

Examining the Relationship Between Demographic Characters of Green Space Users and the Categorization of Green Spaces

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Abstract

The paper examines the relationship between the demographic characters of the users of green spaces and the activities they perform in green spaces. The study considers green spaces from a categorical perspective. Therefore, the study selected green spaces in the city of Kumasi that falls under three categories of green spaces. Using semi-structured questionnaires which were administered to green space users using interviews, data was obtained from 345 visitors of the categories of green spaces selected for this study. The selected green spaces in this study include KNUST Botanical Garden, KNUST Royal Parade Ground, and the road corridor that extends from the Ahodwo Roundabout to the Kumasi Metropolitan Assembly Clinic. The findings of the study indicate that the linear green space and the functional green space attracted more young people than the amenity green space. The findings further indicated that the relationship between the demographic characteristics of the respondents and walking at the KNUST Botanical Garden and the Royal Parade Ground was not statistically significant. However, at the linear green space, some demographic characteristics of respondents such as marital status and age and the use of the green space for walking had a statistically significant relationship. The study found that there was no statistically significant relationship between the demographic characters of green space users and the use of the three selected categories of green space for relaxation. The further statistical test showed that there was no statistically significant relationship between the demographic characters of green space users and the use of green space for conversation at the KNUST Botanical Garden and the linear green space selected for this study. However, the statistical test indicated that the employment status of the respondents had a statistically significant relationship with the use of the Royal Parade Ground for conversations. The study concludes that all green spaces are not the same; therefore, the demographic characteristics of green space users that influence the use of different categories of green space for specific activities are dynamic. The researchers recommend that greenspace administrators and city authorities should avoid making generic greenspace policies that aim to improve the performance of specific activities in green spaces. Green space administrators and city authorities must meticulously collect data on the demographic characteristics of respondents and conduct statistical analyses which will empower them to make context-specific policies for the various categories of green spaces which exist in cities.

1.0 Introduction

Green spaces are critical infrastructure that provides tripartite benefits to cities within which they are located (Nady 2016, Abagna et al. 2019, Nowak et al. 2020). Green spaces serve as spaces where people can gather and socialize, participate in commercial activities, and enjoy the scenery. For example, people visit green spaces to get in contact with nature and socialize with other people and undertake recreational activities that are beneficial to their health and social wellbeing (Kuo and Sullivan 2001, Gearin et al. 2006, Ward Thompson et al. 2012). Green space simply refers to open spaces that most often have permeable surfaces and are covered by vegetation (Swanwick et al. 2003). Examples of green spaces include parks, botanical gardens, woodlands, and wetlands. However, green spaces can be further

classified into various categories, namely amenity green space, functional green space, and woodland/wetlands.

Green space users use green spaces for various purposes based on their demographic characteristics. Mak and Jim (2019), indicated that the relationship between demographic characteristics of green space users and the activities carried out in green space is very critical for green space planning, design, and management.

Some scholars including Mak and Jim (2019), and Takyi (2016) have demonstrated the importance of the relationship between the demographic characteristics of green space users and the activities carried out by green space users when they visit green spaces. However, most of the existing academic work tackles the relationship between activities performed in green spaces and the demographic characteristics of green space users from a generic perspective. Green spaces are classified into various categories, and therefore it is essential to look at the relationship between the demographic characteristics of green space users and the activities performed in green spaces from a categorical perspective. Activities carried out in various categories of green spaces are also not the same. For example, activities that can be performed in woods, such as bird watching, cannot be performed in a functional green space. The aim of this study is therefore to examine the relationship between the demographic characteristics of the users of some selected green spaces in the Kumasi metropolis which fall under the three categories of green spaces namely, amenity green space, functional green space, and linear greenspace. The study also discusses the implications of these relationships for the formulation of green space planning and management policies. The increase in the ineffectiveness of green space improvement and conservation policies, especially in Ghana, makes this study relevant (Amoako and Adom-Asamoah 2017).

2.0 Review Of Literature

2.1 Defining green space

Green space is any piece of land that has vegetation cover like trees, grass, and shrubs. According to Wendel (2011), green space is any public outdoor space that can provide social, economic, and ecological benefits to its users or the community within which it is situated. Green spaces are made up of largely permeable surfaces such as soil, grass, and trees. Green spaces must provide vegetation cover and must serve as a habitat for both flora and fauna. According to Sen (2020), green space can be urban or rural. Urban green spaces are green spaces that exist in cities, while rural green spaces are green spaces located in rural areas. Green spaces can include parks, forests, green roofs, wetlands, and community gardens. Green spaces can be natural or modified by humans but must be outdoor spaces (Wendel 2011). Green spaces are owned by the public or a private individual/organization. The components of urban green spaces include vegetation, water, accessibility, shelter, toilets, seating, playgrounds, and sports areas (Vargas-Hernández et al. 2018). Other important components include

friendly staff, litter boxes, lighting, artistic features, and other artifacts such as sculptures (Vargas-Hernández et al. 2018).

Swanwick et al. (2003), offered a comprehensive overview and a detailed definition of green space, they opined that the urban areas consist of the built environment and the external environment between buildings. The external environment is made up of “green space” and “grey space” as shown in Fig. 2.1. Green space predominantly includes unsealed, permeable, soft surfaces that are covered by vegetation such as grass, shrubs, and trees (Swanwick et al. 2003). According to the authors, these green spaces may exist in the form of linear green spaces, semi-natural green spaces, functional green spaces, and amenity green spaces.

The second component of the urban environment according to Swanwick et al. (2003), is “grey space”. They are lands in the city that are predominantly sealed, impermeable, and hard (Swanwick et al. 2003). Examples of grey space are concrete, roads, and pavements. There are two types of grey spaces; they include functional grey spaces (they serve a particular purpose) and civic grey spaces (accessible public areas planned and designed for public enjoyment).

Green spaces can be formal or informal; informal green spaces are green spaces that do not have a specific label or purpose, while formal green spaces are spaces that are vegetated and have a formal name, aesthetic, and recreational value (Lopez 2019).

2.2 Categories of Green Spaces

There are different types of green space, different types of green space that collectively form the green fabric of cities (Swanwick et al. 2003). Urban green spaces can be categorized according to ownership, characteristics, function, and accessibility level (Swanwick et al. 2003; Barchetta and Chiodelli 2016).

Swanwick et al. (2003) meticulously classified green spaces in urban areas into four different categories or typologies. These categories include amenity green space, functional green space, semi-natural habitats, and linear greenspace.

