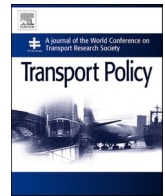Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Dealing with impact of COVID-19 on transportation in a developing country: Insights and policy recommendations

Emmanuel Mogaji [a,e,*], Ibrahim Adekunle [b], Stella Aririguzoh [c], Adeyemi Oginni [d]

[a] *University of Greenwich, London, UK*
[b] *Babcock University, Ogun State, Nigeria*
[c] *Covenant University, Ogun State, Nigeria*
[d] *University of Lagos, Lagos, Nigeria*
[e] *Centre for Multidisciplinary Research and Innovation (CEMRI), Abuja, Nigeria*

ABSTRACT

While developed nations have established policy frameworks for dealing with various macroeconomic shocks, developing countries respond to the influx of COVID-19 on heterogeneous scales, borne out of varying institutional bottlenecks. These inadequate transport facilities are not diversified enough to deal with an impending public health crisis. With the growing divergence in public transport management procedures and societal responses and willingness to adjust to a "new normal" transport procedures in time of COVID-19 and post-pandemic, it becomes expedient to learn evidence-based policy responses to transport service delivery. Qualitative data from semi-structured interviews with commuters and operators were thematically analysed to understand the impact of COVID-19 on transportation in Lagos Nigeria. The analysis revealed that increased cost of transportation, financial sustainability, changes in travel needs and loss of revenue were the significant impacts of the pandemic. This study contributes such that transport stakeholders can better understand how to navigate their transportation needs at this time of global uncertainty. The understanding of these impacts advances policy recommendations that are most inclined to the development objectives of developing nations in the time of COVID-19 and beyond. The limitations and suggestions for further research were discussed.

1. Introduction

Since the sudden arrival of COVID-19, the socioeconomic consequences of the viral diseases have been enormous, and the implications are still unfolding. It is not out of place to say that COVID-19 has forced upon us the most extensive socioeconomic upheaval witnessed since World War II (Adekunle et al., 2020). The severity of its consequences is weighty and detrimental depending on regional development and the quality of the policy responses in place. While developed nations are known to have established policy frameworks for dealing with various macroeconomic shocks, developing countries respond to the influx of COVID-19 on heterogenous scales (Mogaji, 2020a). This response is borne out of varying institutional bottlenecks (Wadoum and Clarke, 2020), depth of transport facilities well-diversified enough to deal with an impending public health crisis (Mogaji, 2020b), divergence in public transport management procedures and societal responses and

willingness to adjust to a "new normal'' transport procedures in time of COVID-19 and post-pandemic (Budd and Ison, 2020). It becomes expedient to analyse the impacts of COVID-19 on the transport industry for better understanding of how this pandemic is impacting developing countries such that credible and evidence-based transport policy lessons can be advanced.

Regional and national restrictions in terms of movement of goods and services and practice of good hygiene are the predominant forms in abating the human-to-human transmission of viral diseases (Chinazzi et al., 2020; Kraemer et al., 2020; Wells et al., 2020). Apart from those on the essential duty of care, a large proportion of the global human population has been placed on one restriction or the other. These restrictive measures (self-isolation in the case of infected patients, stay at home directives, as well as steering essential duty and care) forced "new normal" transport procedures on all stakeholders in the transport industry (Mogaji et al., 2021).

With a specific focus on Lagos State in Nigeria, this study examines the impact of the pandemic on transport services provisions by operators and consumption by commuters. With this understanding, this paper suggests policy measures to strengthen transport planning in post-COVID-19 in the state. Lagos State, located in the Southwest region is Nigeria's commercial hub, it was the former capital state of the country and remained as the commercial hub of the country. The state operates in an emerging economy, which is facing institutional adversity and underlying and persistent economic challenges as it copes with the pandemic (Mogaji, 2020b). With an estimated 20 million people across 3,577 km^2, of which 779.56 km^2 representing about 22% is wetland (Oshodi, 2016). Lagos is Africa's most populous state with the highest population density of all Nigerian states. As the growing population struggles with the poor infrastructure, there is an increasing number of cars on Lagos' roads, which causes traffic congestion and gridlock. Commuters lose up to 75 per cent of their weekly working hours because of traffic congestion (Obi, 2018).

