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# Go-ahead urban liveability indicators (ULI) influence on residents' well-being: a case for Lekki-Lagos, Nigeria

**Eghosa N. Ekhaese · Amarachi A. Asinobi**

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**Abstract** According to the UN habitat report on the new agenda 2030, 3.5 billion persons live in cities currently. By 2030, about 5 billion people are likely to be in cities. Liveability quests are an urban concern across the globe. And it is a holistic connection that involves five key aspects: healthy and ample neighbourhood, convenience and green mobility, diverse and buoyant local economy, lively public places/spaces and affordability. Therefore, the study investigates the impact of urban liveability indicators on inhabitants' well-being in Lekki, Lagos, Nigeria. By: identifying the UN-Habitat and WHO checklist for urban liveability as an assessment of the current liveability conditions in Lekki, Lagos, identifying the urban liveability indicators in Lekki, Lagos, and investigating the effect of urban liveability indicators (ULI) on residents' well-being/health in Lekki, Lagos. The research employed a mixed research methods (quantitative and qualitative methods) and used a case study as the research strategy Semi-structure Questionnaires (quantitative survey method) and In-depth interview guide, Focused Group discussion (FGD), observation Guide, WHO Urban Liveability checklist (qualitative research method) were an instrument for data collection. The data analysis and discussion were chronologically along with the objectives, and study findings established that the Lekki neighbourhood has high liveability standards. However, there is a strong correlation between ULI and residents' well-being/health. The issue of urban liveability is germane to urban residents' health, well-being, happiness and longevity. In conclusion, the guideline for urban liveability identified in the study may be a handy tool for a key interested party in cities to plan for a better world.

**Keywords** Urban liveability indicator · Sustainable mobility · Residents' wellbeing · Liveable city checklist

E. N. Ekhaese (✉) · A. A. Asinobi
Department of Architecture, School of Environmental Science, College of Science and Technology, Covenant University, Km 10 Idiroko Road, Ota, Ogun, Nigeria
e-mail: noel.ekhaese@covenantuniversity.edu.ng

A. A. Asinobi
e-mail: almaasinobi@gmail.com

## Introduction

UN-Habitat SDGs update on Goal 11 target by 2030 indicated that the world would be urban. Over half the global population lives in cities, and it is expected to upswing to 60 per cent by 2030. Cities and metropolises have above 60 per cent of resources consumed. Fast development is ensuing an upward amount of slum residents, scarce and overtaxed infrastructure and services and unplanned urban spread (Bai et al., 2016). Nigeria is experiencing its fair share of rapid random expansion, with its over 200 million population at an annual growth rate of 2.3% (Iwuoha, 2020).

This 2.3% annual growth rate has put pressure on the government and private developers to provide adequate infrastructure and services for residents' (Ebekozien et al., 2021). Urban migration is at its peak as Nigerian cities are experiencing high population growth, and Lagos, Nigeria, experiences the highest inflow (Abubakar & Aina, 2019). Lagos's fast expansion and land zoning have increased mobility distances, energy and other infrastructural constraints inside its neighbourhood (Afolabi et al., 2018). Rapid population growth, pollution and poor air quality produced by vehicles, power plants, and industry in Lagos neighbourhoods are challenges to urban liveability (Žlender, 2021). This rapid expansion requires adequate planning and provision of; public facilities, infrastructure, utilities, and recreational and commercial centres to meet residents' needs and neighbourhood liveability conditions (Yurui et al., 2020). Research has examined urban liveability as a holistic concept and an individual component. However, the focus of the study is to investigate the influence of urban liveability indicators on residents' well-being in Lekki, Lagos. By asking; How does the WHO checklist on liveability assess the current living conditions in Lekki, Lagos, Nigeria? What are the urban liveability indicators in Lekki? And what is the effect of urban liveability indicators on the residents' well-being in Lekki? To properly situate this study in current literature, a systematic, integrative and historical review of the literature will be conducted in the next section.

## Literature review

According to Kaal (2011), liveability is a discursive framework that allows and promotes entrepreneurial policy initiatives. Liveability is a tangible component of living standards and urban quality of life principles in an urban space. Its indicators explain the interface between neighbourhood liveability situations and location (Adam et al., 2017; Yang et al., 2020; Costales, 2021). Considering the complicated and multifaceted structure of urban areas and urban life, the quality of urban life has a far-reaching definition that includes various aspects (Senlier et al., 2013; Kashef, 2016). Our observation showed that the quality of urban life connects to satisfaction on three distinct indicators—housing, neighbourhood and city satisfaction (Marans, 2012). The rapid development of the built environment is a challenge for planners considering the idea of liveability. Research on urban liveability has remained on the rise due to its apparent contributions to the quality of life. According to Iyanda et al. (2018), liveability stands for community-environmental engagement, and the central focus of liveability is on how well planned city functions for its residents. City dwellers need good services to make such a city liveable. The core of liveable cities involves adequate planning that creates active, attractive and safe environments for residents to live, work and play. The characteristics of these liveable cities include good governance, a good economy, high quality of life and a green environment. Moroke et al. (2019) highlighted the fundamental characteristics of a liveable area. These include an appealing public space with a pedestrian orientation, little traffic speed, volume and congestion, access to affordable and safe accommodation, schools, shops and other facilities, Accessible parks and open spaces, areas combining natural and built environment, the safety of all residents, preservation of history, culture, ecology, interaction and human society.

According to Mouratidis (2020), research has linked the concept of liveability to several characteristics, such as quality of life, cost of living, well-being, safety, accessibility to services, satisfying living standards, mobility, transportation and social interaction. According to current research, it is hard to arrive at a stable and healthy social mix, cheap housing, service provision, and integration of work, home, and services. Researches conducted on residential satisfaction show that liveability correlates with home and building characteristics such as age, scale, structure and aesthetic feelings (Victorian Competition and Efficiency Commission, 2009; Türkoğlu et al., 2019), in addition to accessibility to green open spaces, nature, available facilities, pollution, safety and social features (Barreira et al., 2019). The Partnership for Sustainable Communities highlighted six principles of liveability, incorporated into federal funding programs and policies. These principles include Delivery of additional transportation choices, advancement of affordable housing, enrichment of economic effectiveness, support of prevailing neighbourhoods, management of federal policies and investments and value of communities (Appleyard et al., 2019).

Alderton et al. (2019) claimed that researchers conducted several pilot studies on liveability in cities and neighbourhoods across the globe. Neighbourhoods are a tool for urban space planning and analysis (Benita et al., 2020). Cities are usually divided into neighbourhood components to arrange the distribution of resources (Elmqvist et al., 2019). The New Towns liveability assessment was by the State Economic Development Corporations in Malaysia. Research on liveability shown with available community facilities includes primary and secondary schools, worship centres, shopping centres infrastructure services, open spaces, and transport. The findings highlighted that residents in the newly developed towns were content with the living environment and improved quality of life. From residents' views, the study showed that the new towns had adequate infrastructural facilities. A similar study, conducted in Benin City, Nigeria, on neighbourhood liveability measured employment opportunities, housing, facilities, education, and socio-economic functions and revealed that the city was far less liveable (Omuta, 1988; Adekola et al., 2021). Yet another similar study was conducted in Ogun state and yielded comparable results to Benin City. Results revealed that the fundamental amenities in the area are in a state of deterioration (Asinyanbola et al., 2012). According to Ekop (2012); Mohit and Iyanda (2016), household, socio-economic, and neighbourhood factors are essential components of the liveability concept. Many studies have investigated liveability elements such as job, housing, neighbourhood, and climate (Salleh, 2008; Bashari et al., 2021). Stanislav and Chin (2019) quantified liveability in housing quality, social environment, physical environment quality and neighbourhood safety.

