Ghana Journal of Geography

journal homepage: https://www.ajol.info/index.php/gjg/ https://journals.ug.edu.gh/index.php/gjg/

Urban Greenspaces and Patterns of Common Mental Disorders in Ibadan City, Nigeria

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article info

Article history:
Received 17th January 2024
Accepted 30th April 2024

Keywords:
greenspaces,
mental health,
cities,
urban residents

abstract

The restorative roles that greenspaces have on human health are well established in the literature. However, few studies have examined the mental health impact of greenspaces in developing countries and particularly in Sub-Saharan countries where there have been predictions of likely escalated cases of common mental disorders (CMD). This present study examined the location of greenspaces, whether and how residents of Ibadan city, Nigeria connect with the green environments, and the effect of this access on CMD. The concept of human ecology of disease provided the framework for the study. The SRQ-20 was adopted for CMD screening in a cross-sectional survey method of 1200 respondents., The results showed that the availability, visits and time spent at greenspaces were related to lower levels of CMD (mean CMD score was 8.6, R=67% and R^2 =56%). There is a higher prevalence of CMD amongst residents with no greenspaces surrounding their house (35.4% compared to 28.4%). There was also a negative relationship between CMD and participating in recreational activities in greenspaces (β = -0.054, p = 0.021). This study advocates for adequate planning and conservation of greenspaces in designated areas of the city and frequent visit to greenspaces. There is a need for government policies in favour of greenery. Residents are also encouraged to maintain greenspaces around the home.
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Introduction

Common mental disorders (CMDs) are defined as a group of distress states that manifest with symptoms of anxiety, depressive and unexplained somatic and are frequently encountered in community settings (Risal, 2011). It is well entrenched in the literature that greenspaces within cities have been associated with better mental health conditions, thus implying less risk of depression symptoms and psychological distress (Wheeler *et al.,* 2012; Volker *et al.,* 2014).

Emerging studies across various disciplines including land use planning, psychology, psychiatry, tourism studies, environmental management, public health, and epidemiology and for different parts of the globe all point to the health benefits of access to greenspaces (Bertram and Rehdanz, 2015; Ahirrao and Khan, 2021). Greenspace is an umbrella term used to describe areas (Barton and Rogerson, 2017) comprised of vegetation and other associated natural elements (Frumkin, 2013, Taylor and Hochuli, 2015) that are either maintained or unmaintained. According to the World Health Organization (2016) urban greenspace areas range from public open spaces such as parks and recreational facilities but also includes street trees and private gardens or informal vegetated places such as roadside median strips.

Research interest in urban greenspaces is important because access to these more natural environments has been associated with both physical and mental population health benefits including improved cognitive functioning and concentration, higher well-being, increased physical activity and child development (Mavoa *et al.,* 2019; Akpinar 2016; Cherrie *et. al.,* 2018; Bijnens *et. al.,* 2020).

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http://dx.doi.org/10.4314/gjg.v16i3.1

The availability of greenspaces in neighbourhoods of different scales (from parks to street trees) also promotes social interaction and has been associated with an perceived increase in a sense of shared community and social cohesion (Taylor and Hochuli, 2017; Dallimer *et al.,* 2012). Linking how biodiversity can affect human interaction, Margselle *et al.,* (2021) identified four domains of pathways which may be both beneficial as well as harmful-link of biodiversity with human health namely; reducing harm (e.g. provision of medicines, decreasing exposure to air and noise pollution); restoring capacities (e.g. attention restoration, stress reduction); building capacities (e.g. promoting physical activity, transcendent experiences); and lastly, causing harm (e.g. dangerous wildlife, zoonotic diseases, allergens).

The relationship between mental illness and neighbourhood greenspace has been widely established in the literature (Nutsford *et al.,* 2013), identifying that these amenities can serve to mitigate against adverse mental health conditions, mood disorders and anxiety (Barton and Rogerson, 2017). However, a recent review by Nawrath *et al.,* (2021) highlighted an absence of comparable studies in the Global South examining the dynamics of greenspaces and mental health in cities, particularly in the most highly urbanised areas of Sub-Saharan Africa.

Studies have found that urban greenspaces are declining across Global South cities especially in the rapidly growing conurbations (Nero, 2017; Adhikari *et al.,* 2019; Fluhrer *et al.,* 2021). Like most Sub-Saharan African countries, Nigeria is undergoing a process of rapid urbanisation, population growth and increasing housing demand with a high share of urban population living in informal settlements and slums.

These developmental pressures are leading to drastic reductions in the quantity of urban greenspaces. Conservation of urban greenspaces has also typically not received adequate attention by government, local planning agencies and urban residents (Huang *et al.,* 2021).

Measurement of greenspaces can be very dynamic as they vary in scale and level of official recognition from individual street-trees through to accessible parks of different sizes around the home (Wood *et al.,* 2017). Further, the typical lifestyle and daily time pressures on an average Nigerian urban resident leave many individuals with few opportunities to engage with greenspaces.

The concept of Human Ecology of Disease (Addae and Albert, 2013) provides a suitable framework to fully understand the nexus of human health, greenspaces, and mental health conditions. The disease triangle seeks to explain human health as a function of three variables namely, population, habitat, and behaviour. The three variables of the disease triangle can be jointly applied in different forms to explain the state of health at any point in time (Meades and Earickson, 2000). Urban greenspaces like gardens and parks are important components of city habitats that have been established to positively influence mental health but maybe unequally distributed. Behaviour is the most observable aspect of culture and connects to social organisation and technology. The cultural norms of greenspace use will influence how different groups utilise these natural spaces for recreation, socializing and relaxation. Population refers to human characteristics including genetics and demographics (age, gender). For optimum mental health it is important to live in an environment which is suitable for the population present, with acceptable behaviours that facilitate the use of these spaces to deliver health benefits in urban contexts (Barton and Rogerson, 2017).

