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Spatial Characteristics of Outdoor Spaces That Support User's Activities within Hospitals in Abuja, Nigeria

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Abstract

Hospital outdoor spaces (HOS) play an important role in supporting physical and mental well-being among patients and visitors. These spaces are often designed to serve as auxiliary spaces within the hospital environment in developed countries, while it is often ignored in underdeveloped countries. The study aims to identify the spatial characteristics within the hospital's outdoor space that optimally support users' activities. It employed a mixed method using a purposive sampling technique, the studied hospitals were selected within Abuja, Nigeria based on their outdoor spatial characteristics. A 5-point Likert scale was used to assess the perception of both physical and social attributes derived from hospital outdoor spaces. A total of 343 questionnaires were returned and analyzed for this study. The observation of human activities, and administering of the questionnaire were done alongside measuring microclimatic parameters in three phases between the hours of 9:00 am – 12:00 pm, 12:00 pm – 3:00 pm, and 3:00 pm – 6:00 pm for five working days of the week. The results reveal a lack of inclusiveness of hospital outdoor spaces in their design which makes the spaces unsuitable for the various human activities. It also identifies the significant relationship between spatial characteristics and user activities to be optimal, if such spaces are designed and located close to the various units within the facility. The study concludes by suggesting that policies should be implemented that make hospital outdoor spaces an integral part of hospital design for a more sustainable hospital environment.

Keywords: *Environment, Hospital Outdoor Spaces, Human Activities, Spatial Characteristics,*

1.0 Introduction

When outdoor spaces are mentioned, the general perception is limited to urban spaces like gardens and parks, whereas these spaces by extension include spaces within built-up facilities like hospitals. Hospital outdoor spaces (HOS) over the decades have been studied to contribute meaningfully to promoting health among patients and visitors within the hospital environment. (Ajayi & Amole, 2022; Beyer, Szabo, & Nattinger, 2016). Outdoor spaces have also been researched to contribute meaningfully to human coexistence by way of creating social relationships and development. (Scott, et. al., 2022).

The physical makeup of an outdoor space which includes spatial characteristics such as area, distance, landscape features and construction materials finishes were considered to be some key factors that support the frequent use of such spaces (Tourinho et al., 2021; Berg et. al., 2020). Other studies have identified the benefit of the presence of increased green space (Gascon, et al., 2019) and blue spaces (Lu, et al., 2022) to support and encourage often use of outdoor space within an environment. Nikolopoulou and Steemers, (2003) further grouped the factors that enhance the often use of hospital outdoor spaces within a given environment into three (3) namely personal, social, and environmental.

Studies on the impact of outdoor activities within a hospital environment have been proven to have a positive impact on well-being. In Nigeria there is little or no inclusion of such in most of the hospital facilities are designed without the thought of the health and therapeutic benefits it holds on users within such spaces, (Sholanke & Oke, 2020) inclusion of outdoor spaces also serves as space to return away from the stress indoors for patients within the hospital as it also holds for their recuperating.

The hospitals' outdoor environment needs much attention to make it a healthy space and user-friendly, drawing, from this it becomes inevitable for the attention of design professionals, and specialists in the field of environment and medical science to adopt policies to achieve this, which by all means is in alignment to two (2) items of the Sustainable Development Goals (SDG) which are health and well-being, and sustainable cities. This study aims to align with current trends and demands within the built environment for a sustainable outdoor space by way of establishing the outdoor spatial characteristics that best support users' activities within the hospital outdoor spaces in Abuja, Nigeria.

2.0 Summary of Literature

2.1 Overview of outdoor spaces

Outdoor space is defined as spaces that are part of a building's surroundings, which are not entirely enclosed and serve other functions to the users as an extension of activities. In general, spaces located within and adjacent to buildings vary in typologies and also serve different purposes. Semi-outdoor spaces could be seen to have one end open to the natural environment, these spaces which include courtyards, gardens, covered walkways, pergolas, and corridors (Kwon, 2022; Dukajovic, Maric, & Giofre, 2017), these spaces are found to contribute positively to the health and well-being of users (Tourinho et al., 2021). Outdoor spaces also serve as restorative spaces for visitors and patients within the hospital environment, it is prerogative that the inclusiveness of some elements be considered within these spaces in meeting the social and physical needs of the users.