Amenity green spaces are mainly green spaces that provide a type of amenity to their users. Amenity green spaces include recreational green spaces, incidental green spaces, and private green spaces (Swanwick et al. 2003). Specific types of recreational green spaces include parks and gardens, informal recreational areas, outdoor sports arenas, and play areas (Swanwick et al. 2003). An example of incidental green space includes green spaces commonly found in housing projects. Although private green space can include home gardens (Swanwick et al. 2003).

Functional green spaces are green spaces that serve a specific purpose. According to Swanwick et al. (2003), there are three main types of functional green spaces. They consist of productive green spaces, burial grounds, and institutional grounds. Specific types of productive green space include city farms, allotments, and remnant farmland. Examples of burial ground green space consist of cemeteries and churchyards. Institutional green space can include school grounds.

Semi-natural habitat green spaces are types of green spaces located in natural environments and are usually not created by humans. Semi-natural green spaces include wetlands and woodlands. Specific examples of wetlands include open/flowing water, marsh, and fen. A specific example of woodland consists of deciduous woodland, coniferous woodland, and mixed woodland. Other habitats considered to be semi-natural habitat green spaces include grassland, moor, and disturbed ground (Swanwick et al. 2003).

Linear green spaces are types of green spaces situated along corridors such as transportation networks. Specific types of linear green spaces include green spaces along the banks of a river and canals. The green space found along transportation corridors, such as roads, rails, and walking routes, are all examples of linear green spaces. Table 2.1 shows the various categories of green spaces proposed by Swanwick et al. (2003).

Table 2.1
Categories of Green Spaces Source: Swanwick et al. (2003).

MAJOR CATEGORIES OF GREEN SPACES					
All Urban Green Space	Amenity	Recreation	Parks and gardens		
	Green Space	Green Space	green space	Informal recreation areas	
				Outdoor space areas	
				Play areas	
		Incidental Green Space		Housing green space	
				Other incidental green space	
		Private Green Space		Domestic gardens	
		Functional green space	Productive Green Space		City farms
					Remnant farms
					Allotments
	Burial Grounds			Churchyards	
				Cemeteries	
		Institutional Grounds		Other institutional grounds	
	Semi-natural habitats	wetland		Open/ running water	
				Marsh, fen	
woodland			Deciduous woodland		
			Coniferous woodland		
			Mixed woodland		
Linear Green Space			River and canal banks		
			Transport corridors (road, rail, cycleways, and walking route)		
			Other linear features (e.g., cliffs)		

2.3 Uses of Green Space

Green spaces are used by different people for different reasons. People visit green spaces for recreational purposes and to interact with other city dwellers (Beaney 2009).

Speake et al. (2013), conducted a study to investigate the usage of university green spaces. The authors reported that the main use of green spaces on campus was for relaxation and socialization. Most students relaxed on green grasses while they read. Some students also sat on green grasses while they interacted with each other. Furthermore, the authors stated that gender and educational levels also influenced the use of campus green spaces. The most used green spaces according to this study were green spaces that were clean, well maintained, and had quality aesthetics.

A study conducted in Taiwan by Pleson et al. (2014), found that adults were the main users of green spaces. The authors believe that older adults generally used green spaces for walking and performing vigorous physical activities. The research indicated that most older adults who used green spaces were females. In contrast, Speake et al. (2013), conclusions do not follow those of Pleson et al. (2014), which found females use green space more than males. Speake et al. (2013) indicated that most of the green space users in their study were males. Similarly, Mak and Jim's (2019), conclusions do not follow those of Pleson et al. (2014), they found that most green space users within the city of Hon Kong were between the age cohorts of 18–34 years and most of them were males. They further asserted that most green space users in the city are the ones who fall within the youthful population. However, Speake et al. (2013) and (Mak and Jim 2019), however, agree with the conclusions made by Pleson et al. (2014) that people use green space for physical activities and other recreational activities.

Using nonparticipant observation and content analysis of archives, (2010) opined that most people use green spaces for walking, recreation, or sports play. They also stated that people preferred more natural landscapes and well-maintained green spaces (Tzoulas and James, 2010).

(2020) conducted a study by interviewing 955 randomly selected parks to investigate the differences that exist in park use. The authors stated that women and children use green spaces more often than men. Most of the interviewed respondents indicated that they use green spaces for walking, recreation, exercise, walking dogs, and relaxation (Sonti et al., 2020). Motivation to visit and use green spaces according to the findings of the authors included proximity, quality of green space, and amenities available in green space (Sonti et al. 2020).

A large study, carried out by (2011) in Denmark, found that respondents living closer to a green space (that is, 1 km) used green spaces for physical activities such as walking and jogging.

Pazhouhanfar and Feizi (2020) opined that access was critical to the use of green space. The authors, therefore, suggested the improvement of perceived access to green space to promote and improve usage. Other informal uses of green spaces include flying kites, fishing, sunbathing, and photography (Vargas-Hernández et al. 2018).

2.4 Conceptual Framework

The study takes into consideration some specific demographic characteristics of green space users and some of the activities they perform in green spaces. Demographic characteristics considered for this study include age, sex, marital status, and religion. Some activities that were carried out in the green

space considered for this study include walking, relaxation, and social interactions (conversations). These variables were selected to find the statistical relationship between them. Figure 2.2 shows a diagram depicting the conceptual framework of the study.

3.0 Materials And Methods

3.1 Study setting and description of selected categories of green spaces

This research was carried out in the Kumasi Metropolis. The total land area of Kumasi is 2143sq Km. Approximately 8.7% of the land area of the Kumasi metropolis are green spaces (Mensah 2014) The study area currently serves as the capital of the metropolis, Ashanti Kingdom, and Ashanti Region.

The metropolis is the second largest city in Ghana. The metropolis comprised nine sub-metropolitan areas in the year 2012 (Ghana Statistical Service (GSS) 2014). However, in 2018, five new municipalities were carved out of the Kumasi metropolis, limiting the city to a small geographical space despite its extensive influence (Cobbinah and Nyame, 2021). For this paper, the state of the Kumasi metropolis as of the year 2012 was used because of the availability of data and the adjoining nature at that point of various categories of green space across the city's landscape (Cobbinah and Nyame 2021).

The KNUST Botanical Garden is a green space in Kumasi the capital city of the Ashanti region. The green space is owned and managed by the KNUST Department of Applied and Theoretical Biology. The botanical garden is the third largest botanical garden in the country with a total area size of 12.9 ha (Anning et al. 2008). The KNUST Botanical Garden is approximately 11.7 kilometers from the Central Business District (that is, Adum). The green space was developed in 1960 for scientific study and recreation. The weve river flows through the botanical garden and drains the southern parts of the city. The botanical garden consists of a washroom, an office structure, and a main open space where social events are held. The green space provides services to KNUST faculty and students, as well as to the public.