The relevance of this concept is to identify and provide explanations on the different social, demographic, behavioural/lifestyle and environmental factors that determine mental ill-health and wellbeing of different category of individuals. Mayer *et al.,* (2009) found that time spent at greenspaces or natural setting is beneficial to emotional wellness. Park visitation and outdoor activity participation has also been found to be positively related to human health (Godbey, 2009). Alcock *et al.,* (2014) identified that even after moving from a green to less green neighbourhood individuals' mental health benefits from their previous higher exposure to nature can perpetuate for up to three years. Greenspace in the living environment is also associated with lower income-related health inequality (Astell-Burt *et. al.,* 2014). It has also been found that even individuals who report high negative mood are more likely also to select a natural area, rather than other types of land use, as their favourite place (Gao *et. al.,* 2019).

While there is increasingly strong evidence of a correlation between higher levels of neighbourhood greenspace and improved mental health or well-being, the literature is not robust in relation to the behaviour of urban residents from the Global South with respect to human interaction with greenspaces (Cinderby *et. al.,* 2021).

Research Questions

1. What is the prevalence and pattern of CMD.
2. What is the relationship between CMD, and availability of, visit to, and time spent at greenspaces.
3. What is the relationship between greenspaces and CMD prevalence.

The Study Area

This study has been carried out in the ancient city of Ibadan (see figure 1). Ibadan is state capital and the largest indigenous city in West Africa. It is located in the South-Western Nigeria 145 km north-east of Lagos, the federal capital of Nigeria. Ibadan has expanded to rapidly, absorbing nearby towns and villages within its urban boundary like the growth of the Lagos Metropolitan Area. Ibadan is also reputed to be the largest city in Sub-Saharan, Africa. The five local government areas (LGA) that constitute Ibadan city cover an area of 128 km² and are as follows; Ibadan North, Ibadan Northeast, Ibadan Northwest, Ibadan Southeast, and Ibadan Southwest. Ibadan has a tropical wet and dry climate (Köppen climate classification Aw - for a dry winter), with a lengthy wet season and relatively constant daytime temperatures of approximately 24ºC throughout the year. Ibadan is purposively selected for this study due to the high prevalence of mental health conditions reported in earlier studies of mental illness (21.9%) in this traditional city as carried out by Amoran, Lawoyin and Oni, (2005) and the fast pace of urbanization without sufficient corresponding urban planning for the population. Ibadan city is popularly referred to as a "traditional" or "indigenous" city, its foundation dating back to the 1800s with subsequent rapid growth. It is also regarded as one of the pre-colonial urban centres in Nigeria (Fabiyi, 2006).

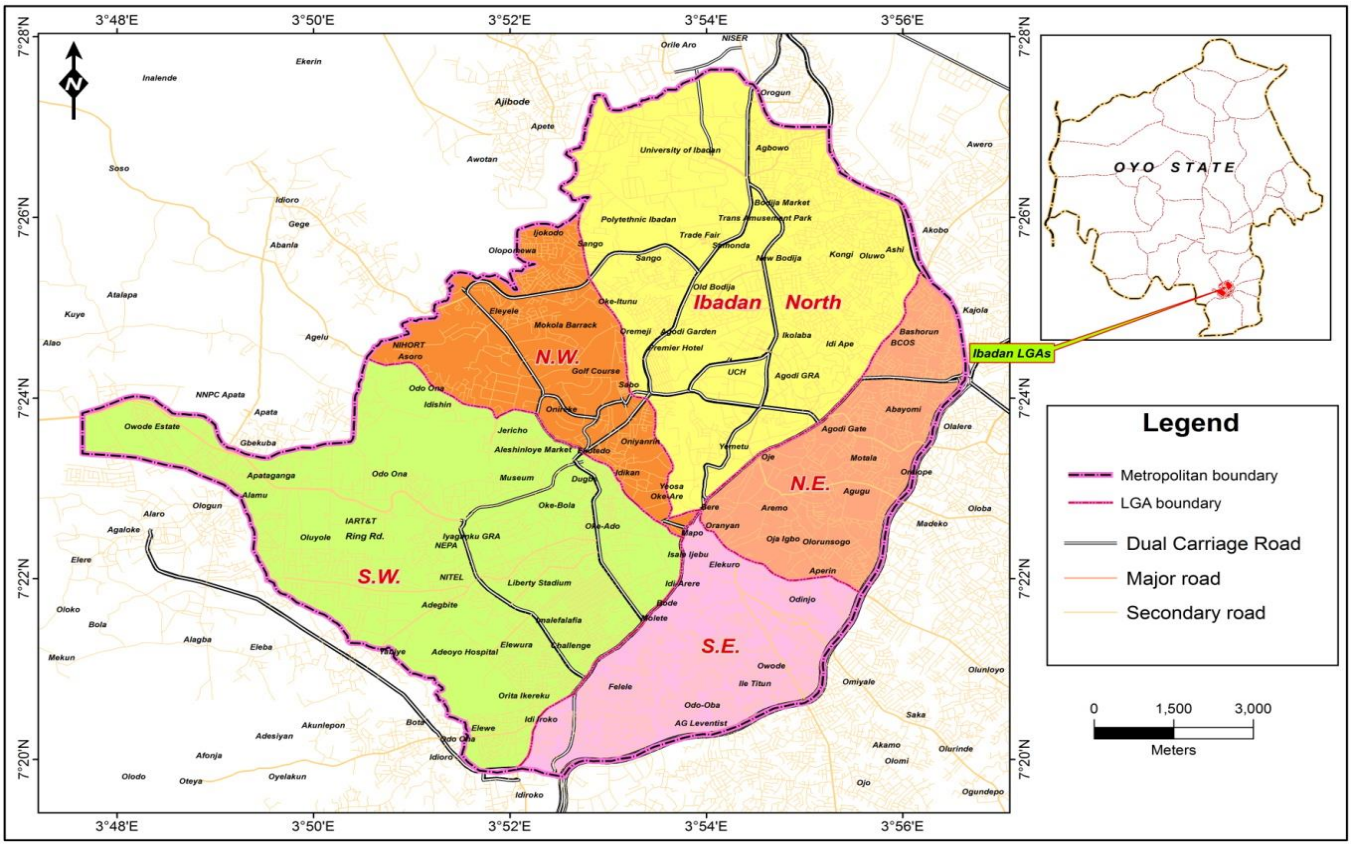

Figure 1. The study area Ibadan city, its location within Oyo State, Nigeria, the local government area boundaries, and the main road network (Source: Ministry of Land and Survey, Oyo State).

