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Wishful thinking? Addressing the long-term implications of COVID-19 for transport in Nigeria

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ABSTRACT

With their inherent economic and infrastructure challenges, developing countries must assess commuters’ travel behaviour and establish whether consumers’ desire for sustainable transport is feasible or merely wishful thinking. Using a qualitative research design, these issues were explored based on semi-structured interviews conducted with 72 participants across the six geopolitical zones of Nigeria. Findings suggest that the desires and dreams of the commuters are great, and they want to reduce their journeys, work from home, and do online shopping. However, when they consider the inherent challenges, they can only hope for a better future. COVID-19 has impacted the ownership or use of motorised and non-motorised transport, but this is also influenced by affordability, convenience, and awareness. Likewise, there are long-term effects on home and work location choices, but this is further influenced by the large informal economy of the country, job accessibility and the infrastructural developments across the country.

1. Introduction

Like other services worldwide, the coronavirus pandemic has affected the transportation service sector (Kim, 2021). There has been non-clinical intervention to manage the spread of the pandemic, which reduced the ridership numbers on public transportation, with passengers changing their travel behaviour, staying at home and not going out (Shamshiripour et al., 2020). Many academic papers have explored the impact of this pandemic on transportation (Conway et al., 2020; Mogaji 2021), but the long-term implications of the pandemic have not been fully explored. As we approach the ‘new normal’ and life after the pandemic, it is paramount to understand travel behaviours and preferences in the long term to enable future decisions on infrastructure development.

This study is contextualised in Nigeria, an emerging economy and a developing country. Understanding the implications of the pandemic for transport and the environment in a developing country like Nigeria is essential for various reasons. First, the country is the most densely populated in Africa, with an estimated 200 million inhabitants, that’s about 20% of the population of Africa (Mogaji and Nguyen, 2021a). There are inherent challenges with transportation in the country, especially considering its large population (Mogaji, 2020). Like many developing countries, there is insufficient infrastructure to meet the growing demands of commuters, and the pandemic has exacerbated this problem.

Second, studies have suggested that while the world is being affected by the pandemic, there is little theoretical understanding of its impact on developing countries. Kutela et al. (2021) conducted a bibliometric analysis of over 400 research articles published on the
effect of the pandemic on transportation. They found that publications were predominantly from developed countries like the UK, US and China, with little representation of most developing countries, especially Africa. They deduced that ‘since fewer studies have been performed in developing countries, it is fair to conclude that little is known of the Transportation-COVID-19 circumstances in developing countries’ (p. 9). Benita (2021) also conducted a bibliometric analysis of academic papers on travel behaviour and mobility during the disruption caused by the pandemic. They found the proportion of articles within the developed countries were significantly higher than that of articles focusing on developing countries in Africa. This lack of theoretical insight aligns with Mogaji’s (2020) comments that policymakers, infrastructure developers, and researchers in developing countries often ignore consumers’ travel perspectives and with this lack of understanding, travel experiences cannot be improved.

Third, most developing countries like Nigeria do not have more extensive transportation systems and infrastructures than developed countries (Dzisi and Dei, 2020, Kutela et al., 2021). However, they can plan and build their infrastructure to address the impact of the pandemic for transport and the environment and adapt their cities and public transport systems to changes in the travel demand brought on by COVID-19. As Kim (2021) noted, there will be significant synergy between the choice of travel mode, infrastructure to support sustainable transportation and collective actions. However, a theoretical understanding of the present and future implications is needed to make these adjustments (Mogaji and Nguyen, 2021a).

Based on this background, this research addresses this knowledge gap, presenting theoretical understanding and managerial implications relevant for stakeholders to address more significant societal problems, especially in providing sustainable transportation. This can afford the government, policymakers, practitioners, and commuters the opportunity to make a fresh start, address these challenges, and improve the wellbeing of citizens. Specifically, this study aims to understand the changes in tele-activities, the impact brought on by COVID-19. As Kim (2021) noted, there will be significant synergy between the choice of travel mode, infrastructure to support sustainable transportation and collective actions. However, a theoretical understanding of the present and future implications is needed to make these adjustments (Mogaji and Nguyen, 2021a).

A valuable theoretical contribution has been made in this study to research the implications of COVID-19 for transportation in several areas. First, moving insights beyond the impact of the pandemic on transportation in Western, educated, industrialised, rich and democratic societies has helped us comprehend how developing countries deal with and manage the impact of the pandemic, addressing some of the lack of theoretical insights raised by Kutela et al. (2021); Mogaji (2020). It is vital to solve the problem as other developing countries may experience a comparable situation. There is an urgency in addressing the implications of the pandemic for transport and the environment. This study provides essential information for policymakers on enhancing the travel experience in their countries. Second, the study highlights consumer engagement with teleactivities and transport modes, citing different cases that demonstrated how commuters balance their travel activities with their method of transportation and residential location. This builds upon previous works around the implication of COVID-19 on transportation, changing consumer travel behaviour and the experience of commuters in developing countries (Dzisi and Dei, 2020; Mogaji, 2020).

2. Literature review

2.1. COVID-19 and transportation

The impact of the pandemic on transportation has been hinged on restrictions to movement, social distancing policies and limiting non-essential travel, which most government has set around the world as one of the non-medical ways of addressing the spread of the pandemic (Kim et al., 2021; Nikolaou and Dimitriou, 2020). Considering public transportation like buses, trains and airlines involve moving commuters in a confined space, there is a high possibility of infectious transmission of the virus, and this has led to a considerable drop in public transit ridership in fear of COVID-19 (Wilbur et al., 2020; Dzisi and Dei, 2020; Gosce and Johansson, 2018). This restriction and reduced ridership have adversely affected the mode of transportation and had huge implications on the travel behaviours of commuters (Gosce and Johansson, 2018; Mogaji, 2020). These implications of COVID-19 on transport have been observed around air quality due to reduced carbon-emitting mode of transportation (Tian et al., 2021), socioeconomic activities (Bashir et al., 2020, Susilawati et al., 2020), religious activities (Mogaji, 2020) and even mental health (Dam et al., 2020).

Recognising that air transportation is probably one of its most significant initial drivers of the pandemic spread, Sun et al. (2020) investigated the effect of the pandemic on global air transportation. They established a link between countries with direct international flights and their exposure to the vast spread of the pandemic. Andreae et al. (2021) provided estimates of the damaging impact of the pandemic on air transport; they found above 80% reduction in all regions. From a domestic point of view, Hotle and Mumbower (2021) found that domestic departures within domestic US air travel operations ‘declined by 71.5% in May 2020 compared to the previous year’. Abu-Rayash and Dincer (2020) also found that Air travel in Canada reduced by 71%. Meng et al. (2021) evaluated the impact of control measures at China, the US and Singapore’s airports, and they predicted that the US ‘would suffer from a far-reaching impact on the industry if the same control measures were maintained’ while there are uncertainties with Singapore considering its close connection with international travel demands. Sun et al. (2021) further extended this knowledge about the impact of the disruption on air transportation by carrying out a bibliometric analysis of over 100 recent pieces of scientific literature. They noted that airport business operations had mainly been affected by the pandemic, especially the changing travel behaviour of commuters and service experiences affected by passengers and reduced shopping experiences with Airport managers, making decisions between commuters’ safety and their enhanced knowledge.