The Royal Parade Ground is located on the KNUST campus in Kumasi. The size of the Royal Parade Ground area is estimated to be 1.83 ha. The Royal Pare Ground is approximately 11.2 kilometers away from the Central Business District of the city. It was developed to serve as a space for reading, discussion, learning, reflection, and meditation. Sometimes, it also has some social functions, such as church services and entertainment shows. The green space consists of an amphitheater, an open green area, pedestrian walkways, summer huts, and circular seating benches that serve both KNUST faculty and students.

The Ahodwo roundabout to the Kumasi Metropolitan Assembly Clinic Road corridor is 0.55 kilometers long in terms of distance. It serves as a transportation link that links the neighborhoods of Santasi,

Ahodwo, and Nhyieso to Adum. This road corridor is shaded by trees and the green space has pedestrian sidewalks. Table 3.1 shows the categories of green spaces selected for the study.

Table 3.1
Categories of green space and size.

Source: Field Survey, April 2021.

Name of green space	Category of green space	Size of green space (ha) or km	Justification of categorization
KNUST Botanical Garden	Amenity green space	12.9 ha	<ul style="list-style-type: none"> • Beautifies its neighboring environment • Provides significant habitat for biodiversity • Provides space for informal leisure and recreational activities
Royal Parade Ground	Functional green space	1.83 ha	<ul style="list-style-type: none"> • Provides habitat for biodiversity • Serve only members who belong to the institution • Provides space for undertaking leisure activities
Ratray Park	Amenity green space	4.2 ha	<ul style="list-style-type: none"> • Provides a setting for buildings • Beautifies its neighboring environment • Provides significant habitat for biodiversity • Provides space for informal leisure and recreational activities
Ahodwo roundabout to Kumasi Metropolitan Assembly Clinic road corridor	Linear green space	0.55 km	<ul style="list-style-type: none"> • Long but less wide space shaded by trees with canopies • Serves as a transportation link that links the neighborhoods of Santasi, Ahodwo, and Nhyieso • Provides an alternative sustainable mode of transportation mainly for pedestrians

3.2 Study design

The study adopted a descriptive design it consisted of both a case study and a green space survey approach. A case study as a component of the design helped select individual green spaces that fall into the three categories of green spaces, while the green space survey helped gather data on the

demographic characteristics of the green space users and the activities they perform when visiting these selected green spaces. This allowed the researchers to identify the demographic characteristics of green space users, explain why there are differences in the demographic characteristics of green space users of various categories of green space, and explain how they are statistically associated with the activities they carry out in the various categories of green spaces selected for this study.

3.3 Data collection

Data were collected from primary sources using a semi-structured questionnaire. The primary source of data for this study was green space users of the selected sites of this study. The face-to-face interview technique was adopted because it is regarded as the most sociable way to collect data and is effective in gaining the cooperation of respondents (Sheskin 1985; Lavrakas 2008). It allowed the researchers to collect data on the demographic characteristics of green space users and the activities they perform when visiting the selected green spaces.

3.4 Sampling

As rightly pointed out by Booth (1991), Milliken (2015), and Sonti et al. (2020), normal surveys usually draw samples from a sample frame randomly using a method, but no such list exists concerning green-space surveys. Instead, the sample of a green space survey is based on visit time and location; the visitors were therefore surveyed at different periods and thus formed the sample. The survey was conducted in three separate periods of the day (that is, morning, afternoon, and evening) at each site for 6 to 7 days (Booth 1991; Milliken 2015; Takyi 2016, Mak and Jim 2019, Sonti et al. 2020). The probable study respondents were approached at the entrances, main routes, and key locations in green spaces, such as sitting areas within the selected green spaces.

3.5 Data analysis

Data collected in quantitative form was carefully cleaned, sorted, edited, and coded before data entries were made in Statistical Package for Social Sciences (SPSS) version 20. A statistical test was performed using the Chi-square test to identify the relationship between the demographic characteristics of visitors to green spaces and the activities they perform when visiting the three categories of green spaces considered for this study. Explanatory variables tested include age, sex, religion, marital status, and the activities that green space users perform in the green space (i.e., walking, relaxing, and having conversations/interactions). The statistical test considered the p-value < 0.05 as statistically significant. Qualitative data was analyzed by conducting a content analysis of qualitative responses and presenting relevant responses as respondents' quotes

4.0 Results

4.1 Demographic Characteristics of Green Space Users

4.1.1 The Age Distribution of Green Space Users

Age distribution aids in identifying and understanding the various age groups that use green space. It will help inform policymakers and decision-makers about the specific age cohorts of green space users. Therefore, this will empower them to make policies and decisions that serve their best interests. In general, most of the green space users in the selected green spaces were in the young age cohort.

The results of the green space survey at the Kwame Nkrumah University of Science and Technology (KNUST) Royal Parade Grounds indicated that 89.7% of green space users were in the age cohorts of 16–24 years and 10.3% were in the age cohort of 25–34 years. Therefore, all green space users sampled during this study at the KNUST Royal Parade Ground were youthful.

The green space survey conducted in the KNUST Botanical Garden, on the other hand, indicated that 26.0% of the respondents sampled were in the age cohort of 16–24, 30.5% in the cohort of 25–34, 24.7% in the cohorts of 35–44, 11.7% in the cohorts of 45–54, 5.8% in the cohorts of 55–64 and 1.3% in the cohorts of 65+. The KNUST Botanical Garden results indicated that the majority (56.5%) of green space users were of a young age (that is, the cohort of 16–34 age cohort).

The result of the greenspace survey from the Ahodwo to KMA clinic transportation corridor indicated that 24.3% of the respondents sampled were in the age cohorts of 16–24, 47.3% in the cohort of 25–34, 16.2% in the cohort of 35–44, 10.8% in the cohort of 45–54 and 1.4% in the cohort of 55–64. Results from the Ahodwo to KMA clinic transportation corridor indicated that the majority (71.6%) of green space users were of their youthful age (i.e., 16–34 age cohort).