Materials and Methods

Questionnaire/instrument

A questionnaire was designed to collect respondents socio-economic, demographic and lifestyle characteristics, their quality of life and symptoms of CMD, and their access and use of local greenspaces.

This study adopted the Self-Reporting Questionnaire-20 (SRQ-20) as it was the main CMD screening tool validated for general populations in low- and middle-income countries (Ola *et al., 2011*, Stewart *et. al.,* 2013). SRQ-20 consists of 20 binary questions focussing on the period of one month before the interview and was administered to adult individuals in households selected for the survey sample. Answers indicate presence or absence of metal health symptoms along four scales – anxiety and depression, somatic symptoms, reduced vital energy, and depressive thoughts. The nature of CMD which are usually under-reported and not easily detected, makes the self-rated approach is desirable in this study. The respondents answered (Yes or No) as applicable to (20) questions.

SRQ-20 has earlier been validated in Nigeria by studies such as, Adebowale and James, (2018) to determine the prevalence, patterns and the relationship between psychoactive substance use risk severity and psychiatric morbidity. Ola *et al.,* (2011) adopted SRQ-20 in examining antenatal mental disorder in West Africa. Also, in the study of Osasona *et al.,* (2015), used SRQ-20 with Nigerian prison inmates to explore depression and anxiety disorders. The tool has also been used in so many African countries like Ethiopia, South Africa and in South American countries like Brazil and Mexico (Parreira *et al.,* (2017). In this study, the Cronbach's alpha which is an indicator of scale reliability and internal consistency for SRQ in this study is 0.77. The respondents can be classified based on the cut-off or threshold into dichotomous outcome 'case' (7 and above) and non-case (below 7). CMD cases were treated as continuous outcome. The total number of CMD cases for the locations were aggregated to explain the spatial distribution.

Sampling

According to 2024 statistics, the population of the city is estimated at 4,004,316 (World Population Review, 2024). A sample size of 1200 respondents was selected from the study area using the Neumann's probability sampling formula. This sample size was selected at the confidence level of 95% and 3% margin of error/confidence interval. Thereafter, the 1200 respondents were selected proportionally to the population of the localities. A multi-stage sample method was adopted with the residential densities classification of 104 localities that comprise the five local government areas (LGA) in Ibadan city. Based on this density a population weighted random systematic selection of households was undertaken with a focus on adult population above 18 years who are heads or members of households for questionnaire administration. The street layout of each of the locality was adopted in selecting the respondents from the households. 10 university undergraduate students acted as fieldworkers coordinated by two post-graduate students. Fieldworkers and coordinators were briefed prior to data collection on the research aims and the data collection instrument with each person assigned to a specific locality. The data was collected over a period of two months.

Data analysis

The survey data collected were coded and analysed in SPSS 2017 using parametric and non-parametric statistics including correlation analysis, chi-square, and multiple regression. Multiple regression modelling was used to explore the relationships between CMD and the availability, number of visits and time spent in greenspaces. Here, the dependent variable (Y) was CMD (yes/no) while the independent variables were denoted as X_1, X_2, X_3….X_n for availability, visit and time spent at greenspaces. The Moran's I statistic was also used to determine the spatial pattern of CMD. This tool measured spatial autocorrelation (feature similarity) based on the locations within the study area and the prevalence of CMD collected through the survey to evaluate whether the pattern expressed is clustered, dispersed, or random. The tool calculates the Moran's I Index value, Z score and p-value which are used in evaluating the significance of the index. In general, a Moran's Index value near +1.0 indicates clustering while an index value near -1.0 indicates dispersion.

Spatial Analysis

The impact of distribution of greenspace and relative accessibility in different neighbourhoods, as established in studies of Chen *et al., (*2020) was assessed using a geographic analysis. Two spatial datasets were used: firstly, prevalence of CMD recorded for each city locality collected from the survey using the SRQ; secondly, the distribution of green and blue space areas for the whole city extent extracted from google map. These datasets were compiled within Quantum Geographic Information System (QGIS version 3.21). To assess the distribution and relative accessibility of greenspace by locality the original polygon coverage boundaries (the edges of each neighbourhood) were buffered to distances of 100m, 250m and 500m which is considered within easy walking distance (ignoring issues of accessibility). These were produced to account for residents being able to access greenspaces beyond the artificial extent of their home neighbourhood. The buffered greenspace extents were intersected with the locality boundaries to compute the area of each neighbourhood covered by greenspace or within 100m, 250m or 500m of a greenspace (see figure 2).

These areas were imported together with CMD prevalence by locality into IBM SPSS version 28 for statistical analysis. Raw areas were used to account for assumed higher populations in larger localities linked to higher CMD prevalence (assuming these were evenly distributed by population). A Spearman's rank-order correlation was calculated to measure the strength and direction of the relationship between greenspace availability and CMD by locality.

