



Published by the UFS

<http://journals.ufs.ac.za/index.php/trp>

© Creative Commons With Attribution (CC-BY)

How to cite: Ajayi, A. 2022. Evaluation of outdoor activities in residential environments: The role of urban open spaces. *Town and Regional Planning*, no. 80, pp. 6-20.

Evaluation of outdoor activities in residential environments: The role of urban open spaces

Ayodeji Ajayi

Research article

DOI: <http://dx.doi.org/10.18820/2415-0495/trp80i1.3>

Received: September 2021

Peer reviewed and revised: January 2022

Published: June 2022

*The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article

Abstract

There is increasing evidence linking the availability of urban open spaces to improve active living and outdoor behaviour. However, it is not clear what typologies of urban open spaces stimulate what types of activities. This article explores outdoor utilisation of open spaces in residential neighbourhoods of Osogbo, a South-Western city in Nigeria. The study classified neighbourhoods in the city into high-, medium- and low-density areas. Out of the 6 818 buildings identified in the selected neighbourhoods, multi-stage sampling technique was used to select 1 265 respondents. Using a survey research method, data were obtained through structured questionnaires, field observations, objective measurement of open spaces via Geographic Information System, and photographic recordings. The data were analysed with the aid of IBM Statistical Package for Social Sciences Statistics 24, and further presented in descriptive statistics, percentage statistics, and *chi-square* test. Different typologies of open spaces were identified (school playgrounds, neighbourhood park, incidental open spaces, pocket park). Walking and vigorous, moderate, and sedentary activities were observed in the open spaces. Results also show that sedentary activities were prevalent across all typologies, and the highest proportion of vigorous activities occurred in the incidental open spaces. In addition, the results revealed statistically significant variations in self-reported vigorous outdoor activities across the open space typologies. There was also statistically significant difference in the level of activities between males and females in the city. Findings show that the patterns of outdoor activities differ by typologies. To stimulate active living, this study recommends that appropriate amenities be provided in urban open spaces.

Keywords: Landscape planning, open space utilisation, outdoor activities, residential environments, urban open space typologies, Nigeria

EVALUERING VAN BUITELUGAKTIWITEITE IN RESIDENSIËLE OMGEWINGS: DIE ROL VAN STEDELIKE OOP RUIMTES

Daar is alhoemeer bewyse wat die beskikbaarheid van stedelike oop ruimtes verbind om aktiewe leef- en buiteluggedrag te verbeter. Dit is egter nie duidelik watter tipologieë van stedelike oop ruimtes watter tipe aktiwiteite stimuleer nie. Hierdie artikel

ondersoek die gebruik van oop ruimtes buite in woonbuurte van Osogbo, 'n Suidwestelike stad in Nigerië. Die studie het woonbuurte in die stad in hoë-, medium- en lae-digtheid gebiede geklassifiseer. Uit die 6 818 geboue wat in die geselekteerde woonbuurte geïdentifiseer is, is die multi-stadium steekproeftegniek gebruik om 1 265 respondente te selekteer. Met behulp van 'n opname-navorsingsmetode is data verkry deur gestruktureerde vraelyste, veldwaarnemings, objektiewe meting van oop ruimtes via die Geografiese Inligtingstelsel, en fotografiese opnames. Die data is ontleed met behulp van IBM Statistical Package for Social Sciences Statistics 24, en verder aangebied in beskrywende statistieke, persentasie statistieke en *chi-kwadraattoets*. Verskillende tipologieë van oop ruimtes is geïdentifiseer (skool speelgronde, buurtpark, toevallige oop ruimtes, sakpark). Stap sowel as kragtige, matige en sittende aktiwiteite is in die oop ruimtes waargeneem. Resultate toon ook dat sittende aktiwiteite oor alle tipologieë algemeen voorgekom het, en dat die hoogste proporsie kragtige aktiwiteite in die toevallige oop ruimtes plaasgevind het. Daarbenewens is statisties betekenisvolle variasies in self-gerapporteerde kragtige buitelugaktiwiteite oor die oopruimte-tipologieë getoon. Daar was ook 'n statisties betekenisvolle verskil in die vlak van aktiwiteite tussen mans en vroue in die stad. Bevindinge toon dat die patrone van buitemuurse aktiwiteite verskil volgens tipologieë. Om aktiewe lewe te stimuleer, beveel hierdie studie aan dat toepaslike geriewe in stedelike oop ruimtes voorsien word.

Sleutelwoorde: Buitelugaktiwiteite, landskapbeplanning, oopruimtebenutting, residensiële omgewings, stedelike oopruimte-tipologieë, Nigerië

TEKOLO EA LIKETSAHALO TSA KANTLE LIBAKENG TSA BOLULO: BOIKARABELLO BA LIBAKA TSA BOITHAPOLLO LITOROPONG

Ho na le bopaki bo ntseng bo eketseha bo hokahanyang boteng ba libaka tsa boithapollo litoropong ho ntlafatsa bophelo le boitsoaro ba kantle bo mafolofolo. Leha ho le joalo, ha ho hlake hantle hore na ke mefuta efe ea libaka tsa boithapollo litoropong e susumetsang mefuta efe ea liketsahalo.

Dr Ayodeji Olusola Ajayi, Lecturer, Department of Urban and Regional Planning, Osun State University, Osogbo, Osun State, Nigeria. Phone: +234 7033871651, email: ayodeji.ajayi@uniosun.edu.ng, ORCID: <http://orcid.org/0000-0001-6104-2632>

Sengolloeng sena se hlahloba ts'ebeliso ea ea libaka tsa kantle tsa boithapallo metsaneng ea Osogbo, toropo e ka Boroa-Bophirima naheng ea Nigeria. Boithuto bona bo arotse libaka tsa bolulo teropong ena ka sesupo se phahameng, se mahareng le se tlase sa baahi. Ka har'a meaho e 6 818 e tsebahetseng libakeng tse khethiloeng, ho khethiloe batho ba 1 265 ho nka karolo boithutong bona ka mekhahlelo e mengata. Ka ho sebelisa mokhoa o ikhethileng oa ho etsa lipatlisiso, lintlha li ile tsa fumanoa ka lipotso tse hlophisitsoeng, tekolo ea libaka tsa boithuto, tekanyo ea libaka tsa boithapallo ka tšebeliso ea Geographic Information System, le lifoto. Lintlha li ile tsa hlahlojoa ka thuso ea IBM Statistical Package for Social Sciences Statistics 24, 'me tsa hlahisoa hape ka lipalo-palo tse hlalosing, liperesente, le tlhahlobo ea chi-square. Ho ile ha hlokomeloa mefuta e fapaneng ea libaka tsa boithapallo (mabala a lipapali a sekolo, serapa sa boikhathollo se ka hara motse/paka e kholo, libaka tse bulehileng ka tsohanyetso, le serapa/paka e nyane). Ka papiso ea liketsahalo tse etsoang ka mafolofolo a phahameng, a itekanetseng, le a tlase, libaka tsa boithapallo li ile tsa lekoloa. Liphetho li boetse li bontša hore ho phomola ke ketsahalo e atileng ka ho fetisisa liketsahalong tsohle, mefuteng eohle ea libaka tsa boithapallo, ha liketsahalo tse kenyelelitse mafolofolo a phahameng li etsahala ka ho fetisisa libakeng tse bulehileng ka tsohanyetso. Ho feta moo, liphetho li ile tsa senola phapang ea bohlokoa ea lipalo-palo tse fanoeng ke bankakarolo tse amanang le tseo ba li etsang libakeng tse fapaneng tsa boithapallo. Ho boetse ho bile le phapang e khōlō ea lipalo-palo boemong ba liketsahalo pakeng tsa banna le basali toropong ena. Qetellong, liphuputso li bontša hore mekhhoa ea liketsahalo tsa kantle e fapana ho ea ka mefuta. Ho hlasimolla bophelo bo mafolofolo, boithuto bona bo khothaletsa hore ho fanoe ka lits'ebeliso tse nepahetseng libakeng tsa boithapallo litoropong.

1. INTRODUCTION

Urban Open Spaces (UOS) are elements in the environment that complement the built-up components of the urban fabric. The contribution of UOS in developing urban environment, quality of life, and sustainability of cities is highlighted in urban planning and policies and is as important as the other urban infrastructure, including water and sewage systems and transportation (Sotoudehnia, 2013: 9), because

UOS act as the 'lungs' of cities by absorbing pollutants and providing people with spaces to enjoy and experience nature and take time out from the stresses of modern life (Sotoudehnia, 2013: 1).

An important area of neighbourhood environment that is thought to influence the health and well-being of residents is the outdoor open space. The availability of UOS is linked with multidimensional benefits, including aesthetic and environmental benefits. Moreover, UOS fulfil a range of different roles such as social spaces and areas for recreation, religious, sociocultural, and political events (Lee, Jordan & Horsley, 2015: 132).

Globally, the contexts and disciplines in the writings of researchers influence the classification and definitions of UOS in literature; nonetheless, the urban landscape is divided into indoor and outdoor areas (Ajayi & Amole, 2018: 90). The types of UOS also differ by geographical scale across residential, neighbourhood, and city levels. In a study by Afon and Adebara (2020: 2), UOS on a city scale are higher order spaces such as town square, beach, and stadium that serve large segments of the urban population. The intermediate scale refers to open spaces that serve many buildings in a more localised area of a city, such as a residential neighbourhood/district. At the smallest scale, individual buildings may have open spaces including private gardens, courtyards, and front and rear yards that family members and neighbours can use (Afon & Adebara, 2020: 2).

