



Research Article

Utilization of Open Space for Beauty and Healthier Cities in Third-World Countries: The Case of Kigali City

David Mihigo 

Department of Urban and Regional Planning, Ardhi University, Dar es Salaam, Tanzania
E-mail: mihigodavid7@gmail.com

Received: 3 January 2024; **Revised:** 11 March 2024; **Accepted:** 31 May 2024

Abstract: Open spaces play critical roles for people in cities. In developing countries, open spaces are used for social gatherings, which are vital for a healthy city. The lack of public spaces in cities obstructs the beauty of cities, spaces for community interaction, and inclusive urban planning. This study explored the utilization of open space for beauty and healthier cities in third-world countries using Kigali city. Tested research questions include: (1) How is the utilization of open spaces in Kigali city for beautiful and healthier cities in developing countries?; (2) What are the challenges that delay the effective utilization of open spaces in Kigali city?; and (3) What are suitable recommendations for future open spaces for healthier cities in developing countries? Qualitative and quantitative methods were used, which involved interviews with 60 Kigali city residents, one vision-impaired person, and one city of Kigali expert. Observations were carried out to expose the presence and utilization of open spaces. The findings show that the city's three key open spaces, one located in front of the Bank of Kigali head office, known as Imbuga City Walk, a second located at Nyandugu Urban Wetland Ecotourism Park, and a third situated at Rebero, Kicukiro District. These are used for social interactions and individual relaxation. Hence, the effective utilization of the open spaces is hindered by challenges, including the absence of basic infrastructure such as power point sockets to charge computers and phones. Other open spaces cannot shade people during sunny and rainy seasons. The study recommends (1) the construction of several artificial lakes in open spaces, as in Gikondo Public Garden; (2) a smart city concept that involves open spaces with sufficient facilities to advance utilization and achieve healthy cities.

Keywords: use, open space, beauty, healthier cities, third-world countries, Kigali city, Rwanda

Nomenclature

AI	Artificial intelligence
CBD	Central business district
CO ₂	Carbon dioxide
COVID-19	Coronavirus disease
DRC	Democratic Republic of Congo
Frw	Rwandan Francs
IoT	Internet of things
KIE	Kigali Institute of Education

ML	Machine learning
PC	Personal computer
SPSS	Statistical Package for the Social Sciences
UR	University of Rwanda
USD	United States Dollar

1. Introduction

By 2050, 68% of the global community will live in urban areas. This is 2.5 billion more people compared to today. In Europe, three out of four of the global population already live in the cities, and the consequences are clear. The concentration or increase of population in urban areas creates urban sprawl, urban pollution, a lack of affordable houses, a local government unable to provide services for all people, human health-associated problems, and automobile exhausts that produce elevated lead levels in urban air. Researchers projected that approximately 9 million people die each year as a straightforward result of air pollution. In London, 2 million people, of whom 400,000 are children, live in places with toxic air [1]. The COVID-19 pandemic has had a direct influence on all sectors and people's lives at the global level. It has also changed the ways the population interacts among themselves in their daily lives, as well as the way they use their open spaces in cities and rural areas [2]. As the world goes into the urban age, the drive for cities become even more noticeable. Thus, a new future is coming, with urban areas around, the world changing from only being a dominant form of habitat for humankind to becoming the instrument for human development as a whole [3]. Health and well-being in cities will be a major concern for city residents and an important factor in cities' effectiveness, specifically after the COVID-19 pandemic. Urban health and aging are closely connected as the number of older people aggregates in urban areas, and this obliges changes in public health strategies [4]. Moreover, the COVID-19 pandemic impacted many activities, including the utilization of open spaces when the community was obliged to socially distancing when traveling or sitting on benches in open spaces and gardens, while at the same time avoiding unnecessary touches unless they were people from the same family or had been tested negative for COVID-19. Therefore, this reduced the number of people who used to join the open spaces because some areas require the attendees to be tested negative before being allowed to enter open spaces and to minimize social interaction with friends, including attending outdoor social events in gardens such as anniversaries, weddings, and other ceremonies. For instance, in Rwanda during COVID-19 times, there was a regulation limiting the number of people attending weddings depending on the COVID-19 situation and the current test results. Sometimes it was 20 people, and this number changes based on COVID-19 conditions. Thus, this relates to the study, as during pandemics like COVID-19, people are advised to use outdoor spaces more than indoor spaces because indoor pandemics spread faster than outdoor ones. In addition to conducting this study, the community will become aware of the utilization of open spaces even during pandemic times such as COVID-19. According to [5], creating many open spaces in cities not only adds natural beauty to urban areas but can also increase the health and well-being of their citizens. Additionally, increasing biodiversity in cities can minimize contamination and air pollution, maintain rainwater, and trap CO₂.

Cities are homes to manage businesses and cultural and civic institutions that help the community in employment, studies, and entertainment accessibility, as living in urban areas has different meanings for each person, including being at the center of actions and production and at the same time being able to travel from one place to another. Then, in cities, the amount and services provided by open space have potentially improved the situation and well-being of citizens [6]. Where it is known that open spaces are good for our well-being, early urban residents went into the long history of constructing a natural environment of open spaces in their cities. Those early city planners knew that open spaces are good and give benefits for large interactions for social cooperation while supporting community health and well-being [7]. The global depression and continued anxiety about climate change call for the need to explore and recommend the effective utilization of open spaces for healthy cities for "green growth," which includes green open spaces that are considered important in generating economic development while minimizing environmental effects and costs in the long term [8].

Open spaces are becoming important and, at the same time, are being threatened by the rapid urbanization of cities across the globe. Cities that are rapidly urbanized such as those in Asia, for example, open spaces in Chittagong City in Bangladesh or Dar es Salaam in Tanzania have been reduced. For instance, the city of Chittagong in 1961 had

a population of 4.1 million on 168.1 km² of land and had most of its open spaces affected by rapid urbanization and population growth, which necessitated the suggestion of 26 new parks and other open spaces to meet the essential population needs in urban areas [9].

Physical design affects human activities at all scales, including settlements, communities, houses, and regions. The areas where we live, play, and work may affect both our physical and mental well-being. In many parts of the world, people are facing obesity and other chronic disease rates in epic quantities. Our built environment gives us both chances and challenges to improve public health and grow active living. Cities are designed in a way that accommodates sidewalks, safer bike lanes, physical activities, and recreation areas that inspire people to make healthier choices and live good lives [10]. Thus, the utilization of open space for beautiful and healthier cities in developing countries is essential because city communities must have places where they can relax, refresh, and have conversations with friends while feeling the outdoor natural air. Therefore, this offers the beauty of the city (open spaces, gardens, urban parks, public spaces, or parks) the same time increasing the attractiveness of foreigners in the city. The following are the research objectives of the study: (1) To analyze the utilization of open space for beauty and healthier cities in third-world countries; (2) To identify the challenges that hinder the effective utilization of open space in developing countries; and (3) To recommend future open space for healthier cities in developing countries. Other than that, the following are some key questions that are tested in this study: (a) How is the utilization of open spaces in Kigali city for beauty and healthier cities in third-world countries?; (b) What are the challenges that delay the effective utilization of open spaces in developing countries using the case of Kigali city?; and (c) What are suitable recommendations for future open spaces for healthier cities in African countries? By defining the goal and the research questions of this study to generate beauty and health in open spaces, the indicators to evaluate beauty and health in public spaces are defined as follows: (1) Presence of public spaces in cities; (2) Community attendance in public spaces; (3) Community events happening day by day in open spaces constructed in urban areas; (4) Provisional of infrastructures connected to public spaces for the aim of making the open space vibrant and attractive to both local and international tourists; (5) Clean public spaces for the good health of citizens and people in general; (6) public spaces considered emerging technologies such as IoT, AI, and ML technologies.

