

ENHANCING PUBLIC OPEN SPACE USABILITY: THE IMPACT OF ACCESSIBILITY AND ACTIVITY DIVERSITY IN UNGUJA, ZANZIBAR

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Abstract

Public open spaces are essential for enhancing well-being, fostering social interaction, and supporting environmental sustainability in urban settings. Objective of this study was to assess the usability of public open spaces focusing on Mwanakwerekwe neighbourhood, in Unguja, Tanzania. Primary data were collected through in-depth interviews and field observations, while secondary data were sourced from existing literature on public space management. The data were analyzed using Past 4.03 software, applying univariate and multivariate statistical methods within a mixed-methods approach, combining both qualitative and quantitative techniques. The results revealed that accessibility was the leading factor affecting the usability of public open spaces, accounting for 94.18% of the variance in user perceptions. Activity diversity is the secondary factor, explained only 5.82% of the variance. Population size was found to significantly influence the usability of these spaces, with the mean score for population size (men) being 82.73, while for women it was 134.34, indicating that areas with a higher female population are largely accessing open spaces. Additionally, a p-value confirmed that gender had a statistically significant impact on the perceived accessibility of the spaces. Overall, the findings highlight that accessibility is the most important factor influencing the usability of public open spaces, while environmental quality and activity diversity had relatively lesser impact. These findings offer valuable insights for

urban planners, policymakers, and community leaders in managing public spaces.

Keywords: Community engagement; Public space design; Social interaction; Sustainable development; Urban planning.

1. INTRODUCTION

Public open spaces are the locations where people, environment and built-up areas interact [1]. Public open spaces are essential components of urban life, offering opportunities for recreation, social interaction, and relaxation [2]. These spaces provide significant benefits to communities by enhancing physical and mental well-being, fostering social cohesion, and contributing to environmental sustainability [3]. As urban populations grow, the demand for accessible and well-designed public open spaces becomes increasingly critical to ensuring liveable cities that meet the diverse needs of their inhabitants. Public open spaces, therefore, play a key role in creating vibrant and healthy urban environments by serving as spaces for leisure, interaction, and community development [4].

In Africa, rapid urbanization has led to the expansion of cities and the growth of informal settlements, often resulting in a lack of adequate public open spaces. Many African cities struggle to provide high-quality, well-maintained, and accessible spaces for their residents, contributing to inequalities in urban infrastructure [5]. The challenge is particularly acute in densely populated residential neighbourhoods, where the scarcity of public open spaces and insufficient urban planning can hinder the development of vibrant, healthy communities [6]. Nonetheless, there is growing recognition across the continent of the importance of improving the usability of public open spaces to enhance urban life, provide opportunities for physical activity, and strengthen community ties [7].

Tanzania, as part of this broader trend, is experiencing rapid urbanization, with growing pressures on its cities to accommodate expanding populations [8]. Zanzibar, a semi-autonomous region of Tanzania, faces similar challenges in providing sufficient and functional public open spaces, particularly in its urban areas [9]. Mwanakwerekwe in Unguja, a densely populated neighbourhood in Zanzibar, is a prime example of an area where the usability of public open spaces plays a critical role in the well-being of its residents [10]. Despite the significance of these spaces, challenges such as limited facilities, poor maintenance, and accessibility barriers often hinder their effective use.

The importance of public open spaces in residential neighbourhoods, such as those in Mwanakwerekwe, cannot be overstated. These spaces provide essential recreational and social benefits, especially in urban areas with limited private space [11]; [12]. Well-designed public open spaces improve public health by encouraging physical activity, offering green environments for mental relaxation, and creating venues for community gatherings [13]. Furthermore, such spaces foster a sense of community ownership and identity, contributing to social cohesion and reducing urban isolation [14]. They can also provide economic benefits by supporting local businesses, increasing property values, and attracting visitors, thus playing a crucial role in the sustainable development of neighbourhoods [15].