## Materials and method

The researchers designed the methodology section of this study to address the research aim and objective. The study aimed to investigate the effect of urban liveability indicators on inhabitants' well-being in Lekki, Lagos, Nigeria. By: identifying the UN-Habitat and WHO checklist for urban liveability as an assessment of the current liveability conditions in Lekki, Lagos, identifying the urban liveability indicators in Lekki, Lagos, and investigating the effect of urban liveability indicators (ULI) on residents' well-being/health in Lekki, Lagos. However, neighbourhoods are physical and social units, and assessing neighbourhood characteristics may be challenging. The researcher considers the feasibility of collecting data, sampling, ease of observation, or data availability. Therefore, the paper is a case study research strategy that uses mixed research methods. This mixed-method approach allows for a healthy triangulation of quantitative and qualitative data, allowing for reliable responses to the research questions raised in the introduction. The study population are Lekki phase 1 residents', Lagos, Nigeria. The whole Lekki (phase one-six) population is 401,272 from 2011 national census results according to Obiefuna et al. (2021) study area, Lekki phase 1 is 120,000. The population elements are 1. Residents of Lekki Phase 1 and 2. Professionals in Eti-Osa local government secretariat.

### Sampling techniques

According to Obiefuna et al. (2017), the population projection of the purposely selected Lekki phase 1, Lagos, is about 120,000 residents. Kothari (2004) determined the sample size by using simple calculations. Kothari (2004) argued that the sample result makes an overview of the entire population as long as it is representative. The formula for the sample size is in Eq. (1) at the confidence interval of 95% with a significance level of 5%.

The formula for sample size:

$$n = N/1 + N\,(e)2 \quad (1)$$

where: n = Sample size to be studied, N = Population size, e = margin of error (0.05), n = 120,000/1 + 120,000 (0.05)2, n = 120,000/1 + 300, n = 398.67.

The sample in this study is 398.67.

From the above formula, the required sample size for this study was 398 people, including all interested parties. The researcher used purposive and random sampling to select the interested party. The sample sizes for Lekki phase 1, Lagos, were picked from the total eligible households listed and some Local government officials, Town planning personnel and estate official.

## Research design

Several factors influence the selection of research methods. There is a connection between the selected topic investigated, these factors and the authors' research philosophy for the study. Therefore, the research technique defines the theories that underpin the study: qualitative, quantitative, or mixed-method (Creswell et al., 2011). Given the factors considered, the mixed-method research method was appropriate for this study. In mixed methods research, the researcher blends quantitative and qualitative research; techniques, methods, approaches, concepts, or language into a single analysis and philosophically by providing a reasonable and realistic alternative. However, a mixed analysis involves quantitative and qualitative data analysis techniques within the same study. The mixed-analysis allows the use of philosophy rational approach and framework. Its inquiry logic includes inference, deduction and abduction (Eastwood et al., 2014). A mixed-methods study is an effort to legalise several approaches to address research questions rather than limiting the researchers' choices. It is an expansive and innovative type of analysis. It is inclusive, balancing and indicating that researchers take a broad approach to the selection methods, study thought and behaviour. It entails collecting both types of data at the same time; assessing information using parallel constructs for both data types; separately analysing both data types; and comparing results through procedures such as a side-by-side comparison in a discussion, transforming the qualitative data set into quantitative scores, or jointly displaying both forms of data (Wisdom & Creswell, 2013). Therefore, mixed-method is adequate for understanding gaps between quantitative and qualitative data and reflecting participants' views. Mixed methods ensure those study findings are grounded in participants' experiences. Promotes scholarly interaction by improving the validity and reliability of the resulting data and strengthens causal inferences by providing the opportunity to observe data convergence. Since liveability and well-being are multi-faceted issues, this paper has employed the sequential explanatory mixed-method approaches (i.e. qualitative and quantitative) to investigate the impact of urban liveability markers on residents' well-being in Lekki phase 1, area Lagos, Nigeria.

### Social survey

The researcher conducted social surveys among two respondent groups: infrastructure users (residents) and Amenities providers (design and planning experts). The questionnaire asked respondents about their preferences for liveability indicators in the physical environment and socio-demographic criteria such as age and overall situation. The study connected the following questions with the issues of urban liveability conditions and residents' well-being needs. The Research assistants were M.Sc. Students in the architecture department, Covenant University, Nigeria, distributed the questionnaires. The distribution was controlled, systematically organised and conducted on weekends (usually Friday through Sunday), in the mornings and evening (9:00–12:00 am and 5:00–8:00 pm). The research assistants randomly distributed the surveys to residents in the Lekki Phase 1 residential neighbourhood and Staff/professionals, designers and planners in the Etiosa Local Government and town planning office. This approach provided the necessary research tuning and enabled seizing the variety of daily routines and behaviours within the several housing estates in the neighbourhood. The authors retrieved 278 filled questionnaires (250 from Lekki phase 1 residents, 28 from staff/professionals) reflecting the socio-demographic characteristics of residents in the study area. These 28 professions were 95 per cent of the officials (workers) found in the Etiosa local government secretariat in lekki, Lagos.

### Data collection

The authors extracted data from both primary and secondary sources. The primary data collection consisted mainly of field observation, Checklist, questionnaire, survey and the informant interview guide. Out of the twenty-eight staff/professionals that filled the questionnaires, Fifteen (15) selected professionals were interviewed. The authors chose five professionals from the Local Government office/secretariat and ten designers and planners from the planning authority office, all within the same office complex premises. Also, Focus Group Discussions (FGD) of 5 household heads in one of the estates (Crown estate) at lekki phase 1 was conducted to gather information on the availability of the urban liveability indicators and the influence on the residents' well-being.

Moreover, in identifying the urban liveability indicators in Lekki, Lagos, a data collection survey was conducted using a semi-structured questionnaire. The research assistant undertook the main data gathering for four months –morning and evening, during the weekend Fridays–Sundays for eight weeks.

Data analysis

The study analysed and presented both the qualitative and quantitative data. The study used the explanatory sequential mixed approach in this analysis. It means collecting quantitative data first, then using qualitative data to explain the quantitative findings. The study interpreted primary data sources and represented secondary data sources by their themes as empirical. The indicators of urban liveability include: Under Walkability—Street connectedness, Dwelling density, Neighbourhood activity centre, Neighbourhood activity centre access and Local living; Public transport—Bus access and Train access; Education facilities—Primary school proximity, Primary school availability, Primary school access, Primary school traffic volume exposure and Secondary school availability; Employment—Local employment distribution; Food—Supermarket access and Market access; Housing—Housing affordability stress and Housing diversity; and Open space—Large open space distribution. The paper treated these urban liveability indicators as the independent variable. And these independent variables were categorical and continuous. Therefore, the study treated well-being as the dependent variable. The study investigated the relationship between categorical variables (urban liveability indicators and populace well-being/health) using Pearson correlation coefficients with a two-tailed significance. The study employed SPSS version 23 to analyse the effect of urban liveability indicators (ULI) on residents' well-being/health in Lekki, Lagos. A multiple regression analysis using the Pearson correlation applying the two-tailed significance test to show the relationship between Urban liveability and lekki phase 1 residents' well-being. The study presented results as shown in Table 1. This research sample is representative in statistical terms, which means that the results can be general for the whole population using the Kothari (2004) formula. However, it is systematically rigorous and validates the results on neighbourhood characteristics.