Generation of the indicators will be done after all the aspects or indicators mentioned above are achieved. In that way, once public spaces are prepared in cities, the evaluation of indicators is possible because it can identify what is missing or what is already done effectively. Even by looking at the community joining the open spaces and conducting various ceremonies or events in that open space, you can identify how that open space is making the city healthier and increasing the city's beauty more than before. This study brings added value to what is already known in existing urban studies in general and in particular in the greening urban literature, it provides a good review, especially for open spaces in cities for future researchers, readers, and decision-makers. Emerging open spaces need to take into account smart technologies to ensure gardens and open spaces shift towards current city transformation along with digital transformation that is being used for cities to address urban complex issues that might impede cities development, cities beauty, and healthy cities as well.

Additionally, this paper will contribute to the work of local authorities, city planners, public health practitioners, city developers, and communal groups for sustainable and healthier cities. Finally, open spaces for developing countries are important compared with developed countries because:

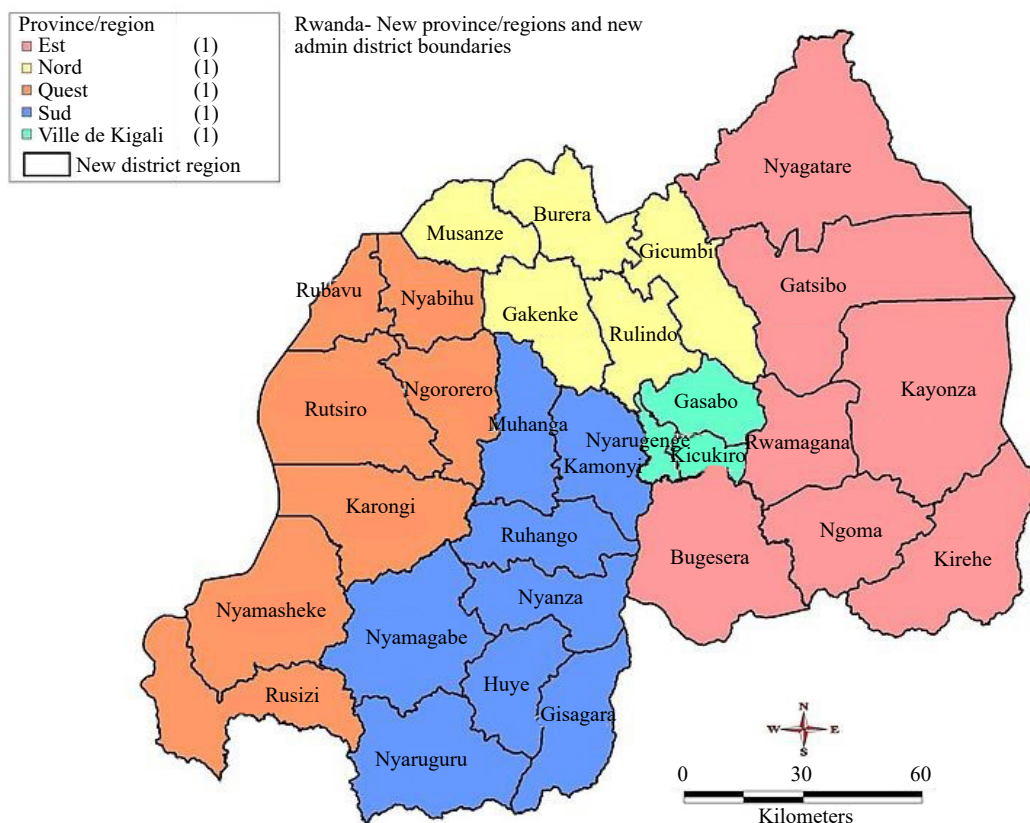
1. All African nations are at the forefront of becoming developed countries compared to developed nations.
2. Social gatherings and social interaction among Africans are highly needed compared to developed countries. Africans need to interact, become friends, create social projects, work in groups, and work together to achieve Africa's development that developed countries have already achieved.
3. Many African countries are missing such open spaces to make their cities healthy and attractive to foreigners and many internationals for tourism purposes or investments more than developed countries.

2. Materials and methods

2.1 Overview of the study area

The country of Rwanda is among the great lakes of central Africa, covering almost 25,000 km² of land and 1,400

km² of water bodies. According to [11], Rwanda's population has reached 13,246,394 people. The country of Rwanda is known as "the land of a thousand hills" and is located in east-central Africa. It lies 121 km south (75 miles) of the equator in the tropic of Capricorn and 1,416 km (880 miles) west of the Indian Ocean, as well as 1,250 km (777 miles) east of the Atlantic Ocean. The heart of Africa. In addition to this, the country of Rwanda is bordered by Tanzania to the east and Uganda to the north, while Burundi is located in the south and the DRC in the western part. Rwanda has two rainy seasons: November to January and February to April. Regular temperatures range from 16-22 °C [12]. From an economic perspective, Rwanda is primarily focused on agricultural activities. Normally, tea and coffee are harvested for export, while vegetables and rice are harvested for local community consumption [13]. Figure 1 stipulates the country of Rwanda and the study area in Kigali city. Hence, different criteria were considered in selecting Kigali city, such as: (1) Kigali city being one of the cities the author is accepted to do research in; (2) Kigali city hosting the CBD of Rwanda; (3) The city of Kigali is the place where the author is living, thus, it is easier for him to collect data without spending a lot of money, for example, going to the village for data collection protocols, etc.; (4) The city of Kigali is rapidly growing with the urban transformation taking place day by day, including the construction of open spaces for the beauty of the city and better health for city citizens. Regarding open spaces for beauty and healthier cities in developing countries, the country of Rwanda, especially Kigali city also took into consideration and practiced this concept of open spaces for beauty and healthier cities where necessary gardens were provided across the city of Kigali to ease community interactions and relaxation in their daily activities and lives. More detailed information about parks and their utilization is presented in the results section.



Source: [14]

Figure 1. Study area administrative boundaries map

2.2 Data collection procedures and analysis

This section explains the various research instruments that were used to collect data. In this study, both primary and secondary data were used, with primary data collected through various methods, including observations and interviews. Secondary data were collected through a literature review related to open spaces in cities. Field observations were used to detect the current situation of open space in Kigali city. Interviews were conducted with Kigali city citizens on the utilization of open space for beauty and healthier cities in developing countries. A total of 60 Kigali city residents were interviewed regarding the utilization of open spaces in Kigali city including one expert from the Department of Urban Planning in the city of Kigali and one vision-impaired person, to get their point of view on the utilization of open space in Kigali city and cities in developing countries. The main reason for choosing this group as an interviewee was to understand their perspective on the utilization of open space for beauty and healthier cities in developing countries. Therefore, a single expert from the urban planning department in the city of Kigali was enough, as he represents other professional experts in the field and Department of Urban Planning because they share a common understanding when it comes to planning the city and the future features that the city must have to maintain beauty and a healthier life for the citizens. This goes hand in hand with participatory planning, when experts come together to decide and plan for the city. In addition, having a city expert's opinion relatively strengthens the results of this study. Furthermore, it was good to have a disabled person participate in this study to open the room of inclusion, welcome all kinds of people to contribute their ideas to this study, and boost inclusiveness in opinion sharing. Again, one disabled individual was chosen to represent persons with disabilities in Kigali city, depending on his or her presence and willingness to provide his or her input for this study. Moreover, having an educated person with a disability at a bachelor's degree level helped a lot, especially during the discussion with him, and he was able to provide more input for the study as the researcher permitted him to speak for other persons with disabilities on their behalf who were not present at the moment during data collection.