Literature also proves the impact of these spaces like the courtyards in different climatic regions considering variables like the aspect ratio (height and width) which cannot be overemphasized of its benefits within the spaces found, the amount of shade they provide further enhances the performance of the microclimate and consequently on the users' comfort and overall use.

(Soflaei, Shokouhian, & Zhu, 2017).

The characteristic features of these spaces also have a way of affecting the use of the outdoors positively, Stangierska, et. al., (2023) observed that increased greenery enhances the use of the outdoors helps spend more time outdoors and contributes positively to their health. These space if properly designed and located close to common spaces that observe high traffic of users will increase their use daily irrespective of the time and occasion (Bai. et. al. 2022)

2.2 Activities Observed Outdoors

Various activities can be identified within the hospital outdoors as a result of regular visits of patients and visitors, these activities are not limited to seating, walking, discussing, sleeping, eating and exercising within the hospitals outdoors as observed, f**igure 1**. Most of these activities are inevitable and are bound to take place within the outdoors. The comfort, pleasure, and safety users derive outdoors can also be attributed to these factors which contribute positively to the restorative potential of the outdoors, (Lee, 2020; Zhao, et. al., 2020)

Figure 1: Some activities observed outdoors within the hospital's outdoor space.
Source: Researchers' fieldwork 2024.

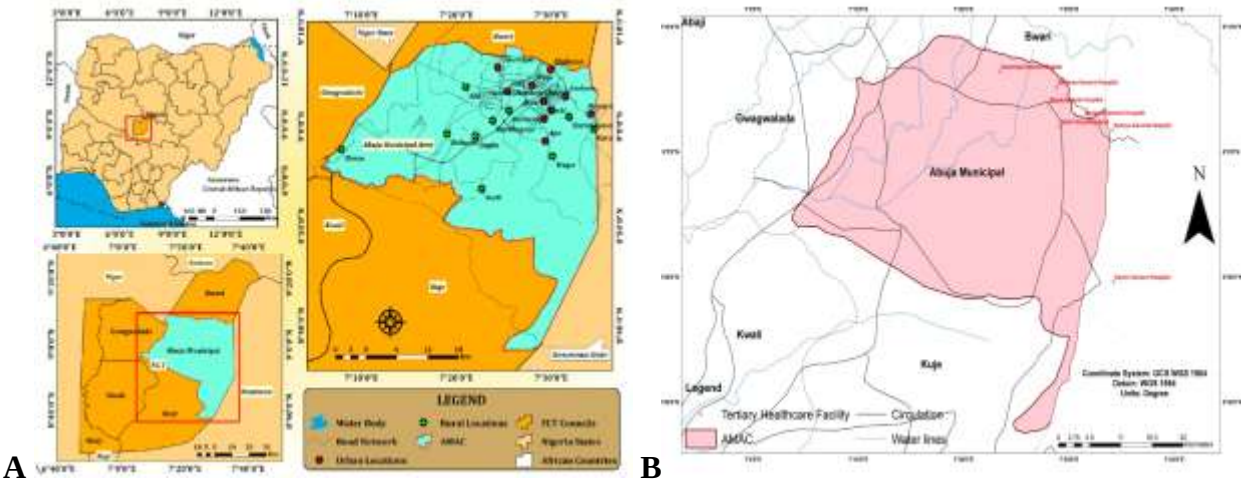
2.3 Time spent outdoors

The quality of time spent outdoors which invariably determines the maximum benefits these spaces have to offer users is also dependent on the amount of quality time spent in these spaces. The outdoor spaces within buildings are becoming interestingly livable as proven to be of health benefit, as well hospital outdoor spaces serve as a relief space for patients and visitors desiring to move away from the confined indoor wards to have a view of nature, the times spent for quality benefit with nature is quite important. Spending between 120 minutes and 200 minutes per week outdoors before it starts to diminish the positive effect (White et. al., 2019). In a relative study by Hunter et. al., (2019) a considerable of between 20 – 30 minutes a day outdoors will benefit users and is necessary for an individual's overall health and well-being.