However, there are limitations to the usability of public open spaces, especially in rapidly urbanizing areas like Mwanakwerekwe. Concerns such as poor maintenance, inadequate infrastructure, and lack of facilities often render these spaces less appealing or functional. Many public open spaces in densely populated neighbourhoods face environmental challenges, such as overcrowding, waste management problems, and the absence of proper seating or recreational facilities. Additionally, accessibility remains a key concern, particularly for marginalized groups such as the elderly, children, and people with disabilities [13]. Without sufficient attention to planning, design, and community engagement, public spaces can fail to meet the needs of all users, limiting their potential to serve as inclusive and multifunctional areas that enhance quality of life.

The objective of this study is to explore the usability of public open spaces in Mwanakwerekwe, Zanzibar, with particular focus on factors such as activity diversity, environmental quality, accessibility, and user comfort. By understanding these factors, the study aims to provide insights into how public open spaces can be better designed and managed to meet the needs of diverse residents. The findings from this research will contribute to improving urban planning practices, offering evidence-based recommendations that could guide the development of more inclusive, accessible, and functional public spaces in Mwanakwerekwe and other similar neighbourhoods across Tanzania and Africa.

2. LITERATURE REVIEW

Public open spaces are vital components of urban environments, providing multifunctional areas that facilitate social interactions, economic activities, and cultural expressions among diverse communities [16]. These spaces take various forms, such as recreational grounds, public parks, vacant plots, and landscaped areas, all contributing to the overall urban fabric. [17] asserts that public open spaces are not only places for urban community gatherings but also spaces where anonymous crowds and strangers can engage, underscoring their importance in modern cities. Public open spaces play a significant role in enhancing different aspects of human life [15]. Socially, these spaces are crucial for tourism and recreation, fostering vitality and vibrancy in urban areas [18]; [19]. Other functions of public open spaces include promoting urban civility, generating income, facilitating investments, and improving environmental sustainability. Additionally, they contribute to public health, enhance urban safety, promote equity and social inclusion, and create opportunities for citizen involvement [20]; [21].

Usability, in the context of public open spaces, is defined as the degree to which these spaces meet the demands of residents in terms of planning, design, leisure infrastructure, and management [22]. These spaces are primarily designed for specific activities such as market trading, social gatherings, and recreational events, which might include ball games, picnics, or ice skating [23] highlight that the use of public spaces varies depending on the time of day, the day of the week, and what activities are available at a given time. Social norms also influence how different groups use these spaces, with some groups self-segregating based on time and space [24]. Furthermore, [25] point out that societal stratification often shapes the usage patterns of these spaces, with certain groups, such as the elderly and young people, often

discouraged from using certain spaces due to lack of facilities like seating or due to regulations that limit their presence [26]. The usability of public open spaces is influenced by various factors such as accessibility, green design, and urban planning interventions [27]. Accessibility, in particular, plays a key role in determining the usability of a public open space, as people are more likely to use spaces that are well-connected and accessible through multiple transportation options.

The activities carried out in public open spaces vary across residential neighbourhoods and are largely influenced by the demographic profile and the size of the space itself [28]. Common activities include sports, jogging, walking, sitting, and food vending. Understanding these activities is essential for evaluating the usability of public open spaces, as physical activity is crucial for promoting healthy lifestyles [29]. Well-designed urban spaces encourage engagement in a variety of physical activities, thereby fostering social interactions. [30] categorizes these activities into three types: necessary activities (those that occur year-round), optional activities (which depend on personal interest and weather conditions), and social activities (which arise from communal gatherings and strengthen the sense of community). Public open spaces that integrate a diversity of activities can provide both social and environmental benefits, improving public health, fostering community bonds, and offering economic benefits such as increasing property values [31]. Moreover, some public spaces may have potential future benefits, such as opportunities for medicinal plant growth. Therefore, designing public open spaces with a variety of activities in mind is crucial for ensuring their usability and fostering long-term community engagement.

