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## Equitable active transport for female cyclists

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### ABSTRACT

This study addresses the call for new insights to improve equity in active transportation systems by exploring the experiences of female cyclists in Lagos, Nigeria. Qualitative data were collected and triangulated from three different sources – four weeks of ethnographic fieldwork, which involved riding with and observing female cyclists and observing the built environment, semi-structured interviews with 21 female cyclists and street intercepts with 61 female participants across various locations in the city. These data were thematically analysed to establish the social, socio-demographics and spatial disparities concerning female cyclists. The study identifies socio-demographic background, accessibility, and infrastructures as some challenges. However, cycling clubs and charities supporting girl cyclists were recognised as initiatives to encourage equitable active transportation and for raising awareness about the social, health and environmental benefits of cycling. The study also presents theoretical and practical implications that can influence the planning, development, and management of equitable active transportation, calling on stakeholders to adopt a place-centred approach for active transport development.

### 1. Introduction

There are growing concerns about the impact of transportation on the environment through emissions from combustion of fossil-derived fuel gas (Wood & Roelich, 2019; Huang et al., 2020). Stakeholders are now being mindful of the environmental damage being caused by transportation which has contributed to the increasing need to decarbonise transportation (Adetoyinbo et al., 2022; Zawieska & Pieriegud, 2018) and explore other forms of sustainable transportation including walking and cycling (Mandic et al., 2022; Jahanshahi et al., 2021; Russell et al., 2021).

The health, social and economic benefits of walking and cycling have long been recognised (Doran et al., 2021; Zawieska & Pieriegud, 2018). For many countries, active transport is becoming a priority in an attempt to reduce single-occupant car usage and address the long-term impact of transportation on the environment. While walking is an integral part of human life, the oldest and simplest form of human mobility, requiring no special lesson (Fonseca et al., 2021; Lyons, 2020), cycling, on the other hand, as a form of active transportation requires skills and confidence, which may deter many people (Mogaji, 2022b).

From a gender perspective, studies have found that women are more likely to walk than cycle as a form of active transportation (Song et al., 2019); many women avoid risks compared to men and will not want to cycle when the infrastructures, like protected bike lanes, are insufficient or compromise their safety. Access to cycling and the willingness to cycle pose an equity challenge for planners

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and practitioners and this challenge is multifaceted and requires a better understanding (Lee et al., 2017; Mandic et al., 2022).

Equity in active transportation envisages the fair allocation of benefits and costs across groups in a region, irrespective of socio-demographic background (Thomopoulos et al., 2009). A systematic review of literature by Jahanshahi et al. (2021) indicates that there is a growing interest to explore, appraise and provide initiatives to support equitable active transportation. Lee et al. (2017) noted that active transportation is inconsistently understood and applied. The authors also mentioned that there is a huge knowledge gap in understanding and measuring equity with regard to active transportation.

With all these theoretical challenges and limited understanding, this study addresses the call for new insights that can improve equity in active transportation systems (Dadashova et al., 2021) and better understanding for developing and evaluating equity measures for effective policymaking (Jahanshahi et al., 2021) by focusing on female cyclists in a developing country. This focus is significant for several reasons. Cycling generally has not been well adopted in many African countries, Goel et al. (2022) reported that 0.1 % of females in Accra, Ghana and Cape Town, South Africa respectively and 2.1 % in Kisumu, Kenya are cycling, compared to 16.8 % of females in Munich Germany. In addition to this low adoption of cycling as a mode of transportation, female cyclists are sandwiched between different layers of inequity – from the cultural and social norms they live with (Song et al., 2019; Iqbal et al., 2020), the gendered differences, household and childcare responsibilities, and how they travel around (Goel et al., 2022; Russell et al., 2021), to the imposing limitations and the instructional and structural challenges of their country, where there is limited investment in cycling infrastructure (Song et al., 2019; Mogaji, 2020; Mogaji, 2022b). This target group of individuals provides a justifiable background for assessing social and spatial disparities of cycling as a form of active transportation.

The study adopts an ethnographic qualitative research methodology which includes riding with and observing female cyclists, collecting photographic evidence of the infrastructures, and documenting their experience with active transportation. In addition, qualitative data were collected through semi-structured interviews with female cyclists and subject experts, and street intercepts with female participants. These data were triangulated and thematically analysed to establish the social and spatial disparities and state of transportation infrastructure and design attributes for bikeability for female cyclists in underserved communities, and expand our knowledge of equitable active transportation.

This study makes a significant contribution to the body of work on equitable active transportation by focusing on female cyclists (Russell et al., 2021), extending previous studies that have simply provided a general view of cycling or compared male and female cycling. (Jahanshahi et al., 2021; Doran et al., 2021) Specifically, this study presents insights which can influence the planning, development and management of equitable active transportation, calling on stakeholders to adopt a place-centred approach for active transport development. Practical implications for planners, practitioners and policymakers are also presented. This knowledge further contributes to shaping service design and ultimately contributes to many of the Sustainable Development Goals (SDGs) (4, 8, 10, 11 and 17) (Macmillan et al., 2020) which promise to ensure inclusive and equitable access, reduce inequality within and among countries, and make cities and human settlements inclusive, safe, resilient and sustainable (Becker & Jaakkola, 2020; Mogaji & Nguyen, 2021; Mogaji et al., 2022).

The remainder of the paper is structured as follows. The paper begins with a review of the literature on active transportation, social and spatial disparities, and female cycling. Following this, the paper outlines the research design, sampling, data collection and analysis techniques. The findings of the thematic analysis are then presented, followed by a discussion of the findings in the context of existing literature and their practical and theoretical implications. Finally, the paper concludes with limitations and the presentation of future research directions.

## 2. Literature review

### 2.1. Literature review

#### 2.1.1. Contextualisation of equitable active transportation

Equitable active transportation aims to promote extensive increases in human-powered transportation modes such as walking, cycling and skating (Young et al., 2020). Walking and cycling are suitable for health and fitness as they provide an enjoyable, affordable and convenient way for exercising and recreation. They also serve as efficient, environmentally friendly and accessible means of transportation (Gehrke & Clifton, 2014). Walking and cycling reduce traffic congestion and pollution due to emissions from motorised transport at the network level. According to Muñoz et al. (2016), active transport modes are environmentally friendly because they are clean and energy-efficient, alongside reducing the levels of noise pollution. Economic issues include reduction in the costs of road construction and maintenance, health care and collision-related expenses, and minimising loss of productivity due to traffic congestion.

Equitable active transportation is expected to increase physical activity among people regardless of their age, racial/ethnic background, income, ability and disability. This increase is however not always the case as policy, infrastructures and cultural norms posit a limitation (Mogaji, 2020). de Nazelle et al. (2011) highlighted three levels of policy implications that can influence the proper integration of equitable active transportation: the macroscale, mesoscale and microscale levels (de Nazelle et al., 2011). The macroscale level encompasses land-use aspects. The mesoscale level pertains to the pedestrian and walking networks and infrastructure. The microscale level entails design interventions and placemaking such as buildings' orientation and access, safety, traffic control measures and street furnishings.

In many developed countries, there are infrastructures, awareness and policies to ensure active transportation, but this is not the case in many low-income and developing countries. Developed countries such as the Netherlands, Germany and Denmark have a high share of active transportation usage. According to CBS (2018), active transport accounted for over 44 % of the trips made in the

Netherlands in 2017, and a majority of these trips were through cycling. The high cycling rates in developed countries have enabled active transportation to move beyond the socio-demographic barriers to cycling.