Beyond air transport, the impact of the pandemic has been explored within public transportation, which is often of particular interest for low-income and historically marginalised groups (Grahn et al., 2019). Mogaji (2020) found that public transportation in Lagos, Nigeria became more expensive as there was a hike in prices, as commuters continued their activities because there were no strict lockdown measures. This increase made it more economically difficult for many commuters in the developing country to afford...
public transport. Wilbur et al. (2020) found that public bus transportation dropped in Nashville, United States, especially during morning and evening commute times. There was a considerable difference in ridership among the commuters in affluent and non-affluent areas. In addressing this reduced ridership and developing reopening strategies for public transit, Wang et al. (2021) noted the need to align the commuters’ agenda and tele-activities, including working from home with the public transport service provision, suggesting that perfect if people are not travelling during the weekday, there could be a reduced public transit service and possibly supporting more micromobility modes.

The fear of getting exposed to the pandemic on public transit has also led to a change in travel behaviour, with commuters using shared mobility and non-motorised transport choices (Zhang and Fricker, 2021). Morshed et al. (2021) found that almost 70% of respondents will share mobility services instead of public transportation. They found that availability of the car increased discount and decreased fare contributed towards a positive attitude towards shared mobility compared to public transit. Huang et al. (2020) evaluated the effect of the pandemic on human mobility data in China. They concluded that commuters should be encouraged to use bicycles and companies should stagger their working hours.

### 2.2. COVID-19 and transportation in developing countries

As earlier indicated, there are inherent challenges with existing pre-pandemic transport infrastructures in many developing countries, worldwide that further exacerbated their challenges during the pandemic (Mogaji et al., 2021). While developed nations have established strategies and plans for dealing with various disruptions like the pandemic, developing countries responded to the invasion of COVID-19 on diverse scales (Mogaji et al., 2021), borne out of varying institutional bottlenecks. Their inadequate transport facilities are not diversified enough to deal with an impending public health crisis (Wadoum and Clarke, 2020).

Though there is little theoretical understanding of the impact of this pandemic on many developing countries (Kutela et al., 2021), studies like Mogaji (2020), Dzisi and Dei (2020), Zafri et al. (2021) and Susilawati et al. (2020) have explored the impact of the pandemic on transportation in Nigeria, Ghana, Bangladesh and Indonesia respectively. Mogaji (2020) examined the consequences of COVID-19 for transportation in the largest commercial city of Nigeria, Lagos and found economic activities, religious activities and social activities to influence transport in Lagos during the heat of the pandemic. Implementing transportation policies has been challenging in developing countries (Berg et al., 2017), coupled with the locational and physical factors increasing the cost of construction due to poor procurement practices (Estache and liimi, 2010). Problems accessing funds for investment in infrastructural development (Sperling and Claussen, 2004; Mogaji, 2020), corrupt practices (Collier and Cust, 2015), ethnic favouritism and political motivation in citing transportation facilities (Burgess et al., 2015), and insufficient maintenance also contributes to many of the inherent challenges in these developing countries.

In many developing countries, the informal sector manages the transport networks with little or no regulations and central funding by the government (Mogaji et al., 2021). There are small buses (Danfo in Nigeria and Trotro in Ghana), run by self-employed owners (Tetteh et al., 2017), there are also tricycles and motorcycles being used as public transport. These public transports are often congested, presenting a conducive environment for infectious diseases to spread (Dzisi and Dei, 2020; Goscope and Johansson, 2018). There are limited financial resources self-employed business owners can expand (Soetan et al., 2021). With reduced ridership on public transportation, it is not surprising to observe the profit maximisation objectives of the transport operators (in terms of expenditure on transport demands and revenue from transport supply, respectively) (Adom, Barnor, and Agradi, 2018). Since the self-employed are not getting fundings from the government, they had to increase their transport fares to relieve the negative effect of the disruption on their business operations (Mogaji, 2020).

The built environment in many developing countries also poses a challenge in managing the implications of COVID-19 on transportation (Ajide et al., 2020). While in most developed countries, people walked, cycled and used scooters to manage the impact of the pandemic (Li et al., 2021), the road condition, lack of walking pathways and cycling lanes has hindered the adoption of these travel modes in developing countries (Mogaji et al., 2021). Mogaji (2020) noted that nobody in their sample of commuters in Lagos, Nigeria, uses bicycles. This is, however, slightly different from findings from Pakistan where, though motorbike and bicycle ownership had no substantial impact on the number of trips made, more commuters were walking and cycling for shorter distances instead of using motorcycles (Abdullah et al., 2021).

The economic situation and infrastructure in developing countries also affect tele-activities and other work-related activities, which may warrant consumers to explore alternative means to travel. Many may want to work from home and not travel to work, but with challenges around electricity to power the house and internet connection, they cannot fully engage in tele-activities (Abdulquadri et al., 2021). More so, many developing countries operating in the informal economy with different working arrangements bring extraordinary challenges to livelihoods during the COVID-19 disruption (Soetan et al., 2021; Lenshie et al., 2021), which may not align with the idea of coordinated working hours for various companies as suggested by Huang et al. (2020). Commuters in Nigeria had to go about their daily activities because there was little palliative from the government, and by operating in an informal economy, they had to go out every day to make money; safety perceptions were not an issue, this aligns with findings from India by Pawar et al. (2020) where safety concerns were not a determining factor in selecting transport mode during the transition phase. This economic situation impacts their travel behaviour, trip pattern and mode of transportation (Mogaji et al., 2021).

Despite these challenges, there has been an effort to encourage active transport (Ilo and Siiba, 2019), support growth and improve economic activities through transport facilities (Porter, 2014), and transport infrastructure are being developed through public–private partnerships (Ose–Kyei and Chan, 2016). While recognising that these policies and interventions are essential for the growth and development of many of these developing countries, the pandemic presents another challenge that will inform decision making and policymaking (Mogaji, 2020), refine transport policy expectations and their limitations (MacKett, 2002) and address the
impact of the pandemic on work and home location, an adaptation of cities and public transport systems and adoption of a sustainable model of transportation (Hasselwander et al., 2021).

2.3. Theoretical positioning

DiClemente and Prochaska, 1982 developed the Transtheoretical Model (TTM) to represent an individual’s preparedness to change their behaviour. TTM illustrates different stages an individual goes through before changing their behaviours. Erdem and Erol (2021) noted that behavioural changes are observed in various stages and align with helping the individuals voluntarily adjust their behaviours and making them aware of the change process. These notions of different stages in behaviour changes make TTM relevant and applicable for different scenarios, ranging from smoking cessation to physical activity. Studies into transportation have also adopted this model to understand commuters change in travel behaviour. Sussman et al. (2020) evaluated behavioural interventions for sustainable transport as a commuters’ behavioural issue and explained how behavioural science could help relieve the problem. Erdem and Erol (2021) examined safe bicycle riding for adolescents using TTM. Biehl et al. (2018) modelled the decision to walk and cycle using TTM, while Mundorf et al. (2018) adopted the model to understand commuters desire for sustainable transportation and health behaviour change. Specifically in understanding how commuters change their travel behaviours during disruptive events like the pandemic, TTM is considered applicable and relevant. Parkes et al. (2016) used TTM to address how commuters changed their travel behaviour during the Olympic and Paralympic Games held in London in 2012, examining how individuals changed their travel behaviour before, during and after the games.