3.0 Research methodology

3.1 Study Area

Abuja the capital city of Nigeria, is one of the six (6) municipal council areas within the Federal Capital Territory (FCT) as shown in Figure 2A, it is geographically located on latitude 9.072264 and longitude 7.491302, the GPS coordinate 9^0 4'20.1504" N and 7^0 29'28.6872" E, occupying a land mass of about 8,000 km^2. Abuja has witnessed swift development in the area of urbanization, with a population estimate of 3,464,000, which has brought much burden on the healthcare facilities within the study area. By Koppen climatic classification, Abuja has a tropical savannah climate, warm humid rainy season and dry season all year round. The influx of people into the city centre has led to the sprawl of satellite towns like Karu, Kuje, Suleija, Gwagwalada, and Lugbe. The city is on the growth with an estimate of 5.42% from the previous year, (world population review, 2022). Table 1, below further shows the distribution of the public secondary healthcare facilities within AMAC.



A **B**

Figure 2A. Federal Capital Territory, Abuja Municipal Area Council (AMAC) showing 1**B**, the public secondary healthcare facilities locations.
Source: Google map, 2023

3.1 Method

The research employed a mixed-method approach using a questionnaire to assess respondents' perceptions and opinions on the use of outdoor spaces and their preferences for spatial characteristics, while an observation schedule was designed to assess the outdoor activities observed within the hospitals' outdoor spaces. A digital camera was used to capture images of various activities from a distance, this is following the ethics policy to give privacy to respondents within the time of the study. Data loggers were employed to measure climatic parameters, such as air temperature, relative humidity and wind speed. The study was done in three (3) phases morning afternoon and evening, 9:00 am – 12:00 pm, 12:00 pm – 3:00 pm, and

3:00 pm – 6:00 pm respectively. Purposive sampling was employed to select the study hospitals H1, H2, and H3 based on the available spatial characteristics as seen in table 1.

Using the Cochran formula (Cochran 1977) for calculating unknown sample size, for an outdoor study, a total of 385 questionnaires was designed to include a 5-point likert scale (Not at all, Not often, Neutral, Often, Very often) to assess both physical and social attributes of outdoor spaces, and was administered to respondents made up of patients and visitors only using random sampling. Table 2, shows a total was 343 questionnaires were retrieved and analyzed using simple statistical tool (SPSS 2.0) such as tables and charts, to discuss the findings of the research.

Table 1: Outdoor space selection

Case Studies	Outdoor spaces			Landscape element				
	Walkways	**Car parks**	**Courtyard**	**Pergola**	**Gardens**	**Corridors**	**Sit-out**	**Fountain**
Gwarimpa (H1)	√	√	√	*	*	√	√	*
Karu	√	√	√	*	*	√	*	*
Maitama (H2)	√	√	√	√	*	√	*	*
Nyanya (H3)	√	√	√	*	*	√	*	*
Wuse	√	√	√	*	*	√	*	*

Source: Researchers' fieldwork 2024

Table 2: Questionnaire administration

S/No	Hospitals	Population/Hospitals	Sample size/Hospital	Retrieved Questionnaire
1	H1	435	96	77
2	H2	741	163	143
3	H3	569	126	123
	Total	**1745**	**385**	**343**

Source: Researchers' fieldwork 2024

4.0 Results and Discussion

The study respondents were made up of visitors and patients found within the hospital's outdoor spaces (HOS) in the study areas, the socio-economic data is presented in table 3. The gender distribution has 53.6% male and 46.4% female that responded to the questionnaire these were made up of 62.7% visitors, and 37.3% patients for the survey. The credibility of the respondent to understand the survey questionnaire and answer appropriately is displayed by the level of

education of the respondent. The respondents with tertiary level of education were recorded to be 62.7%, 36.4% have secondary education and only a fraction of 0.9% have primary. The survey showed that more than 90.0% of the respondents are above the lower level of education, this makes the responses valid for the study.