With considerable changes required to transport infrastructure development, urban structure as well as transport management procedures. Policy guidelines that provide better information on how best to achieve a responsible transport delivery is essential for a responsible transport delivery post-pandemic. We advanced theoretical contributions to the post-pandemic administration and conveyance of transport services, especially in developing countries—also, findings from this study offer credible, hands-on recommendations for transport service provision. It will inform stakeholders in the transport industry, on how best to ensure safety compliance, navigate urban and infrastructural changes required in the time of a public health crisis and the most efficient manners to resolve the uneasy dilemma between the behavioural pattern of commuters and operators in terms of cost minimisation and profit maximisation objectives. The findings of this study are also important for stimulating other waves of research, particularly in areas of transport technological advancement that could help reduce the burden on already overcrowded shared transport facilities.

2. COVID-19 and transportation

From the commuters to the transport service operators or facilitators as well as government agencies saddled with transport coordinations have in one way or the other had to change the dynamics of conducting their transport industry participation (Lemke et al., 2020; Muller et al., 2020; Tien et al., 2020). The stay at home or self-isolating directives, as well as duty of care by essential workers, places enormous pressure on transportation demands and supply (Nikolaou and Dimitriou, 2020). Access to safe and efficient transport services on the part of the commuters are met by structural rigidities that pertain to pricing, safety, availability of transportation fleets to established and unestablished routes (Ivanov, 2020).

For the transport service providers and commercial transport operators, profit maximisation even if fewer passengers are allowed to board fleets is placed at the forefront of their transport participation motives in the time of COVID-19. At the time of COVID-19, commercial transport operators are more conscious about how expected revenue could conveniently offset the attendant cost of providing transport services as well as accommodating excess revenue (profit) could stimulate greater transport business participation in the time of COVID-19. The cost minimisation objectives of the commuters are apparently in stark contrast with the profit maximisation objectives of the transport operators (in terms of expenditure on transport demands and revenue from transport supply respectively) even before the arrival of COVID-19 (Adom et al., 2018). With COVID-19 arrival making such fraught relationships even worse, policy intervention to address this state-wide dilemma becomes apt to avert inefficiency in steering transport demands and supply for essential stakeholders in the transport industry. Transport policy responses in the time of COVID are necessary to moderate transport demands and supply towards responsible transport

service delivery (Budd and Ison, 2020).

In the wake of the pandemic, many studies have explored the impact of covid on transportation. From a UK perspective, Vickerman (2021) asked if Covid-19 put the public back in public transport. The author argued that considering the amount of public financial support to sustain public transportation due to reduced ridership and adjustment to the need for social distancing, the prevailing model of a deregulated competitive public transport needs to be revisited as there are challenges in the current methods of delivery of public transport services. This cost implication theme is also corroborated by Dai et al. (2021) as they explored the fare-free public transport policy in three Chinese cities, Hangzhou, Ningbo, and Xiamen, implemented to lure passengers back to public transport. While passengers may be lured to public transport, Eisenmann et al. (2021) the car became more important for transportation during the pandemic in Germany as public transport lost ground. This was also corroborated by Dai et al. (2021) as they recognised a radical modal shift from public to private transport mode in India. Though there are limited studies on the impact of COVID on transportation, Mogaji (2020b); Mogaji et al. (2021) explored travel behaviour in Lagos Nigeria while Abdullah et al. (2021) explored the case of Pakistan. Understanding the governments' financial support for the transport industry, commuters travel behaviour and perception of several strategies for promoting public transport are important in formulating post-COVID transport policies.

In an attempt to establish the contextual difference or similarities in the COVID-19 impacted transport services in Africa, Porter et al. (2021) illuminates' women 's mobility in Africa as impacted by COVID-19. The author's examination of transportation challenges as impacted by COVID-19 was done in Abuja, Tunis and Cape town. The study established the greater need for the increased involvement of women in the transport sector both as commuters and transport operators to reach regulatory positions that could limit the consequences of COVID-19 in Africa. Elbany and Elhenawy (2021) found an alteration in travel pattern and behaviour as the most significant influence of COVID-19 in Africa. By altering the existing structure in transporting goods and services, COVID-19 has a magnanimous impact on the mobility of residents and commuters. Through several means such as restriction of movement during the lockdown, closure of work and schools, strict limitation in motion from one place to the other, COVID-19 spread was abated marginally while a continuous search for a permanent cure is being sourced. Ania and Joseph (2021) examined the role of reforms in the governance structure for the survival of aviation and tourism sectors in the time of COVID-19 and beyond. The submission of Rothengatter et al. (2021), who examined the consequences of COVID-19 for the transport sector, found substantial evidence for the deleterious effect of COVID-19 for aviation, rail and public transit units of the transportation industry.