**Table 1** Show the socio-demographic distribution of residents in Lekki Phase1, Lagos

| Items | Frequency | Percentage (%) |
|---|---|---|
| Gender | | |
| Male | 171 | 61.5 |
| Female | 107 | 38.5 |
| Total | 278 | 100.0 |
| **Age** | | |
| 18–30 | 93 | 33.5 |
| 31–40 | 101 | 36.3 |
| 41–50 | 58 | 20.9 |
| 51 and over | 26 | 9.4 |
| Total | 278 | 100.0 |
| Marital status | | |
| Single | 85 | 30.6 |
| Married | 159 | 57.2 |
| Widowed | 23 | 8.3 |
| Divorced | 3 | 1.1 |
| Total | 270 | 97.1 |
| | 8 | 2.9 |
| Total | 278 | 100.0 |
| Highest educational qualification | | |
| Primary education | 4 | 1.4 |
| Secondary school | 12 | 4.3 |
| OND | 13 | 4.7 |
| HND | 45 | 16.2 |
| Bachelor's Degree | 114 | 41.0 |
| Master's Degree | 68 | 24.5 |
| Others | 22 | 7.9 |
| Total | 278 | 100.0 |
| Occupation | | |
| Employed for Wages | 121 | 43.5 |
| Self-employed | 97 | 34.9 |
| out of work/looking for work | 3 | 1.1 |
| Student | 42 | 15.1 |
| Retired | 15 | 5.4 |
| Total | 278 | 100.0 |
| **Average monthly income** | | |
| 50,000 or less | 32 | 11.5 |
| 50,000–150,000 | 60 | 21.6 |
| 150,001–250,000 | 38 | 13.7 |
| 250,001–350,000 | 88 | 31.7 |
| Above 350,000 | 60 | 21.6 |
| Total | 278 | 100.0 |

*Source*: Authors (2021)

Study area

The authors conducted this study in Lekki, Lagos, Nigeria. Lekki is a natural peninsula – a planned neighbourhood in Lagos still undergoing rapid development (Obiefuna et al., 2021). The Peninsula is circa that extends 70 to 80 km with a regular width of 10 km. Lekki presently comprises numerous Estates, gated housing developments, farmlands, areas allotted for a Free Trade Zone (FTZ), an airdrome, and a seaport in construction (Aderogba, 2014).

Lekki is situated, in Eti-Osa Local Government Area, Lagos. The Lekki Phase 1 area was previously known as Maroko, a slum before its demolition, as shown in Fig. 1a. LFTZ is, positioned at 6°35′9" N, 3°52′3" E. In the South, it is close to the Atlantic Ocean and Lekki Lagoon in the North (Obiefuna et al., 2017), as shown in Fig. 1b, c. Ibeju Lekki is 50 km east of Lagos and from Lagos international airport is 70 km away. LFTZ conceal an expanse of 3000 Hectares built into a contemporary and inclusive Satellite city of Lagos with a mark populace of 120,000 residents. The master plan group the scheduling area into six (6) practical clusters (i.e. phases 1 to 6), each prepared with service amenities, open spaces and a suitable transportation/traffic network linking each bunch, shown in Fig. 2 (Adedire et al., 2016).

The Lekki land-use master plan envisioned the Cape as a "Blue-Green Environment City", projected to billet above 3.4 million domestic population and at least 1.9 million non-domestic population (Thontteh & Omirin, 2021). Lekki phase 1, being its suburb, is reputed to have several of the most luxurious real estates in Lagos, as shown in Fig. 3. Lekki phase 1 has been chosen for this study because it is a high-brow location in the Lagos metropolis, and liveability conditions are measured easily. Therefore, considering Lekki's population growth rate, liveability conditions need to be assessed (Fig. 4).

## Findings and results

The study investigated the urban liveability conditions in Lekki Lagos, Nigeria, to identify the relationship between urban liveability indicators and

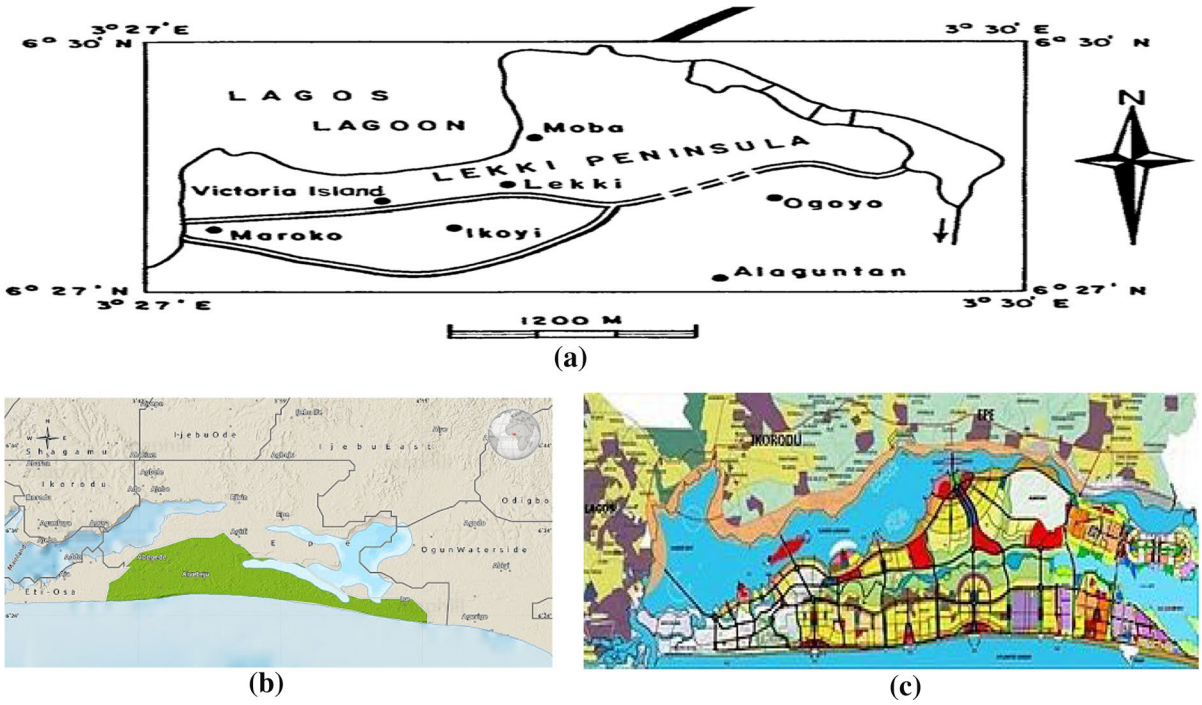



**Fig. 1** **a** Lekki Peninsula, Lagos; Adepelumi and Olorunfemi, (2000). **b** and **c** Map of Ibeju /Lekki, Peninsula, Lagos; Aderogba, (2014)


**Fig. 2** Layout Master Plan of Lekki Free-Trade Zone (FTZ); Source: Dar al-Handasah (Shair and Partners), (2009); *Source*: China-Nigeria ETCZ, 2009

residents' wellbeing/health. Data retrieved from the questionnaires administered were grouped and presented logically along with the research objectives.

Identifying UN-habitat and WHO checklist for urban liveability as an assessment for the current liveability conditions in Lekki, Lagos

The research investigated the present urban infrastructure in the Lekki neighbourhood of Lagos, Nigeria, against the standard sustainable urban infrastructure and service planning on the liveability checklist. The urban liveability checklist is an instrument for the procedure for diagnosing or developing urban spaces. For instance, a place such as Lekki, Lagos, needs to measure liveability and chances to advance health and well-being. Specifically, building neighbourhoods where people can work, play, and shop. It also suggests fashioning an urban environment where residents feel reinforced and involved and appreciate a vibrant street life with other residents. Therefore in designing a liveable, eco-neighbourhood, the paper considered and measured Lekki phase 1 liveability with the following guidelines:

- Builds communities that order eco-modes of transport and reduce our reliance on cars.
- Aids high-quality urban design keen, practical, striking, and benign neighbourhoods.
- Integrates parks and open spaces, sidewalks and walkways, water bodies, landscaping, trees, and lighting into our urban fabric.
- Guards the city's splendour and its environs while permitting density and growth.