Table 3. Characteristics of respondent

		Frequency (N=343)	Percentage (%)
Gender	Male	184	53.6
	Female	159	46.4
Status	Patients	128	37.3
	Visitors	215	62.7
Education	None	2	0.6
	Primary	1	0.3
	Secondary	125	36.4
	Tertiary	215	62.7

Source: Researchers' fieldwork, 2024.

4.1 Time spent outdoors

The study is set to collect data from respondent's outdoors (car parks, walkways, pergolas, courtyards, corridors), the need to account for the length of time spent outdoors which is vital in this research, and this will assess the respondents' subjective evaluation of their experience in the activities they are involved in within the given time outdoors. As such the time spent by respondents is categorized into four (4) parts ranging from less than 2 hours, 2 – 4 hours, 4 – 8 hours, and above 8 hours. From Table 4 below, the majority of the respondents spend relatively more than 2 hours, giving a total of 287 respondents owing up to 83.7%, while those that spend less than 2 hours outdoors fall within 16.3%.

Table 4: Average time spent outdoors

Variables	Classification	Frequency (N)	Percent (%)
Average time outdoor	Less than 2 hours	56	16.3
	2 – 4 hours	164	47.8
	4 – 8 hours	121	35.3
	Above 8 hours	2	0.6
	Total	**343**	**100**

Source: Researchers' fieldwork, 2024.

4.2 Spatial quality of outdoor space

The quality of space gives more value to its use and the benefit to be explored by the users in the various case studies. Table 5, gives the mean vote from the assessment of the users that forms the decision of how safe, comfortable visible accessible and attractive these spaces may be. The mean score for visibility of 3.95 makes the spaces good for various activities as observed, followed closely by how accessible and how comfortable they are having a mean score of 3.76

and 3.50 respectively. Safety and attractiveness form a neutral decision with mean scores of 2.85 and 2.55 respectively.

Table 5: Outdoor spatial quality assessment

	Very poor	Poor	Neutral	Good	Very good	Mean score	Decision
Safety	42(12.2)	78(22.7)	113(32.9)	110(32.1)	0	2.85	Neutral
Accessibility	2(0.6)	37(10.8)	6(1.7)	296(86.3)	2(0.6)	3.76	Good
Comfort	2(0.6)	54(15.7)	58(16.9)	227(66.2)	2(0.6)	3.50	Good
Visibility	0	10(2.9)	7(2.0)	318(92.7)	8(2.3)	3.95	Good
Attractiveness	19(5.5)	167(48.7)	108(31.5)	49(14.3)	0	2.55	Neutral

Source: Researchers' fieldwork, 2024.

4.3 Outdoor space use

Respondents were assessed for their perception of the use of the outdoor spaces as it supports their various activities at the time of the study across the selected study areas. Three (3) typologies of spaces were identified for the study, the courtyard (H1), a pergola (H2), and a car park (H3).

Case study H1 is the only facility with a sit-out arranged within the outdoor open space. Figure 3A is a Google image satellite view of the hospital, showing the courtyard section marked out for the study in colour. The presence of a thick foliage tree was observed which provides a good shade beneath it. This space witnessed some activities as shown in figures 3B and 3C such as sitting, standing, walking, eating, and discussing, it also provides a connection to other units due to its strategic location such as the gynecology, laboratory, admin block and the General Out-Patient Department (GOPD), through a covered walkway. Some stainless steel sits were arranged underneath the tree which allows for the excesses of activities from the laboratory to be contained while waiting to get attended. The floor is covered with interlocks with few soft landscaped elements within.