Mogaji (2020b) 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. While the study adopts the avoid-shift-improve framework, the theoretical commentary was explorative in nature with the analysis of variance used to estimate field survey on data generated to explain changes in transportation in Lagos as induced by COVID-19. Barbieri et al. (2021) analysed the impact of COVID-19 and the risk components associated with various transportation routes in 10 countries. The authors observed a significant reduction in the use of transport rules to meet passengers travel needs. Results further showed that bus transit and aeroplanes are the riskiest modes of transportation in the time of COVID-19.

Apart from Mogaji (2020b), who examined the impact of COVID-19 on transportation in Lagos, Nigeria, very few studies have towed this line of research to establish a clear line of thought on the subject. The author found substantial evidence for the deleterious effect of COVID-19 on public mass transit in Lagos, the commercial hub of Nigeria. Other related studies on the subject matter are Ajide et al. (2020). The authors leaned empirical credence to the extent to which several lockdown

measures effectively contain the COVID-19 confirmed cases. Using the negative binomial regression procedure, the authors found transport limiting factors like parks, transit stations and workplace restriction to hurt the increasing spread of COVID-19 in Nigeria.

Awucha et al. (2020) examined the accessibility challenges to essential medicine in the time of COVID-19 in Nigeria and observed that respondents face a significant number of challenges in the accessibility of critical medications, which further complicated their health complications. A similar result was found by Fuwape et al. (2021) in the distribution of inorganic pollutants in selected cities in Nigeria. In their examination of air pollution in Lagos, Kaduna and Port Harcourt, the authors observed increased impediments in the distribution of inorganic pollutants and found levels to be at a peak at the time of pandemic in these regions. Ivanov (2020) found evidence for the impact of COVID-19 on food security. The transportation of essential food items from the source to the market is a key parameter that gives the study credence to this present study. Some evidence showed that COVID-19 spread constraints on food transportation, security and farm labour in Nigeria. Olapoju (2020) established the role of transportation in the spread of COVID-19 in Nigeria. The author found the seaports and railways as the major hub of the 1918–19 influenza diffusion, while air transport was primarily responsible for inward spreads of COVID-19 in Nigeria.

3. Transport policies

In many of the developed countries, transport policies, measures and investment have enhanced transportation services, resulting in a continuous decline in transport costs, which in turn stirs growth and economic development (Berg et al., 2017). Many of these policies stem from increasing car dependency, infrastructural and environmental impact (MacKett, 2002). Measures are put in place to reduce reliance on single-occupancy cars and significantly reduce traffic levels by encouraging the use of public transportation (Yen et al., 2017), providing transport for social inclusion (Lucas, 2006), encouraging active transportation like cycling and walking and the land use-activity allocation models and development of the built environment (Farinloye et al., 2019).

There has been a lot of reviews of transport policies across different countries and transport modes, providing a variety of interventions and outcomes at various geographic levels (Fageda et al., 2018; Kirschner and Lanzendorf, 2020). For many of the developing countries, there has been an effort towards developing transport policies (Omiunu, 1987; Mwase, 1996), however implementing them has been challenging (Berg et al., 2017). In addition to locational and physical factors, there have been limitations because of the high cost of construction due to poor procurement practices (Estache and Iimi, 2009), the problems accessing funds for investment in infrastructural development (Sperling and Claussen, 2004; Mogaji, 2020b; Mogaji et al., 2021), corrupt practises (Collier et al., 2015), ethnic favouritism and political motivation in citing transportation facilities (Burgess et al., 2015) and insufficient maintenance.

Despite these challenges, there has been an effort to encourage active transport in Africa (Loo and Siiba, 2019), support growth and improve economic activities through transport facilities (Porter, 2014) and also developing transport infrastructure through public-private partnerships (Osei–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, 2020b; Mogaji et al., 2021), calling for the need for further refine transport policy expectations and its limitations (MacKett, 2002).

4. Transport stakeholder in Lagos, Nigeria

With a specific focus on Nigeria, examining transportation policy requires addressing three layers of complexity as described by Gorham

(2017) which are the inherently complex demand-supply interaction, the financial capabilities of commuters and stakeholders to pay for and provide transport services and the distinctive characteristic of the political economy of the country. Lagos, being the commercial hub and the fastest-growing megacity in the world, has struggled with transport challenges for many decades (Otunola et al., 2019) with its transportation characterised by chaotic and mostly unregulated systems (Oshodi, 2016).