While TTM is well adopted in transport research, studies have often used the central construct of the model, which is the stage of change that illustrates how an individual can transfer through a series of five stages when modifying behaviour on their own or with the help of formal interventions (Mundorf et al., 2018; Parkes et al. 2016). This consists of 1. Precontemplation (The individual is not aware of a problem with their behaviour), 2. Contemplation (The individual is now aware of their situation and thinking of changing in a few months), 3. Preparation (The individual is now ready to change), 4. Action (The individual is taking steps and changing the behaviour) and 5. Maintenance (The individual maintains the change process and sticks with the new behaviour). Biehl et al. (2018) and Shannon et al. (2006) used these stages of change and self-efficacy constructs in understanding how commuters engage in active commuting on a university campus, and Parkes et al. (2016) also used the stage of change in their evaluation of travel behaviour during the Olympics game in London.

This study aims to establish the change in behaviour and implication of the pandemic on transportation by understanding commuters’ different stages in behaviour changes, specifically focusing on the pandemic as a disruptive event that has made commuters reflect on their travel behaviour in the wake of movement restriction, government policies and possibilities of tele-activities with a developing country with its inherent challenges. This study aims to examine travel behaviour through the precontemplation stage which was before the disruption of the COVID-19 pandemic, when things were still normal and there was no reason to urgent reason to change travel behaviour, the contemplation change where the individuals are observing things around them - the reduced public transport services, increase in cost of transportation and movement restrictions and the individual begins to contemplate what they plan to do, possibly thinking it’s a problem of the developed world and it doesn’t affect people in the developed countries, the preparation stage presents a more convincing reason for the commuters to change their travel behaviour in order to manage the health risk (exposure to the virus on the congested public transport) and the economic risk (the increasing cost of transportation and the need to engage in their informal economy), the action stage presents the decision they have made on light of their contemplation and preparation, possibly they have changed their mode of transportation (avoiding public transport and using shared mobility) or change travel activities (working from home and shopping online) and the Maintenance stage involves an individual maintaining this travel behaviour, even after the pandemic when everything may seem normal, evaluating the long term implications of the pandemic and maintaining their actions like telecommuting and online shopping.

The theoretical positioning of the study recognises the pandemic as a disruptive event that has made commuters change their behaviour, albeit on a short-term basis and explicitly acknowledging the developing country context. Qualitative insight from a panel of commuters across the country will be gathered to advance the discussion about the long-term effect of COVID-19 disruptions on transportation and change in travel behaviour, as Biehl et al. (2018) noted that studies tend to rely on quantitative data and techniques for analysing TTM-based data and Friman et al. (2017) observation that the most common setting for TTM studies is small geographical location like universities; this study provides a qualitative invite into the lived experiences of the commuters from a large country, providing evidence for developing and further adoption the TTM in the context of travel behaviour and mobility research.

3. Methodology

3.1. Inductive and exploratory strategy

This study utilises an inductive and exploratory strategy to address the long-term impacts on transportation systems in Nigeria. This strategy entails a qualitative comprehension of data collection and establishing the common patterns and individual and collective characteristics of commuters as they change their travel behaviours in dealing with the impact of the pandemic. This exploratory strategy is considered relevant for various reasons. First, it has been adopted for various transportation research like investigating the preference to travel in semi-autonomous electric vehicles (Hardman, 2021), exploring the satisfaction of disabled passengers (Mogaji and Nguyen, 2021b) and understanding the impact of sound in Transit-Oriented Developments (Yildirim and Arefi, 2020). Second, we do not yet have a detailed understanding of the long-term impact of this pandemic or how the changes in the transportation systems
may affect consumer travel behaviour, which is a necessity when developing a questionnaire survey (Hardman, 2021); third, this methodological approach allows for making contextual explanations through analysis of the contextual factors and intrinsic motivations to shed light on the consciousness norms, attitudes and values (Mogaji & Nguyen, 2021) and fourth, it offers an opportunity to understand of participants involvements regarding the matter of discussion and independently provides more profound revelations into the research, thereby increasing the participants’ willingness to share their experience (Czarnecka and Mogaji, 2020).

3.2. Sample recruitment

A sample frame, illustrated in Table 1, was developed to a holistic view of commuters’ experience and travel behaviour in Nigeria. Considering the size of Nigeria, all the 36 states and the federal capital territory could not be realistically covered; therefore, the focus was on the country’s six geopolitical zones. This study extends Mogaji (2020) previous study that explored the short-term implication in Lagos, just one state. In addition, the sample frame was aimed at having representatives across different ages, gender, level of education and residential location. The sampling frame was to get 12 participants from the six geopolitical zones. There are, however, variations depending on the educational levels and residential locations. The demographic information of the participants is present in Table 1.

Six research assistants were recruited to manage data collection at each geopolitical zone. The RAs were tasked with recruiting participants and conducting interviews with the participants. The RAs recruited for this study were university graduates who 1) had experience with carrying out qualitative research, 2) were fluent in English and a local dialect within their selected geopolitical zones, and 3) conversant with their geographical location 4) had an excellent interpersonal relationship to engage and recruit participants 5) demonstrated knowledge about information technology for conducting field research. The selected RAs were trained virtually to understand the scope of the research, provided with information in recruiting and carrying out research and were educated on ethics in data collections. The RAs were tasked with recruiting and interviewing 12 participants, each based on the framework described in Table 1. The RAs were informed about flexibility in achieving above or below the target number. After subsequent contacts and clarifications, 72 participants were enrolled with the designated dates and times for the interview in the diary.

3.3. Data collection

The RAs were majorly responsible for sourcing the participants and interviewing them. Data collection was implemented using an interview guide devised by the research author. This data collection process utilised an interview guide designed from TTM’s stages of change (DiClemente and Prochaska, 1982), travel behaviours change and disruptive events (Parker et al., 2016) and the impact of the pandemic on transportation in a developing country (Mogaji, 2020) and refined after a pilot study with interviews of eight participants who did not constitute part of the final participant’s list. The pilot study had numerous benefits. a) it enabled the research team to develop a better comprehension and scope of the informant’s situation, contributing towards the clarification and establishment of the informant’s distinct situations. b), it allows for the RAs and the Research Team to build a good working relationship and understanding and c), as a continuation from the pilot study, the format of the questionnaire entries and arrangement of the questions were enhanced to align them with the observations made during the pilot study (Mogaji & Nguyen, 2021).

The revised interview guide had open-ended questions which majorly focused on the long-term impacts on transportation systems in a developing country, the long-term changes in tele-activities, the long-term impacts of COVID-19 motorised and non-motorised transport ownership and the long-term effects of the pandemic on home and/or work location choices. The interviews were conducted between July and August 2021. These interviews were conducted face to face with participants’ prior consent. The interviews were conducted across the country’s six geopolitical zones by different RAs. Participants in this study were assured that their information would be kept confidential and personal details would not be shared. Participants were also informed they could stop the interview at any time, and they did not have to give any reason. The Participants were also compensated for their time to participate in the discussion with a mobile telephone credit.