The dominance of the youthful population can be attributed to the need for young people to constantly get connected with their peers; they thus use these spaces as venues to get connected. One of the study's respondents at the Royal Parade Ground remarked as follows: *"My friends live in other halls on campus, so we usually pick the parade ground to meet and hang out twice a week"*. Furthermore, the results indicated that the elderly do not usually use green spaces in the city. Only 1.3% of the elderly used the KNUST Botanical Garden, while 1.4% of green space users who used the Ahodwo to KMA clinic transportation corridor were in the range of the national retirement age. Results at the Royal Parade Ground showed that the elderly do not use the green space. This can be explained by the fact that the green space is meant to serve students and most of these students fall within the youthful age cohorts.

The results of this green space survey are in congruence with the scholarly literature available on green space users. Mak and Jim (2019), for example, found that most green space users fell within the younger population, while the elderly were fewer active users of green space. They pointed to the fact that most young adults were highly active and almost felt the need to connect with friends, business partners, and family in green spaces.

Table 4.1
The Age Distribution of Green Space Users.

Source: Greenspace Survey, April 2021

Age	KNUST Royal Parade Ground		KNUST Botanical Garden		Road corridor stretching from the Ahodwo roundabout to the Kumasi Metropolitan Assembly (KMA) clinic	
	Frequency	%	Frequency	%	Frequency	%
16–24	105	89.7	40	26.0	18	24.3
25–34	12	10.3	47	30.5	35	47.3
35–44	N/A	N/A	38	24.7	12	16.2
45–54	N/A	N/A	18	11.7	8	10.8
55–64	N/A	N/A	9	5.8	1	1.4
65+	N/A	N/A	2	1.3	N/A	N/A
Total	117	100	154	100	74	100

4.1.2 Gender of Green Space Users

The results of the green space survey indicated that most of the green space users were male. The results showed that the majority of The Royal Parade Ground green space users were males (58.1%), The results of the green space survey of the road corridor that extends from the Ahodwo roundabout to the Kumasi Metropolitan Assembly Clinic Road corridor also indicated that majority of linear green space users were men (71.6%). However, in contrast, the KNUST Botanical Garden results indicated that women (57.1%) constituted most users of green spaces. Table 4.2 indicates the gender of the users of green spaces in the selected categories of green spaces.

The results of the green space survey conducted on these three sites explicitly indicated that most green space users tend to be males. This is supported by existing conventional literature concerning gender and green space usage. Speake et al. (2013), for instance, argue that males are more dominant users of green spaces compared to females since they are more active and always yearn to be outdoors.

Table 4.2
Gender of Green Space Users.

Source: Greenspace Survey, April 2021

Gender	KNUST Royal Parade Ground		KNUST Botanical Garden		Road corridor stretching from the Ahodwo roundabout to the Kumasi Metropolitan Assembly (KMA) clinic	
	Frequency	%	Frequency	%	Frequency	%
Male	68	58.1	66	42.9	53	71.6
Female	49	41.9	88	57.1	21	28.4
Total	117	100	154	100	74	100

4.1.3 Marital Status of Green Space Users

The results of the survey showed that, in general, most of the users of green spaces were single. The number of single respondents who were higher than the number of married respondents at all the three selected sites. Figure 4.1 is a bar chart depicting the marital status of green space users at the three selected sites of the study. The marital status of green space users could be attributed to certain factors. For example, most of the users of the Royal Parade Ground are students, thus most of them are not married. The botanical garden, for example, also usually hosts religious activities and these activities usually attract more single people. The green road corridor is also a walkable space that hosts more commercial activities, thus attracting a lot of young people who are not yet married.

4.1.4 Religious Status of Greenspace Users

The overall result showed that most of the users of the green space identified themselves as Christians. The results of the Royal Parade Ground green space survey showed that 78.6% of the respondents were Christians, 21% were Muslims, 2.6% were Agnostic and 0.9% belonged to other religions. In the botanical garden, the results of the green space survey showed that 96.1% of the green space users were Christians while 3.9% were Muslims. Results from the green space survey at the Ahodwo roundabout to the Kumasi Metropolitan Assembly clinic road corridor also indicated that most green space users (87.8%) were Christians while 12.2% were Muslims. Results reaffirm the fact that most people living in the metropolis are Christians (Ghana Statistical Service (GSS) 2014). Religious status among those who used institutional green spaces (i.e., Royal Parade Ground) was more diverse than that of the other categories of green spaces. This increase might be because it is located within a higher learning institution, and thus people from diverse religious backgrounds are found in higher institutions of learning. Figure 4.2 shows a bar graph of the religious status of green space users.

4.1.5 The Employment Status of Green Space Users

The results of the green space survey generally showed that most green space users at the KNUST Botanical Garden and the Ahodwo Roundabout to the Kumasi Metropolitan Assembly Clinic Road

corridor were employed. The results of this research showed that at Royal Parade Ground, which is an institutional space, most of its users were students and therefore voluntarily unemployed.

At the survey KNUST Botanical Garden, the results of the survey showed that 43.5% of the respondents had full-time employment status, 5.2% were unemployed, 3.9% had retired, 21.4% were part-time employed and 26.0% were students. The results of the Royal Parade Ground survey showed that 3.4% of the respondents were employed, 1.7% were employed part-time and 94.9% were students. The results from the Ahodwo roundabout to the Kumasi Metropolitan Assembly clinic road corridor also indicated that 60.8% of the respondents had full-time employment status, 2.7% were unemployed, 20.3% were part-time employed, and 16.2% were students.

The results of this survey are consistent with some results that exist in conventional literature. For example, Mak and Jim (2019) in their study that analyzed the demographic characteristics of green space users in Hong Kong opined that most green space users were employed. Similar findings were also reported by Takyi (2016b), as he analyzed the demographic characteristics concerning the employment status of park users in the city of Vancouver. Figure 4.3 is a bar graph that shows the employment status of green space users.

4.2 Relationship between the Demographic Characteristics of Green Space users and the use of Green Space for Clinic for Walking

The statistical test indicated that there was no statistically significant relationship between demographic characteristics such as sex, age, marital status, religion, and walking in the KNUST Botanical Garden. The p values recorded for all demographic characteristics of the respondents considered in the statistical test were greater than 0.05 ($P > 0.05$). This implies that managers and administrators of the KNUST Botanical Garden must be careful when using demographic characteristics as the main indicator when planning the improvement and provision of walking paths and trails. It has been explicitly demonstrated that the demographic characteristics of green space users have no association with walking in the botanical garden.

Similar results were obtained at the Royal Parade Ground concerning the association between the use of green space for walking and demographic characteristics such as sex, age, marital status, religion, and walking. Thus, the association between the variables was statistically insignificant ($P > 0.05$).

