324.27 (1st)	315.67	289.25 (Male)	1st	554
Tedder	372.73 (1st)	277.40 (3rd)	275.87 (4th)	308.67		2nd	540
Mellanby	336.37 (2nd)	281.75 (2nd)	293.90 (3rd)	304.07		3rd	550
Sultan Bello	311.13 (6th)	266.65 (4th)	299.97 (2nd)	292.58		4th	468
Queen Elizabeth II	298.07 (9th)	256.30 (5th)	262.57 (5th)	272.31		5th	811
Obafemi Awolowo	323.40 (4th)	245.10 (8th)	230.03 (6th)	266.18	262.74 (Female)	6th	1500
Independence	322.87 (5th)	255.30 (6th)	213.97 (7th)	264.05		7th	940
Nnamdi Azikiwe	305.27 (7th)	255.00 (7th)	191.20 (9th)	250.49		8th	980
Queen Idia	298.67 (8th)	236.55 (9th)	213.97 (8th)	249.73		9th	1275

Note: Poptn (Population); Averag- (Average)

3.7 Gender-Based Inequalities in Water Accessibility

Water accessibility showed clear gender disparities favouring male halls. Male halls recorded a higher average accessibility score (289.25) than female halls (262.74), representing approximately 9% better access. The gap existed across all dimensions: ease (330.81 male vs 306.71 female), adequacy (270.41 vs 245.98), and reliability (266.53 vs 235.52), with reliability showing the largest difference (31-point gap). Male halls dominated the top rankings, occupying the first four positions: Kuti Hall (315.67), Tedder Hall (308.67), Mellanby Hall (304.07), and Sultan Bello Hall (292.58). The highest female hall, Queen Elizabeth II Hall, ranked fifth (272.31), while Queen Idia Hall ranked last (249.73), confirming a systemic gender disadvantage.

Proximity and collection time also differed significantly across the halls. In Tedder Hall, 90.9% of students accessed water within their blocks, compared with only 56.7% in Obafemi Awolowo Hall and lower block-level access in Queen Idia Hall and Queen Elizabeth II Hall, where over 65% depended on compound-level water sources. This increased the walking distance and physical effort required for female students. Water collection time reflected similar disparities. Male halls reported shorter water collection times, with 81.8% of Tedder residents spending less than 10 minutes, compared with only 31.6% in Nnamdi Azikiwe Hall and 43.8% in Queen Elizabeth II Hall, where over 50% spend 10–20 minutes per trip. In Queen Idia Hall, 11.5% spent up to 30 minutes fetching water, representing the longest collection time. Physical stress is also higher in female halls. In Queen Idia Hall, only 23.1% reported no stress, while 61.5% experienced moderate to very high stress, including 34.6% reporting severe stress, compared to Tedder Hall, where 0% reported severe stress. These burdens were linked to stair climbing, long distances, and heavy container lifting.

Female halls experienced more severe water shortages. Obafemi Awolowo Hall (53.3%) and Queen Idia Hall (53.8%) had the highest proportion of students collecting less than 40 litres daily, compared with only 18.2% in Kuti Hall and 15.7% in Nnamdi Azikiwe Hall. This showed that female students are about three times more likely to experience inadequate water supply. Reliability disparities were even greater. In Kuti Hall, 72.7% received water all day, compared with only 25% in Queen Elizabeth II Hall and 3.8% in Queen Idia Hall. Weekly supply also differed, with 90.9% daily supply in Kuti Hall, compared with only 34.6% in Queen Idia Hall, which implies that nearly two-thirds of female residents experienced weekly outages. Storage capacity was also weaker. In Queen Idia Hall, 73.1% of the residents exhausted their stored water within 12 hours, compared

with only 36.3% in Kuti Hall, leaving female students more vulnerable during water shortages.

These disparities were strongly linked to infrastructure and population differences. Female halls housed significantly larger populations; more importantly, Obafemi Awolowo Hall houses 1,500 students and Queen Idia Hall houses 1,275 students, compared with some smaller male halls like Sultan Bello Hall with capacity to house only 468 students and Tedder Hall with 540 students. Larger populations placed greater pressure on limited infrastructure, thereby reducing water adequacy and reliability.