The recorded interview conversation and transcription across the fieldwork were saved on a shared drive accessible to the Research

Table 1
The sample frame for participants.

| Location       | North Central | North East | North West | South East | South South | South West |
|----------------|---------------|------------|------------|------------|-------------|------------|
|                | N = 12        | N = 12     | N = 12     | N = 12     | N = 12      | N = 12     |
| Age            | F  M          | F  M       | F  M       | F  M       | F  M        | F  M       |
| 18-30          | 2  2          | 2  2       | 2  2       | 2  2       | 2  2        | 2  2       |
| 30-50          | 2  2          | 2  2       | 2  2       | 2  2       | 2  2        | 2  2       |
| 50+            | 2  2          | 2  2       | 2  2       | 2  2       | 2  2        | 2  2       |
| Education      | F  M          | F  M       | F  M       | F  M       | F  M        | F  M       |
| No Formal      | 2  2          | 2  2       | 2  2       | 2  2       | 2  2        | 2  2       |
| Sec. School    | 2  2          | 2  2       | 2  2       | 2  2       | 2  2        | 2  2       |
| University     | 2  2          | 2  2       | 2  2       | 2  2       | 2  2        | 2  2       |
| Location       | F  M          | F  M       | F  M       | F  M       | F  M        | F  M       |
| Urban          | 2  2          | 2  2       | 2  2       | 2  2       | 2  2        | 2  2       |
| Mixed          | 2  2          | 2  2       | 2  2       | 2  2       | 2  2        | 2  2       |
| Rural          | 2  2          | 2  2       | 2  2       | 2  2       | 2  2        | 2  2       |
Team working on the study. This allows the Research Team to regularly update the collected data, allowing for discussion and verification between both teams. The research team also worked closely with the RAs in stages of the interview process. Serial numbers were used for the individual participants, and any personally identifiable information was removed. Seventy-two interviews were conducted, with the duration ranging from between 28 and 43 min (median 31 min). Audio recordings from the interviews were transcribed and stored as PDF files for the thematic analysis.

Table 2
Summary of Key Themes and Findings

| S/n | Sub-themes | Core Themes | Implications |
|-----|------------|-------------|--------------|
|     | Type of work | Nature of Work | The long-term changes in tele-activities |
|     | Office-Based | Access to an Internet connection | Infrastructure |
|     | Self-employed | Cost of data | |
|     | Informal economy | Lack of electricity | |
|     | | Cost of running the generator | |
|     | | Postal Infrastructure | |
|     | | Laptop | Tele-activity Device |
|     | | Lighting | |
|     | | Work station | |
|     | | Conducive environment | |
|     | | Insufficient infrastructure | Location |
|     | | Rural vs urban | |
|     | | Lack of development | |
|     | | Unable to locate an address | |
|     | | Access to facilities | |
|     | | Managers vs staff | Trust |
|     | | Consumers vs Online Retailer | |
|     | | Patient vs Telemedicine | |
|     | | Physical gathering | Cultural factors |
|     | | Engagement with others | |
|     | | Social events | |
|     | | Religious meeting | |
|     | | Eagerness to buy car | Car Ownership | The long-term effects of Use and Ownership of Transport Mode |
|     | | Affordability | Motorcycle Ownership |
|     | | Traffic congestion | Shared Mobilities |
|     | | Convenience | Bicycle (AWA Bike) |
|     | | Control | Bus (Shuttlers) |
|     | | Avoid public transport | Helicopter (Vetifly) |
|     | | Can’t afford a car | Sustainability |
|     | | Entry-level motorised mode | Security |
|     | | Creates opportunity | Privacy |
|     | | Cars (Uber) | Control |
|     | | Motorcycle (SafeBoda) | Awareness |
|     | | Bicycle (AWA Bike) | |
|     | | Bus (Shuttlers) | |
|     | | Helicopter (Vetifly) | |
|     | | Sustainability | |
|     | | Security | |
|     | | Privacy | |
|     | | Control | |
|     | | Awareness | |
|     | | Safe cost on transportation | Non-Motorised Transport |
|     | | Protect the environment | Exercise. |
|     | | Built environment, | |
|     | | Awareness | |
|     | | Job accessibility | |
|     | | Safety | |
|     | | Difficult to change location | Stay in the present location | The long-term effects on home and/or work location choices |
|     | | Retain job | |
|     | | Renegotiate contract | |
|     | | Searching for job | Relocate |
|     | | Informal economy | |
|     | | Many people to the urban cities | |
|     | | Insufficient transport infrastructure | |
|     | | Pressure on transport infrastructure | |
|     | | Male often initiate the move | |
3.4. Data analysis

The transcribed data were analysed progressively following the thematic analysis guidelines suggested by Braun and Clarke (2006). The interview transcripts were repeatedly read in the first phase to become familiar with the data and better understand the impact of the pandemic on travel behaviour. Transcripts were subsequently exported into NVivo (computer software for analysing qualitative data) for coding in the second phase. In the third phase, identified codes were collated and assigned to an appropriate overarching theme, which qualitatively highlights the informants' self-report of their travel behaviour and changes. The themes were later revised and fine-tuned to address the main research objectives in the fourth phase. Some themes were further merged during this stage because of inadequate data to support them.

Similarly, some themes underwent further development. The fifth phase mainly entailed integrating all the themes, highlighting the participants’ revelation about the impact of the pandemic on their travel behaviour and how they manage the long-term implication of the pandemic. After detailed analysis and discussion within the research team, this final phase of themes sorting and the arrangement was carried out. Table 2 summarises 60 sub-themes later merged into 12 core themes addressing the three implications. In addition, quantitative data were extracted from the interview transcript to create Sankey diagrams using SankeyMATIC produced by Steve Bogart and built on top of the Sankey library of D3.js. The Sankey diagrams visualise the change before, during and after the pandemic.

3.5. Credibility and authenticity

Considerable efforts were taken to ensure the study’s credibility, especially considering RAs were employed for the research. First, the RAs and Research Team used an Open Data Kit (ODK) for data collection across the country. ODK is an open-source suite of data collection tools that can be used on Android mobile devices, and data is submitted to an online server even without the use of an active internet connection or mobile subscriber service during the data collection (Google, 2021); ODK also captures the geo-location of the collected data, allowing the RAs and the Research Team to know where the interviews are being conducted and that the data are not being fabricated (ODK, 2021). Second, as Miles et al. (2013) suggested, our data credibility is enhanced by a meticulous debriefing procedure, check-coding, and continuous data comparison between the Research Team and RAs. Third, the transcribed data was shared with the participants to confirm and verify the information that had been collected. This is described as a ‘member check’, one of the most critical provisions for enhancing the credibility of a qualitative study (Merriam and Tisdell, 2015). Fourth, as Shenton (2004) advised, we provided a detailed ‘audit trail’, a documentation of procedures in conducting this study.

4. Findings

4.1. The long-term changes in tele-activities

Seven different tele activities were presented to the participants to understand their long-term changes and challenges – Work, online shopping, online education, telemedicine, religious activities, social activities, and recreation. Fig. 1 illustrates the frequency of people engaging in various tele-activities during and after the pandemic. While telecommuting and working from home were very

![Fig. 1. Frequency of Tele activities during and after the COVID-19 pandemic.](image)
prominent, there was no intention of continuing recreation and social activities online after the pandemic—subsequent sections highlight commuters concerns about the prospects of tele activities post-pandemic.