Therefore, during the data collection procedure, questionnaires were developed, and this was carried out in a way that every respondent could easily contribute their point of view on the recent situation of utilization of open space for beauty and healthier cities in African countries by using the case study of Kigali city. Additionally, the questionnaire was developed based on the objectives of this study and research questions to respond to. The objectives of this study are stated in the Introduction section. Thus, it was better to highlight and develop questions for each respondent (Kigali city residents, Kigali city experts, and disabled persons), as you will see in Appendix A section. Not only that but attaching the questionnaire in Appendix A helps future readers and future researchers identify the tools utilized and questions developed for easy data collection in the field. Also, it can be used as a reference for future researchers during their research, thesis questionnaire formulation, and dissertation writing. Thus, the selection of the respondents was both purposeful and convenient, focusing on the people utilizing the open spaces as well as the people's willingness to participate in this social experiment. This goes hand in hand with their presence when a researcher was walking around in the city during data collection. There are no criteria used in recruiting the respondents; rather, selection was done randomly based on respondents' readiness to offer their inputs and their availability during data collection. Therefore, the use of this approach helps in avoiding any discrimination that might take place when you want to consider any group of people compared to others in collecting responses. Additionally, data gathering was done by the researcher, and it started on 1st October 2021 and ended on 27th December 2022, except for inputs from both city experts and persons with disability which were collected in November and December 2023. All the data collection was carried out in the morning and evening during working hours and on the weekend, especially Saturday and all this depends on the subject group's availability to provide their insight on the utilization of open space for beauty and healthier cities in developing countries. The researcher walked in the city of Kigali, mostly where these open spaces are located, to observe their utilization and interviewed open space users, then filled out a structured questionnaire developed before he went for data collection. Data were analyzed using Microsoft Excel through quantitative data analysis and Microsoft Word in producing and summarizing this report. In terms of analysis, the study used descriptive statistics, including tables and figures, for the quantitative data, while the qualitative data were analyzed using content analysis. Finally, a questionnaire was designed according to the objectives of this study and the research question to be answered. Appendix B demonstrates the acceptance letter for data collection in Kigali city.

2.3 Research design

Based on this study, the research design used was based on the following successive preparations of accomplishments, which are as follows: Firstly, to reach this stage, researchers initiate by selecting a broad research area due to the area of interest. Later, the researcher identified and framed the research problem by reading different pieces of literature to come up with a concrete concept. Additionally, the methodology used for data collection and analysis on data collected from the site to handle the study until the final stage is given in the research design process in Figure 2. To achieve the objectives of this study, the research design and adoption process were thoroughly discussed. The figure below shows the process adopted to reach a conclusion and future recommendations for this study.

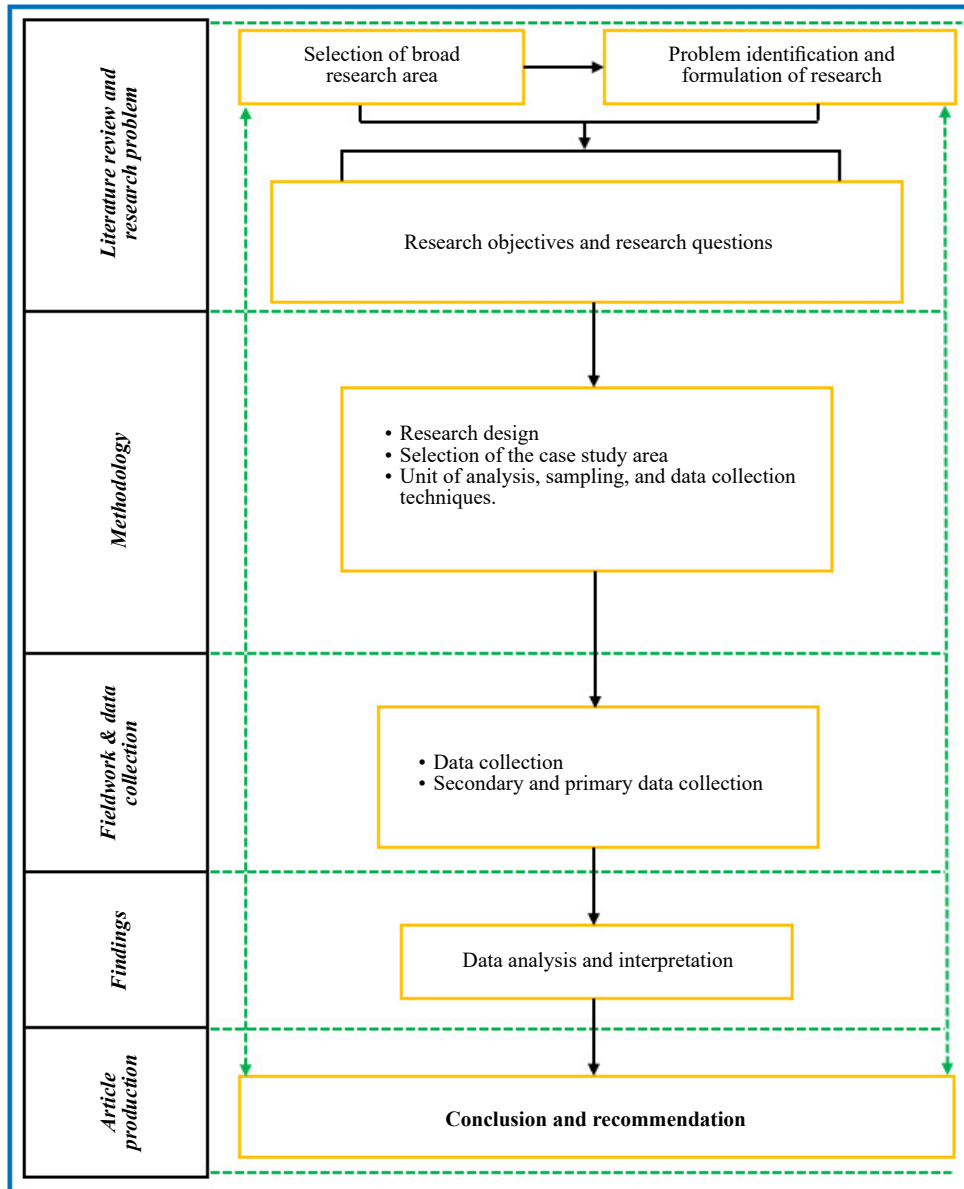


Figure 2. Research design process

2.4 Limitation of the data

As different works have limitations, there are limitations in the research area too. Depending on the type of research a person or group of people are conducting and many other factors to be considered, in this study, the following are some key limitations highlighted in the data collected and data analysis:

- a) Limited secondary data, specifically open spaces, gardens, and park-related literature, exists in developing countries. In most African countries, not only researchers but also urban planners did not consider the concept of open spaces for the beauty and health of cities in developing countries. That is why literature related to public spaces in Africa is limited compared to developed countries as well as Asian countries, which are more advanced.
- b) In most cases, during field data collection, some people are not willing to provide their perspectives or opinions about the topics under study. However, this does not have an effect as someone shares his or her understanding of any given topic and his or her ideas, which can contribute a lot not only in his or her home country but also globally for the benefit of many people. On the other side, people should feel free and open to sharing their points of view when it comes to studies that transform their development as well as African development for the present and future generations.
- c) There is a lack of advanced statistical tools for doing quantitative analysis, such as SPSS, currently on researchers' PCs. During the analysis of quantitative data in this study, Microsoft Excel was used.