Supportive design elements significantly enhance the vibrancy of public open spaces and improve the overall quality of life for urban dwellers. Key design considerations include accessibility, meaningful use, and usability, which shape how these spaces are experienced. Effective designs often incorporate shaded areas such as trees, canopies, and pavilions, which are essential for activities like sitting and relaxation. Additionally, walkways and bike lanes encourage movement, promote physical activity, and foster community engagement. Well-placed lighting is another important design feature, improving safety and extending the usability of public spaces into the evening, while also creating a welcoming atmosphere. Furthermore, safety features, including surveillance and regular maintenance, promote a sense of security [32]. Greenery not only enhances the aesthetic appeal of these spaces but also improves air quality, encouraging outdoor activities. The availability of public toilets, integrated seamlessly into the design, further enhances the visitor experience and convenience. The New Urban Agenda emphasizes the importance of inclusive, accessible public spaces that promote social interaction, well-being, and economic development through thoughtful and inclusive design.

Managing public spaces involves addressing various land ownership issues and the diverse needs of users and stakeholders. While many public spaces are publicly owned, some are privately managed, raising concerns about privatization and its implications for accessibility [32]. argues that public spaces can offer access to areas previously closed off to the public, contributing to greater inclusivity. Municipal governments are typically responsible for maintaining these spaces, including managing infrastructure and regulating traffic. Effective management requires coordination among multiple stakeholders and a commitment to thoughtful design.

Engaging the community in consultations ensures that the spaces meet local needs and support a vibrant, inclusive environment [33].

Globally, public open spaces play a central role in fostering social interaction and cultural activities. In cities like Cairo, spaces such as Al Azhar Park are designed with an emphasis on aesthetics and greenery to create inviting environments for community engagement. Similarly, public spaces in Latin American cities, such as Buenos Aires, offer multipurpose areas for social and cultural activities, reflecting the region's emphasis on public gatherings and cultural expression [34]. In London, urban planning focuses on diverse uses of public spaces, including temporary markets and events, to enhance vibrancy and community involvement [35]. Each region offers valuable lessons in public space design and management that prioritize social connection and community vitality.

In Tanzania, the management and design of public open spaces is also critical for urban life. Public spaces such as Mnazi Mmoja in Dar es Salaam, Forodhani in Zanzibar, and Jamhuri Public open space serve as key venues for community activities and cultural events. Mnazi Mmoja, for instance, serves as a cultural and political gathering site, while Forodhani thrives as a vibrant night food market. These spaces highlight the importance of well-thought-out design and effective management in fostering dynamic public environments. However, challenges such as maintenance gaps and commercialization can limit the accessibility and inclusivity of public spaces, underscoring the need for integrated approaches to their design and management [36].

3. METHODOLOGY

3.1 Study area

The study was conducted in the Mwanakwerekwe residential neighbourhood, located in the Magharibi B district of Unguja in Zanzibar, Tanzania. Specifically, the neighbourhood is within the Mwanakwerekwe ward, situated in the western region of Zanzibar. Geographically, the area is located within the range of approximately 6.165°S 39.199°E. Mwanakwerekwe is a densely populated area with a range of economic activities including petty trading, retail and whole sale shops, business, small scale industries and few urban farming.

3.2 Data collection

Data collection for this study was conducted using a combination of qualitative and quantitative methods to achieve the study's objectives. A simple random sampling technique was employed to ensure that each household in Mwanakwerekwe neighbourhood had an equal chance of being selected. Based on the Yamané formula (Eq. 1), a total of 100 respondents were selected for the study. This formula helps to determine a sample size that is statistically representative of the population, based on the desired level of precision.

$$n = \frac{N}{1 + N \cdot e^2} \quad (1)$$

Where n is the sample size, N is the total population size and e is the margin of error (expressed as a decimal, e.g., for a 10% margin of error, $e=0.10$ $e = 0.10e=0.10$)

Both primary and secondary data were utilized. Secondary data were gathered from existing studies, including journal articles, documents related to public spaces, urban planning, and community dynamics. These documents were reviewed to provide a better understanding of the context and inform the research framework. Primary data were collected through in-depth interviews and field observations. The in-depth interviews allowed for a deeper exploration of individual experiences, perceptions, and insights regarding the usability of public open spaces in Mwanakwerekwe. Field observations provided valuable firsthand information on how residents interact with these spaces, types of activities conducted and the overall usability of the spaces. This mixed-method approach enabled a comprehensive analysis of both the qualitative and quantitative aspects of the study.