4.1.1. Nature of work

23.6% of participants (n = 17) revealed that they could work from home simply because their type of work allows it. One participant working in a law firm said, ‘we were allowed to work from home, and everyone seems to like it, I reckon that the nature of my job made it easier’ Another participant who is a self-employed graphic designer said, ‘I get my work online, I chat with my clients online, and I do all my business transactions without leaving my house’. However, this experience was not the case for most participants who lamented about their experience on the transport network because they could not work online. One participant, a woman from the North Centra who is a petty trader, noted, ‘I had to travel to the market to sell, it was not easy because transportation was scarce, and it became expensive’ Participants also acknowledge that the nature of their job poses a limiting factor. One participant said, ‘how many people can work online in Nigeria? Most of us need to go out and work every day. I work in a factory, and I have to go to work every day unless I do not get paid.’

4.1.2. Infrastructure

The infrastructure to support tele activities has also presented a challenge for many participants. One participant said, ‘I would like to work online, but the cost of data, lack of electricity and even running generator is not conducive, I always have to go to work to use the internet to do my work’. One of the students also highlighted challenges in joining online classes due to poor connection to the internet, and she said ‘I thought I could stay at home and join the lecture, but my internet is always hanging, it’s never reliable, I have to change location, change provider but still same. I ended up going back to attend physical classes.’ This internet access also affects online shopping, religion and even social activities. People were complaining that the internet access is expensive, and the bandwidth is often not strong enough to engage in activities. One participant shared her experiences joining her church service on zoom, and she said ‘the [church] service on Zoom was boring, there were various distractions and disruption.’ She said she couldn’t stand it and had to keep attending socially distanced church services.

4.1.3. Tele-activity device

In addition to challenges with the internet, many participants noted that electricity to power the device is a massive challenge in Nigeria. One participant working from home said, ‘Do you know I don’t have electricity for 8 h I need to work? I have clients around the work I need to attend to. I have had to invest in inverter and solar power because the cost of buying diesel for the generator was killing me.’ This access to a device is even more challenging for those in rural areas. A content creator and social media manager residing in rural area said, ‘the lack of electricity is affecting my business, and I am contemplating moving to Lagos. I just want to finish my youth service here and move out. Life here is boring.’ The financial constraint in buying devices also impacts the long-term changes in tele-activities. Many participants noted that they have mobile phones, which is not always conducive, like having a desktop or having a proper workstation at home. One participant said, ‘I want to work from home, I have shared this with my boss, but I do not have a laptop or proper lighting. I can’t take the computer from work, so I always travel to work. One of the female participants living in an urban city shared her experience: ‘I live in shared accommodation; I am somehow squatting, and I can’t even create a dedicated workspace. This is not very conducive, but I save money on transportation.’

4.1.4. Location

Location was another essential factor in evaluating the long-term impact of the pandemic on transportation. Residents living in some areas around the country, especially in the Northern geopolitical zones and rural areas, noted that their location had disadvantaged them access to internet and telephone connection. One of the older women in Northwest said, ‘many of the young ones are moving away, they don’t have light, no internet, nothing is happening here.’ The issue of location is particularly relevant for those considering online shopping. One participant said, ‘it is always difficult to locate my address; those courier services cannot find me here, so I choose not to but online, I try to go to the shop to buy my things.’

4.1.5. Trust

Trust was also found to impact the long-term impact on tele activities. The trust in the people and confidence in the system. Participants who wished to work from home said, ‘I don’t think my manager trust us. She doesn’t want us to work from home because she can’t monitor what we are doing. We still have to travel to work and mark the register’. Another issue with trust in the system is around online shopping. One woman noted ‘I like online shopping, but sometimes I want to see what I am buying; you want to make the payment and leave. I don’t trust these online shops. People were also sceptical of telemedicine, and only 2.7% of the participants (n = 2) reported they had had an online consultation with their doctor, he said ‘it was a routine check that we did, he asked me questions over zoom, and I answered him, it saved me the stress of leaving my house and driving to the hospital’. There are prospects for telemedicine; however, 15.2% of participants (n = 11) said they would consider it after the pandemic.

4.1.6. Cultural factors

As reported by the participants, cultural factors were also found to impact the future of teleworking. People want to partake in activities physically. These activities include recreation, religious services and social activities. One participant noted, ‘I had to postpone the wedding of my daughter till we can do it properly, who wants to do Zoom wedding.’ Another participant also said, ‘I don’t like attending my Friday prayers on Zoom, its never real, I love to be among the brethren. Participants said they do not like online social activities because they don’t align with their cultural values, which expect people to engage and interact. Participants said they would not be doing
recreation or social activities after the pandemic. While 18 people reported they joined online religious activities during the pandemic, only five said they are willing to continue it post-pandemic.

4.2. The long-term effects of use and ownership of transport mode

4.2.1. Car ownership
As indicated in the flow path illustrated in Fig. 2. Only 37.5% of participants (n = 27) had a car during the pandemic, but that increased to 44.4% (n = 32) after the pandemic, and this includes the majority of those who said they did not have a car during the pandemic. It appeared those who never had a vehicle before were eager to buy one. There are indications that people will want to buy more cars, provided they can afford it. This desire for a vehicle is not really about exposure to the virus but more of having control over their movement, flexibility, and access to transportation when they need it. One participant noted ‘It’s always a struggle on those BRT; I am thinking of buying a car for myself. Another participant living in a mixed area said, ‘the problem with public transportation and my work location is making me contemplate buying a car’. However, these commuters are still concerned about the traffic congestion but believe they can find their way around it, especially adjusting the travel time. Commuters in mixed and rural areas are more convenient because public transportation is unreliable.

4.2.2. Motorcycle ownership
While cars may be considered the most common form of motorised transportation (Mogaji, 2020), motorcycles are used in Nigeria for individual commuting. Though not everyone can afford a car, some commuters consider buying a motorcycle. Fig. 3 shows that 9.7% of the participants (n = 28) reported having a motorcycle before the pandemic. This ownership dropped to 8.3% (n = 6) when asked about their use of motorcycles after the pandemic. However, it is essential to recognise that some who do not have a motorcycle before the pandemic are also considering buying one. A participant in Northwest said, ‘I am saving towards buying my motorcycle; it will open more opportunities for me to travel and work. The public transport is not very reliable.’

4.2.3. Shared mobilities
There is an increase in the desire for shared mobility, including shared cars (Uber), Motorcycles, Bicycles, buses (Shuttlers) and even helicopters (Vetifly). Fig. 4 revealed that the shared car is still the most frequently used form of shared mobility and many people reported they will use it more in their post-pandemic travel plans. 29.1% of participants (n = 21) said they used shared cars during the pandemic, which increased to 38.8% (n = 28) for the long-term post-pandemic. There was no indication of anyone using shared boats but found evidence of commuters using shared helicopters, especially in Lagos, Southwest Nigeria.