As the stakeholder theory posits, the organisations should consider any individual or group that can affect or be affected by their actions and activities (Freeman, 1994). Policymakers can co-create value in the transportation sector by understanding the impact on the pandemic on the number of interrelated stakeholder groups Freeman et al. (2010) as their buy-in is needed to ensure long-term success and survival (Perrini and Tencati, 2006) post-pandemic. Specifically, the insights about these stakeholders, summarised in Table 1 are required to first, understand how the pandemic is affecting them and secondly, to identify responsibilities and involvement with policy recommendation to be discussed in Section 8.1.

4.1. Commuters

These are individuals who go about with their various activities. They are either using their private mode of transportation or using public transportations. Mogaji (2020b) found that Public Transport was the usual mode of transportation in Lagos for 52.3%, while 44.7% had Private Car/Motorcycle. The study found that only 3% reported walking as their usual mode of transportation while cycling was never reported as a mode of transportation in Lagos. Private commuters, often in single-occupancy cars, contribute to traffic congestion and environmental pollution while public passengers that may have to rely on buses, ferries or trains are also impacted through huge traffic, a large number of people using public transportation, and increase in the cost of

Table 1
Summary of key Transport Stakeholders in Lagos.

S/N	Stakeholder	Components		
1	Commuters			Private Commuters
				Public Commuters
2	Transport Operators	Road	Bus Transportation	Private Buses
				Shared Buses
				Government Buses
			Taxi	Private Taxi
				Shared Taxi
			Motorcycle	Private Motorcycle
				Shared Motorcycle
			Tricycle	Private Tricycles
		Water		Private Ferries
				Shared Ferries
				Government Ferries
		Rail		Government Trains
3	Trade Union	Road		National Union of Road Transport Workers
		Water		Maritime Workers' Union of Nigeria
		Rail		Nigeria Union of Railway Workers
4	Policy Makers and Regulators	Government Regulators		Lagos State Government
				Lagos Metropolitan Area Transport Authority
				Lagos State Traffic Management Authority
				Lagos State Waterways Authority

transportation.

4.2. Transport operators

Three primary types of transport operators are identified based on their mode of transportation. There is the Road, Water and Rail. The road is the most frequently used form of transportation in Lagos (Mogaji, 2020b). The Road transport operators include the private buses (e.g. Shuttlers.ng), public shared buses (locally known as Danfo, Fig. 1) and government-owned buses (BRT), though operated by private sectors partnership. There are also taxis, motorcycles (locally known as Okada) and tricycles (locally known as Keke Napep). Transportation services through waterways are also being offered to commuters in Lagos, and this is also government-owned and shared ferries like Uber Boat and LAGFERRY. There are also individuals' boats and ferries for individuals living around the waterways like Makoko. The Rail is another mode of transportation in Lagos, this is however owned and managed by the Federal Government as it was created by a statutory Act of parliament, the Nigerian Railway Corporation Act (1955), (Ayoola, 2016), while the railways are not controlled by Lagos state government, there are new rail system owned by the state is currently under construction and could be ready until 2022 (PremiumTimes, 2018).

4.3. Trade union

The strongest among these unions are the National Union of Road Transport Workers (NURTW), which has been described as the "most politicised and violent" trade union in Nigeria (Albert, 2007). The NURTW has substantial control over the management and administration of motor parks in the state and across other regions in the country. The union leaders are known to be closely linked with political activities, serving the vested interests of many politicians but which has little contribution to the development of infrastructures in the state (Fourchard, 2010). While the NURTW controls road transportation, there is the Maritime Workers' Union of Nigeria (MWUN) for waterway service providers and the Nigeria Union of Railway Workers (NURW) for railway workers.

4.4. Policy makers and regulators

To provide consistent planning and efficient implementation of transport policies within the state, the Lagos State government established the Lagos Metropolitan Area Transport Authority (LAMATA) in 2002. The government released the Lagos State Development Plan (LSDP) 2012–2025 to further provide an overall direction for the growth and development of the state. The Strategic Transport Master Plan within the LSDP sets a strategy which 'will ensure efficient and affordable movement of people and goods, link people to jobs and markets' (Proshare, 2014, p.161). Other regulatory bodies within the state are the Lagos State Traffic Management Authority (LASTMA) responsible for regulating, controlling and managing traffic operations in the state. The Lagos State Waterways Authority is tasked with establishing, maintaining and monitoring the activity of vessels and carriers within the waterways of Lagos state.