Unlike the research findings of the KNUST Botanical Garden and the Royal Parade Ground, the results in the linear green space that extends from the Ahodwo Roundabout to the Kumasi Metropolitan Assembly (KMA) clinic indicated that there was a significant relationship between some demographic characteristics such as marital status and age ($P < 0.05$) and the use of green space for walking. While there was no significant statistical relationship between sex, religious status, and employment status of green space users ($P > 0.05$) and use of green space for walking. These interesting results imply that the city authorities can take marital status and age into account when planning to improve walkability in green spaces. However, city authorities must not use demographic characteristics such as sex, religious

status, and employment status when planning for the improvement of walkability along or within the green space. Furthermore, there is the need for further research to identify factors that influence the relationship between marital status, age, and walking in the linear green space. Table 4.3 summarizes the results of the statistical tests for the relationship between demographic characteristics and the use of green space for walking.

Table 4.3
Relationship between demographic characteristics and the use of green space for walking

Demographic characteristic (KNUST BOTANICAL GARDEN)	χ^2 Test	P-value
Sex	0.62	0.652
Age	3.52	0.618
Marital status	0.41	0.939
Religion	0.21	0.647
Employment status	0.827	0.935
Demographic characteristic (Royal Parade Ground)	χ^2 Test	P-value
Sex	2.45	0.117
Age	1.53	0.332
Marital status	1.48	0.550
Religion	0.82	0.844
Employment status	3.042	0.218
Demographic characteristic (Ahodwo Linear Green Space)	χ^2 Test	P-value
Sex	0.46	0.522
Age	26.76	0.000
Marital status	15.67	0.001
Religion	0.12	0.193
Employment status	4.174	0.243
**. The relationship is statistically significant at the 0.05 level (2-tailed).		

4.3 Relationship between Demographic Characteristics of Green Space Users and the Use of Green Space for Relaxation

The results of the statistical test performed using the Chi-square test indicated that there was no statistically significant relationship between demographic characteristics such as age, sex, religion,

marital status, and employment status of green space users and the use of the KNUST Botanical Garden for relaxation ($P > 0.05$). This implies that green space managers must not overly emphasize demographic characteristics when making green space management policies concerning the improvement of relaxation facilities in the green space.

Similar research findings were made at the Royal Parade Ground and the linear green space that runs from the Ahodwo Roundabout to the Kumasi Metropolitan Assembly (KMA) Clinic. The statistical test showed that there was no statistically significant relationship between demographic characteristics such as age, sex, religion, marital status, and employment status of green space users and the use of both sites for relaxation ($P > 0.05$). Green space managers can improve the relaxation facilities of the green spaces selected in this study, but the demographic characteristics of the green space users should not be used as an indicator to improve the relaxation facilities. The summary of the statistical test performed using the chi-square test is presented in Table 4.4.

Table 4.4
Relationship between demographic characteristics and the use of green space for relaxation

Demographic characteristic (KNUST BOTANICAL GARDEN)	χ² Test	P-value
Sex	0.112	0.779
Age	5.417	0.367
Marital status	1.169	0.760
Religion	0.576	0.448
Employment status	5.895	0.207
Demographic characteristic (Royal Parade Ground)	χ² Test	P-value
Sex	0.112	0.779
Age	5.417	0.367
Marital status	1.169	0.760
Religion	0.576	0.448
Employment status	5.895	0.207
Demographic characteristic (Ahodwo Linear Green Space)	χ² Test	P-value
Sex	2.397	0.170
Age	8.505	0.075
Marital status	6.451	0.092
Religion	2.126	0.256
Employment status	1.012	0.798
**. The relationship is statistically significant at the 0.05 level (2-tailed).		

4.4 Relationship between Demographic characteristics of Green Space Users and the Use of Green Space as a Space for Conversation.

The statistical test at the KNUST Botanical Garden indicated that there was no statistically significant relationship between the considered demographic characteristics of green space users and using the KNUST Botanical Garden as a space for conversations and discussion ($P > 0.05$). This implies that the demographic characteristics considered in the test will not influence whether green space users will use the green space for discussions or conversations while in the green space. Therefore, green space managers and administrators should not be tempted to use the demographic characteristics of green space users as an indicator to formulate policies that seek to stimulate conversations in green space.

Similar results were obtained from the test conducted with respect to the Ahodwo roundabout to the KMA Clinic linear green space. The results indicated that there was no statistically significant relationship between the selected demographic characteristics of green space users and the use of the linear green space for conversations and discussion ($P > 0.05$).

Interestingly, the result obtained from the chi-square test conducted on the Royal Parade Ground was somewhat surprising. The results of the statistical test indicated that there was no significant statistical relationship between sex, age, marital status, and religion of green space users and the use of the Royal Parade Ground as a space for conversations and discussion ($P > 0.05$). However, the results of the statistical test also showed that there was a statistically significant relationship between the employment status of green space users and the use of the Royal Parade Ground as a space for conversation and interactions ($P \leq 0.05$). This unique result can be explained by considering that most of the green space users in this green space are predominantly students. Thus, students will be more likely to have conversations in this green space than people with other employment statuses. It should not be forgotten that the main objective of the development of this green space was to provide a space where students could meet and have discussions or discussions. This result, therefore, implies that green space managers and administrators must take the employment status of green space users into consideration when formulating policies that are targeted toward improving and stimulating conversations and discussions in green space. Green space planners and designers must consider the employment status of users of the Royal Parade Ground when planning and designing facilities that are aimed at aiding and stimulating conversations in the green space. The summary of the statistical test carried out using the Chi-square test is presented in Table 4.5.

Table 4.5
Relationship between demographic characteristics of green space and the use of green space as a space for conversations.

Demographic characteristic (KNUST BOTANICAL GARDEN)	χ^2 Test	P-value
Sex	0.842	0.359
Age	5.638	0.343
Marital status	3.985	0.263
Religion	3.238	0.072
Employment status	1.894	0.755
Demographic characteristic (Royal Parade Ground)	χ^2 Test	P-value
Sex	3.238	0.072
Age	0.101	0.750
Marital status	1.008	0.315
Religion	1.463	0.691
Employment status	7.069	0.029
Demographic characteristic (Ahodwo Linear Green Space)	χ^2 Test	P-value
Sex	1.898	0.168
Age	5.006	0.287
Marital status	1.341	0.719
Religion	0.375	0.540
Employment status	4.986	0.173
**. The relationship is statistically significant at the 0.05 level (2-tailed).		