Many socio-economic disparities exist between cycling in developed and developing countries (Pantyley, 2017). More cycling kilometres are recorded in developed countries, with lower accident and fatality rates than in developing countries. According to Fishman (2016), the main contributor to these socio-economic disparities is the presence of mature and complete cycling infrastructure in developed countries. The same study emphasises that the cycling population is more diverse in the Netherlands regarding socio-demographic variables than in other countries.

## 2.2. Socio-demographic inequities in active transportation

Having recognised some disparities between infrastructures among the developed and developing countries, it is imperative to recognise inherent factors that influence attitudes towards equitable transportation within countries. According to Hasan et al. (2019), several factors influence people's desire to use active transport in the Arab world. These factors include age, culture, gender, climate, personal motivation, clothing, and government policies. Mogaji (2022b) evaluated the prospects of cycling in Lagos, Nigeria and recognised that the weather poses a considerable challenge for those who may choose to cycle or walk. In addition to the cultural or climate limitations within a country, Nielsen et al. (2013) recognised that spatial aspects influencing cycling includes the diversity of urban functions and the density of the built environment. The landscape design and infrastructure also have a significant impact as the availability of separate bicycle lanes tend to be more appealing to cyclists than roads without them (Graystone et al., 2022; Yang et al., 2022). Another spatial factor entails the attractiveness of the built environment along cycling routes as it positively impacts cycling adoption (Ganzar et al. 2022).

Household composition constitutes another demographic aspect affecting disparities in cycling levels, as having young children tends to reduce cycling levels in countries with low cycling levels (Heinen, 2011). The relationship between cycling levels and socio-economic indicators such as income is unclear. Available evidence shows that individuals with higher incomes have more money to spend on bicycles, which eventually increases cycling rates. At the same time, a higher income increases the levels of car ownership, which has a negative impact on cycling. The motivation to use a bicycle also contributes to the disparity as low-income individuals cycle for utilitarian purposes while high-income individuals cycle for physical exercises and recreation (Harms et al., 2014).

According to Heinen (2011), education levels negatively correlate with cycling as individuals with higher education levels tend to cycle less. Socio-cultural aspects affecting cycling include variations in ethnic backgrounds. According to Ferrari et al. (2021), lower educational levels, being of the male gender and an ethnic minority account for higher levels of engagement in active transportation. Educational level has an inverse relationship with active transport in middle- and low-income countries due to various factors such as the low availability of motorised transport (Olstad et al., 2017). Data from the US show that migrants cycle more than native-born individuals (Harms et al., 2014). This disparity is associated with financial barriers to car use. The population and its spatial distribution affect trends in cycling Lyons (2020). This disparity is attributed to the growth of urban populations alongside a decline in rural populations.

## 2.3. Cycling as a gendered mode of transport

Cycling is regarded as a gendered mode of transport because of the socio-demographic characteristics of the users, competitive cycling and general sport characteristics (Grudgings et al., 2018; Heesch et al., 2012; Ravensbergen et al., 2020). Popular cycling competitions such as the Tour de France and Giro d'Italia are exclusively for men (Prati, 2018). This makes the activity generally identified with the male image and contributes to the gendered perception of cycling. Gerrard, Handy and Dill (2012) reiterate this finding, noting that male cyclists outnumber female cyclists and interventions to address the disparity are yet to be effective. Part of this disparity is attributed to the observation that women cycle mostly for recreational purposes rather than utilitarian ones (Grudgings et al., 2018). It also makes women less likely to cycle for training and recreational purposes (Alvanides, 2014), additionally, their cycling trips are shorter than men's, with gender roles contributing to further disparities.

A gender gap is observed in active transportation, with more males being involved in walking and cycling than women. According to Benjamin and Donnelly (2013), most females living in middle eastern countries prefer to use private vehicles or public transport to commute or go to school. Physical road infrastructure and environmental factors also affect people's decisions to use active transport. Social norms account for the main determining factor for women (Stjernborg & Mattisson, 2016). According to Aldred et al. (2015), there are gender differences in the perceptions of the personal benefits of cycling, with males recording better perceptions and consequently regarding it as a convenient and practical transport mode. For men, the safety and conditions of the roadway facilities influence their involvement in active transportation. Generally, a bicycle-friendly environment and the availability of walkways promote the use of active transportation.

According to Prati et al. (2019), cycling tends to be more favourable to men than women, as women report less favourable perceptions and attitudes towards cycling. The self-perception theory justifies these attitudes and perceptions (Bem, 1967), which denotes that women's low cycling behaviour influences their attitudes. The generalisation of cycling as a gendered mode of transport also draws from social constructs of femininity and masculinity. Traditional gender roles such as division of labour account for inequality in women's bicycle use as they are mostly used for non-commuting trips (Mohiuddin et al., 2022). It also accounts for the higher number of men using cycling since available evidence shows that most individuals use it for utilitarian purposes.

Le et al. (2019) conducted an exploratory study on cycling among women in North America. Findings indicate that cycling facilities and a community's cycling culture influence women to cycle. Further results indicate that safety concerns and interactions with

motorised traffic affect female cyclists' motivation. According to [Goel et al. \(2022\)](#), for women, cycling depends on the overall levels of adoption. This study indicates that places with levels of cycling exceeding 7 % have significant proportions of women participating. The converse is true for areas with lower levels of cycling since women constitute a minority and are always under-represented. [Goel et al. \(2022\)](#) further noted that gender inequalities in cycling are common in low cycling clusters. [Song et al. \(2019\)](#) observed that women in Asian countries face mobility and accessibility challenges in rapidly urbanising areas.

Though [Goel et al., \(2022\)](#) noted that men cycle more than women, it is imperative to recognise that women cycle more than men in countries with high levels of cycling penetration, such as Denmark and the Netherlands. Some developing countries, such as Brazil and Argentina, have huge gender disparities in the cycling population, with ratios of male to female cyclists of 7:1 ([Sa et al., 2016](#)). This ratio is high among countries that are less attractive to cycling. [Debnath, Haworth and Heesch \(2021\)](#) observed that, in Australia, men account for 17.3 % of the cycling population compared to 10.4 % for women.

#### 2.4. Barriers to cycling for women

Household roles and responsibilities, cultural norms, gender-based perceptions, valorisation of safety and risk and physical barriers have been presented as barriers to cycling for women ([Lusk et al., 2014](#)). According to [Prati et al. \(2017\)](#), unequal division of time spent on family responsibilities of childcare and housework limit women's participation in active transport. Increasing evidence also indicates that the division of roles in the labour market and family affects women's levels of income and mobility patterns and, consequently, their choice of transport mode ([Akar et al., 2013](#)). Valorising masculinity is a critical barrier to cycling for women based on observations that women travel shorter distances, are less likely to use cars, and make most of their trips on foot ([Lusk et al., 2014](#)). This aspect of socio-demographic inequities raises a concern about gender balance in power structures which affects decision-making ([Olstad et al., 2017](#)).

The barriers to cycling for women can also be contextualised within the gender inequalities in most developing countries with lower income levels, infrastructural deficiencies, and traditional cultural, social and religious norms that pose immense restrictions on women ([Song et al., 2019](#)). These limitations similarly affect their ability to own and use a bicycle. Traditional gender roles, including division of labour, account for the main barriers to cycling for women. Generally, women's travel behaviour includes trip chaining, whereby they have to carry out multiple activities such as shopping and picking up children from school. Such roles create barriers to commuter cycling and, eventually, their cycling frequency.