3. Results

3.1 Socio-demographic characteristics of the respondents

Socio-demographic characteristics were analyzed to highlight people who took their time to participate in the interview and respond to the planned questions of this research. Therefore, Table 1 shows information about the interviewed respondents. According to education perspectives, 15% of the public open space users were primary students, while secondary and university students were among 23% and 62% of the Kigali city open space users, respectively. Categorizing the participants by gender, 72% of the users were women, and 28% of them were men. Gender inclusion is necessary to ascertain how different genders also perceive and utilize the open spaces so that the recommendations of the study results are inclusive. According to the livelihood majority of the users, 58% are self-employed in the private sector, while public sector employees account for 42%. Therefore, most of the people interviewed were doing business while others stayed home for various reasons, including working from home during the COVID-19 era. Age was also a factor considered in this study, where 62% of the users were aged from 30 to 40 years, 25% of the users were aged between 40 and 50 years, and the rest of 13% were above the age of 50 years. It can therefore be seen that the majority of the respondents were active users of the open spaces as well as those with knowledge and experience to inform the study. Additionally, the researcher decided to include the perspectives of people with an age starting at 30 years old simply to capture a high level of ideas, as older people are considered to have more experiences than young people. To add value to this research, ideas and input from aged respondents are essential, but the researcher has decided not to include younger respondents simply to capture a high level of ideas because most of the time, older people are considered to have more experience than young people under the age of 30. In addition to this, open spaces, especially in developing countries, are an emerging concept that needs important consideration for more beautiful and healthy cities in developing countries in the future.

Again, some of the socio-demographic characteristics such as migration background, ethnicity, religious affiliation, marital status, household, and income were not included as the researcher focused much on socio-demographic information that has a big relationship with the study or that could impact the study positively. For example, a country like Rwanda nowadays does not believe in ethnicity due to its history and what the country has gone through. Religious affiliation was also not considered, as a majority of people are Christians and only a certain number are Muslims with a minority group of people who believe in the local traditions. Thus, researchers did not consider respondents' religious information, as it may not have impacted the study. Anyone, regardless of their religion, is welcome to visit the open spaces. Apart from that, their marital status was also not considered a social-demographic factor in this study because both married and single persons are openly welcome to join these spaces, and during the interview with

community residents, both married and single people participated in the interview, unless they showed their statistics. Finally, depending on the type of study, socio-demographic characteristics like migration background, household, and income level are shown. Therefore, people in Rwanda are considered equal regardless of their migration background. In Rwanda, foreigners have equal rights with the local community when it comes to accessing services and other community benefits, as long as they are registered and recognized by the government. Furthermore, there is no discrimination based on their income level. People from all economic levels use open spaces equally and whenever they want, any day. Sometimes some socio-demographic characteristics are not necessary to be recorded, especially when they do not have much impact on the study. Here, important key socio-demographic information was taken into consideration to increase the quality of the results and to strengthen the study for future use. In simple words, not all socio-demographic characteristics were recorded; some were considered and some were not, depending on the type of research and information to include in the study.

Table 1. Socio-demographic characteristics

No.	Respondent	Classifications	Frequency	%	Total
1	Gender	Male	17	28	60
		Female	43	72	
2	Age	Age 30-40	37	62	60
		Age 40-50	15	25	
		Age above 50	8	13	
3	Level of education	Primary education	9	15	60
		Secondary education	14	23	
4	Employment sector	University education	37	62	60
		Private sector	35	58	
		Public sector	25	42	

Source: Resident's interview, 2022

3.2 Current situation of open space and green spaces in Kigali city

3.2.1 Nyandungu Urban Wetland Ecotourism Park

Nyandungu Urban Ecotourism Park is located near the road from the city center to the eastern province, a small distance from the Kigali international airport (Kanombe International Airport). According to the person in charge of the park management team, the government of Rwanda financed this project to restore and conserve the Nyandungu wetland. Around 2,000 trees have been prepared and planned to be planted to form an artificial forest, and a medicinal garden for educational purposes will be constructed. This ecotourism park will also consist of walkways, bridges, cycling ways, kiosks, recreational areas, natural water ponds, and nature views areas, together with other modern facilities that the futuristic park often has. Thus, the long-term plan is to have beautiful gardens that could be used for wedding ceremonies and movie filming venues, which are complete with eating areas. Therefore, Figure 3 shows Nyandungu Urban Wetland Ecotourism Park.



Source: Field data, 2023

Figure 3. Nyandungu Urban Wetland Ecotourism Park

3.2.2 Kigali city green space in front of Kigali City Hall

Located in the city center of Rwanda in front of Nyarugenge District, this open space or garden is constructed for public use where people can go and relax or meet friends to mingle around which can have a positive impact on them. The only problem is that this garden does not have shading to shade people during rainy seasons or even during the sunny period. As can be seen in Figure 4, some of the users of the open space have umbrellas to protect them from the sun. The open space also lacks basic infrastructure such as electrical sockets for customers to power and charge their electrical items such as phones and laptops, as a way to promote intensive use of space. Nonetheless, the garden plays an important role similarly to other open spaces in developing world cities, designed in a modern way with flowers and glasses that can last a long time for garden users' activities.



Source: [15]

Figure 4. Kigali city green space near Nyarugenge District

3.2.3 Kigali city open space at Rebero, Kicukiro District

The attractive Rebero Mountain in Kicukiro District is currently undergoing a massive shift, which will host the biggest cultural center under the government of Rwanda in partnership with Vivendi Group. Last year, they had a plan that Vivendi would develop the Kigali Cultural Village, a project that will be constructed on 30 hectares of land and provide recreational services. The project will consist of a modern cinema hall, concert areas, solar panel technology that will power the facility, and a children's gaming area. Therefore, Figure 5 demonstrates the Kigali view of the cultural village at Rebero in Kicukiro District.



Source: [15]

Figure 5. Kigali view of the cultural village at Rebero in Kicukiro District

The provision of stairs is one of the infrastructures constructed in this open space to connect two areas: paved roads and walkways, where the community cannot easily connect with their walking. This also helps in shortening the travel time for visitors who visit this place. In Figure 6, stairs are made of stones and cement mortar, as well as metal tubes at the top to protect the users from falling during their visit. The use of stones is because it is the most available construction material to be found locally in Rwanda and Kigali, and it also offers the beauty of a place. It is not only that stones are resistant to rain and humidity, but they are also durable compared to clay bricks. The pores between the stone arrangement in the walls help water to drain out rather than retaining it in the wall body and destroy the wall over time. In addition, those pipes permit hot air penetration during sunny days and seasons to enter inside the wall to dry the water or moisture found in the soil and the wall itself. During stone wall construction, masons always add a cement layer on top to avoid rainwater penetration inside the wall. For each possible distance, stairs are provided to help visitors connect two walkways or two places easily without going a long distance or crossing to get to another place.