5. Conceptual framework

The study set out to analyse the impacts of COVID-19 on the transport industry in Lagos, Nigeria, a developing country with its inherent challenges (Mogaji, 2020b; Mogaji et al., 2021). The conceptual framework for this study, illustrated in Fig. 2 recognises the nature of transportation services in the country before the pandemic and how the challenges of being a developing country and COVID-19 is shaping the transportation services. Before the pandemic, there has been huge reliance on the road, the inadequate fleets of public transport vehicles to meet the growing population (Berg et al., 2017). And now coupled with the impact of the pandemic, which has necessitated social distancing and restriction to movement (De Vos, 2020), reshaping the transportation industry.

As highlighted in the previous section, there are key stakeholders the unregulated transport system and drawing from the stakeholder engagement theory, which posits that organisations engage their stakeholders in decision-making, sharing information and dialoguing for mutual benefits (Desai, 2018). It is essential to recognise that to develop and implement an effective policy post-pandemic, all the stakeholders must be involved. The commuters are more likely to feel the increased in
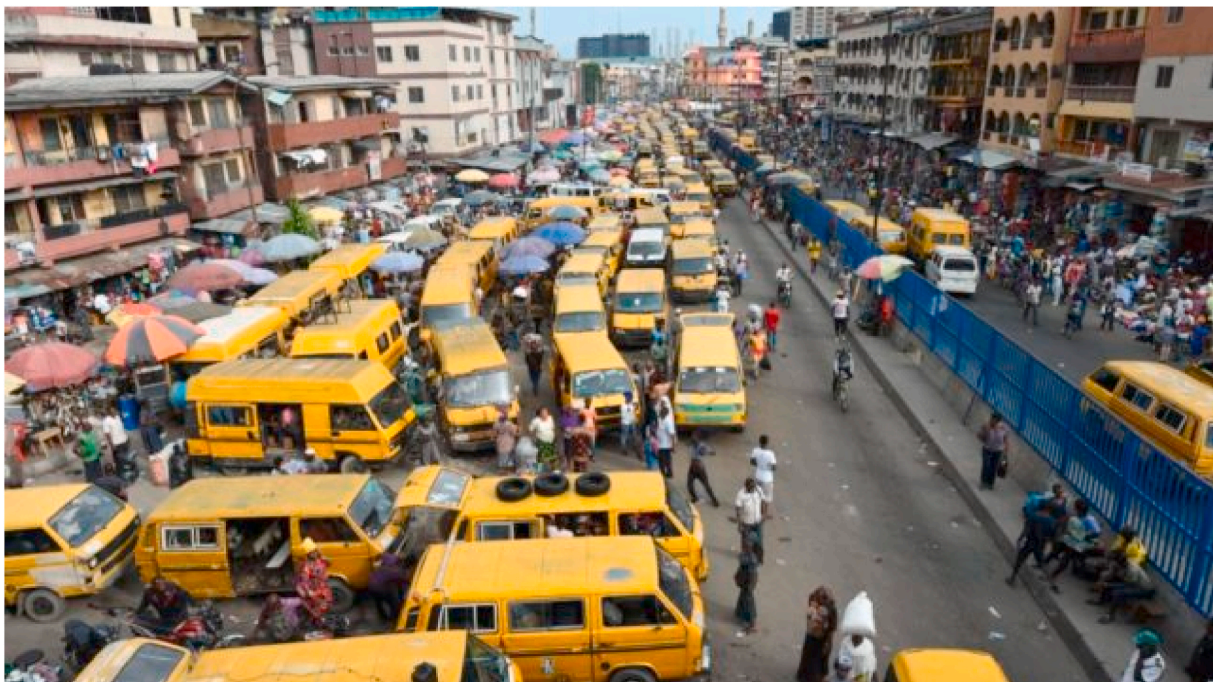