Concerns about cycling safety account for the key barriers to cycling among women ([Mohiuddin et al. 2022](#)). Safety concerns include the perceived risk of injury from crashes with motorised traffic and aggression from motorists ([Heesch et al., 2012](#)). In addition, the availability of bicycle lanes and other cycling infrastructure constitutes another barrier to cycling for women. According to [Aldred et al. \(2016\)](#), female cyclists perceive higher levels of discomfort on roads without bicycle lanes. Similarly, they tend to raise more concerns about safety issues when cycling in mixed traffic. Therefore, risk perception can be a significant barrier to women's decisions to cycle, and eventually accounts for the gender inequities.

According to [Lubitow \(2017\)](#), increased visibility and the risk of gendered harassment account for another barrier to cycling for women. Female cyclists tend to draw additional attention from male motorists and those on the sidewalks. This attention increases the risk of harassment, forcing most women to prefer motorised transport. Gendered expectations regarding women's appearance entail another barrier since external pressures to maintain a certain physical appearance deter most women from cycling ([Lubitow, 2017](#)). The aspect of gender expectations of women's appearance is a major barrier to using cycling for commuting purposes. Cases of racial/ethnic discrimination in public places account for another barrier to cycling for women. Generally, women from racial/ethnic minorities on bicycles tend to be high targets for public violence against minorities ([Benjamin & Donnelly, 2013](#)).

#### 2.5. Equitable cycling for women in developing countries

While [Nello-Deakin \(2020\)](#) may have argued that there is sufficient research into cycling, our study aligns with the position of [Castañeda \(2021\)](#) who argued against eurocentrism in cycling research, suggesting that empirical beliefs around cycling research should not be framed around Europe as there are still limited insights about cycling behaviours in Africa, Asia, and Latin America. Though with no specific focus on female cyclists, [Mogaji \(2022b\)](#) explored the prospects and challenges of cycling in Lagos and recognised there are self, societal, and structural limitations to cycling. In Cape Town, South Africa, [Hitge & Joubert \(2021\)](#) noted that the freedom afforded by a bicycle often encouraged women to cycle more compared to men, they noted that women are less likely to have permanent jobs that will require regular use of public transport and so they found cycling more accessible.

These findings align with insight from Bangladesh where [Mohiuddin et al \(2022\)](#) noted that women are more likely to cycle for commuting trips and not for recreational trips. [Hayhurst et al \(2022\)](#) reiterated the huge value of bicycles for women as they contextualised their study in Uganda, they explored how bicycles are being adopted to key sustainable development goals, providing access for women, and ensuring gender equality. According to a study in Ghana, [Timpabi et al \(2021\)](#) recognised some cultural and societal norms that shape women's cycling behaviour suggesting that women do not have time to learn to cycle as they are busy with chores and other household tasks. This corroborates [Goel et al. \(2022\)](#) findings that there is almost no cycling among females in Accra, Ghana and Cape Town, South Africa.

While studies [Yang et al \(2022\)](#) examining gender differences in active travel among older adults in Japan, and [Graystone et al \(2022\)](#) examining gendered perceptions of cycling safety in Canada are emerging to expand our knowledge about women cycling behaviour, there is little understanding of the explicit active transportation experience of women in developing countries. These women are sandwiched between disparity of societal expectations ([Hayhurst et al, 2022; Timpabi et al, 2021](#)), insufficient transport

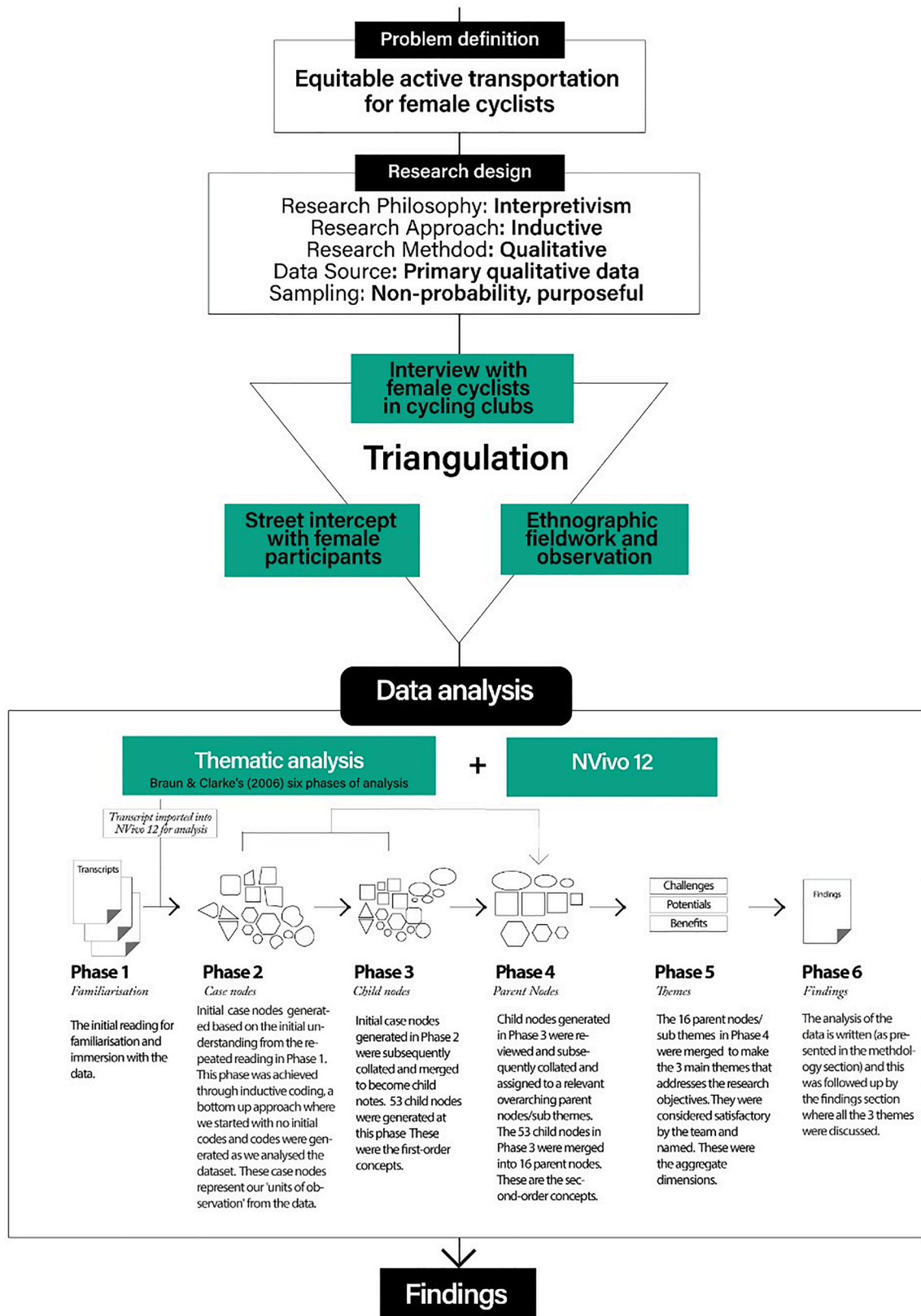


Fig. 1. Research design. Adapted from Braun & Clarke (2006), Badejo et al (2022) and Kaur et al. (2022).

infrastructure such as clearly marked bike lanes or fully separated bike lanes, along especially major roads which are present in many developed countries (Krizek et al., 2005) and the inherent gendered-nature of cycling (Prati, 2018; Gerrard et al., 2012). Specifically, this study aims to explore the experience of female cyclists, to understand the challenges, opportunities and initiatives for encouraging equitable active transportation in a country, where cycling is hardly recognised as a mode of transport, with no provision for basic cycling infrastructure and inadequate city planning general equity measures (Mogaji, 2022b).