Source: Field data, 2024

Figure 6. Stair constructed in Rebero open space, Kigali city

3.2.4 Gikondo Public Garden in the city of Kigali

Currently, the city of Kigali is transforming the former industrial zone of Gikondo into a public park where people in Rwanda will soon start to enjoy the beauty of gardens, various colorful tree species, and refreshment places. During the site visit, there were no ongoing activities as the park is yet to be open for public use. Furthermore, according to the Kigali city officer, there is a mapping of other places that can be developed into recreation areas. There are also plans to interest the private sector to bring on board investment in open spaces specifically for potential areas fit for the purposes.

Figure 7 displays the Gikondo Public Garden in Kigali city.



Source: [15]

Figure 7. Gikondo Public Garden

In the Gikondo Public Garden, there is an artificial lake, as you can see in Figure 8. The major role of this lake is to drain underground sources of water effectively without flooding the entire garden, which may inconvenience visitors during their visit and interrupt them while they enjoy their best moments. During good weather, people can sit around the artificial lake with their friends and relax. It is not only that; there are also tents installed in the garden area for public use during rainy seasons or sunny days. Trees are also planted in this garden to bring fresh air and add to the beauty of the garden, along with flowers. In this garden, there is Coffee Eden Park Restaurant, which sells food and drinks for weddings, ceremonies, and anniversaries. Researchers recommended putting fish in this artificial lake as a gesture of food security, solely for local consumption in the future. Birds are also good in gardens and in attracting local and international tourists.



Source: Field data, 2024

Figure 8. Artificial lake provision at Gikondo Public Garden

3.3 Utilization of open spaces

3.3.1 Utilization of open spaces in CBD

During the site visit and data collection, the researcher was able to observe people utilizing the open space in front of CogeBanque Headquarter which changed into Equity Bank in Kigali city CBD where youths hang out, sit, refresh, and walk into the space using their smartphones chatting with their friends or reading important information for their future development. Figure 9 illustrates the utilization of open space in Nyarugenge District. The photo was taken during the evening above 5 p.m. Open spaces can be accessed at any time, even during the night. During the nighttime, street lights lit the area for community convenience while using these open spaces, and all interviewed respondents agreed that the place is safe and clean for people to utilize.



Source: [16]

Figure 9. Utilization of recreation facility at Kigali's CBD

Children were seen present in the open space, taking pictures with their siblings. Speaking with the community, 88% of the respondents agreed that open spaces, especially in cities, are needed to help people have space to relax and meet friends, as waiting places and places for short discussions on various topics that help their development, as well as job and scholarship opportunities for the future generation's development. As can be seen in Figure 10, adults also go into open spaces to interact with other communities or even take photos on various occasions, such as during their graduation days, dissertation defenses, and the like. Some users film music videos and films here.



Source: [16]

Figure 10. Utilization of open space during night

Therefore, it is obvious that open spaces in Kigali are used for many purposes, including leisure and relaxation, informal meetings, and discussions among friends or different groups of people. Different categories of people, including the young, the middle-aged, and the elderly, use open spaces for various purposes.

There is also a team of cleaners who walk around to clean or take waste thrown there to proper cycle bins in

the open space. Security men are also there to monitor the movement around the open space if there are people who may cause problems for others who visit the open space and calm the situation. Speaking with the community during interviews and site visits in Kigali city open spaces, the following challenges were highlighted as hindrances to the effective utilization of the open space:

- **Lack of electrical connectivity:** About 92% of the respondents agreed that a lack of electricity in some open spaces hinders their utilization. The users point out the need to connect their computers and smartphones to electricity while utilizing the open spaces, especially when they want to use the space for a while and enjoy the outdoor views. For example, the open space in front of Kigali City Hall lacks electric sockets to connect users to their smartphones and laptops once needed.
- **Small commercial activities:** The need to integrate small commercial activities was highlighted by 78% of Kigali residents. The small commercial activities sell soft drinks, and different kinds of food to provide the needed service to the open space users. But at Imbuga City Walk nowadays, there are small shops selling coffee and soft drinks such as juice and water, as well as Rwandan crafts products.
- **Rainy and sunny challenge:** It was also responded to by 87% of the respondents that the utilization of open spaces is constrained by the lack of protection from sunny and rainy weather. The lack of protection was largely mentioned about the open space in front of the Nyarugenge District (Kigali City Hall) entrance, which is exposed to both sunny and rainy weather.

3.3.2 Utilization of open spaces outside the CBD

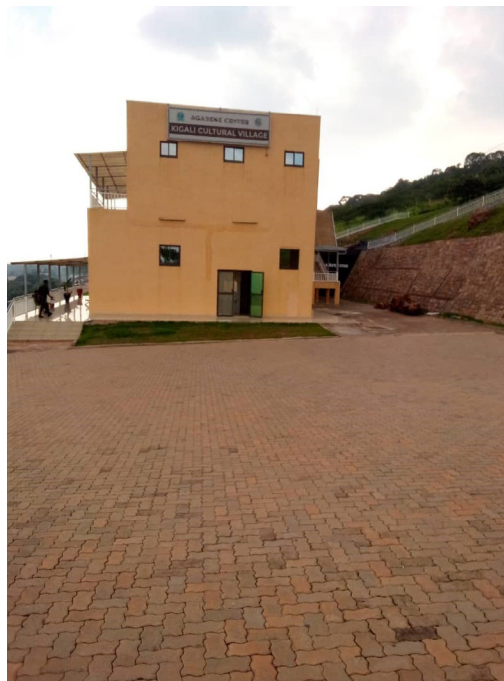
Figure 11 demonstrates an open space at Rebero in the city of Kigali, Kicukiro District, ready for use with chairs made of timber at the top and clay bricks where the community can come together and sit on those chairs, especially when they are tired or need to sit for some time during their open space visit. Walkways, or pedestrian ways, are constructed in this place to facilitate visitors walking around the garden and reaching their destination. Dust bins are also provided for solid waste to ensure the cleanliness of the garden as well as environmental protection. Retaining walls constructed of stones is also good infrastructure, especially in mountainous places, while protecting the soil from falling. Retaining walls also add to the beauty of the place. On the top of these retaining walls, metal tubes are installed to protect people from falling or facing serious injuries. Walkways are paved to make the surface smooth enough for visitors' walkability. Road curbs are constructed along walkways to make sure that walkways are maintained in their positions suitably.



Source: Field data, 2024

Figure 11. Stone retaining wall construction at Rebero open space, city of Kigali

At Rebero, as you go to the end of this open space, there is a building story constructed there, as Figure 12 stipulates. This building is the Agaseke Center. The function of this building or project is (1) to promote Rwandan culture and heritage; (2) to promote made-in-Rwandan products; and (3) to promote cultural tourism. The building's ground floor accommodates Rwanda's local products. Here, visitors can enter this ground floor and find all of Rwanda's local products and be in a better position to buy any product they might be interested in. Then, at the top, which is the first floor, there is the Museum of Culture and Nature. Here, you need to pay some amount of 10.000 Frw, which is approximately USD 10, to visit this area and have a tour guide explain the history and many other museum-related functions. The idea looks good, especially in open spaces like Rebero, because it promotes the country's culture and heritage as well as attracts more foreigners locally and internationally. It is also good when designing open spaces to have different attractions and events,, which play a crucial role in bringing many visitors to the place.