3.3 Data analysis

The collected data in this study were analysed using the Past 4.03 software. It is comprehensive, but simple-to-use software package for executing a range of standard numerical analysis, and is available in free of charge. Initially, descriptive statistics were utilized to summarize the demographic and socio-economic characteristics of the respondents. It employ a combination of univariate and multivariate analysis methods. Univariate analysis was used to examine and describe the distribution of individual variables. Descriptive statistics, such as the mean, median, standard deviation and variance were calculated to provide an overview of the user perspectives on the usability of public open spaces in Mwanakwerekwe. These statistics were essential for understanding the central tendencies, variability, and distribution of the key factors, such as activity diversity, environmental quality, accessibility, and user comfort. For multivariate analysis, Principal Component Analysis (PCA) was utilized to reduce the dimensionality of the data and identify underlying patterns or relationships between the variables. This technique allowed for the identification of the main components that contributed to the variance in the data. Additionally, statistical tests such as the Kruskal-Wallis test and Analysis of Variance (ANOVA) were employed to assess differences in the user perspectives based on various demographic and contextual factors. These tests helped to examine whether significant differences existed in the factors influencing the usability of public open spaces in Mwanakwerekwe.

4. RESULTS

4.1 Respondents characteristics on the usability of public open spaces

The results reveal two main principal components that capture the underlying structure of the characteristics of respondents, existing activities, and user comfortability on the usability of public open spaces in Mwanakwerekwe (Table 1). The factor scores for PC 1 and PC 2 show how each variable relates to the components, with different activities, age groups, and comfortability factors exhibiting distinct patterns of association with these principal components. For PC 1, age groups and activities that are more commonly associated with daytime usage of the public open spaces (such as "Activities-Morning hours" and "Activities-Afternoon hours") show significant negative factor scores, suggesting that these variables contribute more strongly to the first component. For example, the factor scores for the "Age (6-10)

years" group and "Activities-Morning hours" are -373.5 and -239.6, respectively, indicating a strong negative association with PC 1. Similarly, other age groups like "Age (10-18) years" (-330.6) and "Age (19-60) years" (-299.9) are also associated with negative scores on PC 1, further reflecting their link to this principal component. In contrast, variables such as "Activities-Playing football" (-113.0) and "Activities-Political events" (-92.7) show less negative scores, indicating weaker associations with PC 1. The higher positive factor scores for discomfort-related variables, such as "Yes-Poor greeneries" (261.6) and "Yes-Lack of seating benches" (154.8), suggest a higher contribution to PC 1 in terms of factors that users find inconvenient or less comfortable in public open spaces.

PC 2, on the other hand, shows a more mixed pattern, with some variables displaying positive associations and others negative. For instance, "Yes-Unpleasant smell" (29.2), "Yes-Lack of preferred physical activities" (34.3), and "Yes-Lack of seating benches" (57.6) exhibit positive scores, indicating they contribute more significantly to this component. In contrast, "No-Poor greeneries" (-3.6) and "No-Lack of seating benches" (-43.1) are more negatively associated with PC 2. This suggests that PC 2 may capture a dimension related to user comfort and dissatisfaction, focusing more on specific aspects like smell, availability of seating, and activity options.

The frequency and cumulative frequency reveal that the variables are strongly linked to either PC 1 or PC 2. The cumulative frequency has a loading of 1.0 on PC 1, meaning it is entirely associated with this principal component, while the frequency variable loads more heavily on PC 2, with a loading of 1.0, reflecting its stronger relationship with the second component. The eigenvalues provide additional insight into the importance of each component. The first principal component (PC 1) has an eigenvalue of 64451.9, accounting for 99.1% of the total variance, highlighting that it captures the majority of the variance in the data. In contrast, PC 2 has a much smaller eigenvalue of 608.2 and explains only 0.9% of the variance, indicating that it contributes far less to the overall data structure.