### 3. Methodology

#### 3.1. Qualitative research

This research is contextualised in Lagos, Nigeria, and it is significant for several reasons. Lagos is one of the largest, most densely populated cities in the world (Soetan et al., 2021), with an estimated 20 million people across 3577 km<sup>2</sup>. It is Africa's most populous city with the highest population density in Nigeria (Mogaji, 2020) and serves as a template for many other developing countries as they often share the same struggles with a growing population, insufficient infrastructure and limited land size (Abdulquadri et al., 2021; Mogaji et al., 2022). Thus, it is anticipated that insights about Lagos will be applicable in other cities around the world that need to address their sustainable transportation initiatives. While most studies have focused on developed countries with well-developed transport networks and growing cycling adoption (Goel et al., 2022; Yeboah & Alvanides, 2015; Yeboah et al., 2015), there is a shortage of insights about cycling in many emerging economies and developing countries worldwide (Mogaji, 2020; Acheampong, 2017), and especially insight about female cyclists, their experiences and challenges.

The study employed a qualitative research methodology to understand equitable active transport for female cyclists. Recognising the positionality of the study, the research team is made up of two principal investigators (PIs) (one male and one female) and four employed research assistants (RAs) (three females and one male). Data were collected through different sources – ethnographic observation (by one male RA and one female RA), street intercepts with female participants (by the other female RA) and semi-structured interviews with female cyclists (third female RA). This is a methodological approach similar to the study of Mogaji (2022b). This qualitative approach allows for a better understanding of the lived experience of the people in the city; through observation and conversation, the study was able to triangulate the findings, which allows an appreciation of “whole dimensions of social experience” (Mason, 2006, p.13). Fig. 1 presents a graphical illustration of the research design.

#### 3.2. Data collection

Data was collected through different means over four weeks between November and December 2021 in Lagos.

#### 3.3. Ethnographic fieldwork

Qualitative data was collected through four weeks of ethnographic fieldwork across different locations, cycling clubs and cycling routes in Lagos. The fieldwork involves riding with female cyclists in cycling clubs, observing their struggles, understanding their routes, observing gender discrimination, and exploring how other road users engage with them. As noted by Hairon et al., (2017, p. 82), this was “intimate, intensive, and prolonged fieldwork” the fieldwork provided the opportunity to ask clarification questions, to record different activities and take photographs of women's lived experience on the roads of Lagos. As Pritchard et al. (2015) noted that one of the central tenets of ethnography is physically being there to observe, there were many prolonged observations and conversations with the cyclists, the cycling club leadership, prospective cyclers coming in for training, and allied support service providers like the mechanics and cycling store owners; ultimately, these various engagements led to an “emerging pattern of dynamic behaviour” (Macpherson and Holt, 2007, p. 186), which will be subsequently reported in the findings section.

**Table 1**  
Characteristics of female cyclist participants.

| Characteristics    |                       | Frequency<br>n = 21 | %    |
|--------------------|-----------------------|---------------------|------|
| Gender             | Female                | 21                  | 100  |
| Age                | 18–25                 | 2                   | 9.5  |
|                    | 26–35                 | 12                  | 57.1 |
|                    | 36–45                 | 7                   | 33.3 |
| Highest Education  | No formal             | 1                   | 4.8  |
|                    | Secondary             | 5                   | 23.8 |
|                    | University Degree     | 15                  | 71.4 |
| Employment         | Student               | 3                   | 14.3 |
|                    | Unemployed            | 1                   | 4.8  |
|                    | Employed              | 11                  | 52.4 |
| Cycling Experience | Self Employed         | 6                   | 28.6 |
|                    | Less than 1 year      | 2                   | 9.5  |
|                    | Between 1 and 5 years | 10                  | 47.6 |
|                    | More than 5 years     | 9                   | 42.9 |

### 3.4. Semi-Structured interview

The female cyclists in the cycling clubs were approached to participate in the interview, to properly understand their experience of and attitude towards equitable active transport beyond what has been observed during the ethnographic fieldwork. These female cyclists often come together on a weekly basis to cycle together in the cycling clubs, which provides a secure and safe social environment; they also ride together with male cyclists in these clubs. Twenty-one female cyclists from different cycling clubs agreed to be interviewed for the research; they were all above 18, predominantly employed ( $n = 11$ , 52.4 %) and had between 1 and 5 years experience of cycling in Lagos ( $n = 10$ , 47.6 %). Participants' demographic information is presented in [Table 1](#). The interviews were carried out face to face in December 2021 after informed consent had been received from the participants and other ethical considerations had been observed. The participants were asked a series of open-ended questions around their motivation for cycling, their experiences as female cyclists in a busy city like Lagos, their understanding of equitable active transportation, their assessment of social and spatial disparities of different active transportation modes, challenges for female cyclist in Lagos, impact of the built environment on their cycling activities, and future prospects and opportunities for female cyclists in the city. The interviews were audio-recorded, as agreed with the participants, and lasted between 37 and 61 min (average: 48 min).

### 3.5. Street intercepts

Female participants were approached at different locations in Lagos, close to the cycling clubs to understand the public's understanding and perception of cycling as an equitable transport mode. While [Mogaji \(2022b\)](#) adopted a similar approach and intercepted the general public, this present study specifically focuses on female participants, to listen to their stories, and understand their perspectives and what they think of cycling in Lagos. These are individuals who will seldom cycle and may not experience the huge benefits of cycling, therefore, it was considered important to recognise the "inequities among women in accessing infrastructure for active travel, the use of [the] bicycle as a form of active transportation and any pre-existing cultural norms around active travel (such as male-oriented bicycling groups and gender stereotypes)" ([Dadashova et al., 2021](#)). Female participants passing by these cycling clubs, seeing the congregation of cyclists, were approached and questioned about cycling as a form of active transportation. Among the 141 prospective participants approached over the four weeks, 61 people obliged the call for a short interview. [Table 2](#) presents the demographic information for the street intercept participants. Considering the participants were often in a rush and were previously prepared for the interview ([Mogaji, 2022b](#)), huge consideration was given to the interview duration and the questions were brief and short to elicit their understanding. The interviews lasted for 12 to 23 min and had an average duration of 18 min. The conversations were audio-recorded, and short answers were collected via a survey on a tablet.