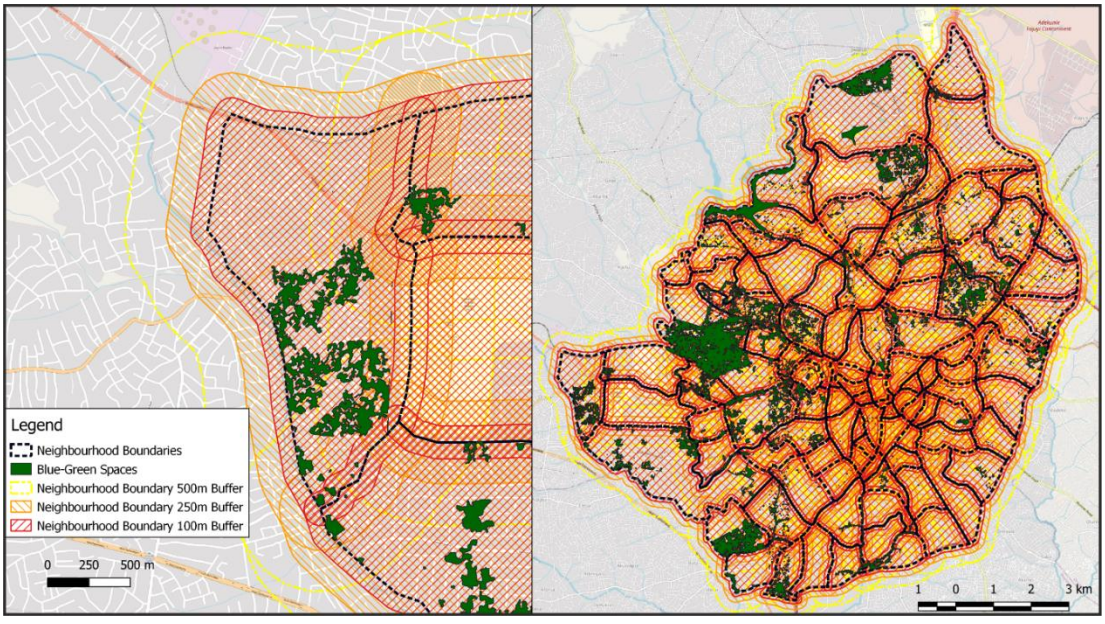

Figure 2: Buffering of neighbourhood borders to assess the extent of accessible greenspace within 100m, 250m and 500m of neighbourhood edges. Zoom in on Apata neighbourhood (left) and whole city (right) (Source: Ministry of Land and Survey, Oyo State).

Ethical Approval

The ethical approval for this study was granted by the Social Sciences and Humanities ethics review committee (SSHREC) of the University of Ibadan with assigned number UI/SSHEC/2017/0012. During the survey, respondents were assured of the confidentiality of the information gathered and that the study will in no way inflict any harm on the respondents. No respondent was forced to participate in this study.

Results

Sample characteristics

CMD was a single outcome variable i.e. as a dichotomous variable where the value 1 means the individual has a case of at least one common mental disorder and zero means no case exists (Gabr *et al.,* 2022). The summary of the demographic and socio-economic characteristic of the respondents is summarised in Table 1. The sample is dominantly male (52.3%), Yoruba (84.6%), and married (94%). 74% of the respondents earn between N18,000 and N59,999 (USD42 to USD141) monthly. 38.8% of the respondents have secondary education and self-employed (62.7%). Respondents without education reported the highest cases of CMD, 48.6%. Migrants' total 52.5% of the CMD cases (27.5% of the Igbos reported cases of CMD while 25% of the Hausas ethnic groups respectively). 34.8% of those that earn monthly income below N50,000 (USD117) reported cases of CMD. Among the married, 32.8% reported CMD cases. The highest number of CMD cases was reported by the self-employed respondents, they reported 33.4%. 48.9% of those with low socio-economic status had cases of CMD. The study setting is a traditional city where factors such as economic migration trigger diverse changes that can affect the mental health of the individuals (Amoran *et. al.,* 2005). The Global Moran I statistic indicates that the pattern of CMD is random (P = 0.78, I=0.00 and Z= 0.29).

To determine the prevalence of CMD in the study area, the prevalence formula is given as:

P = N/TP*100.

Where P = prevalence rate,

N = Number of existing cases and

TP = Total population= 390/1200*100 = 32.5%.

The prevalence of CMD in the study area is 32.5%, and females have higher cases of CMD (Table 2). Previous prevalence studies found higher prevalence range of 35.8% to 39.5% (Tamiru *et al.,* 2022). Generally, the prevalence of depressive symptoms from household samples across Sub-Saharan countries like Burkina Faso, Ethiopia, Ghana, Nigeria, Tanzania, and Uganda showed similar results as was obtained in this present study. For example, prevalence of symptoms of depression was 32.5% for adolescents from rural Ghana, among Ethiopian adolescents living in urban Harare the rates were 28.8% as compared to rural population, in Tanzania, the prevalence rate in urban and rural settings were 31.3% and 30.3% respectively and in Uganda it was 26.5% while in Burkina Faso it was 26.4% (Nyundo *et al.,* 2020; Jörns-Presentati *et al.,* 2021). The prevalence rates of mental health problems in most sub-Saharan countries is a direct outcome of the disease burden as well as lack of or inadequate treatment for mental disorders (Schneider *et al.,* 2016).

Table 1. Socio-economic characteristics of the study sample.

Variables	CMD case (%)	CMD Non case (%)
Gender		
Male	189 (30.1)	439 (69.9)
Female	271(35.1)	371 (64.9)
Age		
18- 40 years	101 (32.5	210 (67.5)
40-59years	260 (33.5)	517 (66.5)
60-79years	29 (26.1)	82 (73.9)
Above 79 years	0 (0)	1 (100)
Education		
Primary	86 (39.6)	131 (60.4)
Secondary	144 (31)	321 (69)
Tertiary	125 (28)	321 (72)
No Formal Education	35 (48.6)	37 (51.4)
Ethnicity		
Yoruba	340 (33.5)	675(66.5)
Hausa	9(25)	27(75)
Igbo	41 (27.5)	108 (72.5)
Income		
Less than 50,000	257 (34.8)	481(65.2)
50,000-100,000	123 (30)	287 (70)
Above 100,000	10 (19.2)	42 (80.8)
Marital Status		
Single	0 (0)	4(100)
Married	370(32.8)	758(67.2)
Widowed	11(28.2)	28(71.8)
Separated	9 (31)	20(69)
Employment Status		
Employed	130 (31.4)	284(68.6)
Unemployed	2 (25)	6(75)
Retired	7 (26.9)	19(73.1)
Self Employed	251 (33.4)	501(66.6)
Personal socio-economic status		
Low	215(48.9)	225(51.1)
Medium	157(23.8)	504(76.2)
High	18(18.2)	81(81.8)
Recreation participation		
Yes	78(21.4)	286(78.6)
No	312(32.3)	524(62.7)
Visits to Greenspaces		
Yes	229(71.1)	93(289)
No	581(66.2)	297(33.8)
Availability of greenspaces around the house		
Yes	110(28.4)	277(71.6)
No	280(35.4)	533(65.6)