5.0 Conclusions And Recommendations

All green spaces are not the same, there exist various categories of green spaces and each category is used by different green space visitors with diverse demographic backgrounds for different purposes. Some categories of green space such as linear and functional green spaces tend to attract younger people. The study showed that the relationship between the demographic characteristics of green space users and the activities carried out in green spaces differs for each category of green space. For example, as shown in this study, there was no relationship between demographic characteristics of green space users and walking in the amenity green space (i.e., KNUST Botanical Garden and the Royal Parade Ground), but in the linear green space selected for this study, there was a statistically significant relationship between some demographic characteristics and the use of green space for walking. Green

spaces are a key infrastructure in cities that provides multiple benefits and can help ensure and promote the sustainability of the cities within which they are located. It is therefore important that the relationship between green space and activities performed should be considered from a categorical perspective to inform effective green space planning and management policymaking.

Green space policymakers and green space administrators must therefore be conscious not to make generic policies for all green spaces in the city. Data must be collected and analyzed meticulously to determine the demographic variables that affect the performance of certain activities in various categories of green spaces before green space policies are implemented that aim to improve the performance of certain activities in green spaces. The study concludes that the demographic characteristics of green space visitors in various categories of green spaces which are significant to the performance of certain activities must be considered when formulating green space policies and vice versa.

Declarations

6.1 Funding

The authors of this paper declare that no individual or organization provided any form of funding for this research.

6.2 Conflicts of interest.

The authors of this study do not report any conflicts of interest.

6.3 Availability of data and material

The data that support the findings of this study are available from the corresponding author, Desmond Gagakuma, upon reasonable request.

6.4 Authors contributions

Desmond Gagakuma

Roles: Conceptualization, Formal Analysis, Investigation, and Writing Original Draft

Stephen Appiah Takyi

Roles: Methodology, Writing - Review & Editing, Supervision, and Resources

Owusu Amponsah

Roles: Writing - Review & Editing, Resources, Project administration, and Visualization

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Figures

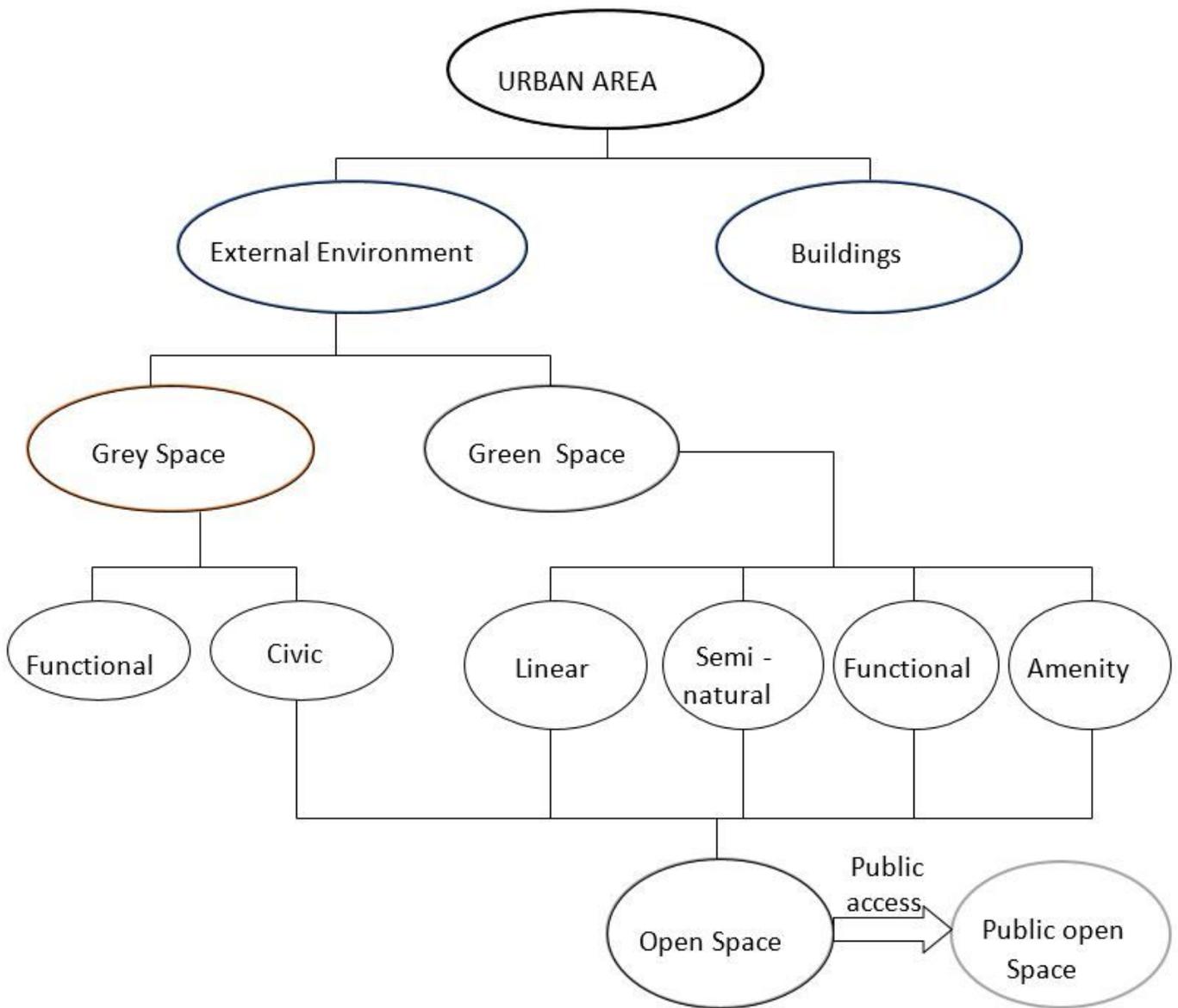


Figure 1

Definition of urban green spaces in the urban environment. Source: Swanwick *et al.* (2003)