### 3.6. Data analysis

Once the fieldwork was completed, all of our collected data, including anonymised interview transcripts, fieldwork diaries and photographs, were exported into NVivo, a qualitative data analysis software package, and subsequently thematically analysed using [Braun and Clarke's \(2006\)](#) six phases of analysis (see [Fig. 1](#) for the research design). This process involved familiarisation with and immersion in the data, such as reading the interview transcripts and the field notes and looking over photos/videos. This phase was followed by generating themes (child nodes) highlighting the challenges and opportunities that emerged from the participants' transcripts and direct observations. These child nodes were subsequently evaluated and merged to form parent nodes. After a detailed analysis and discussion with colleagues, the analysis concluded with a thematic map of the data. [Table 3](#) presents a summary of the 55

**Table 2**  
Characteristics of street intercept participants.

| Characteristics    |                          | Frequency<br>n = 61 | %    |
|--------------------|--------------------------|---------------------|------|
| Gender             | Female                   | 61                  | 100  |
| Age                | 18–25                    | 11                  | 18.0 |
|                    | 26–35                    | 18                  | 29.5 |
|                    | 36–45                    | 11                  | 18.0 |
|                    | 46–55                    | 14                  | 23.0 |
|                    | 56+                      | 7                   | 11.5 |
| Education          | No formal                | 10                  | 16.4 |
|                    | Secondary                | 23                  | 37.7 |
|                    | University degree        | 28                  | 45.9 |
| Employment         | Student                  | 10                  | 16.4 |
|                    | Unemployed               | 7                   | 11.5 |
|                    | Employed                 | 16                  | 26.2 |
|                    | Self employed            | 20                  | 32.8 |
|                    | Retired                  | 8                   | 13.1 |
| Cycling Experience | Yes                      | 10                  | 16.4 |
|                    | No- don't have the skill | 23                  | 37.7 |
|                    | No- not Interested       | 13                  | 21.3 |
|                    | No- health and safety    | 15                  | 24.6 |

initial codes (first-order concepts, third phase of thematic analysis) that were later sorted into 16 themes (second-order concepts, fourth phase of thematic analysis) and finally into three main themes addressing the challenges, initiatives, opportunities and benefits of equitable active transportation (aggregate dimension, fifth phase of thematic analysis).

### 3.7. Data credibility

Considerable efforts were made to ensure the credibility of the data and the emerging findings, as [Karjaluoto et al. \(2015\)](#) note that data triangulation supports the validity of a study. Data from different sources were triangulated to gain a holistic view of the cycling challenges in Lagos. Member check, which allows the participants to read the interview transcript and confirm it is the tangible

**Table 3**  
Summary of sub and main themes.

| S/n | Initial codes<br>(first-order concepts) | Sub themes<br>(second-order concepts) | Main<br>(aggregate dimension) |
|-----|---|---------------------------------------|-------------------------------|
|     | Boy's things                            | Home front/ Socio-demographic         | Challenges                    |
|     | Parent's role                           |                                       |                               |
|     | Socio-economic disparities              |                                       |                               |
|     | Learning to cycle                       |                                       |                               |
|     | Confidence to cycle                     |                                       |                               |
|     | Going against the norm                  |                                       |                               |
|     | Tomboy                                  | Stigmatisation/ Social barriers       |                               |
|     | Poor people                             |                                       |                               |
|     | bikeshare access                        | Accessibility                         |                               |
|     | No access to bicycle                    |                                       |                               |
|     | Not aware of active transportation      | Personal barriers                     |                               |
|     | No skill                                |                                       |                               |
|     | Too hot                                 | Weather                               |                               |
|     | Sweaty                                  |                                       |                               |
|     | No cycling lane                         | Infrastructure                        |                               |
|     | Poor Roads                              |                                       |                               |
|     | Congested road                          |                                       |                               |
|     | Changing facilities                     |                                       |                               |
|     | Cycle rack                              |                                       |                               |
|     | Nature of work                          | Travel activities                     |                               |
|     | Traveling to work                       |                                       |                               |
|     | Travelling to school                    |                                       |                               |
|     | Travelling for leisure                  |                                       |                               |
|     | Daily commute                           |                                       |                               |
|     | Drivers' attitude                       | Safety and Security                   |                               |
|     | Peoples attitude                        |                                       |                               |
|     | Congested city                          |                                       |                               |
|     | Non-conducive route                     |                                       |                               |
|     | Emphasis on motorised transportation    |                                       |                               |
|     | Verbal harassment (shouting)            | Harassment                            |                               |
|     | Sexual harassment                       |                                       |                               |
|     | Physical harassment                     |                                       |                               |
|     | Learning environment                    | Cycling Club                          |                               |
|     | Safe environment                        |                                       |                               |
|     | Social support                          |                                       |                               |
|     | Sense of community                      |                                       |                               |
|     | Cycle Hiring                            |                                       |                               |
|     | Building the skills of girls            | Cycling training                      |                               |
|     | Changing attitude towards cycling       |                                       |                               |
|     | Social responsibility                   |                                       |                               |
|     | Support different initiatives           | Cycling foundations and organisations |                               |
|     | Create awareness                        |                                       |                               |
|     | Provide bicycle                         |                                       |                               |
|     | Lobbying                                |                                       |                               |
|     | Keeping fit                             | Health Benefit                        | Benefits                      |
|     | Decreased body fat                      |                                       |                               |
|     | Cardiovascular fitness                  |                                       |                               |
|     | Less noise                              | Environmental Benefit                 |                               |
|     | Less pollution                          |                                       |                               |
|     | Safer neighbourhood                     |                                       |                               |
|     | Save cost on transportation             | Economic Benefit                      |                               |
|     | Save cost on car maintenance            |                                       |                               |
|     | Just for fun                            | Social Benefit                        |                               |
|     | Running Errands                         |                                       |                               |
|     | Meeting new friends                     |                                       |                               |



expression of what they said, was also carried out (Merriam & Tisdell, 2015). As adopted by Mogaji and Nguyen (2021), the clustered and grouped themes are presented in Table 3 to showcase the different stages of the data analysis. This approach was also adopted to enhance the trustworthiness and traceability of the study.

### 3.8. Findings

#### 3.8.1. Challenges

**3.8.1.1. Socio-demographic background.** This provides an initial insight into the challenges faced by both female cyclists and intending cyclists. Participants shared their experience growing up with family members who considered cycling an activity for boys and suggested girls should not get involved. One of the participants shared her experience during Christmas while growing up, where boys were given bicycles as a gift. This notion was further corroborated by the opinions of participants in the street intercept where they reflected on past decisions to buy bicycles for boys. An older woman in the street intercept, age 56+, said: *"It is interesting you mentioned this, I never thought my daughter needed to ride a bicycle, we all know it's an activity for the boys."* Another woman also corroborated it with comments about extended families, saying: *"You see uncles bringing bicycles and football for boys and teddy bears for girls. That's the way we have conditioned these children from a young age."*

The socio-economic background of the family also presents a challenge with regard to affordability and access to bicycles. While some participants believed that their parent(s) could afford to buy a bike for them, some participants said they had to borrow their first bicycle. One of the female cyclists said: *"There is this boy in my area that took me to a place to borrow a bike and he taught me to ride, because my parent couldn't afford one for me."* The neighbourhood in which a participant grew up was also found to influence their access to active transportation. One of the female cyclists said: *"I grew up in a very rough neighbourhood and you can't even have a place to cycle, so cycling wasn't a thing for me growing up."* Another female cyclist, however, had a different experience: *"I acknowledge my background, we weren't very rich, but I grew up in a residential estate with people flaunting their bikes on the street; it was easy to pick up and learn and even ask your parent for a bicycle."*

On a personal note, female cyclists recognised that they were going against the norm when they decided to cycle. They noted that it was their choice to cycle. This decision was something they had to make even when there was opposition from some neighbours and family members. One of the participants said: *"It was a secret for some time that I can cycle. I didn't want my parents to know until my mum found me cycling on the street; she was shocked and said she [would] report me to my dad. I had to beg her [not to]."* Seven of the female cyclists shared their experiences of being called a *tomboy*, which was considered an expression for girls doing what boys were doing, which included cycling. Participants from the street intercept also noted that they had some restrictions for their female children about cycling, especially because it is too active, unsafe and not built for females. One woman, aged 36–45, said: *"I don't feel [it is] safe for my girl to cycle in Lagos, she is not built for that."* Another woman said: *"Even women driving in Lagos is hard work; cycling for women is a different thing. You need to have a different mentality to do that."*