In most cases, there are three historical eras in the development of typical Nigerian traditional cities: pre-colonial, colonial and post-colonial/independence periods. The three periods produce different residential districts with varying social, economic, and physical attributes. These districts are known as the core, transition and suburban residential areas. Each of these residential areas has been identified to exhibit specific consistent features with regard to the quality and types of housing, in addition to outdoor landscape elements, which reflect

the socio-economic and cultural characteristics of the residents (Adebara 2021: 3). Furthermore, the precolonial cities were curvilinear in pattern, with the unique provision of small spaces within the housing area, usually related to shade trees, where people gather, sit and gossip, and children play in quietness and safety. Each city or town also provided a large space where festive and religious occasions can be celebrated (Abdulkadir, Babanyara & Mustapha 2020: 3).

Consequently, unlike the Global North, where UOS are predominately used for walking dogs, sitting and bonding, jogging and running, camping as well as picnicking, in Nigeria, UOS are avenues for commerce, recreation, cultural festivities, ancestral worship, and social ceremonies such as child naming, birthday party, marriage, and funeral service. Within the field of leisure and active living research, the outdoor environmental setting is of great importance because of its influence on human behaviour (Schipperijn, 2010: 21; Lee *et al.*, 2015: 132). For example, a review by Kaczynski and Henderson (2007: 316) included 20 studies that specifically focused on the role of UOS in stimulating outdoor activity. Nine of these studies reported positive associations; five reported mixed associations, and six reported that the associations examined were not significant. In a bid to get a clearer understanding of the association between UOS and outdoor activities, context-specific studies are being advocated, due to the high impact of geographical and sociocultural differences across the globe. Some studies on UOS are emerging in Nigeria; for instance, some scholars posit that variations in perceptions, experiences, as well as socio-economic characteristics such as age, educational status, and income are responsible for the differentials in the utilisation patterns of UOS (Sati, Uji & Popoola, 2016: 75; Simon, 2016: 6).

A review of 94 papers (Adegun *et al.*, 2021: 1) aggregates empirical evidence from research undertaken on urban open and green spaces

in the sub-Saharan African region. From the studies reviewed, trees and urban forestry received the most research attention, followed by spatio-temporal analysis of urban vegetation cover and then parks. Green roofs, communal or community gardens and vertical greening systems were less studied in Nigeria (because they rarely exist). Furthermore, a significant proportion of the studies were conducted in the context of Lagos and Abuja, being the commercial and administrative capitals, respectively (Adegun *et al.*, 2021: 2).

Although studies on the association between UOS and physical activity are increasing globally, much still needs to be understood, especially in the Global South where literature on this subject is scanty and lifestyles and residents' perception of UOS differ significantly. To fill this gap in knowledge, this study explores the outdoor utilisation of open spaces in the residential neighbourhoods of Osogbo, a Southwestern city in Nigeria. This study is important, because understanding activity patterns in UOS typologies may help design housing interventions, in order to increase outdoor activity in residents that may result in greater health benefits.

2. LITERATURE REVIEW

2.1 Typologies of open spaces

Universal classification of UOS into typologies is challenging, due to the contextual dynamics of geographical, economic and sociocultural differences. Nonetheless, UOS can be basically classified into green and grey spaces. Terminologies such as urban green spaces, green infrastructure, public open spaces, urban recreational spaces, green space network, neighbourhood open space, and urban greening are used interchangeably in literature as UOS.

From the available evidence, mostly originating from the developed countries, grey open spaces are paved surfaces of playgrounds, sports facilities, walkways, cycling routes, yards, and hard-surfaced squares (Jurkovič, 2014: 108;

Thawaba, 2014). Green space typically includes gardens, parks, designed for both formal and informal physical activities, playgrounds, and nature reserves (Regional Public Health, 2010: 7; Brodhead, 2009: 3). Others are natural and semi-natural urban green spaces – including woodlands, urban forestry, scrub, grasslands, green corridors – including river and canal banks, cycleways, and rights of way, outdoor sports facilities (with natural or artificial surfaces and either publicly or privately owned); amenity greenspace (most commonly, but not exclusively in housing areas) – including informal recreation spaces, greenspaces in and around housing, domestic gardens, and village greens.

According to Regional Public Health (2010: 7), green space refers to

any vegetated land or water within or adjoining an urban area and includes natural green space, green corridors and amenity grassland, parks, and gardens. It also includes outdoor sports facilities, playing fields, allotments, as well as derelict, vacant and contaminated land. Another related study by Elizadle (2012: 23) asserts that transport facilities, streets, plaza, recreational space, incidental space, parks, gardens, and food production spaces are common categories of UOS.

Stanley *et al.* (2012) developed a transdisciplinary typology of urban open spaces spanning ancient and modern history. As depicted in Figure 1, the various forms of open spaces were categorised across three scales: neighbourhood, city, and residential).

Within the Nigerian context, space standards are stipulated in urban

		Scale		
		City	Intermediate	Residence
Form	Transport Facilities	Harbors, Airport and Train Station Parking	Transit Stations, City Gate Areas	Driveways, Parking Areas
	Streets	Central Boulevards	Street Space	Pedestrian Alleys, Paths
	Plazas	Large Formal Plazas	Smaller Neighborhood Plazas	Interior Courtyards
	Recreational Space	Stadiums, Greenbelts, Beaches	Sports Facilities, Playgrounds	Houseyard Playspace
	Incidental Space	Natural Features and Semi-Wild Areas	Empty Lots, Transit Borders	Marginalized Space Between Buildings
	Parks and Gardens	Major Formal Park and Garden Space	Institutional Gardens, Small Parks, Cemeteries	Household Gardens
	Food Production	Orchards, Agricultural Fields	Grazing Commons, Community Gardens	Kitchen Gardens, Small Horticulture
			Grey space	
			Green space	
			Grey/Green space	

Figure 1: A transdisciplinary typology of urban open spaces

Source: Stanley *et al.*, 2012: 1094

and regional laws regarding the development and management of open spaces. The law stipulates that provision must be made for children's playground, neighbourhood playground, as well as gardens and parks in residential neighbourhoods (Obateru, 2009). These outdoor open-air spaces are used principally for active and/or passive recreation use, developed by either the public or the private sector.

Moreover, in most of the developing countries such as Nigeria, pockets of traditional and culturally relevant open spaces such as town squares, marketplaces and sacred groves predate the colonial administration era. The colonialists introduced new outdoor recreational activities and facilities such as race courses, polo, golf, cricket, among others, and built buffer zones (vast grasslands and trees) to separate them from the indigenous settlers. These diversified the typologies and sizes of open and green spaces in Nigeria (Abdulkadir *et al.*, 2020: 2). In a recent study by Adegun *et al.* (2021: 2), the frequently studied UOS typologies by sub-Saharan African scholars include gardens, parks, vertical greening systems, and urban forests. Likewise, Adebara (2021: 4) considers streets, sidewalks, recreational parks, town squares, beaches, market squares, school playgrounds and motor parks as types of UOS in traditional cities in Nigeria. Because of the diverse and multifaceted nature of UOS in literature, it is operationalised and defined in this study as all publicly accessible amenity or incidental spaces, playgrounds, gardens, and parks at neighbourhood and residential scale, regardless of size, design (formal/informal), and physical features. Similarly, Abraham *et al.* (2010: 60) posit that UOS and other public places enhance social integration activities by facilitating social contacts, exchange, collective work, community building, empowerment, social networks, and mutual trust.

2.2 Open spaces and outdoor activities

According to Perdue, Gostin and Stone (2003: 558), the leading cause of deaths in America is heart disease, often caused by a sedentary lifestyle, characterised by low physical activity and a high caloric (but low nutrient) diet. Moreover, the prevalence of sedentary lifestyles and the decline in physical activity have been found to have adverse effects on health (Janssen *et al.*, 2013: 212), because a significant proportion of urban residents now spend more time interacting with electronic screens such as mobile devices, television, and video games. These sedentary, indoor lifestyles are likely to have a negative impact on the physical and mental health of residents in neighbourhoods. While health-related behavioural patterns such as smoking, alcohol consumption and eating may not be directly linked, it has been reported that attributes of UOS may influence the duration and frequency of activities exhibited by residents across the socio-economic groups in the neighbourhood (McCormack *et al.*, 2010: 712).

Evidence consistently indicates an association between UOS and outdoor activities (Yan, 2013: 1; Godbey & Mowen, 2010: 16; Lee & Maheswaran, 2010: 213). It is reported that exposure to nature or the presence of open spaces in urban environments stimulates residents to engage in outdoor activities (Lestan, Eržen & Golobič, 2014: 6546; Pitas *et al.*, 2017: 3; Wu *et al.*, 2013: 60). Frequent contact with nature may provide enhanced mental and physical health because the provision of open spaces has been reported as a cost-effective way to improve health, by providing opportunities for physical exercise (Godbey & Mowen, 2010: 26). Findings also show that regular outdoor activities in open spaces improves residents' health (Taylor *et al.*, 2011: 38; Lestan *et al.*, 2014: 6566). Similarly, research has also shown that improvement of urban open space conditions is significantly related to increase in self-rated health (Pitas *et al.*, 2017: 3).