Based on the analysis of the factor scores and eigenvalues from the results, the cumulative frequency should be used in relation to PC 1, as it shows a strong and entirely positive association with this component. The loading of the cumulative frequency variable is 1.0 on PC 1, indicating that it is fully linked to this principal component, which captures the majority of the variance in the data (99.1%). On the other hand, the frequency variable, which loads more heavily on PC 2, should be considered in relation to the second component, given that it has a stronger relationship with this component (loading of 1.0). Therefore, while cumulative frequency is relevant for analyzing PC 1, frequency is more closely related to PC 2.

Table 1: PC-Analysis of respondents' characteristics on usability of public open spaces in Mwanakwerekwe

Factor scores:	PC 1	PC 2
Age (6-10) years	-373.5	-17.0
Age (10-18) years	-330.6	14.8
Age (19-60) years	-299.9	3.0
Age (>60) years	-282.3	-10.5
Activities-Morning hours	-239.6	11.3
Activities-Afternoon hours	-220.3	-11.2
Activities-Night hours	-181.8	5.7
Activities-Playing football	-113.0	34.9
Activities-Informal businesses	-97.4	-16.6
Activities-Political events	-92.7	-28.7
Activities-Community meetings	-85.6	-26.9
Activities-Attending none	-82.7	-31.0
Yes-Unpleasant smell	-16.1	29.2
Yes-Lack of preferred physical activities	56.1	34.3
Yes-Lack of seating benches	154.8	57.6
Yes-Unsupportive environment for disabled	205.5	10.2
Yes-Poor greeneries	261.6	12.6
No-Unpleasant smell	296.0	-9.3
No-Lack of preferred physical activities	323.8	-17.1
No-Lack of seating benches	325.1	-43.1
No-Unsupportive environment for disabled	374.3	1.6
No-Poor greeneries	418.2	-3.6
Factor loadings:		
Frequency	0.03	1.0
Cumulative frequency	1.0	-0.03
Eigenvalue	64451.9	608.2
% variance	99.1	0.9

4.2 User perspectives on activity diversity of public open spaces

The results reveal that there is considerable variability in user perspectives on activity diversity in relation to the usability of public open spaces in Mwanakwerekwe, Zanzibar (Table 4). For the individual responses, the data ranges from a minimum of 8 to a maximum of 82, with a total sum of 290. The mean response is 48.3, indicating a moderate overall perspective on activity diversity. The standard error of 11.7 suggests some variability around this mean, while the variance of 825.7 and standard deviation of 28.7 highlight the spread of responses. The median of 50 indicates that half of the

responses fall below this value, and half are above it. The 25th percentile is 20, with 25% of responses falling below this value, and the 75th percentile is 77.5, meaning that 75% of responses are below this number. The skewness of -0.3 suggests a slight leftward skew, with a few lower values, while the kurtosis of -1.3 points to a distribution that is flatter than a normal distribution. The geometric mean for the individual responses is 38.0, which is lower than the arithmetic mean, indicating that the lower values have a notable effect on the overall distribution. The coefficient of variation for the individual responses is 59.5, reflecting a high degree of variability relative to the mean.

For the cumulative frequency data, the range is from 8 to 290, with a total sum of 930.4. The mean for the cumulative data is 155.1, which is significantly higher than the mean for the individual responses, indicating that the cumulative data is influenced by a broader range of values. The standard error for the cumulative data is 42.4, higher than for the individual responses, suggesting more variability in this dataset. The variance of 10784.1 and standard deviation of 103.8 further confirm this increased spread. The median for the cumulative data is 152, and the 25th and 75th percentiles are 69.5 and 251.3, respectively, showing a wider range of values in the cumulative dataset. The skewness of -0.1 suggests near symmetry, while the kurtosis of -1.0 indicates a moderate flattening of the distribution. The geometric mean of 101.3 is lower than the arithmetic mean, reflecting the impact of lower values in the cumulative data. The coefficient of variation for the cumulative frequency is 67.0, indicating a higher relative variability compared to the individual responses, which suggests greater dispersion in the cumulative dataset.