The analysis indicated that the adoption of shared mobility was of interest to three kinds of people—first, those who are more concerned about sustainability and protecting the environment. One participant noted, ‘I don’t think I should buy a car now and contribute to the pollution and congestion on the road; I use Uber when I need to commute’. Second, those who are concerned about their safety. Generally, these ladies are mindful of possible attacks on public transportation and feel safer using shared services. Though Rahimi et al. (2021) recognised some perceived risk of using shared mobility services during the COVID-19 pandemic, commuters in Nigeria were more concerned about their physical safety and not just the virus. One of the female participants noted that ‘using a shared bus gives me a sense of privacy and security when I go to work early in the morning. I can book it online and reserve my seat’. Third, third are those who may not afford a car now but want a bit of control and convenience. One participant shared her experience saying, ‘I was going to a party, and I was fully dressed in all my attires, I didn’t want to use the public transport, they aren’t reliable and conducive for my dress style, I had to use Uber’

Some passengers also reported using shared mobility for beating traffic congestion, especially the Motorcycle and Helicopter. One participant said, ‘it’s sometimes faster using the SafeBoda [Motorcycle hailing service in Ibadan, Southwest, Nigeria] to beat the traffic jam, they can manoeuvre themselves around. Another shared mobility taking prominence in Nigeria is the helicopter; a participant shared her experience using Vetify, a helicopter hailing service in Lagos. She said, ‘it was a different experience like never before, it was very easy beating the Lagos traffic, flying over Lagos. It looks expensive, but it’s worth it, trying it occasionally for the experience’. The concentration of shared mobility users in the South of the country is observed in the analysis as commuters in the north seldom mention shared mobility as they contemplate adjusting their travel behaviour. All participants planning to use shared bicycles, motorcycles, and buses were from South West. All participants willing to use shared helicopters were from the Southern part, and likewise, 78.5% (n = 22) of those planning to use shared care were from the Southern part of the country.

![Fig. 2. The Sankey diagrams visualising car ownership during and after the pandemic.](image-url)
4.2.4. Non-motorised transport

Commuters are looking for alternative ways to save costs on transportation, protect the environment and exercise. Though cycling was not well adopted during the pandemic, some commuters reported contemplating taking up cycling. As indicated in Fig. 5, 5.5% of participants \( (n = 4) \) said they were cycling during the pandemic, but this increased to 18% \( (n = 13) \) after the pandemic. Many of these people were those who were not cycling before the pandemic. Feedback from the passengers suggests that the three key factors significantly influence adopting cycling. First, the unconducive and unsafe built environment, Second, the awareness about the bicycle, cycling and ability to ride and third, job accessibility, especially when it’s closer to home within a safe environment. One of the older women participants said, ‘I love to ride bicycles, safe for the environment, but can you believe I don’t know how to ride? I will love to get on it if I have a chance.’ Another participant also noted ‘I know how to cycle, but I don’t feel safe because the roads are unsafe. If I relocate to a better area and my job is closer, I will surely reconsider cycling.’ A student participant from South-South shared how her parent discouraged her from cycling, and she said: ‘My parents don’t like my cycling, they believe it is not safe, I have had my shares of accidents, but I think commuters and other road users should be educated about cyclist safety.’

Unlike cycling, many participants reported walking as part of their non-motorised mode of transportation. As illustrated in Fig. 6, 40.2% of participants \( (n = 29) \) walked during the pandemic, but they were contemplating and planning to stop walking after the pandemic. When asked about these decisions, participants shared security concerns, especially kidnapping, harassment and accidents from road users. Commuters said their location is not well lit, and it can be dangerous to walk alone at night. One female participant
said, ‘I previously walk home from the bus stop, but it is becoming more difficult and dangerous; I was attacked a few months ago by robbers, and since then, I have used motorcycle from the bus stop to my house.’ Other participants noted that the recklessness of other road users poses a challenge. One of the participants said, ‘you can be walking on the street, and then you get hit by a car with brake failure, or the motorcycle hit you. We are too many in this country, and we can’t all be walking on the street’. One participant shared her concerns about armed bandits kidnapping people, and she said: ‘I can’t put myself in danger of being kidnapped; it’s better to use uber and be safe than walk’.

4.3. The long-term effects on home and/or work location choices

4.3.1. Stay in the present location

Participants were asked if they were contemplating relocating to ease the impact of the pandemic on transportation. As indicated in the flow path diagram in Fig. 7, 43% of participants (n = 31) were contemplating staying at their present location, especially those in urban areas. Participants noted that while it may be difficult to change their location and be looking for a new job, they are trying to retain their position and renegotiate their contract, allowing them to work more from home. They acknowledge that working will reduce their need to travel and save the environment. One participant noted ‘I have lived in this city before the pandemic and will continue to live here. I can’t relocate and be looking for another job, and I hope my contract is changed so I can work from home.’

4.3.2. Relocate

Those contemplating relocating to seek better job opportunities are more likely to move to the urban area, including many presently in a mixed residential area. One participant from the mixed residential area said, ‘I think I can go and hustle in the city, this pandemic has just affected work here, even if I can’t work from home, I can find work in the city’. It is essential to recognise the context of this implication, especially regarding the country’s economy, which is predominantly informal, and people go out every day to make ends meet. With the potential of many more people coming to the urban cities and insufficient transport infrastructure, there are enormous challenges and implications for transport planners in the urban areas. This highlights more challenges for transport infrastructure in metropolitan cities.

5. Discussion

While disruptions may bring about lasting changes to travel behaviours (Parkes et al., 2016), findings from this study indicate that commuters in Nigeria are having challenges in achieving the desired lasting changes they want. There are still huge concerns around the need to travel, congestion on the transport network, conveniences, health, and safety, but in all, the country context presents an underlining factor. Nigeria is an emerging economy and a developing country with its inherent challenges. This suggests that these implications need to be examined considering the country’s capabilities. Nigeria is a country with a large population, considerable size, and insufficient transportation network.

With job accessibility being an important reason for commuting and often associated with different built environment features (Zhu et al., 2020), the long-term changes in tele-activities for commuters, long-term effects on home and work location choices, and the future of long-distance travel is very bleak. While the prospects of tele activities have increased because of this pandemic, the inherent challenges with the economy, the insufficient transportation infrastructure and inadequate technology infrastructure contribute to this uncertainty about addressing the long-term impact of the pandemic on transportation. With 33.3% of the working population in Nigeria being out of work, few available jobs are concentrated in urban cities like Lagos in the Southwest as there is no industry in many other regions. The insecurity and poor infrastructure have also made people migrate, and there are limited opportunities for

Fig. 6. The Sankey diagrams visualising walking during and after the pandemic.

Fig. 7. The Sankey diagrams visualising car ownership during and after the pandemic.
telecommuting. There are challenges with internet facilities and electricity to support their work for those considering telecommuting. These unique features of a developing country like Nigeria pose a challenge in benefitting from the enormous prospects of tele-activities on transportation. Many people still have to commute to make ends meet. Many people still have to do long-distance travel to access jobs. All these contribute to congestion on transportation networks, health and safety of commuters, and impact on the environment.

In understanding the unique situation of Nigeria, it is critical to compare it with other developing countries that are financially buoyant enough to fund transport networks, where people have internet access and can work online from home, with little need to travel. If they must travel, there are sustainable modes of transportation with electric vehicles and effective public transport that accepts cashless payment, cycling lanes and others. Like many African countries, Nigeria is a predominantly informal economy. According to the International Labour Office (ILO), informal employment accounts for 85.8 per cent of all jobs in Africa, making it the main source of employment on the continent (ILO, 2018). Those employed in this informal economy have to go out and work each day, often not having the option of working from home. They receive a daily salary, and the nature of the work is not online (Soetan et al., 2021). There is a digital divide and digital illiteracy. Many commuters need to travel on congested public transport that still collects cash, exposing themselves to further risk (Mogaji et al., 2021). Often there is no choice, and people become stuck in a vicious cycle.