In a study by Coorey (2007: 31), human outdoor activity is divided into three types: necessary, optional, and social activity. Necessary activities are compulsory activities such as going to school, and access to shops, among others, which are only slightly influenced by the environment. Optional activities are those in which people engage only when they wish to. They occur when time and place make it possible and depend on favourable exterior conditions. Social activities occur when necessary and optional activities are combined with an agreeable spatial and physical environment. Moderate activity is primarily reported as walking, while vigorous activity is primarily reported as engagement in organised group sports. Examples of passive activities are sitting in public open space, social activities, and attending events (Kellett & Rofe, 2009: 24).

According to Koohsari *et al.* (2015: 16), open space can influence outdoor activity in at least three ways. Open space can be a setting where people engage in physical activity; open space can be a destination to which people actively travel either to be active or simply to socialise, and open space can be used as part of a route to reach another destination (e.g., passing through a greenway to reach a shop), or as part of a recreational walk or running route.

There are many findings on how UOS attributes influence outdoor activities (Cohen *et al.*, 2007: 510; Kaczynski, Potwarka & Saelens, 2008: 1452; Hino *et al.*, 2011: 147). UOS have a wide variety of attributes that lend themselves to different types of use. Attributes refer to the peculiar character of UOS that make it distinct from other types. Open space attributes could be objectively and subjectively measured.

The location or scale (city, neighbourhood, or residential area) and type of open space (parks/garden, incidental, recreational, school playgrounds) are classified as objective open space attributes (Ajayi & Amole, 2019: 54). In a qualitative review of UOS characteristics associated with outdoor activity, subjectively evaluated attributes

that could influence activity patterns include features, conditions, aesthetics, and safety (McCormack *et al.*, 2010: 716). According to the findings of McCormack *et al.* (2010: 718), aesthetics may be evaluated on the basis of residents' perceptions regarding cleanliness of open spaces, presence of trees, flowers, shrubs, water feature, as well as sculptures and monuments. Features of the open spaces are divided into amenities and facilities. Facilities that could be found in UOS include playgrounds, green spaces, water features, sports field, tennis court, volleyball court, and swimming pool. Availability of car park, sidewalk, traffic signal, restroom, benches, picnic table, picnic shelter, and trash can be considered as UOS amenities, whereas conditions of UOS refer to maintenance of features, cleanliness of surfaces, and quality of features (McCormack *et al.*, 2010: 718).

Based on the submissions of Byrne and Sipe (2010: 13) as well as Coorey (2007: 34), some of the major UOS characteristics that may influence patronage and utilisation are the size, function, geographic location, personal safety, types of facilities present and sometimes the degree of naturalness. People are attracted to UOS so that they may partake in specific behaviours and realise certain benefits. The presence or absence of a variety of UOS attributes can be an important determinant of the ability of an open space to promote physically active leisure behaviour (Wang, Mateo-Babiano & Brown, 2013: 5). For instance, pocket parks, also known as mini-parks or vest-pocket parks, are urban open spaces at the very small scale, usually no more than one-quarter of an acre. Functions can include small events spaces, play areas for children, spaces for relaxing, meeting friends, or taking lunch breaks (Byrne & Sipe, 2010: 10).

2.3 Socio-demographic/socio-economic characteristics, and outdoor activity

It has been shown that some factors influence urban residents' outdoor activity patterns across socio-economic groups. These include people's perception and their value of UOS; it reflects their demands and needs or expectation from open spaces.

Lee and Maheswaran (2010: 213) found that teenagers living in disadvantaged neighbourhoods, for example, lacked access to UOS they considered safe and were, therefore, less likely to participate in physical activities than teens in more affluent neighbourhoods. Meanwhile, Lachowycz (2013: 189) submitted that a significant proportion of vigorous physical activity in childhood takes place in urban parks. Another study noted that people in low-income households were more likely to adopt low levels of activity and were least well served by affordable facilities in open spaces (Abbasi, Alalouch & Bramley, 2016: 203). A study by Cohen *et al.* (2013: 326) examined the influence of neighbourhood socio-economic status on UOS uses. The results of the study showed that the size and number of facilities in high-poverty neighbourhood open spaces were similar to those in low-poverty neighbourhood open spaces, but the former had more hours of organised and supervised activities. Neighbourhood poverty level, perception of safety, and the presence of incivilities were not associated with the number of observed open space users. However, organised and supervised activities and the number of activity facilities were strongly correlated with utilisation and energy expended in the open spaces (Cohen *et al.*, 2013).

Similarly, Cohen *et al.* (2007: 510) studied how residents in low-income, minority communities use public UOS and how open spaces contribute to physical activity. Results revealed that most of the activities were sedentary; more males than females used the open spaces, and males were twice as likely to be vigorously

active. Both UOS utilisation and exercise levels of individuals were predicted by proximity of their residence to the open spaces. The study concluded that parks are critical resources for physical activity in minority communities.

There is also evidence that women and men experience open spaces in different ways (Omoleke, 2012: 7). For example, Hino *et al.* (2011: 147), in a Brazilian context, relationship between open spaces user's characteristics (gender and age) were explored through observational methods to evaluate public open spaces and physical activity. Results showed that more men than women were observed in parks (63.1%) and squares (70.0%) as well as more adults and adolescents than older adults and children. Users were more physically active in parks (men = 34.1%, women = 36.1%) than in squares (men = 25.5%, women 22.8%). The study concluded that the characteristics of public open spaces may affect the nature of activity in the observed places (Hino *et al.*, 2010: 150).

Similarly, a study reported significant associations between features of public open spaces and children's outdoor activity (Timperio *et al.*, 2010: 514). The presence of playgrounds was positively associated with younger boys' weekend moderate to vigorous physical activity and lighting along paths was inversely associated with weekend moderate to vigorous physical activity. The number of recreational facilities was inversely associated with younger girls' moderate to vigorous physical activity after school and at the weekend. The presence of trees providing shade and signage regarding dogs were positively associated with adolescent girls' moderate to vigorous physical activity after school (Timperio *et al.*, 2010: 517).

It is important to note that not all users see UOS in the same way. Studies have shown that there is an implied "correct" way to use UOS, specifically for an appreciation of nature, quiet contemplation, and gentle recreation (Kessel, Green & Pinder, 2009: 33). Consequently,

users who perceive the UOS as a ‘playground’, who value the entertainment opportunities, cafes, organised events, and facilities can be regarded as being in conflict with these ideas (Peschardt, Schipperijn & Stigsdotter, 2012: 240).

Arising from the above, one of the least discussed, but perhaps most important limitations in the literature is the contextual assessment and understanding of the types and frequency of activity that occur in types of open spaces in developing countries. Moreover, apart from urban parks, studies reporting outdoor activities in other types of UOS are scanty. In the absence of a robust classification of UOS, the association between UOS availability and outdoor activity may be evasive. Hence, it may be difficult to attach benefits to specific open space typologies in policies and design interventions aimed at improving healthy living in urban environments of African cities.

3. STUDY AREA

Osogbo, the capital of Osun State, was the study setting. It is located on latitude 7° 46’ North and longitude 4° 34’ East. The city is the headquarters of Olorunda Local Government in the north, Osogbo Local Government in the south, and Egbedore Local Government Area in the west (Adedeji, Fadamiro & Adeoye, 2014: 36). Figure 2a shows Osun State, situated in the south-western part of Nigeria. Its population, based on the 2006 census, was 183 223, and it was estimated to be 323 938 in 2015 (National Population Commission, 2016). Preliminary survey across the city led to the identification of different categories of open spaces in the neighbourhoods. This study evaluated only publicly accessible incidental open spaces, school playgrounds, public parks, and gardens from selected neighbourhoods in Osogbo (see Figure 2b).