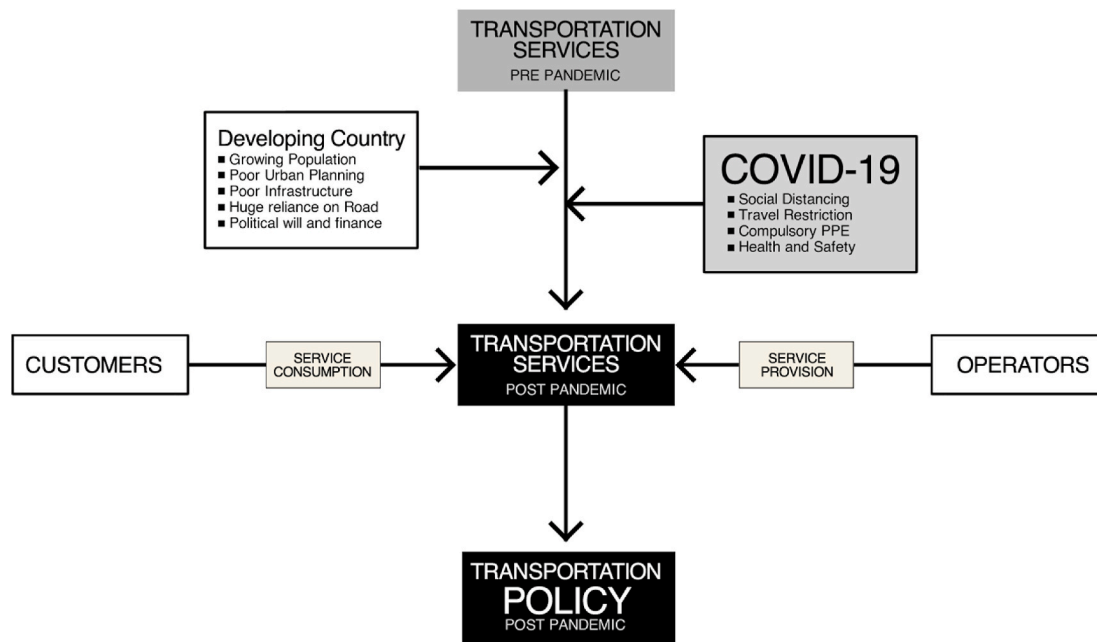**Fig. 1.** Image of Minibuses (locally called Danfo) in Lagos, Nigeria.

Fig. 2. Conceptual framework.

cost of providing transport services but also there is need for the regulator and the government to put measures in place to ease the impact of the pandemic on all stakeholders. While there is competition for scarce resources, even from other sectors, robust stakeholder engagement practices are essential (Ghassim and Bogers, 2019) to develop and implement an effective transport policy post-COVID-19.

The commuters who are consuming the transportation services and infrastructure - to access work engage in social and religious activities have a different experience as they engage with the services that are being provided during the pandemic. Likewise, the transport operators who are financially motivated and responsible for providing the services through various transport modes like buses, taxis and boats are experiences challenges as they have to abide by various social distancing guidelines and yet remain financially sustainable.

Through qualitative research method, the study aims to understand the short term and long term impacts of COVID-19 pandemic post-recovery on travel behaviour, choices, and preferences of people by first, understand the impact on the commuters through the service consumption and second, the impact on transport operators providing these services. This understanding is subsequently used in advancing and developing credible and evidence-based transport policy that is most inclined to the development objectives of developing nation in the time of COVID-19 and beyond.

6. Methodology

6.1. Semi-structured interview

Following on from Mogaji (2020b) survey of residents to understand the impact of coronavirus on traffic in Lagos State, this present study adopts a qualitative research methodology by interviewing commuters, operators and union leaders to understand better the effect of the pandemic and transport policy implications. Beyond the survey, engaging with the participants through a qualitative data collection method allows for more in-depth insight as participants can tell their stories beyond the numeric dimension and Likert scale in quantitative methodology (Patton, 2002). Longitudinal data was collected through series of open-ended questions focusing on the concerns of commuters as they engage with transportation services providers, the impact of the pandemic on service provision and how the transport workers are

navigating their business during this challenging time. First sets of interviews were collected in June 2020, few months into the National lockdown and the second set of interviews were conducted one year later in June 2021.

6.2. Sample recruitment

The studies sought to understand the impact of the pandemic from both consumers' and operators' perspective. Convenience and snow-balling sampling techniques were adopted to reach commuters who resided in Lagos and were available during the pandemic and willing to participate. After a few interactions, several commuters indicated their interest in participating in this study. Of the 30 consumers that contacted the team, 21 indicated their interest and agreed to be interviewed, giving a response rate of 70%. The participants' ages ranged from 18 to 35 (n = 7), 36–50 (n = 10) and 50 above (n = 4) and there were 10 female (47.6%) and 11 male (52.3%) participants. 5 (23.8%) participants were Essential Worker (Nurses, Doctors, Food seller), 4 (19%) were non-essential worker (Public), 3 (14.2%) were non-essential worker (Private), 7 participants (33.3%) described themselves as self-employed/business owners while 2 (9.5%) participants were unemployed. (Only 1 participant - female, non-essential worker, was unable to participate in the second interview held in June 2021).