Infrastructure design also contributed to inequality. Female halls relied more on centralised water points, thereby increasing travel distances, while frequent equipment failures affected over 86% of residents in female halls, compared with lower levels in better-performing male halls. The findings confirmed that gender significantly shapes water accessibility. Female students faced longer collection times, higher physical stress, lower water adequacy, and less reliable supply. These inequalities reflected structural planning and infrastructure deficits rather than individual factors, highlighting the need for targeted infrastructure improvements to ensure equitable water access across all the halls.

4 Conclusion

The study has revealed that there are different sources of water within the halls of residence on the campus. The major and reliable sources of water are boreholes and piped water. The boreholes were built by each hall of residence, while the piped water is supplied centrally across the university campus. The comparative analysis using ease, adequacy, and reliability as indices quantified a cumulative deficit for female halls, characterised by low quantity of water, unreliable supply, and the physical stress of navigating steep staircases and long queues. These disparities are not caused by infrastructural shortage only but were also manifestations of population pressure, which left female halls most vulnerable to chronic scarcity. The female halls have a higher population and stories of building. The majority of the male halls, except for Independence and Azikwe halls of residence, are with lower floors, contributing to the ease of water accessibility within the premises. Time taken to access water at different points varies considerably among the halls and particularly between female and male halls. Male residents spend less time fetching water because of the proximity of the facilities to their rooms and the number provided by the authority.

The study recommends that public universities, particularly in Nigeria, should be gender sensitive in the provision of physical structures and service delivery.

Distribution of facilities should be guided by the principle of equity in public service delivery, particularly among the university students. In Nigerian contexts, where students often come from different backgrounds, administrators should be sensitive to sex differences to encourage both sexes in the educational environment. By addressing these specific gender inequalities, public universities can demonstrate good governance, improve

the welfare of diverse students, and create an environment where academic success is possible for all students, regardless of their hall of residence.

References

- Adejumo, S. A. (2020). Urban Household Water Insecurity in Ibadan, Nigeria. *International Journal of Research and Scientific Innovation (IJRSI)* | Volume VII, Issue VIII, pp. 240-247
- Adejumo, S. A. & Adelowokan, O. (2020). Urban Well Characteristics and Groundwater Pollution in Ibadan, Nigeria. *The International Journal of Humanities & Social Studies*, Vol. 8, Issue 2, pp357-364
- Adejumo, S. A. (2019). Assessment of Public Involvement in Urban Water Supply: Lessons from Ibadan City Sector. *Ibadan Planning Journal*, 8(1 & 2), 1-9.
- Balsas, C. J. L. (2003). Sustainable transportation planning on college campuses. *Transport Policy*, vol.10(1), 35-49.
- Crow, B., & Sultana, F. (2002). Gender, class, and access to water: Three cases in a poor and crowded delta. *Development and Change*, vol.33(4), 709-735.
- Graham, S., & Marvin, S. (2001). *Splintering urbanism: Networked infrastructures, technological mobilities and the urban condition*. Routledge.
- Jepson, W., Wutich, A., Collins, S. M., Boateng, G. O., & Young, S. L. (2017). Progress in household water insecurity metrics: A cross-disciplinary approach. *WIREs Water*, vol.4(3), e1214.
- Krumholz, N., & Forester, J. (1990). *Making equity planning work: Leadership in the public sector*. Temple University Press.
- Sommer, M., Caruso, B. A., Sahin, M., Calderon, T., Cavill, S., Mahon, T., & Phillips-Howard, P. A. (2015). A time for global action: Addressing girls' menstrual hygiene management needs in schools. *PLOS Medicine*, 12(2), e1001962.
- Swyngedouw, E. (2004). *Social power and the urbanization of water: Flows of power*. Oxford University Press.
- United Nations General Assembly. (2010). *The human right to water and sanitation (Resolution A/RES/64/292)*. New York: United Nations.
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. New York: United Nations.
- World Health Organization. (2017). *Guidelines for drinking-water quality: Fourth edition incorporating the first addendum*. Geneva: World Health Organization.
- World Health Organization, & United Nations Children's Fund. (2023). *Progress on household drinking water, sanitation and hygiene 2000-2022: Special focus on gender*. Geneva: WHO and UNICEF.
- Yusufu, A. B., Paschal, U. O., Adejumo, S. A. & Choji, V. (2022). Wastewater Usability in Abuja Municipal, Nigeria. *African Journal of Geographical Sciences*, Vol. 3, No.1: 128-139.