This vicious cycle illustrated in Fig. 8 represents the summary of our findings and a cogent theoretical contribution, specifically in understanding the inherent challenges of the impact of the pandemic on transportation in a developing country (Mogaji, 2020, Mogaji et al., 2022). The cycle explores the complex chains of long-term changes and effects—the prospect of working online, the long-term effects of use and ownership of transportation modes and the effect on home and work locations that commuters navigate through and further reinforce through a feedback loop (Badejo et al., 2021). The commuters explore the possibilities of online activities but often become challenged with limited access to the internet, the nature of their work and their level of digital literacy. These obstacles will

![Fig. 8. The vicious cycle of the impact of the pandemic on transportation in a developing country.](image-url)
usually make them consider owning a mode of transportation. The analysis reported an increase of 18% in people considering buying a bicycle after the pandemic. People want to cheaply, safely, and conveniently transport themselves after considering the risk of exposure to the virus on public transportation. Affordability, however, becomes a critical factor. In this informal economy, many people struggle to afford this convenience, and they end up exploring changes to their work or home locations to manage these expenses (Mogaji et al., 2021). In some cases, people decide to negotiate their contract and work from home: however, for those who are not able to relocate, they continue in the vicious cycle, exploring if they can engage in online activities in their present location and their ability with and access to resources.

The cultural factor underlining these implications cannot be ignored in the case of Nigeria. According to Hofstede Insights, Nigeria is considered a collectivistic society with a strong long-term commitment to their family members, extended families, and community (Hofstede, 2021). Nigerians engage in different social and religious activities (Mogaji, 2020), which they were unwilling to substitute with online activities. People are still eager to drive their car in convoy to the wedding party, and they are still willing to travel at the weekend for religious conventions and are not keen on online activities. They often prefer to be there physically and engage in the activities. This again adds to the congestion on transport infrastructure and highlight the impact on the environment.

5.1. Theoretical contribution

This study contributes to the limited number of works on transportation in an emerging economy (Salon, and Aligula, 2012; Salon & Gulyani, 2019) and precisely insights on the impact of the pandemic (Mogaji, 2020; Dzisi and Dei, 2020; Susilawati et al., 2020; Zafri et al., 2021). Though it is well established that COVID-19 has impacted the transport sector, it is important to recognise the limited theoretical insight from developing countries. Studies like Cao et al. (2021), Kutela et al. (2021) and Benita (2021) has shown that publications around the impact of COVID-19 on transportation were predominantly from developed countries like the UK and the US. One of the main theoretical contributions of this study is the insight into the inherent features of Nigeria and how it’s shaping commuters’ travel expectations and behaviours. Specifically, the study provides insight from a developing country with inherent economic challenges, insufficient transportation infrastructures, and an increasing population (Mogaji, 2020; Mogaji and Nguyen, 2021). The study recognises that while commuters are willing to change their travel behaviour, there are inherent challenges within their built environment, job availability and awareness about sustainable travel options.

The vicious cycle of the impact of the pandemic on transportation in a developing country illustrated in Fig. 8 is also presented as a compelling theoretical contribution of this study. First, this cycle summarises the challenges of commuters in developing countries as they navigate different options about tele activities, the ownership of transport model, and home and work locations. Specifically, it highlights the country context and how it affects travel behaviour (De Vos, 2020; Mogaji, 2020. Mogaji et al., 2022). Second, it contributes to the literature on travel behaviour (Parinloye et al., 2019; De Vos et al., 2018), the impact of the built environment on commuting behaviour and job accessibility (Zhu et al., 2018; Zhu et al., 2020) and relocation for travel satisfaction and the ownership of transport mode (De Vos 2018; Storme et al., 2020). Third, it highlights practical ways towards sustainable transportation, suggesting that policies and infrastructure development must be put in place to break this cycle and allow commuters to explore options that can enhance their travel behaviour.

Recognising that understanding commuters travel behaviour is for future decisions on infrastructure development, this study provides insight into transport equity in developing countries. There is a divide between transport infrastructure in the South of the country compared to what is available in the north. Considering rural residents’ residential segregation and employment outcomes (Zhu, 2016; Zhu et al., 2017), the divide between the urban and rural areas was also observed in infrastructure, affordability, and access to transport mode. Aligning with earlier findings from Kenya, another developing country where a substantial portion of rural residents can’t afford transportation, has limited access to non-motorised transportation and exacerbates the risk they face when travelling (Salon and Aligula, 2012). Transport equity is also presented across gender, with males more likely to own a car than females. This aligns with previous findings from Salon and Gulyani (2010) study on mobility, poverty, and gender in Kenya, where many cannot afford any motorised transport options, and the women and children are often at a disadvantage. Likewise, the men are more likely to contemplate and act on relocation and critically decide on travel behaviour changes (Zhu, 2013). There is a difference between the considerable rich and educated people who can afford more than one car, causing congestion on the insufficient transport network and those who have to rely on public bus transportation.

Adopting the TTM, the study to recognise the stage of change of commuters as they manage the impact of COVID-19, especially from their contemplating about changes to make, acting and maintaining that behaviour (Mundorf et al., 2018; Parkes et al., 2016). Beyond the quantitative insight, as Biehl et al. (2018) observed, TTM studies rely on quantitative data and techniques. This study provided qualitative and explorative insight into the reasons and factors that shaped commuters travel behaviour. Consumers were able to report their travel behaviour and share their lived experiences on a national level beyond the usual is the small geographical location, as noted by Friman et al. (2017).

Analyses from this study also corroborated the effects of built environment features on commuters’ willingness to relocate, job accessibility and exploring different travel options (Zhu et al., 2020). We provided evidence of people struggling with their travel behaviours because of their residential location, work access, and transportation. People are deciding to stay in their present place because they are not guaranteed jobs elsewhere and other people relocating to the urban centres. This human movement also put enormous pressure on the insufficient transport infrastructure.
5.2. Practical implication

These long-term implications need a holistic approach to address, and it requires the involvement of different stakeholders, including the economist, technology developers and transport policymakers. People are willing to work, shop and consult online, keen to reduce the need to travel, but there is a need to invest in infrastructure to support these changes. There is a need to improve internet facilities, electricity, and, ultimately, transport infrastructure investment to help sustainable and equitable access to transportation. Public transportation cannot be ignored; even though many people may want to buy their cars, not everyone will afford and maintain them. It is essential to explore other forms of mass transit across the country. Considering the benefits of high-speed and metro rail on urban land development (Salon et al., 2014; Zhu, 2021; Zhu et al., 2020), it is essential to make more investments to link the north with the South of the country and open up the areas. This investment will reduce the congestion in the urban areas as people can afford to live in suburban areas and still engage in various tele activities.

As a lack of a suitable transport system aggravates travel challenges for individuals across all income groups (Salon and Aligula, 2012), managing these transport infrastructures is essential, especially managing long-term projects. This is a reminder that policymakers, government, regulators, and funders should monitor and regularly evaluate the project’s progress. As Pojani and Stead (2017) noted, transport governance, decision-making, and financing infrastructure development present considerable challenges in managing transportation in many developing countries. Likewise, Gorham (2017) acknowledges that Nigeria’s political and socioeconomic state offers a unique challenge for developing the transport system in Nigeria. Stakeholders should be aware that changes in government and other political activities can affect the progress of transportation projects.