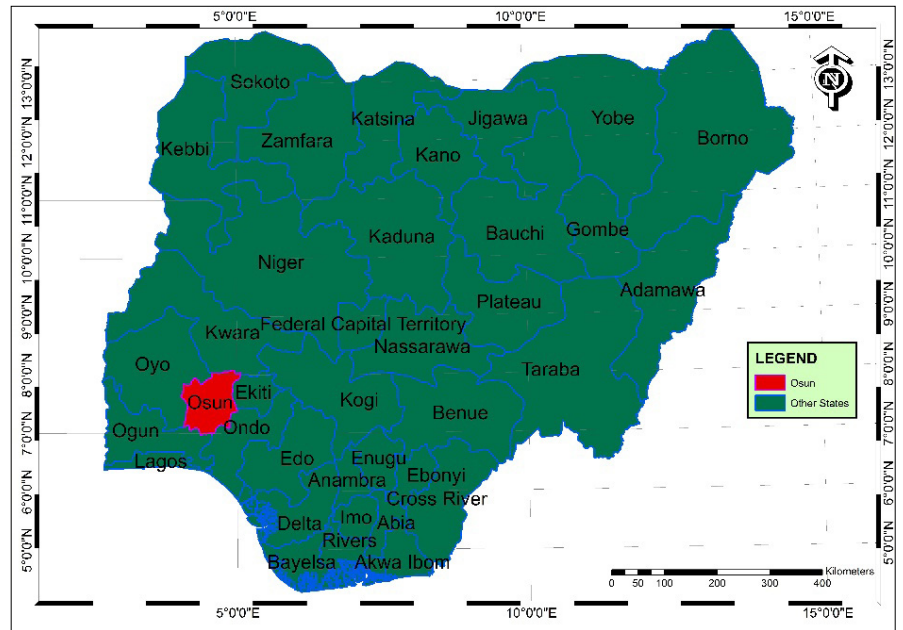
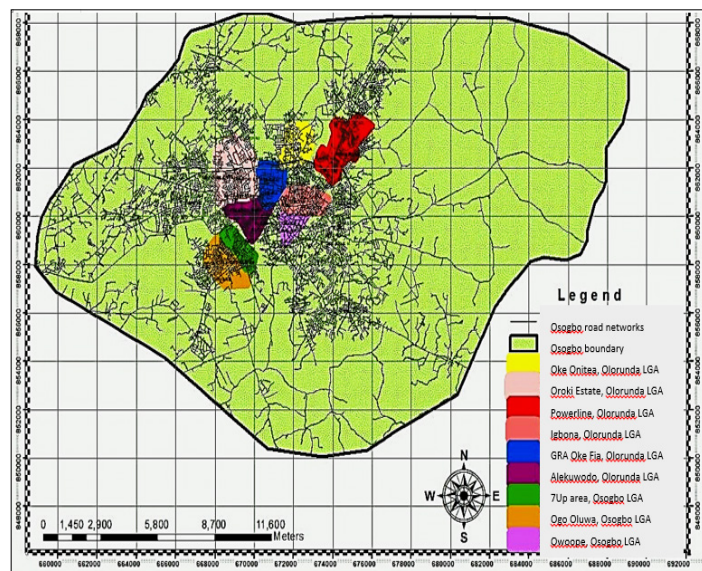


Figure 2a: Map of Nigeria showing Osun State

Source: Ministry of Lands and Physical Planning, Osun State, 2017



*GRA: Government Reserved Area; *LGA: Local Government Area

Figure 2b: Selected neighbourhoods in Osogbo

Source: Author’s compilation, 2017

4. METHODOLOGY

4.1 Measures of activities in open spaces

Results from studies show that different methods and techniques are used for measuring and categorising activities in open spaces (Sotoudehnia, 2013: 106; Kerr *et al.*, 2012: 89). From the submission of Schipperijn (2010: 18), there are three basic methods of studying activity in UOS. Most of the studies collect data on-site by means of surveys or observations using

selected UOS as case studies. These types of studies provide a good picture of the people actually using an UOS and their preferences, but exclude the views of potential users who are currently not using the UOS. The second type of studies have settings that provide data on both current users and potential users by randomly selecting residents living in the vicinity of a selected UOS and including them in the survey. This type of study technique has the advantage that it can reveal possible barriers or constraints for not using

a certain UOS. However, both types of studies focus on the use of one specific area for each respondent. Information on the use of other UOS that are also in the vicinity is typically not collected. A third group of studies examine the use of all UOS close to the respondents' home in one or more cities or neighbourhoods, by conducting a survey targeting randomly selected citizens. The third method provides good information on the total use of UOS, as respondents tend to use more than one area, but most of these studies lack the knowledge on exactly which UOS is used for what (Schipperijn, 2010: 18).

4.2 Research design

Considering the assertion by Schipperijn (2010: 18) and Creswell (2014) in support of a mixed methods research design, this study adopted a blend of qualitative and quantitative research methods to examine the types and uses of neighbourhood open spaces in Osogbo City, Nigeria. Qualitative data were collected through direct observation to identify and categorise the types of open spaces in the city. The structured questionnaire survey (quantitative data) helped identify the nature and types of outdoor activities of respondents in the open spaces in their residential districts. The reason for collecting both quantitative and qualitative data is to elaborate on specific findings from the observations on the open spaces, such as similar types of public open space(s) and activities indicated from respondents (Creswell & Plano-Clark, 2011). A mixed research design also allows for the use of descriptive and inferential statistics, in order to analyse the data.

4.3 Population, sampling and response

Since the unit of analysis was the open space, and the units of data observation were people in Osogbo, the study population comprised all people in Osogbo; they were sampled from their residences. Prior to data collection, a reconnaissance survey of the selected neighbourhoods revealed the existence of open spaces. The

researcher used an observation schedule to examine the physical attributes of the open spaces. Data on physical attributes such as the names and locations of UOS were categorised into four major typologies (school playgrounds, incidental open spaces, neighbourhood park, and pocket parks) based on evidence from literature. The sample frame comprised all residential zones identified from the preliminary survey of the study area. A multistage sampling technique was used to select the buildings. A previous study classified communities in Osogbo into low-, medium-, and high-density communities (Adedotun, 2016: 59). Hence, the simple random sampling technique was used to select three neighbourhoods from each of the above density areas. From the selected areas, a total of 11 022 buildings were identified, comprising 6 818, 2 696, and 1 508 building units in the respective high-, medium- and low-density areas (see Table 1). Systematic random sampling technique was adopted in selecting one out of every twenty buildings (5%). In each of the selected buildings, a teenager (14-19 years) and two adults (one male and one female) were selected purposively for questionnaire administration, to ensure that more age groups and both genders were included in the survey. Where no respondents were found, the next building was sampled. Out of the total number of 1 656 questionnaires administered, 1 265 copies (76%) were properly completed and retrieved for analysis. Krejcie and Morgan's (1970: 608) sample size table recommends that a sample size for a population of 15 000 is 313. This recommendation validates the sample size of 552 as efficient for the building population of 11 022 (see Table 1).

4.4 Data collection

The researcher, accompanied by research assistants, collected data for this study over a period of four months in 2017. The research assistants were final-year students in the Department of Urban and Regional Planning, Osun State University, Osogbo. First, an observation checklist (Ajayi & Amole 2019: 58-60) was used to identify all the open spaces that were then categorised into four typologies. The questionnaire consisted of three sections. The first section, on respondents' socio-demographic and socio-economic characteristics, obtained personal information on age, gender, and income. The second section, on outdoor activity, set one tick-box question with yes/no option to identify the proportion of respondents who engage in outdoor activities and one Likert-scale question with four options ('vigorous', 'moderate', 'sedentary' and 'walking') to measure the type of outdoor activity in each of the four typologies. Another Likert-scale question with three options ('1', '2-3' and '4' days a week) measured the intensity of activity for each of the four typologies. The third section set one Likert-scale question with four options for each typology, namely 'never', 'occasionally', 'frequently', and 'always', to measure the respondents' frequency of utilisation and type of open space used. The results from these measurements form the items used in the descriptive and inferential analysis.

4.5 Data analysis and interpretation of findings

First, the Geographic Information System (GIS) was used to simplify the observation data involving open spaces. Then Microsoft Excel was used to categorise them into four typologies. School playgrounds are

Table 1: Population and sample

Building category (density)	Building unit (population)	Building sample	Respondents	Responses	Response %
Low	1 508	76	228	204	12.3
Medium	2 696	135	405	380	22.9
High	6 818	341	1 023	681	41.1
Total	11 022	552	1 656	1 265	76

large outdoor spaces designed for sports and located in secondary and primary schools. The neighbourhood park is a larger, consciously designed open space with various facilities for diverse users. Incidental spaces are informal, left-over or undeveloped spaces in residential neighbourhoods. Pocket parks, also known as mini-parks or vest-pocket parks, are formally designed open spaces at the very small scale.

In order to capture objective data information on the specific locations and sizes of open spaces, satellite imagery of the study area and geographic information on the specific locations of open spaces were collected from Google Earth. After the acquisition of the imagery, features in the neighbourhoods were geo-referenced for precision of the true features. These features were clipped to the earth surface using ArcGIS and Google Earth. A handheld Global Positioning System (GPS) 72Hz was used to identify both existing physical developments and open spaces in the selected neighbourhoods. The data were processed further, using Microsoft Access 2014, to create a data base. ArcGIS 10.2.1 was used for geo-spatial analysis and geo-visualisation of both the created data base and satellite imageries. IBM Statistical Package for Social Sciences Statistics 24 was used to calculate the frequencies and percentages of responses, to analyse the respondents' profile and the overall and individual ratings of respondents' activities in open spaces in the city. For analysis purposes, '1' = low, '2-3' = moderate, and '4' = high. The *chi-square* test (X^2) is a statistical test commonly used to compare observed data with hypothesised data. *Chi-square* is used when absolute data cannot be obtained but the frequency distribution of data is available or where data are not normally distributed. The *Chi-square* statistical technique was used to establish the relationship between socio-demographic/socio-economic characteristics, activity types (vigorous, moderate, sedentary, walking), and the four open space typologies (school playgrounds,

neighbourhood parks, incidental open spaces, pocket parks) in the study area. *Chi-square* is used to express variations in the distribution of non-parametric data; whether the variations in the distribution are significant or not. The variation is significant when the calculated value is lower than the P-value at 0.05 level of significance.

5. RESULTS AND DISCUSSION

5.1 Typologies of open spaces

Prior to data collection, direct observation was used to identify and categorise open spaces in the city. The classification categories show that school playgrounds (63.3%) and incidental open spaces (27.3%) were the most observed; neighbourhood parks and pocket parks were also noted in all the communities (see Figures 3a-3e and Table 2).