However, in Table 2, the 'desirable' benchmarks are evidence-based and were advanced as a guideline to assess the Lekki phase 1 neighbourhood, Lagos, as a Healthy-Liveable Community.

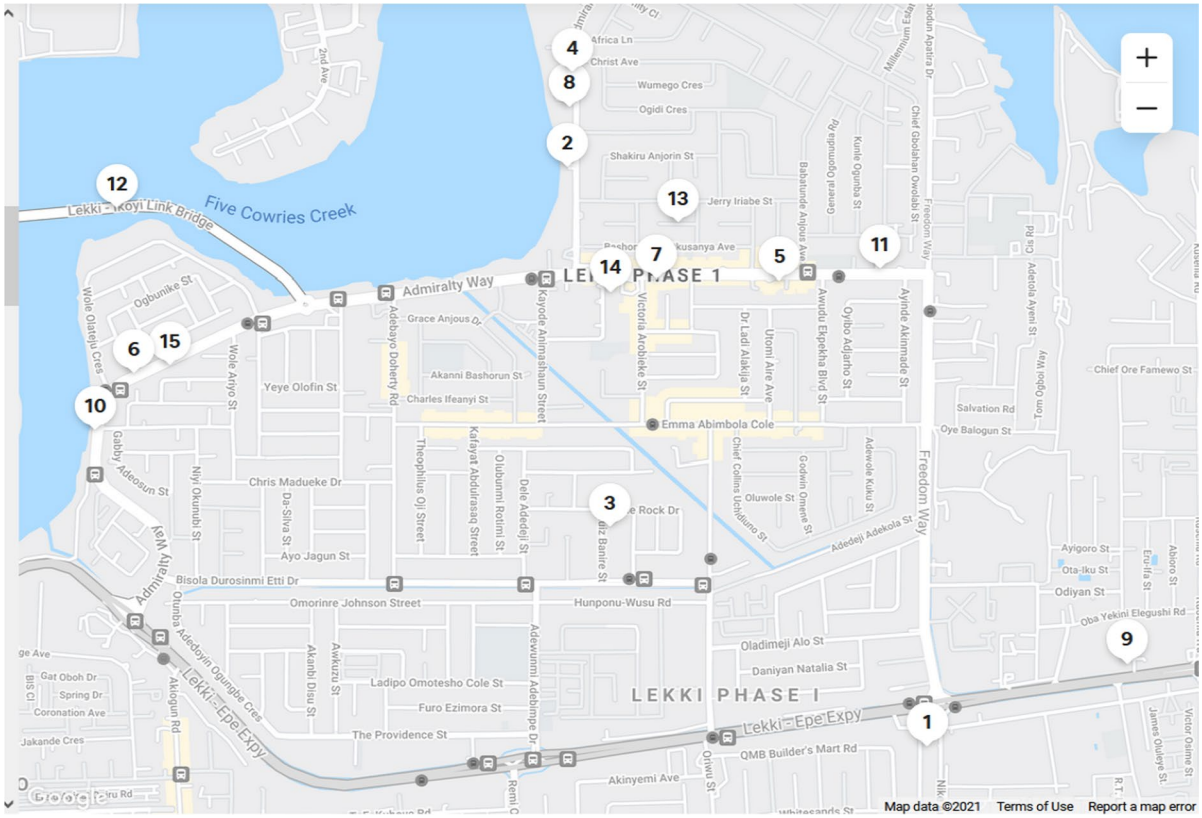



**Fig. 3** Ibeju, Lekki Phase 1 Neighbourhood; Source: Neighbourhoodreview.com

Data were investigated on the background information of the respondents using Fig. 5 as a typical neighbourhood (crown housing Estate) in Lekki phase 1, based on their length of stay, tenancy type and liveability of the neighbourhood based on individual access to urban infrastructure and services (Housing affordability stress, diversity, clean water and electricity). Data collected revealed that 99 respondents were property owners in the neighbourhood, and 171 were tenants paying rent, accounting for 35.6% and 61.5% of the total. Between single-family houses and apartment buildings, respondents amounting to 162, representing 58.3% of the total, had apartments as their primary home. Eighty-Eight (88) respondents represent 41.7 per cent of people who live in single-family houses. It implies that most respondents lived in rented apartments in the neighbourhood. Most of the respondents, 156, had lived in this neighbourhood for less than five (5) years, while 97 had lived here between 5 and 15 years. Figure 6 is representing the lowest number of respondents and somewhat all the number of respondents.

Respondents in the neighbourhood indicated a positive response to access to clean water and electricity. 269 of the 278 respondents have access to clean water, and nine (9) respondents do not. It indicates that 96.8 per cent of the respondents have access to clean water, as shown in Fig. 7a. Although the responses of 5 participants were unrecorded, as shown in Fig. 7b, 96.3 per cent of the valid responses showed that they had access to power, whereas an insignificant 3.7 per cent indicated otherwise. It implies that residents of the Lekki Phase 1 neighbourhood have access to clean water and electricity.

The respondents were, asked to describe their neighbourhood from the liveability Checklist—(Housing; and Open space); their responses were, grouped in descending order of mean loading, as seen in Fig. 8 below. The respondents described their neighbourhoods as buildings with similar functions and height. Then other characteristics include a


**Fig. 4** **a–c** Aerial view of a neighbourhood in Lekki, Phase I, Lagos Nigeria. **d**, **e** Aerial view of Lekki, Peninsula Lagos; Source: Shutterstock.com

similar age, consistent landscape, access roads, recreational spaces and trees along the street. According to respondents, the Lekki Phase 1 neighbourhood has no buildings with a similar style.

Figure 9 examined the mobility conditions within the neighbourhood. By Using the liveability checklist indicators such as walkability—street connectedness, neighbourhood activity centre and local living destinations. Public transport; Facilities access (educational, food, business, employment and economic). And Accessible road provision for vehicular, cyclist and pedestrian movement with adequacy and safety. It also analyses the proximity of facilities to the reach of residents in the neighbourhood. 267 out of the 278 respondents, representing 96.0% per cent, admitted that accessible road provisions were in the area, and 11 representing 4.0 per cent disagreed. Suggest that the neighbourhood has no accessible road provisions. When asked to rate the access roads on a 5-point Likert scale, it was rated good by 189 respondents, representing 68.0 per cent. Fifty-eight (58) respondents, representing 20.9 per cent, found the access road very good, and seven (7) were undecided. Although 24 respondents rated it as poor, none found it 'Very Poor', as seen in Fig. 9 below. It validates that overall, accessible road provision in the neighbourhood is good.