#### 3.9. Accessibility and personal barriers

Access to bicycles was presented as a challenge, especially for those with cycling skills. These individuals noted that they either had to buy a bicycle, which they no longer use or rent one (and they were unaware of where to rent one from). One female participant on the street intercept, aged 46–55, self-employed, said: *"I used to cycle when I was a girl but, at this age, I don't think I want to cycle again. I don't think I should go and buy a bicycle; my children will laugh at me."* Another woman, aged 55+, said: *"I will just stick to walking. I have been doing that for over 50 years, no need to stress myself cycling."*

Most of the participants recognised that they live in a city which still struggles with institutional and infrastructural challenges and things are not at the level they expect them to be. These participants recognised that the attitude to cycling is slowly improving, highlighting the benefits of COVID-19 as people explore other forms of transportation. The cyclists noted that there is limited access to bike sharing, which further discourages people from cycling. One of the cyclists said: *"I can't really blame the bike start-up companies. It is not economically viable to put bicycles everywhere when the attitude towards cycling has not improved."* Evidence from the ethnographic fieldwork confirms that these bikes are not readily available. Awa Bike was the only visible bicycle sharing system (BSS) but was only found around the Lagos State University campus and the Government secretariat.

This limited access further highlights the inequity in active transportation as many people may have to buy their own bicycles but, considering the spending power of many commuters, that may not be an urgent need. Another participant shared her concern, saying: *"If these bikes are not readily available in Lagos, many people will not have access to cycling unless they buy their own bikes but how many can afford that now?"* Additionally, when the street intercept participants were asked about renting a bicycle from a BSS to move around the city, 68.9% (n = 42) had no knowledge about such a system, 31.1% (n = 19) were aware of BSSs but 10 of them said they did not know where to rent a bicycle around their area. Five participants felt they could not use it as they did not feel comfortable with it, while the remaining four said they could not be bothered to download the app and enter their card details. Only five people who were aware of BSSs said they had used it and would use it again.

#### 3.10. Weather

The Lagos effect was recognised by participants as having a great influence in reducing the inequalities in active transportation.

Greatest among these Lagos effects is the weather. Participants felt that the weather is not conducive enough to always encourage active transportation. Female cyclists reiterated that they try to cycle in the morning or evening when the weather is more conducive; they acknowledged that cycling in the hot weather of Lagos can be uncomfortable and discourage those who want to use active transportation. One of the participants said: *"We need to be realistic as a woman. I am mindful of my skin, the sun and keeping my makeup intact. There are sometimes [when] I choose not to cycle but take an Uber."* Another female cyclist said: *"I don't cycle every time; the sun in this Lagos can be extra hot and you sweat profusely. As a lady, personal hygiene is extra important, so you need to use your brain [think wisely]."* Similarly, 83.6 % (n = 51) of the street intercept participants agreed that the scorching sun can be a discouraging factor. One participant said: *"If I have money, I will take [an] Uber and enjoy the air conditioning. I am walking to the bus stop now because I don't have money for an Uber, this sun is not playing."*

### 3.11. Infrastructure

Evidence from our ethnographic fieldwork shows that cyclists share the same road space with motorised transport which is not safe at all considering how unsafe the road environment is due to the reckless behaviour of the drivers. This risk to the cyclists is further exacerbated in a congested and densely populated city like Lagos – a large number of people struggling with insufficient transport infrastructure presents a unique challenge for the cyclists, especially during the rush/peak hours when the roads are congested. This was further corroborated by evidence from the field notes by the researcher in the Ojodu Berger area of Lagos, observing that the roads were busy, there was no dedicated cycle lane and cyclists were seldom seen using this route. In the space of two hours' observation, only two cyclists were seen, and they were both males. It is not surprising to see that people choose to cycle on the weekends when there is reduced traffic and congestion.

The non-availability of changing rooms was another issue that emerged during the interviews, especially for female cyclists who feel they need to take care of themselves after cycling but these facilities are not readily available. One of the female cyclists said: *"Imagine cycling to work on a Monday morning and [having] no place to change [in]to [a] proper dress and have a shower; you will just be smelling all day."* Another female cyclist said: *"I was on my period and had to cycle; I knew I [would] be going home after that ride, so I could manage myself and my personal hygiene, but I can't do that any day when I don't have a place to clean up."*

The challenges around infrastructure have further highlighted the inequity with active transportation and not just for the female participants but for cyclists in general. The participants recognised that there is an emphasis on motorised transportation compared to cycling, and this, therefore, reinforces their fear about cycling. Participants from the street intercept said: *"Look around you, where are they spending the money? On roads. Cycling is not on their agenda; you need to think twice before cycling in this state."* According to the participants, this further makes the roads more congested and unsafe for people to cycle. Over half (57.1 %, n = 12) of female cyclists, however, acknowledged that there is investment in creating cycling lanes and our ethnographic fieldwork recognises this investment, but these are not equally spread around different locations around the city.

### 3.12. Travel activities

The nature of work and activities in the city was also found to have an impact. The employed feel less obliged to ride compared to those who are self-employed, who choose to manage their business activities around the time that suits them. One of the participants, who works in Lagos Island, a part of the city, said: *"I wish I could cycle to work but I know it's not safe, the roads are busy and it's a long distance for me"*, while another participant, who is self-employed, said: *"I do cycle to my clients' meeting and my office; I choose the time that is convenient, and I can manage my appearance."* Likewise, those going to school/university are also not willing to cycle during the day. One of the female cyclists said: *"I attend lectures during the day and I only cycle during the weekend with the club; I don't feel comfortable cycling to the university."* There are instances of older females during the street intercepts (n = 3, age 56 + ) who said they only cycle in their residential estate and solely for health benefits while others (age 36–45, n = 4, and age 46–55, n = 5) shared their experience about the different activities they get involved during the day and said cycling is not conducive to them, but walking and using public transport are. One of the women (aged 46–55) said: *"I need to drop my child in school, go to the market, attend midweek service and go to my shop; cycling is not convenient for me to do all these activities as a woman."*

### 3.13. Safety and security

Those who chose to cycle to get to their various activities, further highlighted their limitations with regard to their travel pattern. Participants noted that they seldom cycle to work but just on social recreational rides. Some further noted that they did not feel safe riding to work, school or religious activities. They noted that these activity locations can often discourage them because they are not conducive to cycling, are unsafe and can be challenging. Five (23.8 %) of the female participants shared their concerns about not having a secure place to park their bicycles when they attend social events. One of them said: *"I am mindful of keeping my bike safe and therefore I am very selective of where I take my bicycle."* This concern about security was further corroborated from records in the field notes where it was observed that people were leaving their bikes in shop entrances because there was no space to securely put them.

### 3.14. Harassment

Many participants (85.7 %, n = 18) reported their experiences with harassment when cycling as a problem that needs to be addressed with policies and relevant education. They noted the discouraging attitude of some drivers who drive recklessly, thereby

jeopardising their safety and putting their lives at risk. Evidence of this reckless driving was also observed during the ethnographic study and recorded in the field note, where drivers had little to no regard for the female peloton cycling on the road; they were moving close to them and dangerously overtaking them. It was observed that this can be intimidating for the female cyclist. One of the cyclists said: *“These Lagos drivers see us as competitors, they harass us with their horns, shouting and driving recklessly. This is unfair and you can imagine why many more people will avoid cycling.”* Street intercept participants also alluded to these concerns, feeling that drivers’ unsafe driving behaviour in Lagos did not encourage people to cycle. One of the street intercept participants said: *“People are even scared of walking and now we are talking of cycling – not yet on these Lagos roads.”* Beyond the attitude and behaviour of the drivers, female cyclists also highlighted their concerns about the attitude of other road users, especially when they become verbally aggressive and touch them inappropriately. One female cyclist shared her concerns: *“People think we are competing for the limited available spaces for walking, you see them shouting and sometimes using derogatory words.”*

### 3.15. Initiatives and opportunities

These themes highlight the different initiatives to address some of the challenges and encourage equitable active transportation. Insights from the participants reiterated opportunities being offered by individuals and charity organisations to encourage more females to cycle in Lagos.