Table 2. Prevalence of CMDs

Common mental disorder	Male	Female	Total
Case	189 (30.1%)	201 (35.1%)	390 (32.5%)
Non case	439 (69.9%)	371 (64.9%)	810
Total	628	572	1200

Table 3 Regression results showing the relationships between greenspaces and CMD

Parameters	B	Standard error	T	P
Availability of greenspaces	-0.048	0.45	-0.048	0.028
Visit to greenspaces	-0.076	0.52	-2.627	0.004
Time spent on visit to greenspaces	-0.066	0.47	2.468	0.042
Constant		0. 37	77.966	

Table 4 Relationship between Time Spent at Greenspaces and CMD

	r	p
Time spent at greenspaces vs. CMD	0.584	0.016

Relationship between CMD and the availability, visit and time spent at greenspaces

There are extensive studies on the association between exposure to nature and health. This present study examined the relationship that exist between, CMD prevalence and indicators of access to greenspaces (availability, visit, and time spent). The study found negative and significant relationship between the availability of greenspaces and having a CMD (Table 3; $\beta = -0.048$, $p \leq 0.05$), with an R^2 value of 0.56. This suggests that having greenspaces around the house reduces CMD by 4.8%. The study also showed that visits to greenspaces showed a negative and significant association with CMD ($\beta = -0.076$, $p \leq 0.05$), implying that frequent visitation to greenspaces are associated with a 7.6% reduction in reporting a CMD. This study provided similar findings as established in White *et al.,* (2019) and Pasanen *et al.,* (2023). This study, thus, provide evidence that access to greenspaces has a lot of bring population mental health benefits (Greary *et al.,* 2023). Identifying positive behaviours like visiting and spending time in greenspace (habitat) explains the immense contribution of these variables to human health as illustrated by the disease triangle.

Similarly, time spent at greenspaces revealed a negative and significant relationship with CMD ($\beta = -0.066$, $p \leq 0.05$). This denotes that an increase in time spent at greenspaces can reduce CMD outcome by 6.6%. Overall, the results showed that greenspaces provide some form of succour against the likelihood of developing CMD. These results indicate that using urban greenspace can reduce residents stress and decrease the likelihood of depressive symptoms (Bratman *et. al.,* 2015, Roe *et. al.,* 2013; Adhikari *et. al.,* 2019).

The field responses on greenspace visitation, availability of greenspaces and time spent at greenspaces were cross tabulated and CMD outcome. The results depict the responses to the question "do you have greenspaces (garden, parks, trees) around your house" with CMD. The result shows that 71.6% of those that have greenspaces like gardens, parks and trees around the house do not have CMD. Only 28.4% of those that have greenspaces around the house have CMD. 35.4% of respondents that do not have greenspaces have CMD. The chi square tests further show the significance and similarities between availability of greenspaces around the house and CMD prevalence ($\chi2 = 4.326$, $p = 0.038$). Respondents were asked the question "do you visit greenspace (garden / parks)" with CMD. Most (71.1%) of the respondents that visit greenspaces don't have CMD. Only about 28.9% of those that visit greenspaces reported CMD. Conversely, 33.8% of those that do not visit greenspaces reported CMD while 66.2% do not have CMD. The chi-square test of visits to greenspaces and CMD case is however not significant ($\chi2 = 2.626$, $p = 0.105$). This result implies that visiting greenspaces alone is not sufficient to reduce the likelihood of CMD case. The study calls for reinforcement and encouragement of health-enabling behaviours and advocates for increased visit and time spent at greenspaces.

Relationship between time spent at greenspaces and CMD.

To determine if any relationship exists between time spent at greenspaces and the mental health outcome in the form of case or non-case of CMD, correlation analysis of the time spent at greenspaces with CMD was carried out and the result was 58.4%. Knowing fully well that the exact exposure-response relationship of nature and mental wellbeing are under-researched, this finding aligns with earlier studies like White *et al.,* (2019) that spending at least 120 minutes a week in nature is associated with good health and wellbeing. Although, this study presents no specific amount of time to be spent in greenspaces, the result shows that there is significant relationship between the time spent at greenspaces and the case of CMD reported (Table 4).

Analysis of Recreation and CMD Prevalence

It is often said that those who have access to more greenspaces in their local environment might be expected to achieve higher levels of physical activity (Gomez *et al.,* 2010). Based on this background, the study was extended to examine the effect of recreational participation on CMD prevalence. The negative relationship ($\beta = -0.054$, $p = 0.021$) suggests that participating in recreational activities is associated with a reduction in the risk of CMD and is an indication that the higher the time spent on recreational activities, the lower the occurrence of common mental disorder. That is, individuals who participate more in recreational activities have low tendency of developing or manifesting common mental disorder. The chi-square test of recreation and CMD obtained a significant value ($\chi2 = 29.194$, $p < 0.001$). This implies that participation in recreational activities is a healthy habit that reduces stress and invariably reduces CMD risk. Further, participation in community-based recreational activities was associated to better self-rated health and well-being in all socioeconomic groups (Petersen *et. al.,* 2021). In an earlier analysis of association between physical activity and greenspaces, gardening, do-it-yourself, and occupational physical activity and greenspace were found to be associated (Mytton *et al.,* 2012).

A descriptive analysis of greenspaces and prevalence of CMD

Here, the patterns of greenspaces were compared and the overall CMD cases and for female and male is shown in Fig. 3.1, 3.2 and 3.3. Generally, greenspaces are largely scattered across the city. Relating these pockets of greenspaces with prevalence of CMD, the following observations are striking. First, there are low or no cases of CMD where greenspaces are concentrated. Some of these localities include government residential areas and high-income residential neighbourhoods; Jericho GRA, Onireke GRA, Idi-Ishin, Agodi GRA, Alalubosa, Iyanganku. Second, the interior or core areas are deficient of greenspaces hence the reason for the concentration of CMD cases around these locations. It is worthy to note that there are cases of CMD observable around the blue space at the North-western areas of Ibadan city and these may be said to be due to flood prone residences; the panic of previous flood experiences and likelihood of future occurrences may be

responsible for this pattern. Thus, we can also infer from the Human ecology of disease framework, that population groups located around greenspaces (habitat) are less likely to report CMD (disease outcome) as compared with other categories.