Table 2: Typologies of open spaces identified in Osogbo

Open space typology	Residential density						Total	%
	High (F)	%	Medium (F)	%	Low (F)	%		
School playgrounds	10	66.7	6	50.0	5	83.3	21	63.6
Neighbourhood park	1	6.7	0	0.0	0	0.0	1	3.0
Incidental open spaces	3	20.0	6	50.0	0	0.0	9	27.3
Pocket parks	1	6.7	0	0.0	1	16.7	2	6.1
Total	15	100.0	12	100.0	6	100.0	33	100.0



Figure 3a: Urban open spaces in the high-density area

Source: Author's fieldwork, 2017



Figure 3b: Urban open spaces in the low-density area

Source: Author's fieldwork, 2017

5.2 Respondents' outdoor activities in neighbourhood open spaces

Table 3 presents the summarised overall patterns of respondents' activities in open spaces in the city. The results of overall outdoor activities indicate the dominance (86.7%) of sedentary behaviour such as sitting/interaction with nature or attending social, political, and religious events in neighbourhood open spaces by respondents. This result corroborates the findings from the researcher's observation data. Most of the respondents exhibited passive outdoor activity level, which typifies sedentary behaviour in neighbourhood open spaces in the city. This suggests that the vast majority of the respondents go to open spaces to chat with friends, attend events, watch games or sports, and enjoy the beauty of nature in a sitting position most of the time. The prevalence of sedentary behaviour observed in this study is similar to that of an earlier study (Cohen *et al.*, 2007: 514). Moreover, the results also show that only 39.1% of the respondents in the city participate in vigorous physical activities such as football, volleyball, lawn tennis, heavy lifting, jogging, and fast cycling in neighbourhood open spaces. With respect to walking, findings show that 46.4% of the respondents in the city engaged in walking in neighbourhood open spaces for either transportation or leisure. Further analysis to reveal the variations in the patterns of activities across various typologies of neighbourhood open spaces in the city are also discussed.

5.2.1 Vigorous physical activities

Table 3 is a summary of vigorous physical activities across open space types in the city. Based on the findings, the highest percentage of respondents' vigorous physical activities occurred in the incidental open spaces (49.6%). This was followed by school playgrounds (40.1%) and pocket parks (29.4%). The least number of respondents' vigorous physical activities (23.2%) was reported

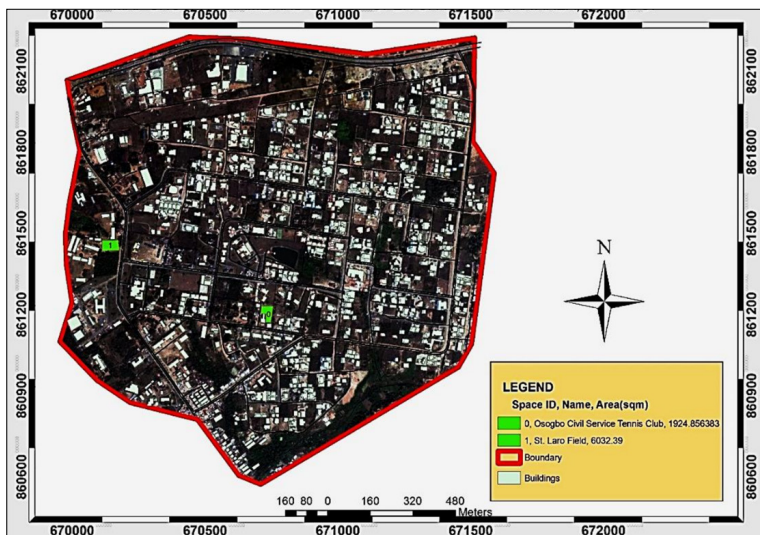


Figure 3c: Map showing names and sizes of open spaces in low-density area
Source: Author's compilation, 2017

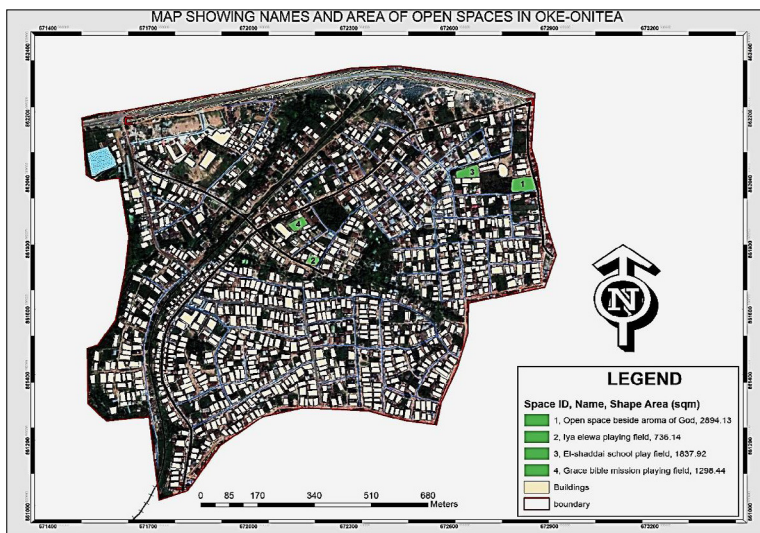


Figure 3d: Map showing names and area of open spaces in medium-density area
Source: Author's compilation, 2017

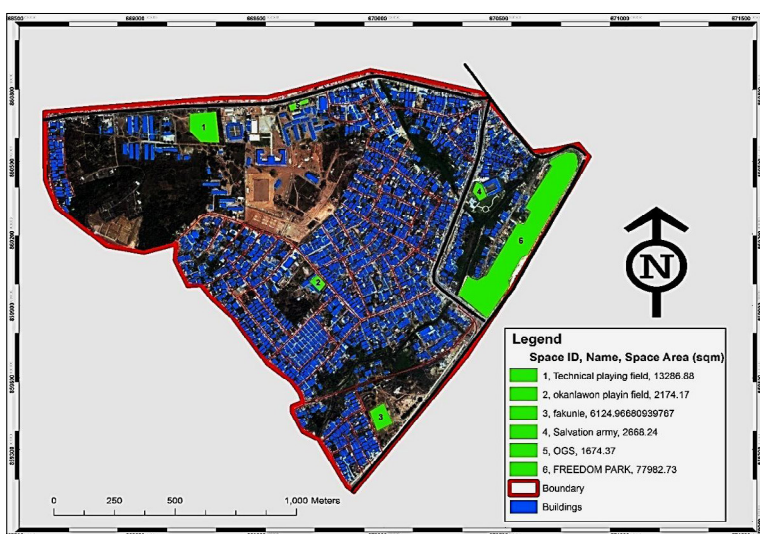


Figure 3e: Map showing names and sizes of open spaces in high-density area
Source: Author's compilation, 2017

Table 3: Patterns of respondents’ outdoor activities in open spaces in the city

Type of activity	Usage of open space	Typology				Total	X ²
		School playgrounds	Neighbourhood park	Incidental open spaces	Pocket parks		
Vigorous	Yes	314 (40.1%)	26 (23.2%)	64 (49.6%)	10 (29.4%)	414 (39.1%)	.000
	No	469 (59.9%)	86 (76.8%)	65 (50.4%)	24 (70.6%)	644 (60.9%)	
	Total	783 (100%)	112 (100%)	129 (100%)	34 (100%)	1058 (100%)	
Moderate	Yes	219 (28.0%)	44 (38.6%)	25 (19.5%)	8 (23.5%)	296 (28.0%)	.010
	No	563 (72.0%)	70 (61.4%)	103 (80.5%)	26 (76.5%)	762 (72.0%)	
	Total	782 (100.0%)	114 (100%)	128 (100%)	34 (100%)	1058 (100%)	
Sedentary	Yes	674 (86.1%)	105 (92.1%)	109 (85.2%)	30 (88.2%)	918 (86.7%)	.323
	No	109 (13.9%)	9 (7.9%)	19 (14.8%)	4 (11.8%)	141 (13.3%)	
	Total	783 (100.0%)	114 (100%)	128 (100%)	34 (100%)	1059 (100%)	
Walking	Yes	355 (45.3%)	55 (49.1%)	69 (54.3%)	11 (32.4%)	490 (46.4%)	.085
	No	429 (54.7%)	57 (50.9%)	58 (45.7%)	23 (67.6%)	567 (53.6%)	
	Total	784 (100.0%)	112 (100%)	127 (100%)	34 (100%)	1057 (100%)	

5.2.2 Moderate physical activities

Table 3 also shows the results of respondents’ moderate physical activities across open spaces in the city. It is obvious that only 28% of the total number of respondents in the study participated in moderate physical activities in open spaces. According to the results presented in Table 3, the highest proportion of respondents’ moderate physical activities occurred in the neighbourhood park (38.6%), followed by school playgrounds (28%) and pocket parks (23.5%), whereas the least was reported in incidental open spaces (19.5%).

The high occurrence of moderate activities reported and observed in the neighbourhood park may be due to the presence of facilities such as the steel tower with many steps and ramps in the neighbourhood park (see Figure 4b). It was observed that users of the park were motivated to climb the steel tower because it afforded them the opportunity to have a panoramic view of the entire park and its surroundings. This implies that when age-appropriate pieces of equipment are installed in UOS, users are likely to get more active. In addition, the results of the frequency of respondents’ moderate activities

in the neighbourhood park. The *chi*-square results confirmed statistically significant variations in self-reported vigorous activities across open space typologies ($\chi^2 = 19.521$, $df = 3$, $p < .000$).