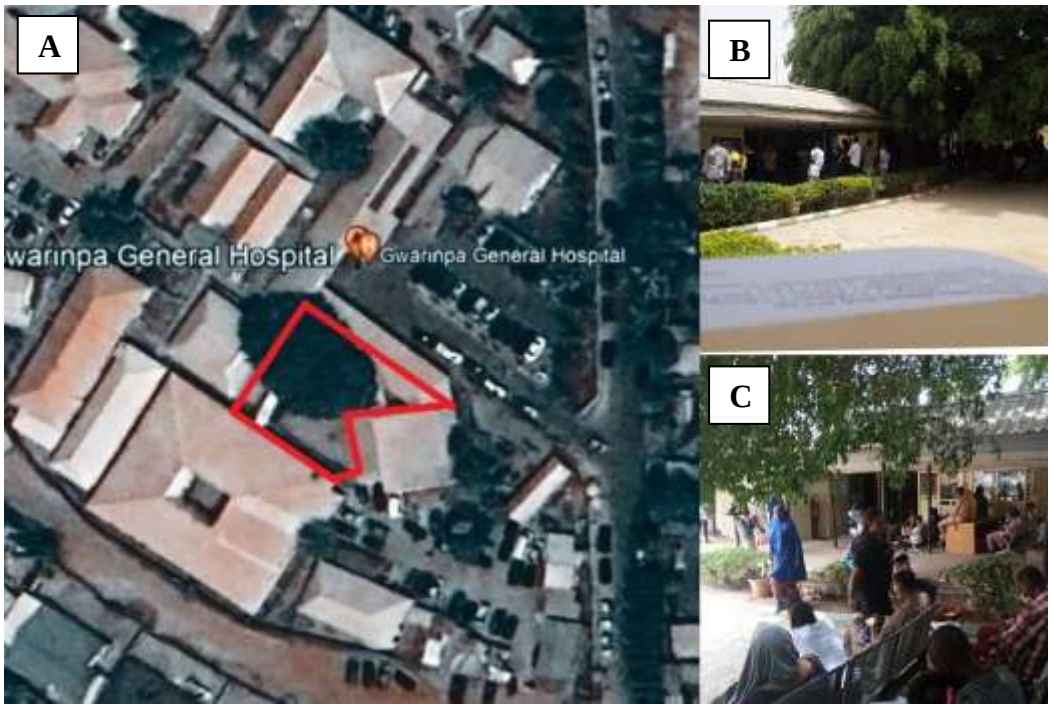


Figure 3: H1 case study
Source: Google map/researchers' fieldwork 2024

The second case study was picked uniquely as a result of the availability of a pergola as an outdoor space. This is a covered structure within the hospital outdoors close to the facility's entrance drop-off. Figure 4A is the satellite image of the facility showing the neighboring structures and the pergola marked in colour. This space is located close to the hospital entrance by the drop-off that exits into the Accidents and Emergency (A & E) unit, it shares a boundary wall with the facility and distance away from other units within the hospital. The pergola itself is made of 4 pieces of 4" (100mm) stainless steel pipe stands, a network of 2" steel (100mm) pipe as a roof truss covered with an aluminium roofing sheet. The boundary wall to the fence is cladded with bamboo to give cover and shade from the other side of the fence while the floor is finished with interlocking stones. Figures 4B and 4C show the stainless seat arranged for activities.

Figure 4: H2 case study
Source: Google map/ researchers' fieldwork 2024

The third facility H3 hospital, has a car park as the only outdoor space, figure 5A is the satellite image of the case study with all adjourning streets and properties, and the characteristic view of the car park is a common feature of the outdoor space is visibly seen from the image. Figure 5B shows the main entrance to the facility through the car park into the G O P D distributes into the wards and other units in the hospital, this car park also connects with the ambulance bay and the accidents and emergency unit (A & E). The whole floor is laid with interlocking stones. Some soft landscape elements were also visibly seen. Figure 5C is a covered walkway that connects the facility in an 'L' shape from the A & E unit through some offices.