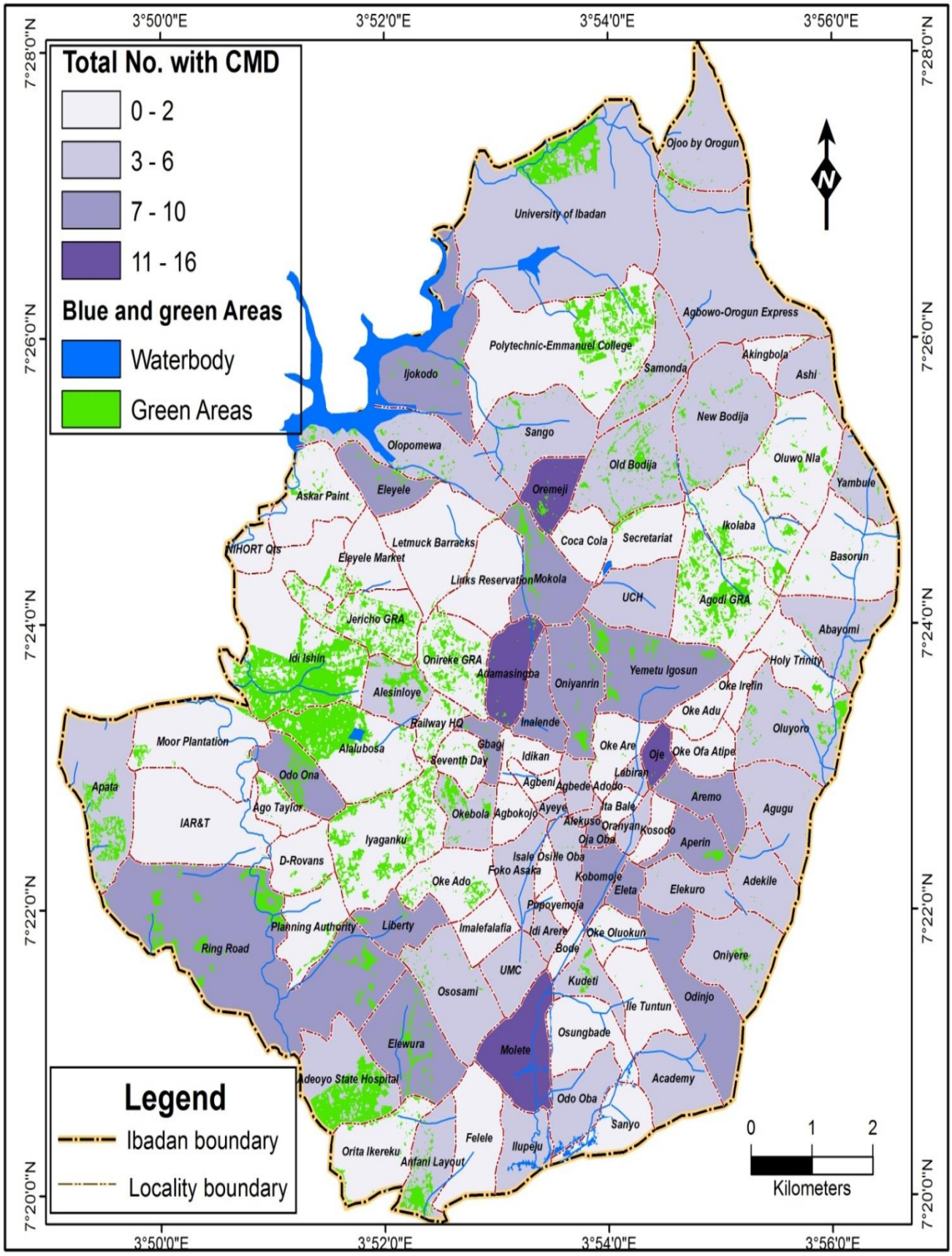

Fig 3.1 Green spaces with Overall CMD pattern (Source: Ministry of Land and Survey, Oyo State).