Table 2: The summary statistics for user perspective on activity diversity on usability of public open spaces in Mwanakwerekwe

	Frequency	Cumulative frequency
Response (N)	6	6
Min	8	8
Max	82	290
Sum	290	930.4
Mean	48.3	155.1
Standard error	11.7	42.4
Variance	825.7	10784.1
Standard deviation	28.7	103.8
Median	50	152
25 percentile	20	69.5
75 percentile	77.5	251.3
Skewness	-0.3	-0.1
Kurtosis	-1.3	-1.0
Geom. mean	38.0	101.3
Coeff. var	59.5	67.0

4.3 User perspectives on activity diversity of public open spaces

The results of the PCA for user perspectives on activity diversity in relation to the usability of public open spaces in Mwanakwerekwe (Table 5) indicate that the PC 1 and PC 2 account for the majority of the variance in the dataset. For PC 1, the factor scores for various responses show a strong association with certain variables. The highest factor loadings for PC 1 are associated with "Population size-Women" (134.34), indicating that this factor is most strongly influenced by the population size of women in relation to activity diversity. Other notable variables with higher factor scores for PC 1 include "There is diversity" (-150.86) and "No diversity" (-60.52), suggesting a clear division between the perceptions of diversity in the space. The Eigenvalue for PC 1 is 10933.90, explaining 94.18% of the variance, which shows that this principal component accounts for most of the variability in user perspectives on activity diversity.

In contrast, PC 2 appears to capture a different aspect of the data. The factor scores for "Population size-Men" (82.73) and "Distant located" (38.02) are relatively higher, indicating that these variables have a stronger association with PC 2. "No diversity" (41.28) also shows a moderate factor score for PC 2, suggesting that perceptions of lack of diversity may have some association with this component. The Eigenvalue for PC 2 is 675.86, accounting for 5.82% of the variance. Although this component explains a smaller portion of the total variance compared to PC 1, it still provides valuable insight into the factors that influence user perspectives on activity diversity in public open spaces.

The percentage of factor loadings for the variables "Percentage" and "Cumulative frequency" are relatively low for PC 1 and PC 2, with 0.12 and 0.99 for PC 1, and 0.99 and -0.12 for PC 2, respectively. These loadings suggest that these variables have minimal impact on the two principal components in this analysis. The analysis reveals that PC 1 is the dominant factor, explaining the majority of the variance in user perspectives, particularly in relation to perceived diversity and the gendered population size. PC 2, while explaining a smaller portion of the variance, highlights factors related to the location of spaces and the population size of men.

Table 3: The Principal Component Analysis for user perspective on activity diversity on usability of public open spaces in Mwanakwerekwe

Factor scores:	PC 1	PC 2
There is diversity	-150.86	-22.26
No diversity	-60.52	41.28
Well accessible	-43.71	-19.19
Distant located	38.02	23.24
Population size-Men	82.73	-10.01
Population size-Women	134.34	-13.07
Factor loadings:		
Percentage	0.12	0.99
C. frequency	0.99	-0.12
Eigenvalue	10933.90	675.86
% variance	94.18	5.82

4.4 Activity levels across different categories of public open spaces

The data for public open spaces in Mwanakwerekwe reveals varying activity levels across different categories of spaces (Table 7). The three categories such as Total Public Open, Active Public Open and Dormant Public Open were analysed. Each consist of 8 observations, providing insight into the diversity of activity in these spaces.

In the Total Public open spaces, the minimum level of activity is 2, with a maximum of 6, and a total sum of 24, yielding a mean of 3. This suggests moderate activity levels across the spaces. The variance of 2 and the standard deviation of 1.41 indicate a reasonable spread of activity, with some spaces showing more activity than others. The median value of 2.5 suggests a slight leftward skew, indicating that more spaces have lower levels of activity, though not by a large margin. The skewness of 1.62 reinforces this, indicating a moderate positive skew with a small number of spaces exhibiting higher activity. The kurtosis value of 2.47 suggests a slightly peaked distribution, with some spaces experiencing extreme levels of activity compared to others. The coefficient of variation of 47.14% reflects a moderate degree of variability in the data.