Considering the impact of working from home on motorised transportation and sustainability (Zhu and Mason, 2014), there is a need to raise awareness about the implication of vehicles on the environment. People are keen to buy cars for convenience and not look at the impact on the environment. There seems to be little awareness about CO2 emission and climate change. There should be a social marketing campaign to let commuters know about their transportation choices’ implications on the environment and possibly explore other means of transportation (Gokerik et al., 2018). While the social media campaign is going on, it is also imperative to ensure sustainable public transit. If we tell people to consider alternative transportation, public transpiration, and a built environment to support non-motorised transportation should be developed to meet their needs.

Likewise, there should be awareness and investment into shared mobility, significantly beyond the urban areas (Nguyen and Mogaji, 2021a). Many commuters outside the urban areas and in the Northern part of the country have little understanding about shared mobility. This presents opportunities for travel technology start-up companies to consider this location and launch their business operation to target commuters in the northern part of the country. This may reduce the desire to buy cars and make transportation accessible. However, Internet access, mobile technology adoption, commuters’ purchasing power, and existing transport infrastructure are factors to be considered.

People should be educated and supported to use non-motorised transportation, especially bicycles (Salon, 2016). This education is essential as findings from this study revealed that some adults in Nigeria do not know how to ride bicycles and do not even know where and how to try them. Here is an opportunity for a transport social enterprise and with support from the government to teach people how to cycle and provide bicycles. This education could involve working with primary school children and possibly patterning with bicycle-sharing platforms to access adults who want to cycle. This same approach can be adopted for integrating scooters and other non-motorised transport modes into the travel ecosystem.

5.3. COVID-19 and policymaking pertinent to sustainable transport modes

As the pandemic continues, it is essential to highlight policy recommendations pertinent to sustainable transportation modes. While there have been many policy recommendations to address the impact of the pandemic on transportation (Ali et al., 2021; Javid et al., 2021; Marek, 2021), it is essential to recognise the inherent challenges of developing countries. It is critical to acknowledge that one type (of policy) does not fit all (countries) - a policy adopted in one developed country with developed transport infrastructures may not be applicable in another developing country like Nigeria.

This study acknowledges, at this point, the policy recommendations as presented by Mogaji et al. (2022) as these policies specifically focused on Nigeria. Mogaji et al. (2022) noted that developing countries are dealing with various macroeconomic shocks and are responding to the impact of the pandemic through varying institutional bottlenecks. Their policy recommendations call for inclusivity, innovation, and incentivisation. While there is no need to repeat those policy commendations presented by Mogaji et al. (2022), this study offered a different perspective by focusing on the vicious cycle of the impact of the pandemic on transportation in a developing country, as depicted in Fig. 8. The present study postulates that it is necessary to provide policies pertinent to sustainable transportation modes to break the vicious cycle while amidst the pandemic. Specifically, these policy recommendations are around online activities, modes of transportation and work and residential location choices. These policies must be coordinated and adopted simultaneously.

First, access to skills, tools, and infrastructure is needed to support online activities, and improvement is required in internet access, power (electricity), infrastructures and confidence in information technology. While these are not specifically transport focused, they have an impact on people’s need to travel. People are willing to engage in online activities if they have the enabling resources and capabilities (Mogaji and Nguyen, 2021b). The government should put measures in place to provide access to these infrastructures. This access could mean allowing more investors into these digital spaces, supporting companies developing the broadband and logistics infrastructures and providing incentives for companies supporting staff who work from home.

Second, improving access to a sustainable mode of transportation. As Mogaji et al. (2022) call for a plan towards sustainable urban
mobility and Budd and Ison (2020) call for responsible transportation, the government needs to explore decarbonising transport, especially road transportation. There should be an effort towards public transport electrification, providing support and incentives towards electric vehicles and encouraging more people to walk and cycle. As people consider options for transportation modes, and with affordability a concern, the government can provide grants for people to buy bicycles and electric motorcycles (e.g. the Bike 2 Work Scheme in the UK) and more investment in shared mobility. In addition, practitioners can further integrate artificial intelligence (Dwivedi et al., 2021) into transport planning. Transport-tech start-ups and manufacturers working on the supply of these sustainable modes of transportation need to be supported by incentives and tax cuts grants.

Third, structural changes to existing infrastructures are also important in addressing the long-term implication of the pandemic on transportation. With the great divide between infrastructures in the rural and urban areas, it is not surprising to see many people travelling distances to access work and other opportunities (López-Lambas et al., 2021). It is, therefore, critical for policymakers to invest equitably in different locations across the states, bring travel activities closer to people and reduce their journey times. There should be more investment in transportation, for example, high-speed rail, investment in facilities that create employment and reduce journey times and investment in health and education facilities. These facilities around people, will influence their travel behaviour and reduce their commuting time. (Farinloye et al., 2019).

6. Conclusion

This study has analysed the qualitative reports of the travel changes for selected participants across Nigeria to understand the implications of the pandemic on transportation and the environment. There is an impact on the ownership and use of motorised and non-motorised transport, but this is influenced by affordability, convenience, and awareness. The long-term effect of the pandemic on home or work location choices are further influenced by the large informal economy of the country and the infrastructural developments across various locations. Analysis of the data showed there are prospects for long-term changes in tele-activities, but the commuters acknowledged in their self-report that these are just wishful thinking. The desires and dreams of the commuters are great, and they want to reduce their journey, work from home, and do online shopping. However, when they consider the inherent challenges, they can only hope for a better future.

For a developing country like Nigeria and possibly many other developing countries with inherent challenges with their economy and infrastructure, addressing these long-term impacts for the benefit of the commuters and the environment is urgently needed (Mogaji et al., 2021; Nguyen and Mogaji (2021b)). It requires a holistic and simultaneous investment in infrastructural development (transport facilities and internet technology), awareness (about climate change and sustainability) and education (around non-motorised transport, but this is influenced by affordability, convenience, and awareness. The long-term effect of the pandemic on home or work location choices are further influenced by the large informal economy of the country and the infrastructural developments across various locations. Analysis of the data showed there are prospects for long-term changes in tele-activities, but the commuters acknowledged in their self-report that these are just wishful thinking. The desires and dreams of the commuters are great, and they want to reduce their journey, work from home, and do online shopping. However, when they consider the inherent challenges, they can only hope for a better future.

There are limitations to this present study, and the result should be interpreted in this knowledge. First, considering the size and population of the country, it would be challenging to have a qualitative sampling strategy to offer a generalisable conclusion, even though this study extends the works of Mogaji (2020) that only focused on 1 of the 36 states in the country, future research should, however, adopt a holistic quantitative approach through larger sample size, advance data analysis techniques and statistical modelling to provide a more generalisable conclusion. Second. The study examined participants’ self-reports, and as Farinloye et al. (2019) noted, there are bound to be an element of inherent biases. Possible efforts were, however, made to clarify and ascertain the findings. Notwithstanding these limitations, the study has provided insights relevant to key stakeholders in managing the effects of the pandemic on transportation, contributed to limited studies on the impact of COVID-19 on transportation in developing countries and offers agenda for future research.

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.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.trd.2022.103206.

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