When asked how much reliance the respondents had on vehicle transportation, the results revealed that the respondents used vehicular transit to travel from place to place inside the neighbourhood. 36.7% said it did not need often, and 43.5% indicated otherwise. 19.8% were undecided. It suggests that residents in this neighbourhood have a moderately high dependence on vehicular transportation for mobility. When asked if the basic facilities were within close reach of the area, about 79.0% of the respondents indicated positive, and 21.0% said

**Table 2** WHO Urban liveability checklist of Healthy liveable communities such as Lekki Phase 1

| Domain | Indicators | Desirable | Actual for Lekki Phase 1, Lagos |
|---|---|---|---|
| Walkability | *Street connectedness* is the number of junctions with more than three lanes added together in an 800 m street network | ≥150 intersections | about 200 intersection |
| | *Dwelling density* Total number of houses per hectare | ≥25 dph | approximately 27dph |
| | *Neighbourhood activity centre* Distance between the layout and the street network | 800 m main street layout with 80% of residences | main street layout having 80% of dwellings ≥ 800 m |
| | *Neighbourhood activity centre access* A pedshed is the ratio of the area inside an 800 m street network buffer to the area within an 800 m crow flies buffer around a neighbourhood activity centre. The higher the ratio, the easier it is for pedestrians to get about | ≥0.60 | Walkable catchment of 769 m street network around a neighbourhood activity centre |
| | *Local living destinations* residents live within 800 m of the following destination types: convenience shop (i.e. convenience store, newsagent, or petrol station); speciality food (i.e. fruit and vegetable, meat, fish, or poultry store); post office; bank; pharmacy; general practice / medical centre; dentist; community centre or hall; early childhood education centre; and library | Ten (10) destination types | Residents live within 800 m of the ten (10) different categories of destinations through the street network |
| Public transport | *Bus access* on a regular weekday, the maximum street network distance from a bus stop with a planned service every 30 min from 7 am to 7 pm | 80 per cent of residences 400 m | 80 per cent of residences 400 m |
| | *Train access* on a regular weekday, the maximum street network distance from a railway stop with a slated service every 30 min from 7 am to 7 pm | 80% of all homes 800 m | 80% of all homes 800 m |
| Education facilities | *Primary school proximity* distance from a government and private primary school through the street network | 80% of all homes 800 m | 100% of all homes 800 m |
| | *Primary school availability* number of homes per public and private primary school | 1500 dwellings | 1,500 dwellings |
| | *Primary school access* a pedshed is defined as the ratio of the area inside a 1.6 km street network buffer to the area within a 1.6 km Euclidian (as the crow flies) buffer surrounding a neighbourhood activity centre. The higher the ratio, the easier it is for pedestrians to get about | ≥0.60 | ≥0.60 |

**Table 2** (continued)

| Domain | Indicators | Desirable | Actual for Lekki Phase 1, Lagos |
|---|---|---|---|
| | *Primary school traffic volume exposure* Total length of roads carrying more than 3,000 cars per day to a total length of roads carrying 3,000 vehicles per day inside a 1.6 km street network buffer around a primary school. The higher the ratio, the greater the exposure to traffic volume | ≤ 0.50 | ≤ 0.50 |
| | *Secondary school availability* Number of homes per public or private secondary school | 6500 dwellings | 6500 dwellings |
| Employment | *Local employment distribution* the proportion of employed persons who live in small local areas (SA2) and work in the larger local area (SA3) | ≥25% | ≥75% |
| Food | *Supermarket access* distance from a supermarket through the street network) | 80% of all homes 800 m | 100% of all homes 800 m |
| Housing | *Housing affordability stress* percentage of the lowest 40% of income earners that spend at least 30% of their family income on rent or mortgage | 0% | 80% of income earners spend 30% on rent |
| | *Housing diversity* residents reside within 1.6 kms of the following dwelling types via the roadway network: freestanding home; 1 or more story terrace; 0–2 storey flat/unit/apartment; 3 storeys flat/unit/apartment; 4 or more storey flat/unit/apartment; flat connected to a house; and other dwelling types | ≥7 house-types | Residents reside within a 1.6 km street network radius of 8 or more home types |
| Open space | *Large open space distribution* the distance between the roadway network and an open area is greater than 1.5 hectares | 80% of homes ≤ 400 m of ≥ 1.5 ha of open space | 80 per cent of homes 400 m or more than 1.5 hectares of open space |

Key: dph = dwellings per hectare; ha = hectare; km = kilometre; m = metres; * = practice-guided measure that has not been experimentally proven

*Source*: Author 2021 adapted from Badland et al., (2019)


**Fig. 5** A typical neighbourhood (Housing estate) in Ibeju Lekki phase 1, Lagos; *Source*: Neighbourhoodreview.com

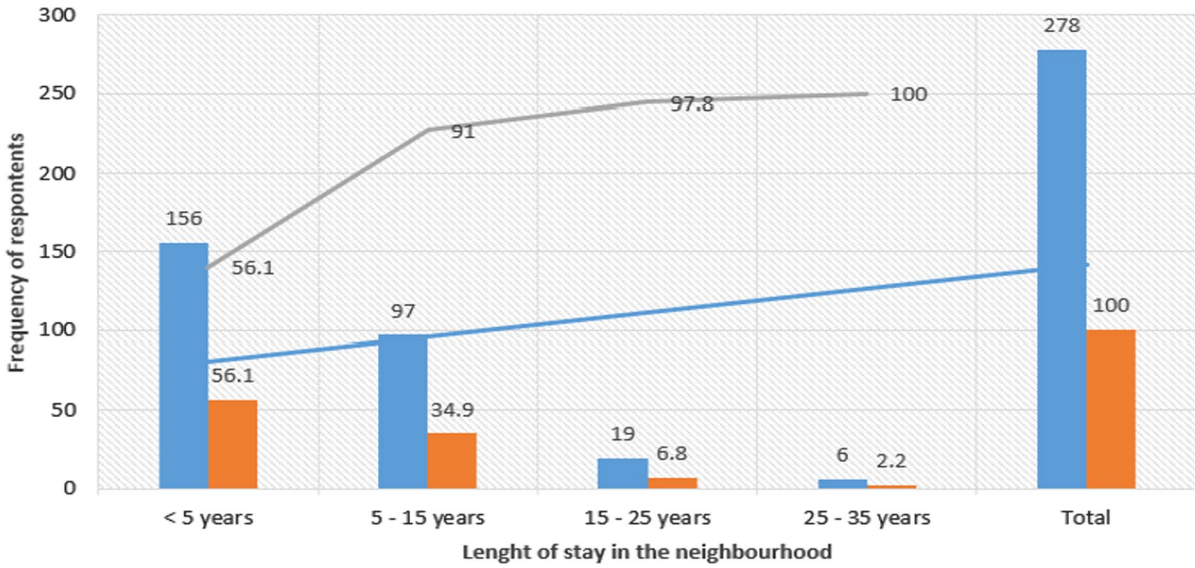



**Fig. 6** Residents' length of stay in the neighbourhood; *Source*; Author 2021

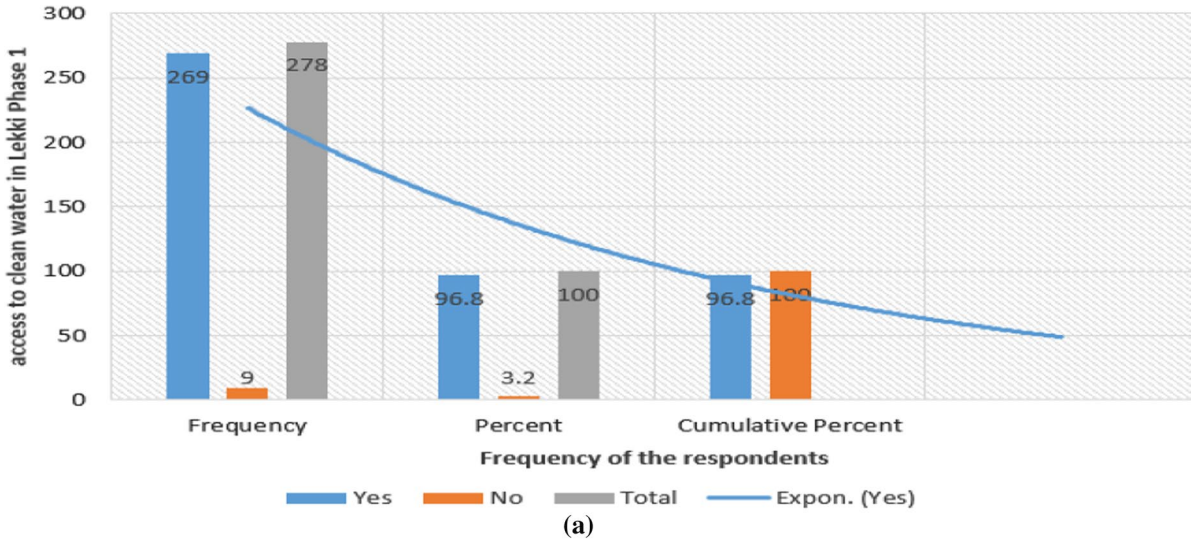
otherwise. It implies that although basic facilities are near the neighbourhood, residents still often rely on vehicular transportation to move.