Source: Field data, 2024

Figure 12. Kigali Cultural Village at Rebero open space

Figure 13 demonstrates the Gikondo Public Garden. The image was taken at the main entrance of the garden, where you can see that drainage systems are provided, such as trenches to drain rainwater and unclean water away from the garden. Trenches are constructed from stones and cement available locally in Rwanda for use. Flowers make the place more beautiful for visitors and the community interested in open space. Parking paved in pavers was left for cars, which brought visitors to the place during their ceremonies. The big tent is used to accommodate a large number of people for outdoor activities. This place is used by various people from the city of Kigali, the countryside of Rwanda, refugees, and foreigners coming from abroad. Inside the garden, visitors can also buy drinks or something to eat if needed.



Source: Field data, 2024

Figure 13. Parking and drainage system provisional at Gikondo Public Garden, Kigali city

Very interesting Figure 14 shows a water storage tank constructed in the Gikondo Public Garden, collecting underground water from the source. The idea came when they discovered that in that garden there is a presence of water from the ground to the top soil surface. The water collected and stored in the tank is used by garden owners to water the trees and flowers, as well as to clean chairs, and is used in the kitchen for cooking and drinking as it is good water and clean for use. This symbolizes the different concepts that gardens must have for various uses and the benefits to garden users or visitors as well as open space owners.



Source: Field data, 2024

Figure 14. Potable water storage tank construction at Gikondo Public Garden, Kigali city

The following Table 2 provides a summary and an overview of the survey results that were collected during field data collection work on the utilization of open space for beauty and healthier cities in third-world countries. Using the case of Kigali city in the country of Rwanda, during field data collection, 20 people were interviewed in Kicukiro District, then 20 people were interviewed in Nyarugenge District, and the remaining 20 people were interviewed in Gasabo District. Table 2 below stipulates all necessary information regarding respondents who took part in this study and spent their time responding to structured questions.

Table 2. Overview of the survey results on the utilization of open space for the beauty and healthier cities in third-world countries

No	Variable	Category	Total Frequency	Question 1		Question 2		Question 3				City of Kigali								
				Yes	No	Yes	No	Lack of electrical connectivity		Small commercial activities		Rainy and sunny challenge		Districts						
		Responses		%	%	%	%	Yes	No	Yes	No	Yes	No	%						
1																				
2	Gender	Male	6	100	0	14	88	3	12	15	2	10	7	14	3	13				
		Female	14	0	0	39	4	40	3	8	3	3	40	38	5					
		Age 30-40	13	0	0	33	4	34	3	7	3	7	30	33	4					
3	Age	Age 40-50	5	100	0	13	88	2	12	13	2	4	22	11	78	12	87	3	13	
		Age above 50	3	0	0	7	1	8	0	2	0	2	6	7	1					
		Primary eucation	3	0	0	9	0	9	0	2	2	2	7	8	1				Nyarugenge	
4	Education	Secondary education	5	100	0	12	88	2	12	12	2	3	22	11	78	11	87	3	13	
		University education	12	0	0	32	5	34	3	8	8	8	29	33	4					
		Private sector	11	100	0	30	88	5	12	32	3	10	25	30	5					
		Public sector	9	100	0	23	2	23	2	8	3	3	22	22	87	3				
6	Total percentage in Nyarugenge District			100	0	88	12	92	8	22	78	87	13							
7	Gende	Male	6	100	0	15	88	2	12	14	3	5	12	15	2					
		Female	14	0	0	38	5	41	2	8	8	8	35	37	6					
		Age 30-40	12	0	0	32	5	35	2	9	2	9	28	32	5					
8	Age	Age 40-50	5	100	0	14	88	1	12	13	2	3	22	12	78	13	87	2	13	
		Age above 50	3	0	0	7	1	7	1	7	1	1	7	7	1					
		Primary education	3	0	0	8	1	8	1	2	2	2	7	9	0					Kicukiro
9	Education	Secondary education	4	100	0	12	88	2	12	13	1	2	22	12	78	11	87	3	13	
		University education	12	0	0	33	4	34	3	9	9	9	28	32	5					
		Private sector	12	100	0	31	88	4	12	31	4	11	24	29	6					
		Public sector	8	100	0	22	3	24	1	8	2	2	23	23	87	2				
11	Total percentage in Kicukiro District			100	0	88	12	92	8	22	78	87	13							

Table 2. Continued

No	Variable	Category	Total Frequency	Question 1	Question 2	Question 3	City of Kigali
12	Gender	Male	5	0	3	2	1
		Female	15	100	88	8	16
13	Age	Age 30-40	12	0	4	3	7
		Age 40-50	5	0	3	2	5
		Age above 50	2	0	7	1	8
		Primary education	3	0	0	1	8
14	Education	Secondary education	4	0	2	2	2
		University education	12	0	5	7	5
		Private sector	12	0	2	3	7
15	Employment	Public sector	8	0	5	2	1
		Total percentage in Gasabo District	100	0	88	8	22
16							87

Source: Field data, 2022

Additionally, Table 3 refers to the regression analysis of the respondents' answers regarding the utilization of open space for cities' beauty in third-world countries by adopting the case of Kigali city, made with three districts, which are Nyarugenge District, Kicukiro District, and Gasabo District, during field data collection.

Table 3. Regression analysis results on respondent's opinions on open space for the city's beauty

Regression statistics		Element B	Element C	Element D				
Multiple R	0.990832745							
R square	0.981749528							
Adjusted R square	0.979468219							
Standard error	0.602079729							
Observations	10							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	156	156	430.3448	3.06E-08			
Residual	8	2.9	0.3625					
Total	9	158.9						
	Coefficients	Standard error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.1	0.430079	0.232515	0.821976	-0.89176	1.091764	-0.89176	1.091764
City beauty	0.2	0.009641	20.74475	3.06E-08	0.177768	0.222232	0.177768	0.222232

Source: Field data, 2022

Note: df = degree of freedom; SS = Sum of squares; MS = Mean Square error; F = F-statistic (ratio of two variances; explained and unexplained variances); t stat = ratio of the departure of the estimated value of parameters from its hypothesized value to its standard error (hypothesis test static); then P-value = probability of observing the coefficient value or more extreme, if the null hypothesis is correct (probability value).

3.4 City of Kigali expert opinion from Department of Urban Planning on utilization of open space for beauty and healthier cities in third-world countries

According to the expert we interviewed, the city of Kigali decided to have open space within the city so that people can have a place where they can relax and enjoy in the city center without going out of the city to look for these places. Thus, this place is used by many people, including youth, children, males and females, as well as old people. He added that commercial activities also emerged there, where people are selling artisans or handcrafted products known as those made in Rwanda and those selling drinks, for instance, juices, soda, coffee drinks, chips, or fast food. In this area, no car is allowed to cross, as it was designed for pedestrians only. Public benches are provided in case people get tired and want to sit for some time. Children also use this place for playing outdoors together and feeling good as they are not playing at their home or settlement but rather in the city center. Additionally, dust bins are fixed along open spaces for users to dump their solid waste materials for a clean and beautiful city. Trees are also planted in the open space to shield users from the sun. Wireless connectivity is there so that people can have access to the internet and chat or read their important documents in public spaces or while waiting for their friends or families. Finally, he mentioned that open space is used every day from Monday to Sunday from the morning to the evening for visitors to the city of Kigali.