The observed high incidence of vigorous physical activity in incidental spaces and school playgrounds suggests that physically active residents are likely to use the informal open spaces and school playgrounds, which are usually close to their dwellings, as avenues for outdoor recreation regardless of the physical and social attributes of such open spaces. In addition, the high level of vigorous activities in school playgrounds may be related to the relatively flat terrain that encourages free movement of participants in individual or group sports. This result is similar to the findings of Kellet and Rofe (2009: 26), which assert that playgrounds are most suitable for vigorous activities. In addition, Figure 4a shows the results of the rate of recurrence of respondents’ vigorous activity across neighbourhood open spaces. Across the open space typologies, incidental open spaces had the highest number of respondents who performed vigorous activities more than four times a week (18.8%); next were school playgrounds (16.4%), pocket parks (9.1%), and the neighbourhood park (3.7%). The observed high

incidence of vigorous physical activity in incidental spaces and school playgrounds may also have a great deal to do with distances people have to travel to get to other open spaces and the lack of, or insufficient transportation to other open spaces. Studies affirm that the propensity to visit UOS diminishes with an increase in distance; the optimal distance is said to be less than 0.5 km or 5 minutes’ walking time (Rosso, Auchincloss & Michael, 2011).

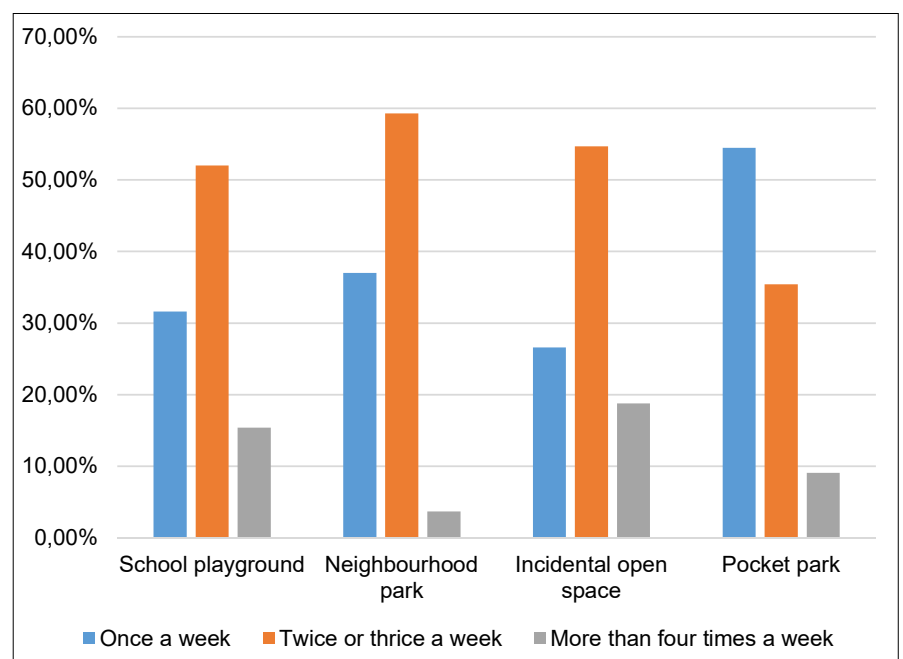


Figure 4a: Respondents’ frequency of vigorous activities in neighbourhood open spaces



Figure 4b: Patrons climbing the steel tower at the neighbourhood park.
Source: Author's fieldwork, 2017

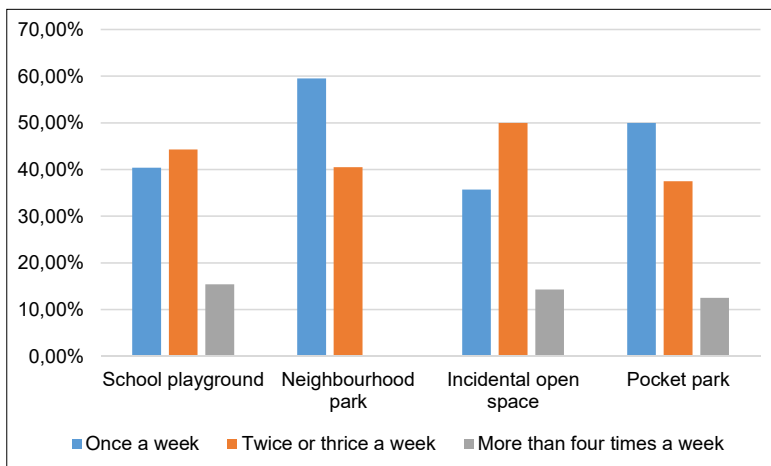


Figure 5: Frequency of respondents' moderate physical activities across open spaces

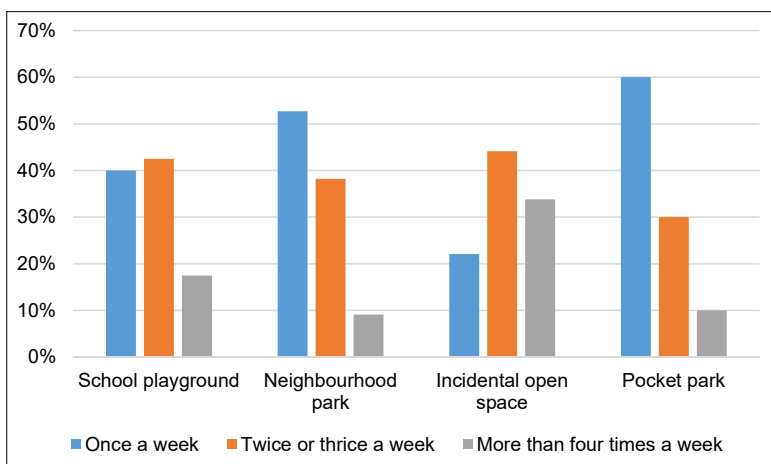


Figure 6: Frequency of respondents' walking behaviour in open spaces

across open space typologies per week revealed that 42.8% of the respondents engaged once a week in moderate physical activities in the city (Figure 5). More than half of the respondents (59%) who use the neighbourhood park reported moderate physical activities.

5.2.3 Walking behaviour

Results of the walking behaviour of respondents in open spaces show that 46.4% of the total respondents walked actively in neighbourhood open spaces in the city. Overall, the most utilised open space typology

for walking by residents in the city were incidental open spaces (54.3%), followed by the neighbourhood park (49.1%), school playgrounds (45.3%), and pocket parks (32.4%). Likewise, the frequency of walking across open space typologies, as presented in Figure 6, shows that incidental open spaces recorded the highest frequency (33.8%) of respondents who used open spaces more than four times a week.

This result has some implications and explanations for the study. Despite the fact that incidental open spaces in the city were unattractive and of low physical quality, the highest frequency of the respondents' recreational walking occurred in incidental open spaces. This result indicates that the proximity of open spaces may be more important than other open space features in stimulating residents' walking behaviour in neighbourhood open spaces. Another possible explanation is that these incidental spaces might be used for different walking purposes such as recreation and transportation; UOS might be used as access routes to some other parts of the neighbourhood.

This finding can be linked with the submission of Lee *et al.* (2015:133) who assert that some users may use the UOS for a secondary purpose such as a transport route to another location.

5.2.4 Sedentary behaviour

Examples of sedentary activities observed in this study include chatting with friends, watching games/nature, and attending events. The summary of the respondents' sedentary behaviour in neighbourhood open spaces in the city shows that most of the respondents (86.7%) engaged in sedentary activities. Overall, the most utilised open space typology for sedentary activities in the city was the neighbourhood park (92.1%), followed by pocket parks (88.2%), school playgrounds (86.1%), and incidental open spaces (85.2%). The results of direct observation of activities in open spaces in the city also reveal a similar pattern of utilisation. The high level of sedentary

behaviours observed and reported in the city might reflect the lifestyles of residents, which may influence their health. Figure 7 shows that 44.4% of the respondents in the city engaged in sedentary behaviours in neighbourhood open spaces weekly.

5.3 Socio-economic/ demographic correlates of overall outdoor activity

Robust contextual evidence on the influence of individual characteristics on activities in open spaces is highly desirable in active living studies. Therefore, this study examined the variations in respondents' overall outdoor activities in neighbourhood open spaces based on socio-economic status. Data from all four types of outdoor activities were combined for this analysis. The socio-economic characteristics examined were gender, age, and income. The results presented in Table 3 show that male respondents were more involved in high-intensity outdoor

activities (35.5%), while 22.5% of female respondents participated in high-intensity activities in open spaces. The results of the *chi-square* show a statistically significant difference in the level of activities between males and females in the city ($\chi^2 = 62.099$, $df = 1$, $p < 0.001$). This finding corroborates previous studies in that males use open space more than females do and are more active than females (Omoleke, 2012: 7; Hino *et al.*, 2011: 154; Cohen *et al.*, 2007: 512). The results from the researcher's observations also show that activities such as football, volleyball, lawn tennis, roller skating, and fast cycling in open spaces were mostly performed by male users. This result suggests that males and females use open spaces differently for outdoor activity. This may be due to the social and cultural expectation that public spaces are for males, while domestic spaces should be for females. Literature from some African settings shows that adult

females, more than males, engage in domestic utilisation of gardening spaces (Abdulkadir *et al.*, 2012: 298; Ngome & Foeken, 2021: 104).