Conditions that facilitate sustainable mobility in the neighbourhood were assessed, including maintenance and safety, as shown in Fig. 10. When asked how often the walking and cycling provisions in the locality are well maintained, 141 and 22 respondents indicated that they were "often" and "very often" upheld, representing 66.5% of the total number. Forty-two (42) respondents indicated the negative, representing 15.1%, and for the remaining 73, 26.2 per cent were undecided. It implies that the mobility provision is often well-maintained. Regarding safety-the authors asked the respondents if these mobility facilities like the pedestrian paths and cycling tracks were safe every time. One hundred and sixty-nine (169) respondents representing 60.8 per cent, indicated that they were safe at all times of day, 81 representing 29.1 per cent, were undecided, and 28 respondents representing 10.1 per cent, specified that they were not safe. It implies that the residents perceive the mobility paths and facilities in the neighbourhood to be safe.

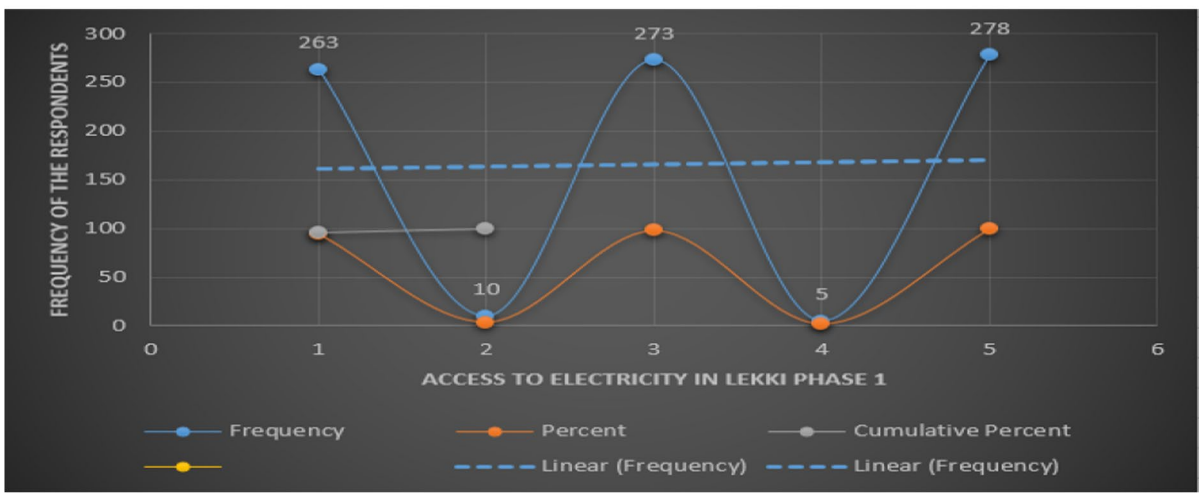
Investigate the influence of urban liveability indicators on the Residents' Wellbeing/Health in Lekki, Lagos

Is the overall environment perceived to be safe?—P8.
Are basic facilities such as schools and shops close to your neighbourhood?—P5.
Are there accessible road provisions in your area?—P2.
Do you often need a mode of transportation (vehicular) to move from place to place in your neighbourhood?—P4.
Do you have access to clean water?—B4.
Do you have access to electricity?—B5.
My neighbourhood is characterised by consistent landscape P1e.
How do you rate the overall accessible road provision of your neighbourhood?—P3.

The above questions are from urban liveability indicators (Walkability-street connectivity, dwelling density, neighbourhood activity centre, neighbourhood activity centre access, and local living density);




(a)




(b)

**Fig. 7** a: Access to clean water in Lekki Phase 1; *Source*: Author 2021. b: Access to electricity in Lekki Phase 1; *Source*: Author 2021

Access to public transit (buses and trains); Educational facilities-proximity to a primary school, availability of a primary school, access to a primary school, and availability of a secondary school; Distribution of employment-local employment distribution; Access to a grocery store. The Pearson correlation applying the two-tailed significance test shown in Table 3 and Fig. 10 was employed to connect housing-housing affordability stress, housing variety, and open space-large open space distribution to questions about resident welfare and health in the Lekki Phase 1 area of Lagos, Nigeria. There is a strong relationship between liveability indicators and residents' well-being. For instance, when the respondents were, asked about the overall environmental safety (P8), it was, found to have a relationship with the proximity of basic facilities such as education, shopping, recreation, economy, work, and leisure (P5). And this also has a relationship with accessible road provision and neighbourhood characteristics having a consistent landscape. These questions are all related with a significant coefficient at level 0.01. Therefore the Pearson coefficient amongst these variables were 0.405, 0.231 and 0.160 (Fig. 11).