Purposive Sampling was adopted for selecting ten operators as participants in the study. The individuals were approached explicitly because of their specific characteristics and direct responsibilities and oversight for transport operations in the state. Six men and four women participated in the interviews. These participants came from different backgrounds in terms of their educational achievements, the number of years of transport service experience, age, and position of responsibility. They were three (3) Self-employed Bus (Danfo) Drivers, two (2) BRT Bus Driver, two (2) ride-hailing service providers, two (2) transport tech founder and one (1) union leader. (Only 1 participant - female, transport tech founder was unable to participate in the second interview held in June 2021).

Before the interviews, the voluntary consent of the participants was obtained. Participants were also made aware that the interview would be recorded and was informed that the information collected would be treated in confidence. All the participants agreed to the use of all information provided during the interviews to advance qualitative

research. Due to the ongoing COVID-19 pandemic, lockdowns and restrictions in Nigeria, the interviews were conducted and recorded on Zoom with the informants' consent. All the interviews conducted in June 2020. lasted between 28 and 60 min, the interviews in June 2021 were shorter as they were follow ups. The lasted between 20 and 45 min. The recorded interviewers were transcribed and exported to NVivo 12 for thematic analysis.

6.3. Data analysis

Braun and Clarke (2006) six phases of analysis were adopted for the data analysis. The first phase was concerned with familiarisation with and immersion in data; this involved reading the interview transcripts over and over again to become familiar with and immersed in the data and to understand better how the participants engaged with the technologies. Second, initial codes which identified the commuters' experiences were generated from the transcripts. Likewise, codes were produced for the operators' perspectives. Boyatzis (1998) considered the generation of these initial codes as a necessity for accessing meaningful insights about a phenomenon from the data. The third phase was concerned with the growing number of codes that were identified across the data set. In this study, it was necessary to sort the codes of the commuters and operators into more meaningful themes (Tuckett, 2005). All the codes were subsequently collated and assigned to a relevant overarching theme which highlights how both commuters and operators are experiencing the impact of the pandemic on their travel experiences and business operations. The fourth phase was concerned with the themes identified in the third phase; these themes were reviewed and refined to address the research objectives. During this stage, as adopted by Farinloye et al. (2019), some themes were further merged because of inadequate data to support them. Also, some themes were developed further. The fifth phase was concerned with drawing a thematic map of the data, which highlights the critical impact for both stakeholders; this was carried out after detailed analysis and discussion within the team. The sixth and final stage involved a write-up of the report, which is presented in the next section.

Considerable effort was made to ensure the credibility and authenticity of this study. Member check, which means sending the transcripts back to the participants was carried out. This additional engagement with participants was considered the most critical step that can be made to bolster a study's credibility (Lincoln and Guba, 2004) as it allows participants to check, validate and verify transcripts (Merriam and Tisdell, 2015). Also, a detailed account of the methods, procedures and decision points in carrying out this study was documented in the form of an 'audit trail', as advised by Shenton (2004).

7. Results

7.1. The increased cost of transportation

Commuters acknowledge the increase in cost of transportation as a major impact of the pandemic on their travel experience. For those who had to use public transportation, they reported they had to pay more as there were limited spaces on buses and the drivers were making extra money from the scarcity, though this however got better towards the end of the year as commuters and transporter were more relaxed with the restrictions and social distancing. It is essential to recognise that the increase was coming from self-employed Danfo drivers. These are the unregulated drivers, operating in an informal economy and can change their prices at will. Commuters using the BRT Buses and Uber said they have not experienced any increased in cost of transportation.

There has been an increase in the cost of transportation, especially from the Danfo drivers who feel that they can use this opportunity to make more money. It is very unfair and inconvenient but, in most cases, we do not have a choice. Commuter, M.

I use the BRT from Ketu to Fadeyi, and the price has not been increased, but the Danfo from my area to Ketu has increased their fare, I don't think the government can force them to maintain their pricing like the BRT. Commuter, F.

7.2. Financial sustainability of transport business

Transport operators recognise the impact of social distancing and the travel restriction on their business and financial sustainability. These operators realise that they are not making money as they were before the pandemic; they seem to understand that the pandemic is affecting every sector of the economy. Still, they feel the government should support them. The BRT bus driver also sympathised with the operator as they have not been carting the number of passengers they typically carry; the driver recognises that the company is losing money because they are not filling their seats while still running the same route. The Shared drivers noted that the social distancing had not made much impact on their businesses, but the travel restriction and curfew in place are instead affecting their businesses. As the government put curfews in place during the peak of the lockdown, transportation after a certain time is prohibited, and these drivers cannot operate.