3.5 Vision impairment perspective on utilization of open space for beauty and healthier cities in third-world countries

It was on Friday, 22nd December 2023, at 11:20 a.m. when I had an interview with a disabled person (vision impaired) on the utilization of open space for beauty and healthier cities in third-world countries. The case of Kigali city. Meeting this person was not the first time because I discussed other topics with him. After all, he holds a bachelor's

degree in education from the former KIE, currently UR. In addition, due to his education level, the conversation with him has a lot of ideas and innovative approaches, which attracts me to interview him most of the time when I am conducting any research. After meeting him, we initiated the discussion, as it was not the first time, as I mentioned above. According to him, open space is a nice place for people with disabilities because when they are there, they feel safe with no disturbances such as vehicles, bicycles, or motorbikes crossing the location. He also said that within open spaces, people can order drinks and food in case needed.

As a vision-impaired person, he advised the use of smart technologies, which can be used to make them understand the open space and further activities taking place there. This will help them know very well the place and services around without asking someone. Finally, he said that they fully utilize the open spaces in Kigali as other people with no disability.

4. Discussion

Urban open spaces play critical roles for residents in cities in both developed and developing countries. In developing countries, open spaces are used for social and community gatherings, which are necessary for a healthy city. Moreover, urban open spaces have direct health benefits as they provide spaces for the resident's physical activities and social interaction and allow psychological restoration to take place through relaxation. There are also health benefits related to their effects on reducing urban heat, especially when they are characterized by green structures. Therefore, it means that urban open spaces are a prerequisite for healthy cities. According to [2], open spaces are designed, maintained, and built with the anticipation of giving access to clean air, nature, and recreation, as well as a place where communities can interact with each other.

Open spaces for healthier cities are needed, especially in developing countries, such as in the African context, where the spaces are important for community and social gatherings. Moreover, the open spaces are important and useful for relaxation and recreation. According to [17], green spaces are an important element of healthy and vibrant communities. These areas give different benefits, such as improving mental and physical health, promoting social connection, maintaining the environment, and improving economic development. It is, therefore, important that urban planners take into account this idea of green spaces in their cities or in their neighborhood plans where the community can come and sit for recreation and relaxation purposes or for short meetings with their co-workers and even friends. Besides, open spaces are even more important in the era of a pandemic such as COVID-19, which calls for a need to work and, when necessary, hold meetings outdoors rather than indoors. Open spaces can also play another role in attracting foreign visitors from not only neighboring countries but also from distant places such as Europe, Asia, and America, which might be for different purposes of refreshment during vacation. However, to ensure effective utilization of the open spaces, infrastructure provisioning such as power and shade on sunny and rainy days needs to be improved.

4.1 Open space and development

Open spaces are mostly needed now and, in the future, then before, as most cities both in the developing and developed world are transforming with new transportation ideas coming into place and new development coming. If this is not properly managed, future cities might face different problems of respiratory diseases and many other illnesses. This was confirmed by [18]: the network of open spaces not only improves the quality of life but also the mobility and operations of the city. It added that well-designed and conserved streets as well as public open spaces may help reduce minor rates of violence and crime. It is for this opportunity we would like to highlight this so that future developers can consider this while transforming their cities into livable cities. Figure 15 shows the combination of transformation and development without undermining the natural environment. Roads are constructed in a way that gives space for gardens where people can sit and have coffee or discuss their projects, and then once they want to go home, get the buses and other public transportation nearby.



Source: [19]

Figure 15. Integration of transportation, new developments, and the natural environment

4.2 Open space and smart city concept

Similarly, to the smart city concept, the way we construct our cities and the technology we bring into our cities must also take into consideration the provision and utilization of open spaces. In developing countries, so-called vertical forests are widely integrated into urban development, where developers plant trees or flowers on their buildings for gardening purposes. The gardens can be used both for capturing fresh air and for cultivating vegetables, which can serve them during times of need. In some cases, it can be made on the rooftops of houses, especially when land is scarce. Emerging technologies can be used in watering open spaces and gardens in smart cities as well as monitoring the situation of gardens to know which trees to consider depending on the climate in a given country or city. IoT and AI are the major technologies for garden monitoring and quality and quantity of water measurement for plants, together with suitable soil identification for those gardens and better places for open spaces. Thus, Figure 16 shows the smart city concept and open space in the future.



Source: [20]

Figure 16. Smart city concept and open space in the near future

Finally, the limitations of the study include:

1. Time limit.
2. Self-financed to conduct the study of the utilization of open space for beauty and healthier cities in developing countries.
3. Some respondents during field data collection were not ready to provide their points of view.
4. Weather conditions.

Future research directions include:

1. To conduct research in the field of open space development, especially in African countries, as this will help African cities cope with suitable development, which includes open spaces for social interaction and gatherings when needed.

5. Conclusion and recommendations

5.1 Conclusion

The study observed that open spaces are utilized for various purposes, including leisure, formal and informal gatherings, as well as relaxation. The open spaces are used by different groups of people, ranging from the youth to the middle-aged and elderly. However, effective utilization of the open spaces is constrained by a lack of basic infrastructure and facilities such as power and shade. Besides, the lack of services such as provisioning for soft drinks and food hinders the effective utilization of the open spaces in the city of Kigali such as the open space in front of the city of Kigali's main office. By defining the objectives of this study and the research questions of this study for beauty and health in open spaces, the indicators to evaluate beauty and health in public spaces are as follows: (1) presence of public spaces in cities; (2) community attendance in public spaces; (3) community events happening day by day in open spaces constructed in urban areas; (4) provisional of infrastructures connected to public spaces for the aim of making the open space vibrant and attractive to both local and international tourists; (5) clean public spaces for the good health of citizens and people in general; (6) public spaces considered emerging technologies such as IoT, AI, and ML technologies.

Finally, future researchers could develop the outcomes of this study by generating more studies on top of this study, especially subjects that were not discussed in this study, to add value to this study as well as highlight necessary information for open spaces for beauty and healthier city development. This also implies international implications when international researchers, decision-makers, and future urban planners take into consideration the concepts mentioned in this study that do not exist in their current open spaces. This includes:

1. Use of recent technologies in open space management such as cameras to monitor the entire open space and respond in time when needed.
2. Some open spaces in African countries and in developed countries where they did not consider artificial lakes, as seen at Gikondo Public Garden should start to think of this idea and include artificial lakes with fish inside for healthy cities.
3. This also includes the collection and storage of clean water from natural sources.
4. As well as the use of local construction materials when decorating or making open spaces durable and attractive to local and international tourists.

5.2 Recommendations

The study recommends that for healthy cities associated with effective utilization of open spaces, there is a need to consider the concept of smart cities, which entails providing open spaces with sufficient facilities. When provided with facilities and infrastructure such as power, shade, and sitting facilities, as well as supporting infrastructure such as kiosks for food and drinks, the open space can be intensively used by various categories of people with different needs. This can be achieved through bottom-up design, which advocates open spaces to meet the needs of the community in addition to considering of the concept of a smart city in making open space in cities. Furthermore, the provision of fish within artificial lakes was seen in Gikondo Public Garden during the visit. It is not only that, but also the consideration of more artificial lakes where possible in open spaces.

Acknowledgments

The author would like to express his sincere acknowledgment to experts from the city of Kigali city, Kigali city residents, and persons with disability for their valuable time and inputs shared for the improvement of this article as well as the final output of this study.