For Active Public open spaces, the minimum activity is 0, the maximum is 6, and the sum is 13, resulting in a mean of 1.63. This shows that, on average, the activity level in active public open spaces is relatively low. However, the standard deviation is higher (1.92), indicating greater variability in how activity is distributed across these spaces. The variance of 3.7 underscores this broad range of activity levels. The median of 1, alongside a skewness of 2.0, suggests a pronounced positive skew, meaning that most active spaces have minimal activity, while a few spaces experience much higher activity levels. The kurtosis of 4.66 indicates a leptokurtic distribution, with the data being more concentrated around higher activity levels than expected and fewer spaces with mid-range activities. The very high coefficient of variation (118.31%) shows significant variability in how activity is spread across the active spaces.

For Dormant Public open spaces, the minimum activity is 0, the maximum is 3, and the sum is 11, with a mean of 1.38. The data suggests that these spaces generally see low activity. The standard deviation of 1.19 indicates a moderate spread of activity levels across these spaces. The variance is 1.41, reflecting a more consistent level of activity, although still with some variation. The median value of 1 and the 25th and 75th percentiles (0.25 and 2.75, respectively) suggest that most dormant spaces have minimal activity. With a skewness of 0.39, the distribution is mildly positively skewed, showing that while many dormant spaces have low activity, there are some with higher levels of use. The kurtosis of -1.23 indicates a platykurtic distribution, suggesting that the data is more flat than normal, with fewer extreme values. The coefficient of variation of 86.38% reveals considerable variability in activity levels across these spaces, though it is less extreme than in the Active Public Open category. These findings reveal that the activity levels in public open spaces are diverse, with Total Public open spaces exhibiting moderate activity, Active Public open spaces displaying significant variation, and Dormant Public open spaces generally having minimal use but with some exceptions.

Table 4: The summary statistics for Town Planning (TP) drawing on activity diversity on usability of public open spaces in Mwanakwerekwe

	Number of Open	Active Open	Dormant Open
TP drawing (N)	8	8	8
Min	2	0	0
Max	6	6	3
Sum	24	13	11
Mean	3	1.63	1.38
Standard error	0.5	0.68	0.42
Variance	2	3.70	1.41
Standard deviation	1.41	1.92	1.19
Median	2.5	1	1
25 percentile	2	0.25	0.25
75 percentile	3.75	2	2.75
Skewness	1.62	2.0	0.39
Kurtosis	2.47	4.66	-1.23
Geom. mean	2.77	0	0
Coeff. var	47.14	118.31	86.38

5. DISCUSSION

The findings of this study provide a detailed understanding of the factors influencing the usability of public open spaces, with a particular focus on user perspectives, activity diversity, and environmental conditions. The research highlights the multifaceted nature of public space usability, emphasizing that comfortability is just one of many factors that affect how users interact with these spaces.

A key aspect that emerged from the study is the role of activity diversity in shaping user engagement. The research found that the variety of activities available, such as football, informal businesses, political events, and community meetings, plays a significant role in how users perceive the usability of public open spaces. This finding aligns with the work of other researchers [37], who have stressed the importance of offering a broad range of activities to attract diverse groups and encourage prolonged engagement with public spaces. In Mwanakwerekwe, however, the limited range of activities available was cited by users as a barrier to their full engagement with the space. This suggests that expanding the range of activities could significantly improve user satisfaction and increase the overall utility of the space [11]; [38]. The study also highlights how different user groups, including men, women, and different age categories, may have varying needs when it comes to the types of activities they wish to engage in, suggesting that providing a more inclusive range of activities could help accommodate these diverse preferences [39].