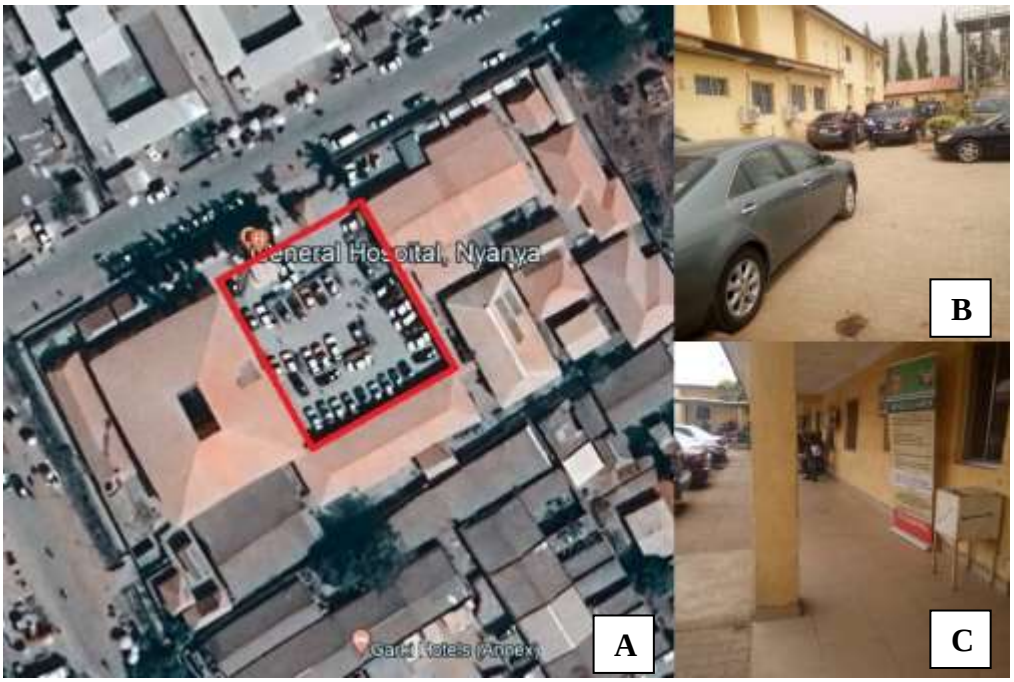


Figure 5: H3 case study
Source: Google map/ researchers' fieldwork 2024

The responses from table 6, going by the percentages and irrespective of the number of responses reveal that H2 has more users having a total of above 91.0% users it also records 0.0% of users who voted "Not at all" which simply means the outdoor spaces witnessed frequent use within the hospital. The hospital H1 witnessed a record of users making up 50.7% of users who often make use of the outdoor space, a total of 25.9% responded to not often use of the space or their various activities. It was recorded from the responses that H3 recorded the least use 13.9% usage and a high response of 50.3% responded "Not at all", and 16.3% were neutral about their response to the outdoor use.

Table 6: Outdoor space use

Scale	Courtyard **(H1)**		Pergola **(H2)**		Car park **(H3)**	
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)
Not at all	8	10.4	0	0	62	50.3
Not often	12	15.5	3	2.0	19	15.4
Neutral	4	5.2	3	2.0	20	16.3
Often	39	50.7	130	91.0	17	13.9
Very often	14	18.2	7	5.0	5	4.1
Total	**77**	**100.0**	**143**	**100.0**	**123**	**100.0**

Source: Researchers' fieldwork, 2024.

4.4 Assessment of outdoor activities

The activities within the hospitals' outdoor space were observed to vary for the different times of the days studied, across the studied hospitals. The design of the spaces, the provision of some facilities and proximity could be a contributing factor to these differences. Various users responded differently based on the choice of the use of the space at different times during the study. The desire for comfort warrants some activities within the hospital's outdoor space at different times. Figure 6 is the distribution of the various activities observed in the cause of the study.