### 3.16. Cycling clubs

These are groups of people, often more affluent individuals within the city, coming to cycle on a regular basis. Though these clubs are for recreation, they offer huge opportunities to raise awareness about cycling, improve attitudes towards cycling for every-one and, importantly, provide a supportive environment for female cyclists. The group draws attention to cycling, especially when they cycle together in peloton, people see them, and they become more curious. Eighty-one percent (n = 17) of the female cyclists also acknowledged these clubs as a place for them to develop their confidence, find a support network and develop their skills, meet like-minded people and have a sense of community. One female participant summarised her experience by saying: *“This club is a hub of like-minded [people], we have [a] similar and shared interest, and you get supported to do what you like.”*

### 3.17. Cycling training

While the cycling clubs are there to provide support and community for people who have experience in cycling, there are a growing number of initiatives to train and support people who do not know anything about cycling. The following are some of the prospects that are available to reduce the inequalities in active transportation. The ethnographic fieldwork revealed that more females are taking an interest in cycling. On one of the Saturdays when the cycling club organised a training session, seven of the 10 participants were females. The effort of the Girls Bike Club needs to be acknowledged in this space. It provides cycling training for young girls between the ages of 10 and 16, raising their confidence and giving them skills for life. It is also important to recognise the individual efforts of female cyclists who teach their neighbours, sisters, nieces and cousins how to cycle. One female cyclist said: *“My interest in cycling has motivated my brother to buy a bicycle for my niece and I have taught her to cycle. Soon, we will be cycling on the streets of Lagos.”*

### 3.18. Cycling charities

There are currently many foundations and organisations working on raising this awareness and changing the narratives of cycling as an accessible form of active transportation. There are organisations like Rethinking Cities, organisers of #BikeableAlausalkeja, the African Cycling Foundation promoting grassroots cycling and empowerment through bicycles, Girls Bike Club focusing on training, empowerment, rights of young girls, and Lagos Urban Development Initiative, a non-governmental organisation that brings organisations and people together to advocate for a more inclusive, liveable and sustainable Lagos (LUDI, 2022). These organisations are anticipated to play a crucial role in encouraging active transportation for female cyclists and therefore funding and grants will be important to allow their work to have a wider reach and impact.

### 3.19. Benefits

Embracing the benefits that cycling brings allows female cyclists to become further involved in active transportation, albeit going against the norm. These female cyclists recognised the health, social and environmental benefits of cycling, noting that they are not polluting the environment and still keeping fit. The only unemployed female cyclist shared her insight about the economic benefits: *“At this point in time, I do not have a job. [I am] actively searching for a job, but, with my bicycle, I am still able to move around and access opportunities. I save money on transport.”* The social benefits were also an important motivating factor for the female cyclists as they reflected on their equitable access to cycling as a form of active transportation. They shared their experience of the cycling social club where they can interact with like-minded people. They see the club as a group to support their drive in terms of active transportation. One female cyclist said: *“You feel empowered when you are in the cycling club, you get the adrenalin for the support of the peloton and pack of riders.”* However, many participants in the street intercepts were not aware of the benefits of cycling; only seven (11.5 %) people mentioned that the benefits of cycling were a reason for adopting cycling as a form of active transportation. Often, the negative experiences seemed to overshadow their judgment about the value of cycling. One woman in the street intercept said: *“The bad thing of*

cycling in Lagos is more than the advantages. You want to cycle in your gated community to be safe and don't just come out to city on the main road.”.

Those who cycle recognised that they often did so for fun and not necessarily to get to various activities. This was an idea that cut across the female cyclists in the cycling club and those in the street intercepts. Female cyclists in the club noted that they joined the club to have fun, explore the city and keep fit. Those in street intercepts who cycle noted that their neighbourhood allows for that; one participant said: *“I simply cycle for fun with the family around the estate. The estate has good roads and, even though we don't have a dedicated cycle lane, it's a safe environment for me and the kids.”* Another woman from the street intercept said: *“I cycle for fun in my area, try to go to the minimart in the area and come back home.”* Another woman said: *“The estate people laugh at me, not that it is [a] bad laugh but just surprised that I cycle, but I know my limit, it doesn't pass that area. I can't cycle on Lagos streets.”* This participant's vignettes iterated the growing awareness about cycling for women, while they recognised their socio-demographic background and personal barriers, they are aware of the benefits and making effort, albeit in their own little way, to be very active.

#### 4. Discussion

This study set out to explore the prospects of equitable transport access for female cyclists. The study is contextualised in Nigeria with its inherent challenges around infrastructure, growing population and policy limitations. Beyond the insights from developed countries with more developed transport infrastructures, especially in North America (Lee et al., 2017; Bernatchez et al., 2015; Agyeman & Doran, 2021) and Oceania (Russell et al., 2021; Bassett et al., 2020), this study presents insights into the lived experience of female cyclists in developing countries, recognising their inherent challenges and limited access to equitable transportation through cycling.

With limited theoretical understanding of equitable access to active transportation (Lee et al., 2017; Jahanshahi et al., 2021), this study contributes to knowledge on this subject matter, specifically focusing on an under-researched and under-represented area (developing country) and socio-demographics (female cyclists). Through our sampling and methodological approach, our study builds on previous studies that have explored cycling in developing countries (Acheampong, 2017; Acheampong & Siiba, 2018) and specifically on studies that have explored active cycling for women. The study's findings around safety concerns, access to bicycles and cultural perspectives on cycling align with Russell et al.'s (2021) findings on women's cycling in a New Zealand city.

The Lagos, Nigeria, context of this study highlights the unique challenge of the home front and the social demographic background and access to cycling. It is not surprising to see Mogaji (2022b) highlighting the attitude towards cycling as a challenge in Lagos; people have not come to fully realise the benefits of cycling as an integral part of the transport network. Despite this, it is not surprising to see that women are experiencing different challenges as they consider cycling. Their personal barriers and the limited infrastructure coupled with fears about safety and security contribute to these challenges. Amidst these challenges, we recognise potential opportunities to encourage active transportation, especially from the cycling clubs, but this appears to be more suited for better-off women to ride recreationally and is still not breaking the barriers or leading to more women cycling for transportation.

From a personal hygiene perspective, our findings about the non-availability of changing rooms present an infrastructural challenge worth considering by key stakeholders, especially in workplaces. These challenges align with studies by Mogaji (2022b) and Simons et al (2013) highlighting the weather condition as an influencing factor for active transportation and Prince et al (2021) establishing an association between workplace showers/changing rooms and walking and cycling, especially with regards to age and gender. Nobody likes to start the day sweaty or rain-soaked, and with Avila-Palencia et al (2017) showing that employees who cycle to work experience up to 50 % less stress than those who take the car or public transport, it is imperative for organisations to consider providing these facilities to encourage active transportation within their workforce.