Conflict of interest

The author declares no conflict of interest concerning the research, authorship, and/or publication of this article.

References

- [1] Mair C. *City life: Why are green spaces important?* Natural History Museum. <https://www.nhm.ac.uk/discover/why-we-need-green-spaces-in-cities.html> [Accessed 8th March 2024].
- [2] Aristyowati, Ellisa E. An overview of ecotherapy-based activities in urban green spaces design. *Journal of International Conference Proceedings (JICP)*. 2021; 4(1): 38-57. <https://pdfs.semanticscholar.org/89ae/3b32c99bf326d3b97ca4b3bcb145dcb846cc.pdf>
- [3] United Nations Human Settlements Programme (UN-HABITAT). *State of the world's cities 2012/2013: Prosperity of cities*. 2012. <https://sustainabledevelopment.un.org/content/documents/745habitat.pdf>
- [4] Habib N, Rau S, Roth S, Silva F, Shandro J. *Healthy and age-friendly cities in the people's Republic of China: Proposal for health impact assessment and healthy and age-friendly city action and management planning*. Asian Development Bank (ADB). 2020. <http://doi.org/10.22617/TCS200323-2>
- [5] Reynandez R. *Innovative ways to create more urban green spaces*. Project Learning Tree. <https://www.plt.org/educator-tips/urban-green-spaces/> [Accessed 8th March 2024].
- [6] Pineo H, Rydin Y. *Cities, health and well-being*. Royal Institution of Chartered Surveyors (RICS). 2018. <https://www.rics.org/globalassets/rics-website/media/knowledge/research/insights/cities-health-and-well-being-rics.pdf>
- [7] Regional Public Health (RPH). *Healthy open spaces: A summary of the impact of open spaces on health and wellbeing*. 2010. <https://www.rph.org.nz/resources/publications/healthy-open-spaces-a-summary-of-the-impact-of-open-spaces-on-health-and-wellbeing.pdf>
- [8] Hammer S, Kamal-Chaoui L, Robert A, Plouin M. *Cities and green growth: A conceptual framework*. OECD Publishing. OECD Regional Development Working Papers 2011/08, 2011. <https://doi.org/10.1787/20737009>
- [9] Jafrin M, Beza BB. Developing an open space standard in a densely populated city: A case study of Chittagong city. *Infrastructures*. 2018; 3(3): 40. <https://doi.org/10.3390/infrastructures3030040>
- [10] Eitler TW, McMahan ET, Thoerig TC. *Ten principles for building healthy places*. Urban Land Institute. 2013. <https://uli.org/wp-content/uploads/ULI-Documents/10-Principles-for-Building-Healthy-Places.pdf>
- [11] National Institute of Statistics of Rwanda (NISR). *Statistical article: Rwanda's population reaches 13,2 million in 2022*. https://www.statistics.gov.rw/publication/Rwanda_population_2022 [Accessed 28th February 2024].
- [12] Rwanda Directorate General of Immigration and Emigration. *Key geographical uniqueness*. <https://www.migration.gov.rw/about-rwanda#:~:text=Rwanda%2C%20warmly%20known%20as%20%22the,literally%20the%20heart%20of%20Africa> [Accessed 29th February 2024].
- [13] World Vision. *Country profile: Rwanda*. Report Number: 6222, 2010. <https://www.worldvision.com.au/docs/default-source/school-resources/rwanda-country-profile.pdf?sfvrsn=0>
- [14] Wikimedia Commons. *Rwanda districts map*. https://commons.wikimedia.org/wiki/File:Rwanda_Districts_Map.jpg [Accessed 14th April 2022].
- [15] Bizimungu J. *Video: Kigali's recreational projects will transform city life—And they are ready for investors*. <https://www.newtimes.co.rw/article/181439/News/video-kigalis-recreational-projects-will-transform-city-lifeand-they-are-ready-for-investors> [Accessed 14th April 2022].
- [16] Byishimo B, Umurerwa IR. *Video: Explore the new Imbuga City Walk*. <https://www.newtimes.co.rw/article/189717/News/video-explore-the-new-imbuga-city-walk> [Accessed 30th May 2022].
- [17] UGREEN. *The power of green spaces: How parks and public spaces promote happiness and health*. <https://ugreen.io/the-power-of-green-spaces-how-parks-and-public-spaces-promote-happiness-and-health/> [Accessed 8th March 2024].

- [18] UN-Habitat. *SDG indicator 11.7.1 training module: Public space*. United Nations Human Settlements Program. 2018. https://unhabitat.org/sites/default/files/2020/07/indicator_11.7.1_training_module_public_space.pdf
- [19] TODresources. *Integrating transportation, new development, & the natural environment*. National Resources & Technical Assistance for Transit-Oriented Development. <https://Todresources.Org/Blog/Integrating-Transportation-New-Development-Natural-Environment/> [Accessed 14th April 2022].
- [20] Nair S. *Best urban design firms in India and around the world*. Rethinking The Future. <https://www.rethinkingthefuture.com/architectural-community/a6423-best-urban-design-firms-in-india-and-around-the-world/> [Accessed 14th April 2022].

Appendix A: Structured questionnaire for data collection

Questionnaire addressed to Kigali city residents.

Part 1: Social demographic information

No	Questionnaire information			
1	Questionnaire details	Date/...../2023	
		Questionnaire number		
2	Survey site details	District:	Nyarugenge	
		City:	Kigali	
		Country:	Rwanda	
3	Age	30-40 years <input type="checkbox"/>	40-50 years <input type="checkbox"/>	Above 50 years <input type="checkbox"/>
4	Gender	Male <input type="checkbox"/>	Female <input type="checkbox"/>	
5	Level of education	Primary education <input type="checkbox"/>	University education <input type="checkbox"/>	
		Secondary education <input type="checkbox"/>		
6	Employment	Private sector <input type="checkbox"/>	Public sector <input type="checkbox"/>	

Part 2: Formulated questions to Kigali City residents

Utilization of open space in Kigali city.

1. Do open spaces in Kigali city safer and clean for suitable utilization?

Yes	No

2. Do you need open spaces in the city of Kigali for different uses such as (relaxation, place to meet with friends, waiting place, short discussion)?

Yes	No

3. What are the challenges do you face in the open space located nearby city of Kigali hall?

Answers	No	Yes
Lack of electrical connectivity		
Small commercial activities		
Rainy and sunny challenge		

Interview with expert from the city of Kigali questionnaire

1. Hello, my name is XXXXXXXXXXXX, Urban Researcher and I am currently doing research on the utilization of open space for beauty and healthier cities in third-world countries. The case of Kigali city. What do you say about this concept?

.....

.....

.....

.....

.....

Interview with person with disability questionnaire

1. Hi, my name is XXXXXXXXXXXX, Urban Researcher and I am currently conducting research on the utilization of open space for beauty and healthier cities in third-world countries by using the case of Kigali city-Rwanda. What is your perspective on this study?

.....

.....

.....

.....

.....



Figure A. Open space in Kigali city nearby the convention center



Figure B. Kigali golf course



Figure C. Kigali city running track



Figure D. Gikondo Public Garden walkways and entrance



Figure E. Garden at Kigali cultural village in Rebero, Kicukiro District



Figure F. Open space and walkways at Rebero in Kicukiro District



Figure F. Open space and view at Rebero in Kicukiro District

Appendix B



Figure H. Acceptance letter for data collection from the city of Kigali