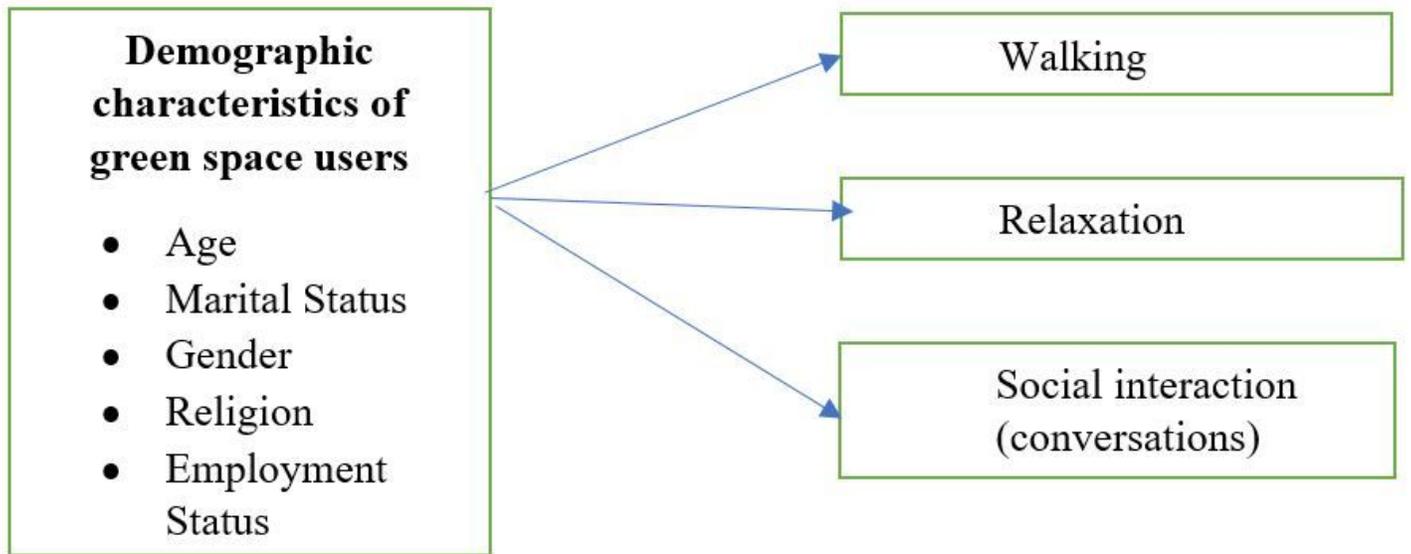


Figure 2

Conceptual Framework of the Study. Source: Authors construct

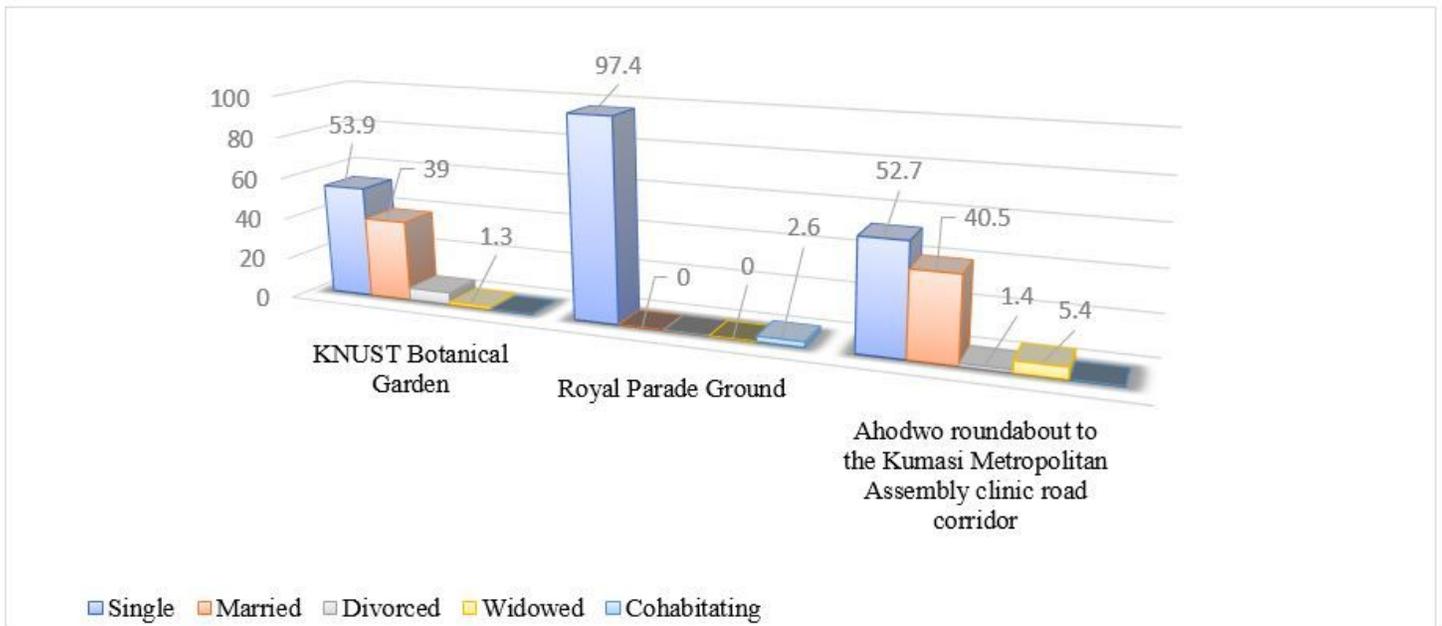


Figure 3

Marital status of green space users in percentages. Source: Greenspace Survey, April 2021