Overall, as presented in Table 4, teenagers were the most active respondents (45%), followed by young adults (29%), and middle-aged adults (14.7%), whereas 12.5% of the aged engaged in high-intensity activity. This result is expected because physical activity demands a great deal of energy and physical strength, which teenagers and youth have. This implies that the level of activities in open spaces may decrease with an increase in age. This finding is corroborated by a previous study (Simon, 2016), which asserts that young people predominantly patronise parks and gardens in the south-western city of Ibadan, Oyo State, Nigeria.

Table 4 also presents the findings on the relationship between income and activities. The results show that, overall, most of the respondents who reported high-intensity outdoor activities (34%) earned below N18 000 monthly. Roughly 24.3% and 22% of low-income earners and middle-income earners reported high-intensity outdoor activities, respectively, in the open spaces. Only 10.5% of high-income earners reported high-intensity activities. This result implies that respondents' intensity of activities decreases as their income increases, indicating that social class might influence utilisation patterns across UOS typologies. Residents in higher income neighbourhoods are less likely to use public UOS, because they have private gardens or can afford high-end open spaces such as golf or polo/recreation clubs for the elites. On the other hand, low-income groups are likely to prefer socialising more often in publicly accessible UOS.

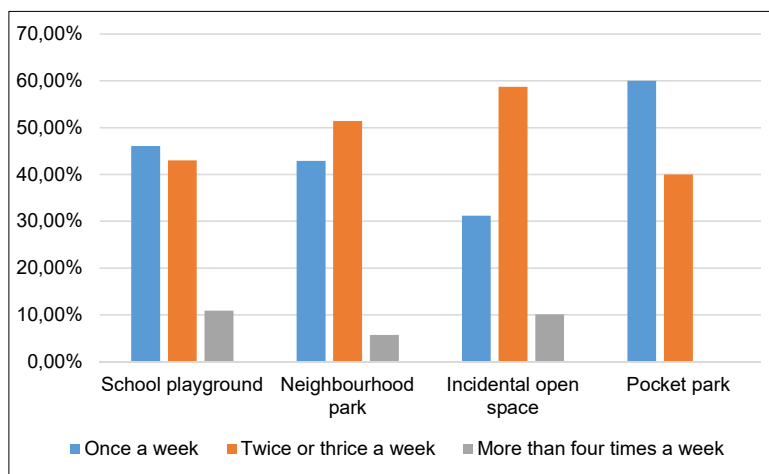


Figure 7: Frequency of respondents' sedentary activities in neighbourhood open spaces

Table 4: Respondents' socio-economic/demographic attributes and overall activities

Characteristic	Category	Outdoor activity (%)			
		High	Moderate	Low	Total
Age	Teenagers	45	32.9	22.1	100
	Young adults	29	30.2	40.7	100
	Middle-aged adults	14.7	26.7	58.6	100
	Aged	12.5	37.5	50	100
Gender	Male	35.5	30.9	33.6	100
	Female	22.5	29.1	48.30	100
Income (monthly)	Below poverty line < N18 000	34.8	33.3	27.9	100
	Low income (N20 000-60 000)	24.30	26	49.7	100
	Middle income (N61 000-150 000)	22	20.7	57.3	100
	High income (>N150 000)	10.5	34.2	55.3	100

6. CONCLUSION

The built environment is one of the environmental factors that influence the lifestyles of urban residents. There is increasing evidence of the varying categories of UOS and their associated benefits to health and

well-being. Among other functions, UOS provide the settings to get people active either individually or collectively, while also creating strong social bonds at neighbourhood, city, and regional levels. The results of this study indicate that residents in Osogbo use urban open spaces in a variety of ways. Specifically, the results show that most of the people in the city rarely use open spaces for vigorous or moderate intensity activities; instead, they engage mostly in passive or sedentary activities. The study also found socio-economic variations in the activities of respondents in open-space typologies. The neighbourhood park was the most frequently used open-space typology in the city, while the pocket park was the least used. Most of the vigorous and moderate intensity activities were reported in incidental open spaces and neighbourhood parks, respectively.

This study concludes that the presence of UOS in residential neighbourhoods is associated with more physical activity among residents. This is the case for low-income young adults and particularly among male residents.

Therefore, to stimulate outdoor activities in urban open spaces, design interventions that will encourage a variety of activity intensities therein are suggested. Features that will improve the quality and attract all user groups should generally be provided in open spaces. More attention should be paid to the quality of incidental open spaces so as to fully exploit their potential of encouraging walking and other categories of outdoor activities. In addition, the unexploited possibilities of natural sites in the city should be developed to provide more avenues for active and healthy lifestyles in urban residential environments.

Owing to the pivotal roles of UOS in healthy living and sustainable urban development, policy makers should pay more attention to these, rather than viewing and treating these as subsidiary spaces in urban centres.

REFERENCES

- ABBASI, A., ALALOUCH, C. & BRAMLEY, G. 2016. Open space quality in deprived urban areas: User perspective and use pattern. *Procedia-Social and Behavioral Sciences*, 216, pp. 194-205. <https://doi.org/10.1016/j.sbspro.2015.12.028>
- ABDULKADIR, A., DOSSA, L.H., LOMPO, D., ABDU, N. & VAN KEULEN, H. 2012. Characterization of urban and peri-urban agro-ecosystems in three West African cities. *International Journal of Agricultural Sustainability*, 10(4), pp. 289-314. <https://doi.org/10.1080/14735903.2012.663559>
- ABDULKADIR, I.F, BABANYARA, Y.Y. & MUSTAPHA, K.M. 2020. Geospatial distribution's pattern and people's perception of green spaces in Bauchi, Nigeria. FIG Working Week 2020 Smart Surveyors for Land and Water Management, Amsterdam, The Netherlands, 10-14 May 2020.
- ABRAHAM, A., SOMMERHALDER, K. & ABEL, T. 2010. Landscape and wellbeing: A scoping study on the health-promoting impact of outdoor environments. *International Journal of Public Health*, Vol. 55, pp. 59-69. <https://doi.org/10.1007/s00038-009-0069-z>
- ADEBARA, T.M. 2021. Open space utilisation in residential areas of selected traditional cities in Nigeria. Unpublished Ph.D. thesis in Urban and Regional Planning, Faculty of Environmental Design and Management, Postgraduate College, Obafemi Awolowo University, Ile-Ife, Nigeria.
- ADEDOTUN, S.B. 2016. Urban form and household mobility patterns in Osun State, Nigeria. Unpublished Ph.D. thesis, Department of Urban and Regional Planning, Lautech, Ogbomoso, Oyo State, Nigeria.
- ADEDEJI, A.J., FADAMIRO, J.A. & ADEOYE, A.O. 2014. Spatial implications of street trading in Osogbo traditional city centre, Nigeria. *Architecture Research*, 4(1A), pp. 34-44.
- ADEGUN, O.B., IKUDAYISI, A.E., MORAKINYO, T.E. & OLUSOGA, O.O. 2021. Urban green infrastructure in Nigeria: A review. *Scientific African*, vol. 4, article number: e01044. doi.org/10.1016/j.sciaf.2021.e01044
- AFON, A.O & ADEBARA, T.M. 2020. Socio-cultural utilization of open spaces in the traditional residential neighbourhood of Ile-Ife, Nigeria. *Space and Culture*, pp. 1-19. doi.org/10.1177/1206331219874698
- AJAYI, A.O. & AMOLE, D.O. 2019. Quality of urban open spaces in a south-western Nigerian city. *Osun Geographical Journal*, vol. 2, pp. 52-63.
- AJAYI, A.O. & AMOLE, D.O. 2018. Residents' evaluation of the quality of urban open spaces in a Nigerian city. *Journal of Geography and Planning Sciences*, 3(2), pp. 88-102. <https://doi.org/10.1093/oxfordhob/9780198804307.013.7>
- BRODHEAD, F. 2009. Green space development: A literature review of research on the benefits of urban green space, and what green space can become. West Broadway Development Corporation, pp. 1-9.
- BYRNE, J. & SIPE, N. 2010. Green and open space planning for urban consolidation: A review of the literature and best practice. *Urban Research Program*, 11. [Online]. Available at: <www.griffith.edu.au/urp> [Accessed: 2 February 2021].
- COHEN, D.A., LAPHAM, S., EVENSON, K.R., WILLAMSON, S., GOLINELLI, D., WARD, P., HILLER, A. & MCKENZIE, T.L. 2013. Use of neighbourhood parks: Does socio-economic status matter? A four-city study. *Public Health*, 127(4), pp. 325-332. <https://doi.org/10.1016/j.puhe.2013.01.003>
- COHEN, D.A., MCKENZIE, T.L., SEHGAL, A., WILLIAMSON, S., GOLINELLI, D. & LURIE, N. 2007. Contribution of public parks to physical activity. *American Journal of Public Health*, vol. 97, pp. 509-514. DOI: 10.2105/AJPH.2005.072447
- COOREY, S.B.A. 2007. Design of open spaces in high-density zones: Case study of public housing estates in Hong Kong. Unpublished thesis, University of Hong Kong, Pokfulam, Hong Kong, SAR. http://dx.doi.org/10.5353/th_b3984890.
- CRESWELL, J.W. 2014. *Research design: Qualitative, quantitative and mixed methods approaches*. 4th edition. London: Sage.
- CRESWELL, J.W. & PLANO-CLARK, V.L. 2011. *Designing and conducting mixed methods research*. 2nd edition. Thousand Oaks, California: Sage.