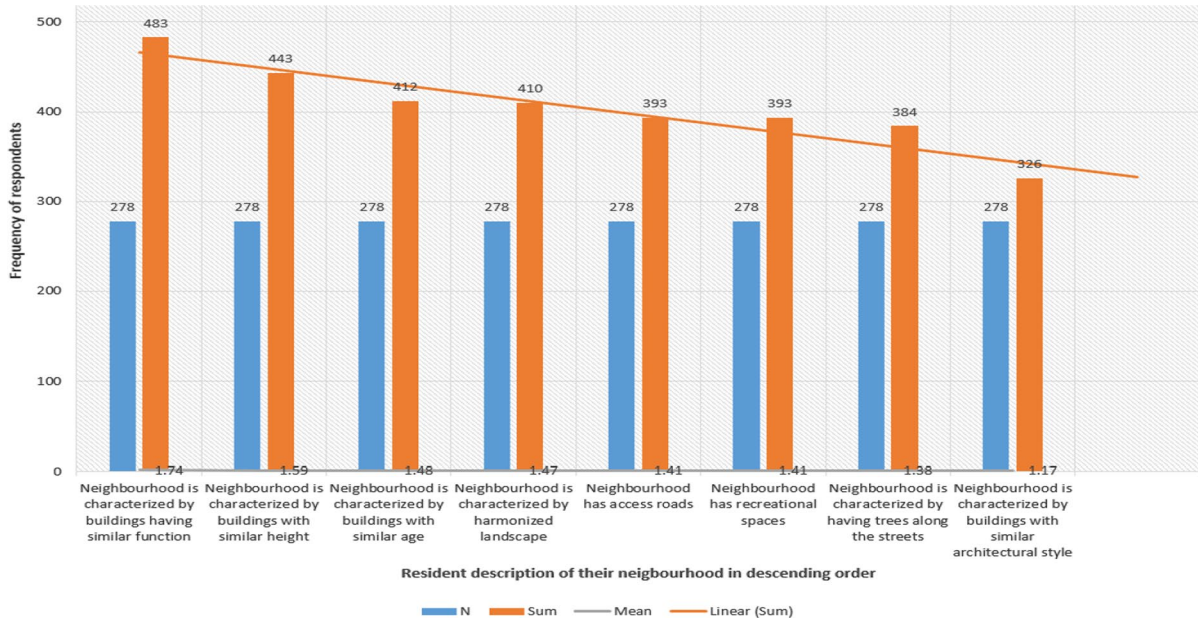



**Fig. 8** Respondents describe their neighbourhood in descending order of mean loading; *Source*: Author 2021

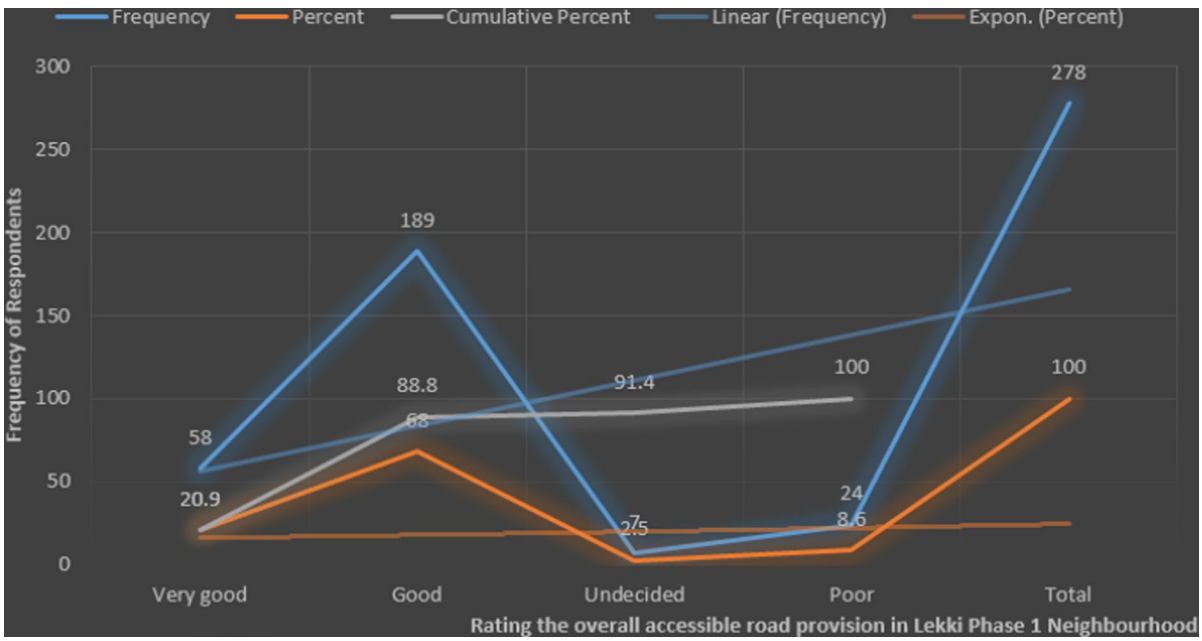



**Fig. 9** Rating the overall accessible road provision of your neighbourhood; *Source*: Author 2021

Again, the authors asked the Lekki phase 1-residents about their welfare, such as access to clean water (B4). A Pearson coefficient- 0.728 showed a strong association with B5-access to electricity. Clearly, the study shows that the urban liveability indicator influences residents' well-being and health. According to the UN habitat and WHO standard guidelines, as outlined in Table 2 above, if liveability

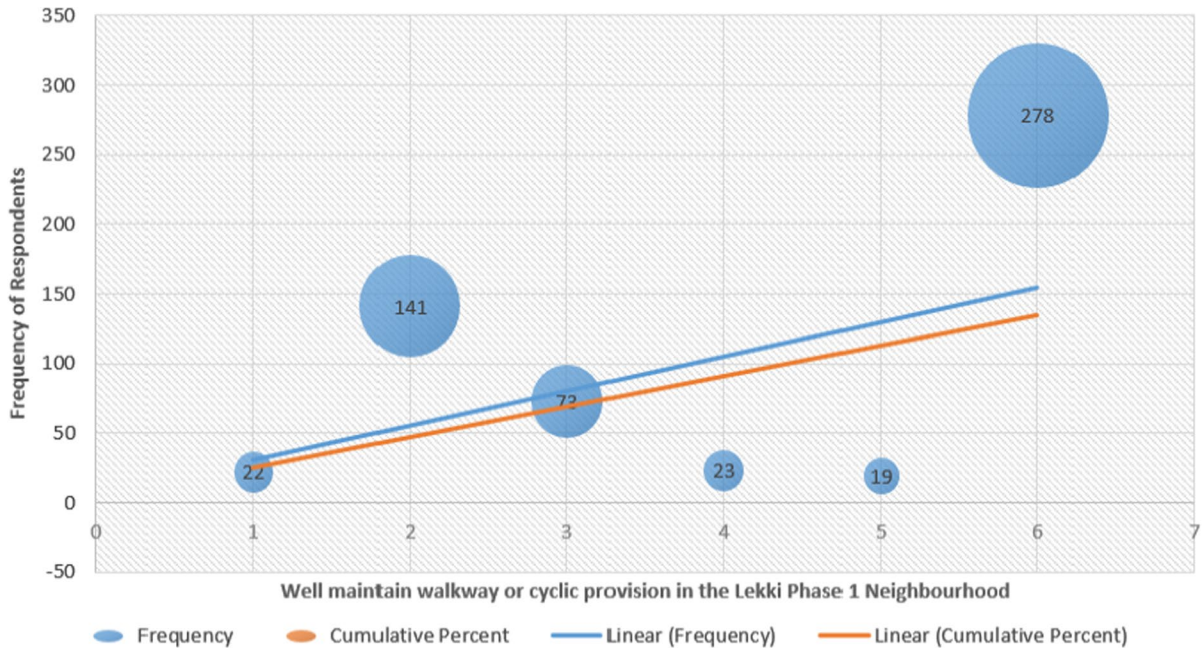



**Fig. 10** Well-maintained walking or cycling provisions in Lekki Phase 1 neighbourhood; *Source*: Author 2021

indicators in a neighbourhood are desirable, there may be a possibility that the health and well-being of residents in that neighbourhood and city generally are positive. Findings from Lekki Phase 1, Lagos, showed that 96.8% of respondents have access to clean water. And 96.3% of the responses indicated that they had access to electricity. It showed the availability of basic facilities and services in the neighbourhood. Therefore, residents' cannot suffer any waterborne diseases such as diarrhoea, dysentery, running stomach, and skin disease resulting from unclean water. Equally, the result obtained from the overall safety of the environment is the proximity of basic facilities such as education, shopping, recreation, economy, work, and leisure. 267 out of the 278 respondents, representing 96.0 per cent, admitted that accessible road provisions were in the neighbourhood, and when asked if the basic facilities were within close reach from the area, 79.0% of respondents indicated in the affirmative. While on overall environmental safety, the data reveal that 169 respondents represented 60.8 per cent safety at all times. It showed that if the Lekki phase 1 neighbourhood is safe, accessible road provision and neighbourhood characteristics have a consistent landscape, meaning that residents' well-being/health is enhanced because there will be less stress, no fears and insecurity, less fatigue and the likes. Therefore, with these desirable urban liveability indicators primed, residents' well-being/health is influenced positively.