In addition to the role of cycling clubs for better-off women, inequity about access to bicycles is also worth considering. Our findings indicate that individuals are responsible for buying their own bicycles, and access to equitable bicycle infrastructure, BSSs, and dock-less bicycle sharing systems (DBSSs) is very limited, posing barriers to active transportation, especially for women with diverse travel needs and activities (Russell et al., 2021), and possibly worse for those with disabilities (Mogaji & Nguyen, 2021). Recognising the various intersectionality between the country context (infrastructure, commuters' attitude, built environment) and gender in our study, we address call for a holistic understanding of the various challenges, especially the socio-economic and attitudinal factors that may shape attitude towards cycling.

Though our study has focused on Lagos, a metropolitan city in Nigeria, we have not identified any cultural, ethnic or social norms that may influence women's attitude to cycling, beyond cycling being seen as a masculine domain, aligning with findings from Song et al. (2019). It is, however, important to reiterate that Lagos is not a representation of the economic and social norms of Nigeria; Lagos has its exceptionalism (Mogaji, 2020) and we cannot assume lessons from a unique megacity are transferable to other cities. We acknowledge that there could be similar incidences in places like Karachi, Pakistan, where women may be socially restricted from travelling alone (Iqbal et al., 2020) and this further influences their willingness to explore cycling as a mode of active transportation.

##### 4.1. Theoretical contribution

This study contributes to equitable active transportation in many ways. First, it provides much-needed insight into equitable active transport by focusing on the female gender and cycling as a mode of active transportation. It identifies the unique feature of the person (a female), their travel patterns and how they manage despite the challenges of where they reside.

Second, the study provides insights from a developing country and highlights the challenges and experiences of women and what they are doing. Insights from this part of the world highlight additional struggles for women considering that many developing

countries do not have equitable access to transportation. This study highlights the additional layer of barriers for women who choose to cycle in a country with insufficient infrastructure and often a negative cultural attitude towards women cycling. It recognises the growing prospects of cycling clubs as a safe, secure and social environment for women, the girls' cycling training centres teaching girls how to cycle and organisations providing bicycles for disadvantaged students who need to cycle to school.

Another key contribution of this study is the presentation of the key challenges, initiatives, opportunities, and benefits of active transportation in a developing country. The study illustrates the need for policymakers, practitioners, and planners to recognise the unique characteristics of the people, the place in which this transport initiative will be introduced, the travel pattern of the people, their existing problems, the various initiatives, opportunities and benefits of active transportation. The study calls for a place-centred approach to active transport development.

Methodologically, this study contributes to an ongoing quest to have a better understanding of incorporating equity concerns in the appraisal of active transportation projects (Jahanshahi et al., 2021). Thomopoulos et al. (2009) provide a critical review of practice and propose a multi-criteria analysis (MCA) and cost-benefit analysis (CBA). Russell et al., (2021) also adopted a focus group to explore equitable active transportation and this present study further introduces ethnographic fieldwork, which provides a direct and up-close insight into the lived experience of those individuals who may be disadvantaged. It goes beyond what they can say or fill out in a questionnaire as researchers, being present in their midst and actively involved to understand their struggle, critically evaluate the equity concerns and provide actionable insights, aligning with the call for a better representation of diverse views in transportation planning (Lee et al., 2017).

#### 4.2. Managerial implications

This study provides relevant implications for managers, policymakers, practitioners and stakeholders involved in planning, developing and managing active transportation, especially with a focus on women's experience of cycling. There is a great need to change the attitude towards cycling to ensure that people see the value in it as a form of active transportation. With education, awareness and investment in infrastructure, people should begin to see cycling as an integral part of the transport network and positively influence the societal expectation of women and cycling, reducing women's exposure to harassment, and encouraging women to cycle more (Goel et al., 2021; Nguyen & Mogaji, 2022a).

It is imperative to reiterate the need for investment to support active transportation. This includes improving the built environment, creating cycle lanes, increasing the cycling network, decongesting the roads and removing street traders who obstruct active transportation (Farinloye et al, 2019, Lyons, 2020; Mogaji, 2022a; Berghoefter & Vollrath, 2022). There should be an effort towards modal equity strategies, possibly restricting driving in order to slow or reduce vehicle traffic (Mullen et al., 2014) to ensure the safety of those using non-motorised transport. Beyond the top-level government responsibilities, it is imperative for private organisations including companies, schools and religious bodies to put facilities in place to support active transportation. This could include providing changing facilities for personal hygiene and bicycle racks for storing bicycles. As seen with Awa Bicycle Hire at the Lagos State Secretariat, large organisations and universities with campuses can have cycle and scooter clocking stations to allow people to use active transportation on campus (Mogaji, 2022b).

There should be an ongoing awareness about the social, health and environmental benefits of cycling and walking, training for those who are not able to cycle or use a scooter, and the ensuring of equitable access to different modes of active transportation (Mogaji, 2022a; Nguyen & Mogaji, 2022b). We found evidence of girls' cycling clubs and other cycling charities supporting female cyclists. Public and private organisations should be supporting these initiatives to enhance the adoption of equitable transportation. There is also a call for procedural equity (Bullard, 2004; Bierbaum et al., 2021), an effort towards representation in the decision-making process (Lee et al., 2017) to ensure that stakeholders are well represented in decision-making about active transport initiatives. This means having diverse groups (including women, disabled and older commuters) involved in the planning and designing of the infrastructures (Mogaji et al., 2022).

Additionally, it is important to have a better understanding of travel patterns from a record of how people are cycling. This information is needed to properly plan and manage travel demands. In the case of Lagos, Nigeria, there was no record of cycling data, and it was not surprising that Goel et al.'s (2022) study of gender differences in active travel across 17 cities could not capture information about Lagos, one of the most populous cities in the world. Policymakers should endeavour to put mechanisms in place to collect data on land use, travel behaviours, travel patterns and different modes of active transportation being used. It is imperative to identify those cycling for fun and to work, the percentage of males and females cycling, and also the percentage of vulnerable individuals who are using active transportation. This study adds to the growing call for a quality data set on travel patterns and behaviours for non-motorised transportation (Iacono, Krizek, & El-Geneidy, 2010; Rafiq and McNally, 2021; Xu, 2014). This information will enhance the assessment of social and spatial disparities of different active transportation modes, help to estimate active transportation demand in underserved communities and to develop initiatives that will promote equity in active transportation (Dadashova et al., 2021).

## 5. Conclusion

This study has explored the prospects of equitable active transportation; it has specifically focused on the experience of female cyclists in Lagos, Nigeria. The study recognises that, while there is growing interest in active transportation, there are still many institutional, cultural and structural challenges that are inhibiting the full integration and adoption of equitable active transportation. This study makes a theoretical contribution to the growing body of work on active transportation by qualitatively establishing the challenges, initiatives, opportunities and benefits that can influence the planning and managing of equitable transportation, including

practical implications for key stakeholders.

It is important to reiterate that this is an exploratory qualitative study and, while efforts have been made to ensure the reliability and validity of the study through triangulation of data from different sources, this study, however, cannot be generalised. This limitation opens opportunities for future research – (i) to explore other forms of active transportation like walking, and (ii) to explore active transportation within a different context like another city or a rural area in a developed country. It is anticipated that these studies will further develop the existing body of work on active transportation and ensure equitable access for every-one, irrespective of their gender, social demographics or ability.

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### CRediT authorship contribution statement

**Emmanuel Mogaji:** Conceptualization, Methodology, Writing – original draft. **Uzundu Chinebuli:** Methodology, Writing - review & editing.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Data availability

Data will be made available on request.

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