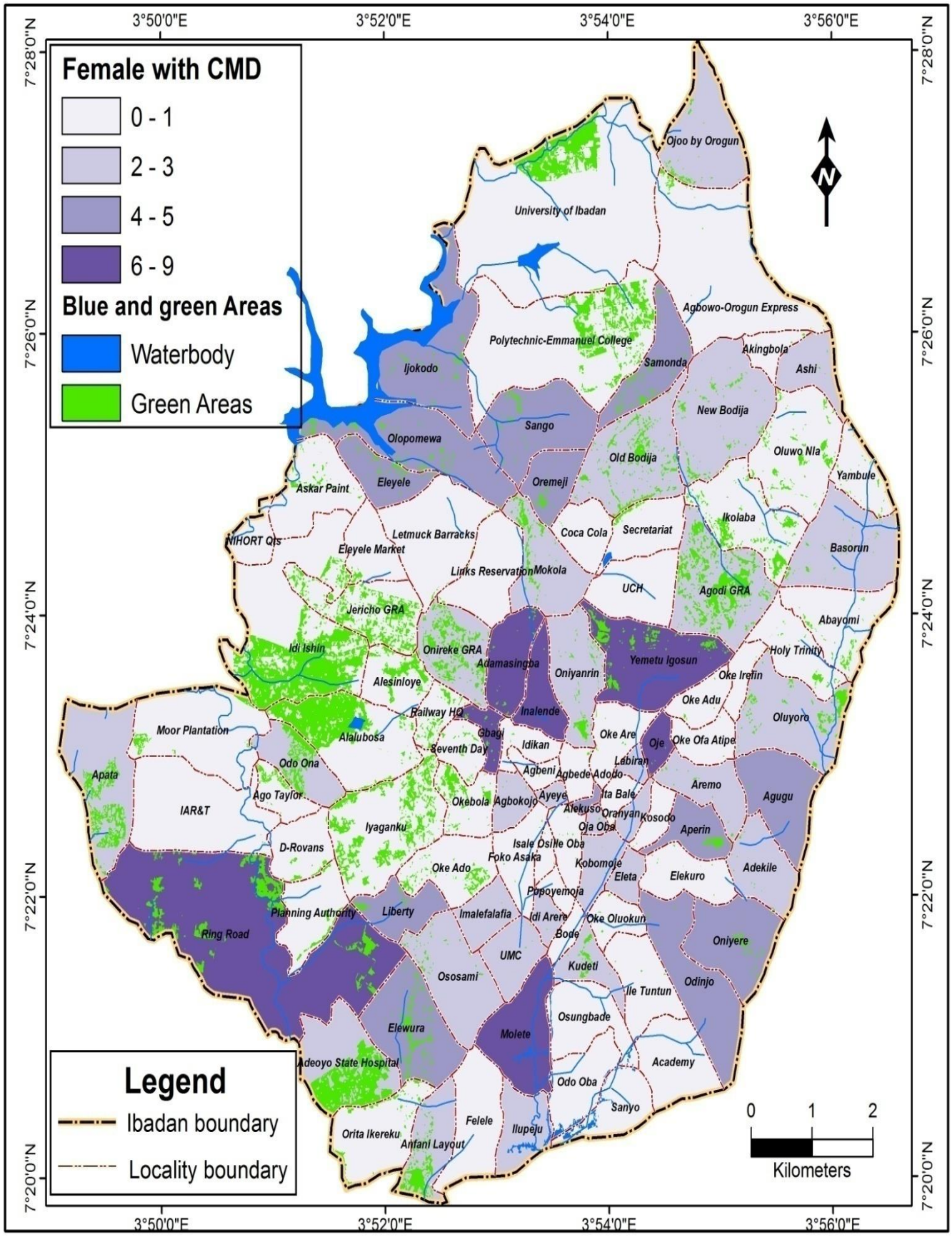

Fig 3.2 Green spaces with Female CMD pattern (Source: Ministry of Land and Survey, Oyo State)

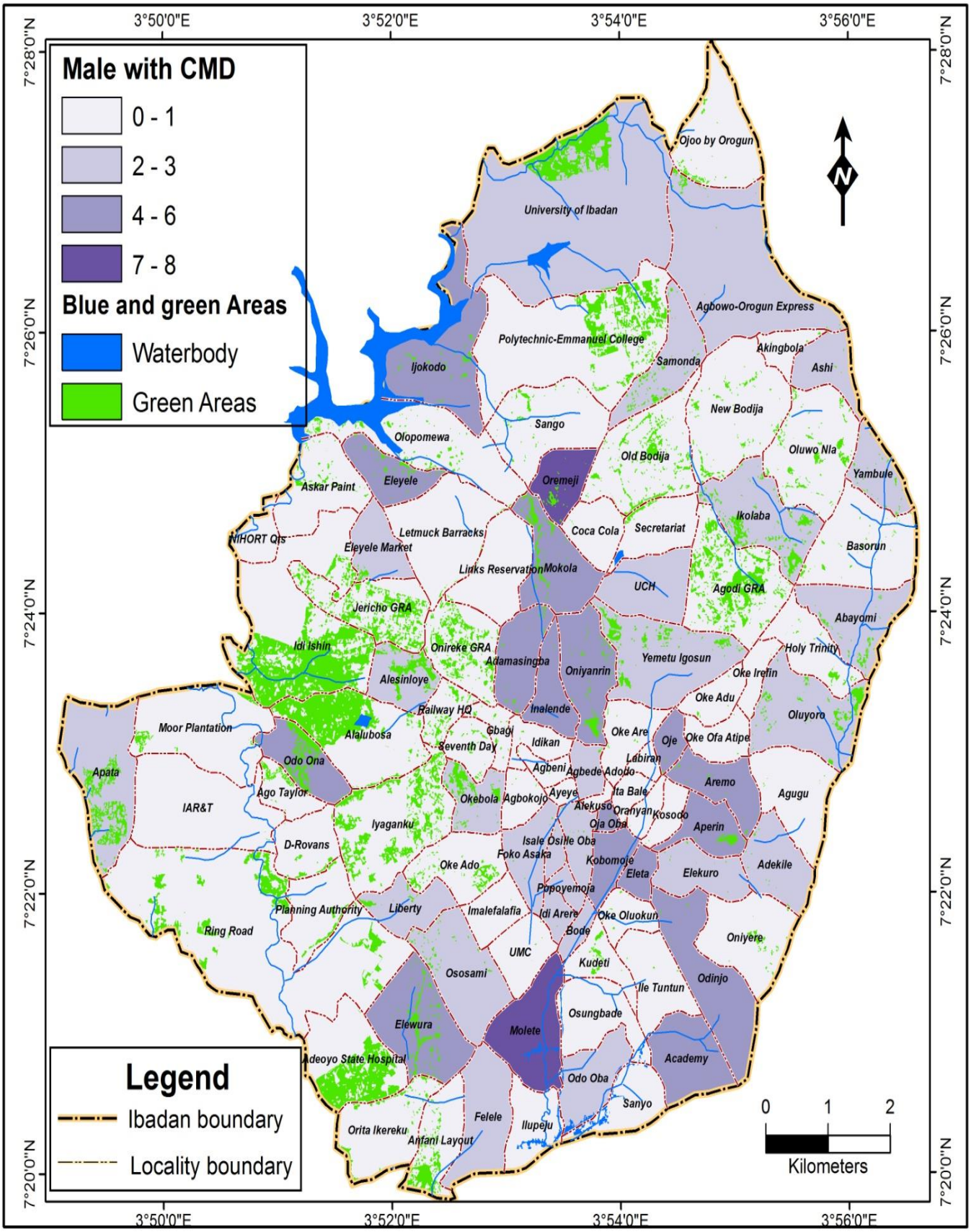

Fig 3.3 Green spaces with Male CMD pattern (Source: Ministry of Land and Survey, Oyo State)