H1 was observed to have activities spanning a longer time between 12:00 pm and 6:00 pm covering beyond the clinical hours to the visiting hours, most of these activities took place within the open courtyard space connecting the gynaecology unit, the GOPD, pharmacy and the A & E units of the hospital.

H2 has the pergola located a distance away from the core units of the hospitals witnesses the highest traffic of users was observed to have the highest record of activities between 9:00 am and 12:00 pm, which is within the clinical hours. The location of the pergola which is a distance away from the core units of the facility, could be attributed to its limited use beyond the hours observed.

H3 hospital was selected for the presence of a car park. This hospital experienced the least activities, the design did not take into consideration an auxiliary space for activities within the facility. The space served as entry and exit within the hospital.

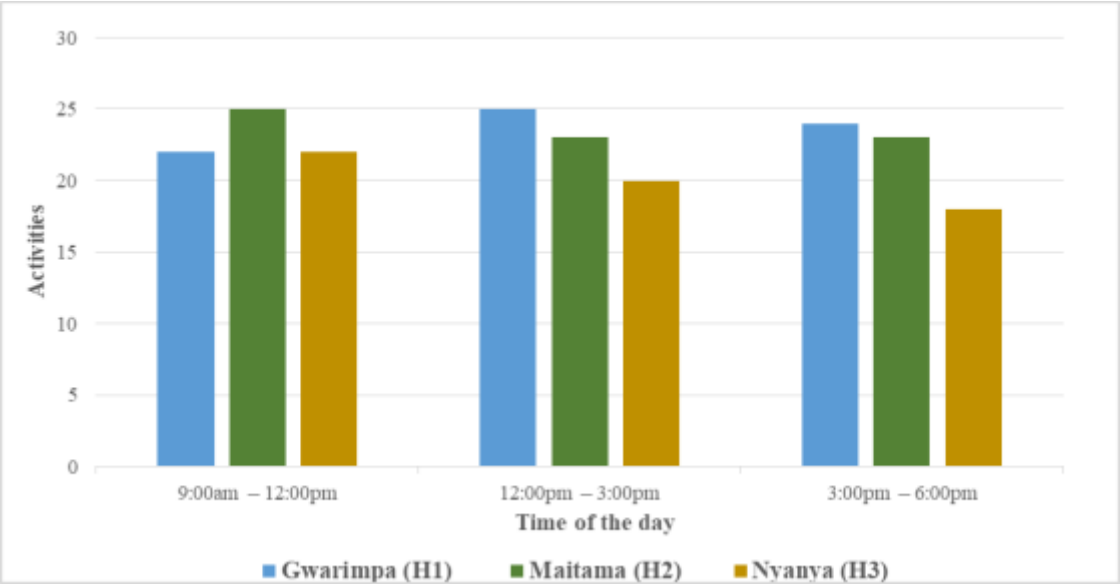


Figure 6: Observed outdoor activities
Source: Researchers' fieldwork, 2024

5.0 Conclusion and Recommendation

The study which aimed at identifying outdoor spaces that best support activities within a hospital's outdoor space (HOS) with the view of achieving a sustainable hospital environment concludes by observing that, despite the positive outdoor spatial quality recorded from the study across the hospitals, the differences in the activities observed and preferences given to the typology of spaces across the studied hospitals explains a relationship between spatial characteristics and outdoor activities. The better the design of outdoor spaces the more frequently they are used, especially if they are located within general spaces where much traffic of users occurs. It also concludes that the location of outdoor space as observed in H1 gives it a longer time of use compared with H2 and H3. Though H2 has the highest usage, the time range is limited due to its location away from other units of the hospital.

The study, therefore, recommends that proper planning and regular maintenance of outdoor spaces within the hospitals should be encouraged regularly, also policy be put in place for the designing of HOS to be all-inclusive and the outdoor spaces should be designed with the consideration of their location and proximity to other units within the hospitals.

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