## Discussion

From the analysis conducted on the relationship between urban liveability checklist and residents' well-being/health. There is a significant relationship between both based on occupants' perceptions. It is likely due to factors that influence liveability and well-being. It further corroborated the response of Lekki residents considering the effect liveability has regarding proximity to facilities and services that satisfy everyday human needs. Urban liveability indicators are the facilitator of this satisfaction of residents' needs. Therefore, based on objective 1, which is: to identify UN-Habitat and WHO Urban Liveability guidelines or checklist as an Assessment for the Current Liveability Conditions in Lekki, Lagos, the study found that the conditions and facilities such as; access to clean water and electricity, access roads, proximity to facilities, sustainable liveability, mobility facilities and means were, provided, well-maintained and safe

**Table 3** Influence of urban liveability indicators on Residents' Well-being/health in Lekki, Lagos

| | P8 | P5 | P2 | P4 | B4 | B5 | P1e | P3 |
|---|---|---|---|---|---|---|---|---|
| P8 | | | | | | | | |
| Pearson Correlation | 1 | .405** | .231** | −.129* | −.034 | −.024 | .160** | −.074 |
| Sig. (2-tailed) | | .000 | .000 | .031 | .576 | .689 | .007 | .220 |
| P5 | | | | | | | | |
| Pearson Correlation | .405** | 1 | .356** | −.341** | −.045 | −.007 | .245** | .316** |
| Sig. (2-tailed) | .000 | | .000 | .000 | .462 | .914 | .000 | .000 |
| P2 | | | | | | | | |
| Pearson Correlation | .231** | .356** | 1 | .053 | −.037 | .059 | .140* | −.021 |
| Sig. (2-tailed) | .000 | .000 | | .376 | .538 | .330 | .020 | .723 |
| P4 | | | | | | | | |
| Pearson Correlation | −.129* | −.341** | .053 | 1 | .201** | .116 | −.180** | −.177** |
| Sig. (2-tailed) | .031 | .000 | .376 | | .001 | .055 | .003 | .003 |
| B4 | | | | | | | | |
| Pearson Correlation | −.034 | −.045 | −.037 | .201** | 1 | .728** | −.133* | −.024 |
| Sig. (2-tailed) | .576 | .462 | .538 | .001 | | .000 | .026 | .689 |
| B5 | | | | | | | | |
| PearsonCorrelation | −.024 | −.007 | .059 | .116 | .728** | 1 | −.150* | .024 |
| Sig. (2-tailed) | .689 | .914 | .330 | .055 | .000 | | .013 | .694 |
| P1e | | | | | | | | |
| Pearson Correlation | .160** | .245** | .140* | −.180** | −.133* | −.150* | 1 | .250** |
| Sig. (2-tailed) | .007 | .000 | .020 | .003 | .026 | .013 | | .000 |
| P3 | | | | | | | | |
| Pearson Correlation | −.074 | .316** | −.021 | −.177** | −.024 | .024 | .250** | 1 |
| Sig. (2-tailed) | .220 | .000 | .723 | .003 | .689 | .694 | .000 | |
| N | 278 | 267 | 278 | 278 | 278 | 273 | 278 | 278 |

*Source*: Author 2021

**Correlation is significant at the 0.01 (2-tailed) level

*Correlation is significant at the 0.05 (2-tailed) level (2-tailed)

to use. However, respondents still rely on vehicular transportation to get to their places of interest within the neighbourhood. It simply means that the liveability conditions of Lekki phase 1, Lagos are high and at a desirable level of satisfaction. While objective 2; is to investigate the Influence of urban liveability indicators on Residents' Well-being/health ln Lekki, Lagos. The study found a significant relationship between the two categorical variables. Urban liveability indicators influence Lekki Phase 1 residents' well-being and health.

## Conclusion

The study indicated that the liveability conditions of Lekki, Lagos, are optimal. So to validate this higher standard and desirable liveability, which is connotative of the optimal functionality of these liveability indicators. The study, however, concluded that there should be an actual evaluation framework. That can build a feedback protocol for recording opinions and reports of occupants per time. Following the existing building codes, more facilities and services should be available within walking and cycling distances in the residential areas. Further study can investigate the factors that affect residents' choice of mobility means; others should examine lower-rated areas in Lagos and other states in Nigeria to propose a more sustainable and futuristic urban planning to accommodate the rapid urbanisation.

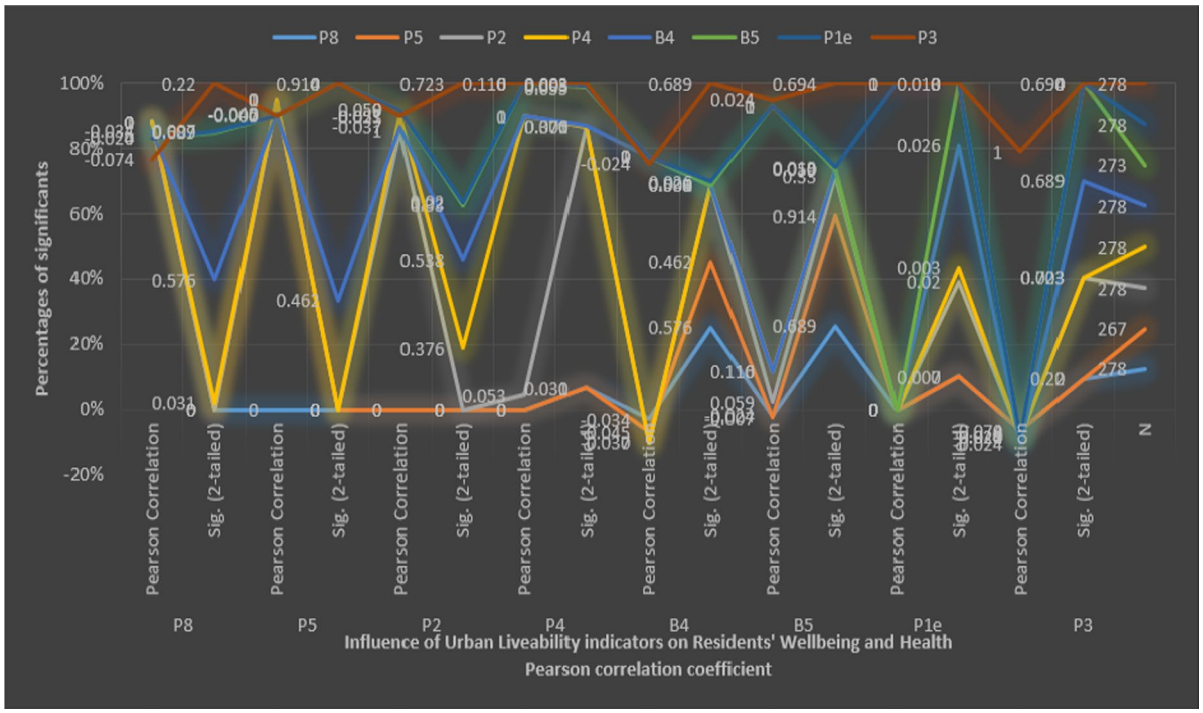



**Fig. 11** Influence of urban liveability indicators on Residents' Well-being/health in Lekki, Lagos; *Source*: Author 2021

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**Authors' contributions** Amarachi A. Asinobi did some writing of an aspect of the literature review and was involved in the collection of data, conducting and investigating the process of data collection. Dr. E N Ekhaese, for the conceptualisation of the ideas, research aim and objective; developing or design of methodology; project administration; research supervision; final writing and collation of all sections of the paper together.

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**Availability of data and materials** Not applicable.

**Declarations**

**Conflicts of interest** The authors declare no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

**Ethical approval** All procedures performed in this study were following the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

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