Table 5 Correlation of greenspaces and CMID

	Greenspace Intersection	Greenspace 100m Buffer Intersection	Greenspace 250m Buffer Intersection	Greenspace 500m Buffer Intersection
Correlation Coefficient	**-.303****	**-.357****	**-.347****	**-.384****
Significance (1 tailed)	**0.00095**	**0.00011**	**0.00016**	**0.00003**
N	**103**	**103**	**103**	**103**

Discussion

Globally, urban population has consistently increased with urban population rising from 220 million in 1900 to 732 million in 1950 with predictions of 4.9 billion urban dwellers by 2030 (United Nations, 2009). The greater proportion of this growth has been predicted to come from the Low and Middle-income countries (LMICs), mainly Africa and Asia where urban population is likely to triple and double respectively (United Nations, 2015; Alirol *et. al.*, 2011). Asia and Africa are fast urbanizing and by 2050, 56% and 64% of the population will reside in urban areas. Like other cities in Nigeria and the developing world, Ibadan has experienced rapid population growth fuelled by inward rural-urban migration and high fertility of city residents. Ibadan has experienced an annual population increase of 2.94% over the past fifty years, rising from an estimated 2.95M inhabitants in 2012 to 3.75M in 2022 (worldpopulationreview.com/world-cities/ibadan-population). However, the provision of social services and basic infrastructure has not met with this pace of population growth (Aliyu and Amadu, 2017). The growth of Ibadan city has also led to the development of urban sprawl. Unmanaged urban growth, poor urban planning and haphazard development of informal housing have resulted in a gradual deterioration of the green environment and a decline in health and human quality of life (Areola and Ikporukpo, 2018) and by extension in various dimensions and in the light of the research topic, CMDs as investigated in this study.

This study has shown that access to urban greenspace is beneficial to human health and that the closer urban residents are to natural spaces, the greater the health benefit; specifically, the reduced likelihood of onset of CMD. Research has shown that exposure to greenspaces can be psychologically restorative improving mental health and reducing stress levels and physiologically beneficial in reducing blood pressure and encouraging physical activity (Braubach *et. al.,* 2017). The spatial evidence in this study indicates that expanding the extent of greenspace could be a useful mental health intervention alongside providing multiple other ecosystem service benefits for the city that could also improve physical health (recreation, exercise, climate services including urban cooling and stormwater attenuation) and mental wellbeing (stress amelioration, relaxation, and socialising opportunities). Our evidence indicates the need for city planners to protect the urban greenspaces in terms of the maintaining existing urban natural areas, improving access to natural spaces, and increasing the provision of greenspace in new development areas. Planners should also ensure that individual houses in the urban areas also have provision for greenspace features within their private realm. Healthcare providers are also encouraged to focus healthcare interventions on areas deficient of green areas where the beneficial buffering impacts of these natural environments on mental and physical health are absent. There is also need for increased sensitization of the populace on the preventative health advantages inherent in spending time in greenspaces.

Proper planning of urban greenspaces will also foster the achievement of the United Nation's Sustainable Development Goal 11 (SDG 11) which emphasises inclusive, safe, resilient and sustainable cities. SDG 11 targets elimination of detrimental elements such as air pollution, but also includes positive environmental exposures, like green open spaces (United Nation, 2022). Most cities of developing countries are still far from achieving this goal and our recommendation is that local government agencies should be required to maintain and manage designated locations as greenspaces and improve their accessibility to the public.

This paper provides important evidence to demonstrate the significant mental health benefits associated with urban greenspace in a rapidly growing, traditional city in Nigeria. Future work could complement our approach with the use of secondary hospital data to support robust spatial analyses and potential longitudinal analysis to assess a causal relationship between mental health and greenspace. Future work could explore if similar relationships exist with other types of health problems apart from CMD, for example psychical health measures. Although the SRQ-20 has been consistently validated around the world, measuring the CMDs as a single outcome element has raised concerns (Iragorri and Spackman, 2018). In our study, greenspaces have been assessed as uniform, and with no differences in characteristics and quality. Future work could consider the importance of the differences across greenspaces for mental health, such as biodiversity levels.

Conclusion

This study adds new evidence from a rapidly growing city that greenspaces can significantly attenuate mental health effects. While the advantages inherent in visits and increased accessibility to greenspaces abound, the study showed that not many urban residents in Ibadan city visit greenspaces for their potential restorative and health beneficial purpose. Within the city the unequal distribution of public greenspace assets highlights the need for public policy on conservation, urban planning, and maintenance of greenspaces to maximise these benefits more equitably for a wider urban population.

Meanwhile, the depletion of existing greenspaces due to urbanisation in Ibadan city (like many cities of most LMICs) justifies calls for the need to plan and protect the existing available greenspaces in urban areas whilst also taking note of the SDG11 objectives of increasing universal access to safe, inclusive, and accessible, green and public spaces. This ambition to widen access at the mental health gains that greenspaces provide requires the inclusion of greenspace in new city developments to maintain these benefits into the near future.

Recommendation

This study contributes to filling this knowledge gap by comparing the distribution of greenspaces in Ibadan city, Nigeria with the pattern of common mental disorders (CMD) using a quantitative and spatial analysis approach. The growth and expansion of urban areas typically depletes the available greenspaces that provide positive gains in health and well-being of residents. Management of the natural environment balancing the demand for growth with health is a key challenge for planning in rapidly growing cities. The important role of city planning to incorporate and green and blue spaces cannot be over-emphasized. This study thus examines firstly, the overall pattern of CMD in the city and secondly, relates and describes the greenspace accessibility (availability around the home, visits to greenspaces and time spent at greenspaces) and CMD distribution across the city.

Acknowledgements

The authors acknowledge the contribution of everyone from the data collection stage to the manuscript final version.

Declaration of interest statement

We wish to confirm that there are no known conflicts of interest associated with this publication. The manuscript has been read and approved by all named authors.

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