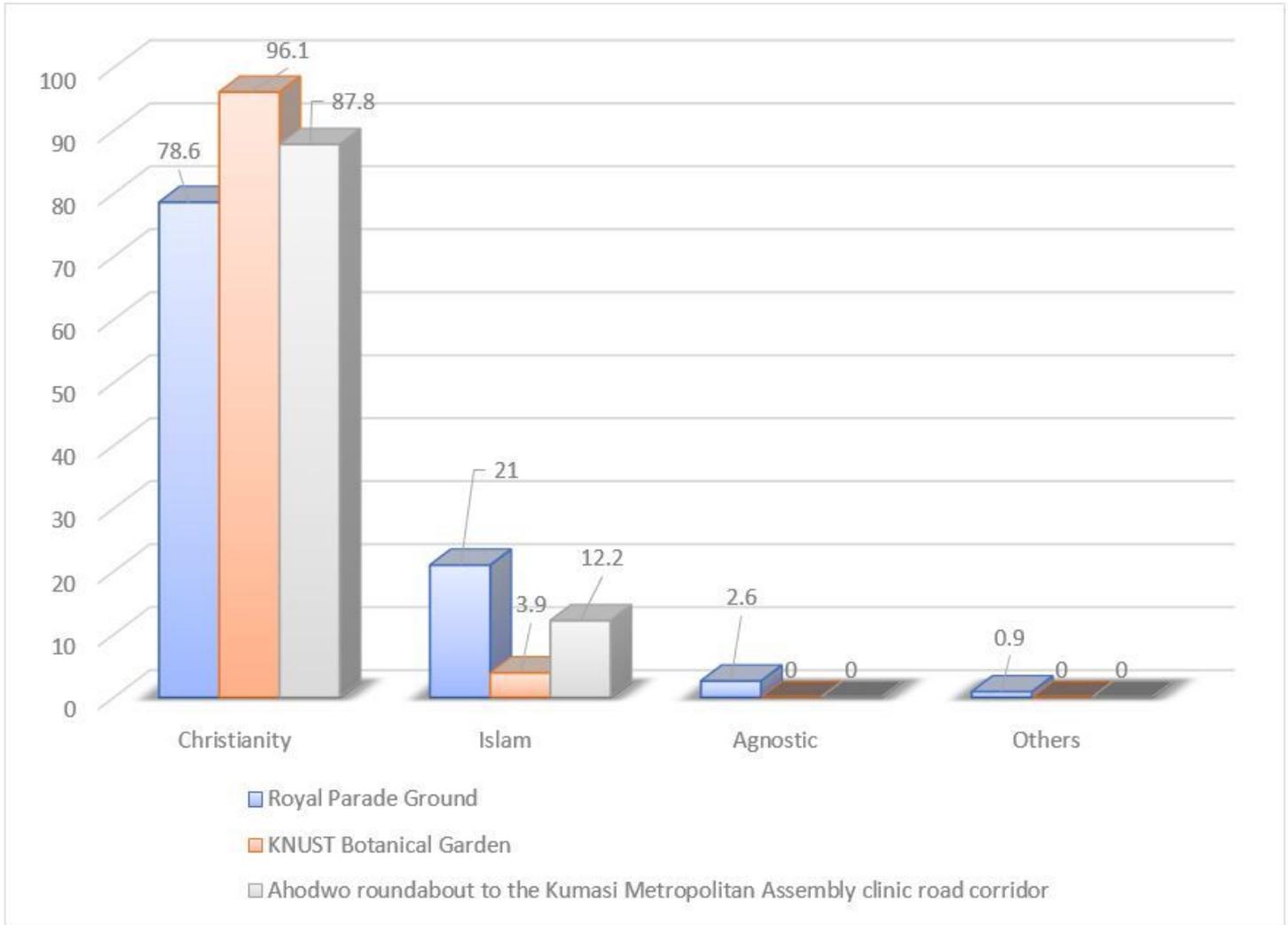


Figure 4

The religious status of space users in percentages. Source: Greenspace Survey, April 2021.

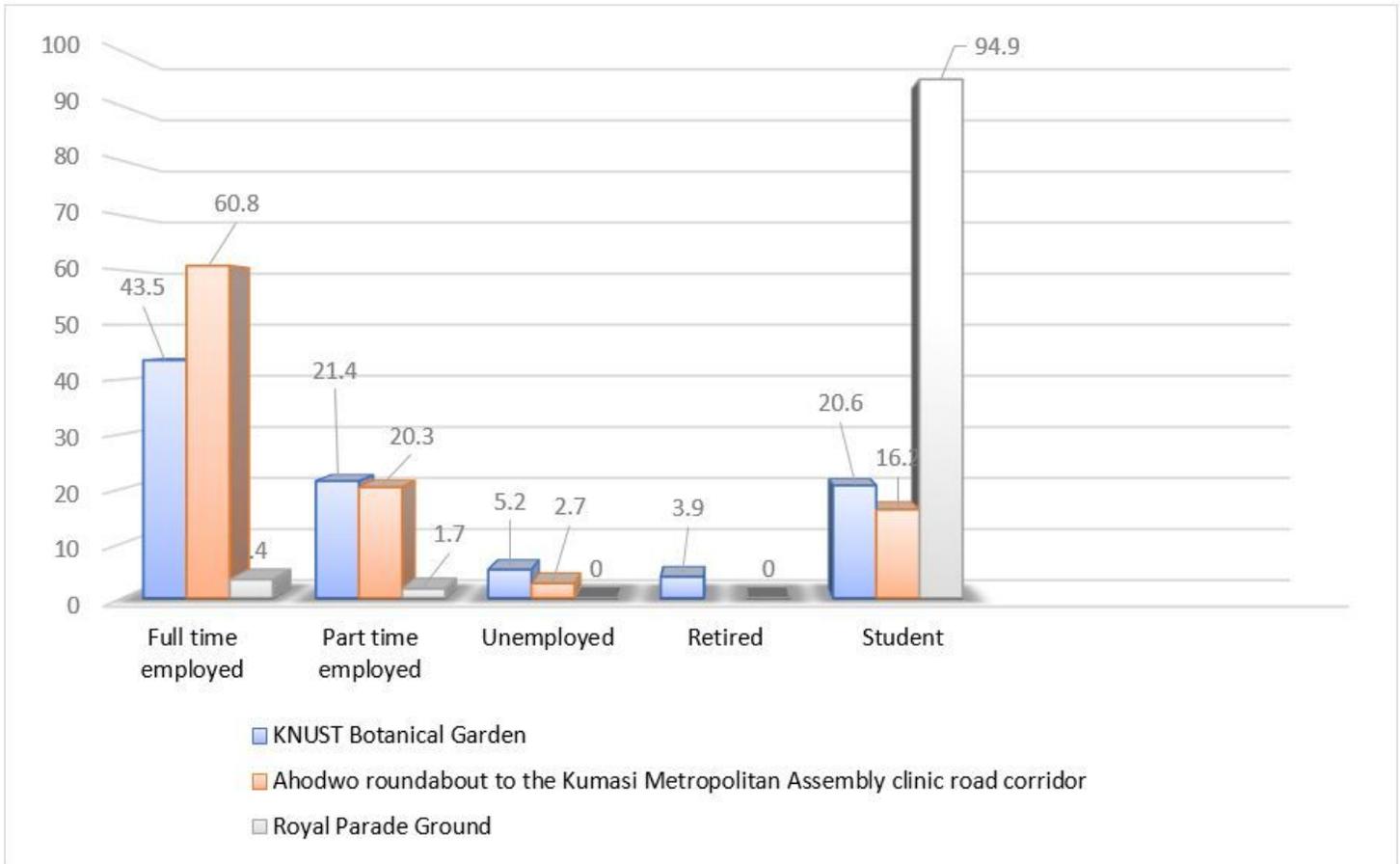


Figure 5

The employment status of green space users in percentages. Source: Greenspace Survey, April 2021