Environmental factors were another critical element identified in the study. Aspects like unpleasant smells, lack of seating, and insufficient facilities for disabled users were frequently mentioned as discomforts that negatively impacted the user experience. This finding is consistent with existing findings which highlights the connection between the quality of the physical environment and users' perceptions of public spaces [40]. In Mwanakwerekwe, the absence of key amenities, including seating and accessible features, was a major issue, particularly for vulnerable groups such as the elderly or disabled. These environmental challenges not only diminish comfort but also limit the space's overall usability [41]. The study thus reinforces the need for improvements in the physical environment of public spaces, such as the inclusion of more seating options, better greenery, and accessible infrastructure. These improvements would contribute to greater user comfort, making the space more inviting and functional for all.

Demographic factors, including gender and age, were also found to influence user perceptions and engagement with public open spaces. The study revealed that men, women, and different age groups interact with the space in distinct ways, with varying expectations and needs. This is in line with existing research by [42] and [43], which highlights that public spaces are experienced differently by various demographic groups, particularly women and older adults, who may face barriers such as safety concerns, lack of appropriate activities, and inadequate infrastructure. In Mwanakwerekwe, the study found that the different needs of men and women, as well as age-related preferences, affect how users perceive and interact with the space. These findings underscore the importance of designing inclusive public spaces that cater to the needs of diverse user groups. For example, spaces designed with greater consideration for women and elderly individuals, such as well-lit areas, safe paths, and age-appropriate seating, can enhance their comfort and usability of these spaces [44]. The study highlighted the impact of gendered population sizes on perceptions of activity diversity. The findings indicated that the number of men and women in the population influences how activities are perceived, with differing levels of engagement based on gender. This insight adds to the body of research suggesting that the demographic composition of a space can shape its use and perception [45]. In Mwanakwerekwe, this suggests that public space designs should take into account

gendered differences in usage patterns and ensure that both men and women have equal access to activities and amenities that meet their needs [46]. By addressing the specific requirements of different gender groups, public spaces can become more inclusive, equitable, and appealing to a broader segment of the population.

The findings support urban design principles that emphasize accessible public spaces, as seen in research by [47]. In Mwanakwerekwe, improving the environment, diversifying activities, and ensuring accessibility could enhance user comfort and engagement with public spaces. These trends align with global studies, like those in New York and Melbourne, where accessible spaces show higher activity levels [48]; [49]. Dormant spaces in Mwanakwerekwe reflect the global issue of poor maintenance and limited amenities, as noted by [50]. Additionally, the varying activity levels in Zanzibar public open spaces match with [51] idea that public open spaces serve different functions, from social hubs to quiet areas, confirming that accessibility, design, and maintenance are key to space usability.

6. CONCLUSIONS

To improve the usability of public open spaces in residential neighbourhoods, a comprehensive approach focusing on activity diversity, environmental quality, inclusivity, accessibility, safety, and community engagement is essential. This study emphasized the importance of offering a range of activities that cater to diverse age groups and interests, particularly to underrepresented groups like women and the elderly. Providing spaces for sports, informal businesses, community meetings, and cultural events can make public open spaces more vibrant and engaging.

Enhancing the physical environment is also crucial. This includes addressing issues like unpleasant smells, inadequate seating, and lack of accessibility for disabled users. Installing seating, ensuring cleanliness, adding greenery, and creating safe, well-lit spaces can significantly improve user comfort. Additionally, spaces should be designed to be inclusive, with features such as ramps, wider pathways, and gender-sensitive areas to accommodate diverse users. Safety and security are critical for promoting usage. Well-maintained spaces with natural surveillance and adequate lighting, along with community safety initiatives, help reduce concerns, especially for women and children. Encouraging community involvement in the planning, design, and management of public open spaces fosters a sense of ownership and ensures that spaces reflect local needs. Continuous monitoring and feedback from the community help adapt and improve these spaces over time.

The sustainable management approach, supported by partnerships with local organizations and governments, will ensure the long-term viability of public spaces. Regular monitoring and feedback from users can help adapt these spaces to the evolving needs of the community, ensuring they remain functional, accessible, and enjoyable for all.

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