- GODBEY, G. & MOWEN, A. 2010. *The benefits of physical activity provided by park and recreation services: The scientific evidence*. University Park, Pennsylvania: Department of Recreation, Park and Tourism Management of the Pennsylvania State University.
- HINO, A.F., REIS, R.S., RIBEIRO, I.C., PARRA, D.C., BROWNSON, R.C. & FERMINO, R.C. 2011. Using observational methods to evaluate public open spaces and physical activity in Brazil. *Journal of Physical Activity and Health*, 7(2), pp. 146-154. <https://doi.org/10.1123/jpah.7.s2.s146>
- JANSSEN, M., TOUSSAINT, H., MECHELEN, W. & VERHAGEN, E. 2013. Translating the playgrounds program into practice: A process evaluation using the re-aim framework. *Journal of Science and Medicine in Sport*, vol. 16, pp. 211-216. <https://doi.org/10.1016/j.jsams.2012.06.009>
- JURKOVIČ, N.B. 2014. Perception, experience and the use of public urban spaces by residents of urban neighbourhoods. *Urbani Izziv*, 25(1), pp.107-125. DOI: 10.5379/urbani_izziv-en-2014-25-01-003
- KACZYNSKI, A.T. & HENDERSON, K.A. 2007. Environmental correlates of physical activity: A review of evidence about parks and recreation. *Leisure Sciences*, 29, pp. 315-354. <https://doi.org/10.1080/01490400701394865>
- KACZYNSKI, A.T., POTWARKA, L.R. & SAELENS, B.E. 2008. Association of park size, distance, and features with physical activity in neighbourhood parks. *American Journal of Public Health*, 98(8), pp. 1451-1456. DOI: 10.2105/AJPH.2007.129064
- KELLETT, J. & ROFE, M.W. 2009. Creating active communities: How can open and public spaces in urban and suburban environments support active living? A literature review report by the Institute for Sustainable Systems and Technologies, University of South Australia to SA Active Living Coalition.
- KERR, J., SALLIS, J.F., SAELENS, B.E., CAIN, K.L., CONWAY, T.L., FRANK, L.D. & KING, A.C. 2012. Outdoor physical activity and self-rated health in older adults living in two regions of the US. *International Journal of Behavioural Nutrition and Physical Activity*, vol. 9, article number 89, pp. 59-69. <https://doi.org/10.1186/1479-5868-9-89>
- KESSEL, A., GREEN, J. & PINDER, R. 2009. Multidisciplinary research in public health: A case study of research on access to green space. *Public Health*, 123(1), pp. 32-38. <https://doi.org/10.1016/j.puhe.2008.08.005>
- KOOHSARI, J.M., MAVOA, S., VILLIANUEVA, K., SUGIYAMA, T., BADLAND, H., KACZYNSKI, A.T., OWEN, N. & GILES-CORTI, B. 2015. Public open space, physical activity, urban design and public health: Concepts, methods and research agenda. *Health & Place*, 33, pp. 75-82. <https://doi.org/10.1016/j.healthplace.2015.02.009>
- KREJCIE, R.V. & MORGAN, D.W. 1970. Determining sample size for research activities. *Educational and Psychological Measurement*, 30, pp. 607-610. <https://doi.org/10.1177/001316447003000308>
- LACHOWYCZ, K. 2013. An exploration of the relationship between green spaces, physical activity and health. Unpublished PhD. thesis, School of Environmental Sciences, University of East Anglia, UK.
- LEE, A.K. & MAHESWARAN, R. 2010. The health benefits of urban green spaces: A review of the evidence. *Journal of Public Health*, 33(2), pp. 212-222. <https://doi.org/10.1093/pubmed/fdq068>
- LEE, A.K., JORDAN, H.C. & HORSLEY, J. 2015. Value of urban green spaces in promoting healthy living and wellbeing: Prospects for planning. *Risk Management and Healthcare Policy*, vol. 8, pp.131-137. DOI:10.2147/RMHP.S61654
- LESTAN, K., ERŽEN, I. & GOLOBIČ, M. 2014. The role of open space in urban neighbourhoods for health-related lifestyle. *International Journal of Environmental Research and Public Health*, vol. 11, pp. 6547-6570. <http://doi:10.3390/ijerph110606547>.
- MCCORMACK, G.R., ROCK, M., TOOHEY, A.M. & HIGNELL, D. 2010. Characteristics of urban parks associated with park use and physical activity: A review of qualitative research. *Health and Place*, vol. 16, pp. 712-726. DOI: 10.1016/j.healthplace.2010.03.003
- NGOME, I. & FOEKEN, D. 2021. My garden is a great help: Gender and urban gardening in Buea, Cameroon. *GeoJournal*, 77(1), pp. 103-118. <https://doi.org/10.1007/s10708-010-9389-z>
- OBATERU, O.I. 2009. *Planning the city for outdoor recreation*. Ibadan, Nigeria: Penthouse publications.
- OMOLEKE, S.A. 2012. Green space, gender and health: A re-examination of the literature. *Bulletin of Environment Pharmacology Life Science*, 1(9), pp. 3-11.
- PESCHARDT, K.K., SCHIPPERIJN, J. & STIGSDOTTER, U.K. 2012. Use of small public urban green spaces (SPUGS). *Urban Forestry & Urban Greening*, 11(3), pp. 235-244. <https://doi.org/10.1016/j.ufug.2012.04.002>
- PITAS, N.A.D., BARRETT, A.G., MOWEN, A.J., GRAEFE, A.R., GODBEY, G.C. & SCIAMANNA, C.N. 2017. The relationship between self-rated health and use of parks and participation in recreation programs, United States, 1991 and 2015, Preventing Chronic Diseases. *Public Health Research, Practice, and Policy*, 14(2), pp. 3-8. <https://doi.org/10.5888/pcd14.160441>
- REGIONAL PUBLIC HEALTH. 2010. Healthy open spaces: A summary of the impact of open spaces on health and wellbeing. Regional Public Health Information Paper, Lower Hutt. pp. 1-24.
- ROSSO, A.L., AUCHINCLOSS, A.H. & MICHAEL, Y.L. 2011. The urban built environment and mobility in older adults: A comprehensive review. *Journal of Aging Research*, article number: 816106.
- SATI, Y.C., UJI, Z.A. & POPOOLA, O.J. 2016. Perceptible attributes of urban green spaces in the architectural characterization of metropolitan areas in Jos, Nigeria. *Research on Humanities and Social Sciences*, 6(4), pp. 71-77.
- SCHIPPERIJN, J.J. 2010. Use of urban green space. Skov & Landskab, Københavns Universitet. *Forest and Landscape Research*, No. 45-2010.
- SIMON, F.R. 2016. Prevalence and usage of open recreational spaces in Ibadan, southwest Nigeria. Unpublished PhD thesis, Department of Architecture, Covenant University, Canaan Land, Ota, Ogun State, Nigeria.
- SOTOUDEHNI, F. 2013. A spatial and social analysis of green space access: A mixed-methods approach for analysing variations in access perceptions. Unpublished Ph.D. thesis, Department of Geography, University of Leicester.

- STANLEY, B.W., STARK, B.L., JOHNSTON, K.L. & SMITH, M.E. 2012. Urban open spaces in historical perspective. A trans-disciplinary typology and analysis. *Urban Geography*, 33(8), pp. 1089-1117. <https://doi.org/10.2747/0272-3638.33.8.1089>
- TAYLOR, R.W., FARMER, V.L., CAMERON, S.L., MEREDITH-JONES, K., WILLIAMS, S.M. & MANN, J.I. 2011. School playgrounds and physical activity policies as predictors of school and home time activity. *International Journal of Behavioural Nutrition and Physical Activity*, 8(38), pp. 5367-5376. <https://doi.org/10.1186/1479-5868-8-38>
- THAWABA, S.A. 2014. Integration of GIS and perception assessment in the creation of needs-based urban parks in Ramallah, Palestine. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability*, 7(2), pp.170-186. <https://doi.org/10.1080/17549175.2013.879454>
- TIMPERIO, A., GILES-CORTI, B., CRAWFORD, D., ANDRIANOPOULOS, N., BALL, K., SALMON, J. & HUME, C. 2010. Features of public open spaces and physical activity among children: Findings from the CLAN study. *Journal of Preventive Medicine*, 47(5), pp. 514-518. <https://doi.org/10.1016/j.ypmed.2008.07.015>
- WANG, D., MATEO-BABIANO, I. & BROWN, G. 2013. Rethinking accessibility in planning of urban open space using an integrative theoretical framework. Final paper submitted to State of Australian Cities Conference.
- WU, S., WANG, R., ZHAO, Y., MA, X., WU, M., YAN, X. & HE, J. 2013. The relationship between self-rated health and objective health status: A population-based study. *BMC Public Health*, vol. 13, pp. 320-330. DOI: 10.1186/1471-2458-13-320.220
- YAN, Y.Y. 2013. Perceived neighbourhood environments and self-rated health of older adults in Hong Kong. *The Internet Journal of Geriatrics and Gerontology*, 8(1), <http://ispub.com/IJGG/8/1/14674>