You need to understand why there is this increase. We need to deliver money to the Bus Owner, and we are expected to carry two passengers in a row instead of four. Someone has to pay for that extra seat. It is a business. Danfo Driver, M.

I can say the BRT has an arrangement with the government and we have not increased our fares, but I think that will happen very soon as we are losing money. The buses are carrying less than half capacity. BRT Driver, M.

Prices on Uber is automatically generated, and there is nothing I can do about that which can be fair. I can decide if I want to go on the ride or not. But I need money to maintain myself, so I often take those gigs. I think it's only the curfew that is affecting us. Uber Driver, F.

7.3. Health and safety

The conscious need to protect oneself was another impact of the pandemic on transportation. Participants were aware of the need for social distance, to use facemask and wash hands, but they were also concerned about the practicalities of these measures. Commuters feel concerns about the additional cost of a nose mask; passengers have had to use clothes and other materials as an alternative.

I want to protect myself when using public transport, I have my nose mask, but you still see many people not wearing the mask, and you wonder if everyone cares about this virus. Commuter, F.

Social distancing in Danfo is almost impossible. Those guys still want to make their money and carry a full load of passengers. We just have to be careful and know when and how to commute. At worst trek or stay in your house. Commuter, M.

We are aware that our customers are interested in riding in a safe environment and therefore we have made an effort to clean our buses, disinfect and provide hand sanitiser. We have also had to enforce social distancing in the bus. Transport Tech Founder, F.

Considering the number of vehicles has not increased and the carrying capacities has reduced, this often makes people impatient and rushing to get a seat on the Buses. In some cases, this encourages the Danfo drivers to ignore the guidelines of social distancing and meet the travel demands of rushing customers. While these practices are unsafe, commuters feel they need to take such risk to engage in their own business.

Everyone knows how difficult it is to move around Lagos when you rely on public transport, even before COVID it was all rough, and people are rushing, talkless of when there is the corona, but man must eat, we have to go out. Commuter, M.

Likewise, when the guidelines have stipulated that people should wash their hands and use hand sanitiser, commuters also questioned the practicalities of these measures. They feel most of the bus stops are not

conducive for standing and waiting for a bus, talk less of having a running tap and soap to wash hands. These are health and safety concerns that the operators, especially the bus drivers feel they were not prepared to address as they think they do not own the bus stop, more so the driver was concern about monitoring the safety of commuters. This, therefore, seems to put the responsibility on the commuters to take care of themselves and be safe.

7.4. Changes in travel need

The commuters have indicated their decision to adjust their travel needs post pandemic. Some are considering working from home. They feel they are protecting themselves from the virus, avoid the stress of travelling, and they can be more productive by working from home.

Working from home is being a blessing for me at this time. I work in a Law firm, and I am accessible on the phone and over the email. Though I miss the vibes of the office, I feel I am not stressed about using public transport or getting stuck in traffic congestion. This is my new normal. Commuters, F.

I only go out if it's a matter of emergency now, as much as possible, I have to rearrange my travel needs, trying to work from home and reducing my travelling. As part of protecting myself, I think I am also not contributing to the traffic on the road. Commuter, M.

While some are considering staying at home, there are those considering using their cars and also buying additional vehicles for their partners to avoid contact and reduce their exposure to the coronavirus. These were commuters that would have used the BRT buses, but due to shortage of seats, the anticipated rush and congestion, which increases the exposure to the virus, they are changing their mode of transportations.

My wife will need another car to access her work now as it is best to reduce exposure to this pandemic, especially because public transport is a massive carrier of the virus, but the problem is maintaining that car. It will be another expense. Commuter, M.

Commuters also gave indications they were willing to change different concepts of travel behaviour through various indicators such as trip time, trip frequency, and trip purposes. Commuters suggest they have to evaluate their purpose of leaving the house. Even with the government relaxing the lockdown and putting curfews in places; passengers feel they have to reduce their travelling activities like shopping, visitation and even attending religious places, they evaluate when they go and how often they go out.

Personal characteristics such as age, gender and disability were also factors that warrant commuters to consider changing their travel needs and mode during the pandemic. One of the participants who is a 63-year-old woman felts she does not feel safe struggling with public transportation in this pandemic, though she is retired, she feels she has to reduce her travel needs in the wake of the pandemic for her health reasons and the lack of infrastructure to support their choice of travel. Female participants also raise concerns about security and the need for a more conducive means of transportation; three of the female participants revealed that they would prefer to use Uber or a shared car to be safe. The participant who has a disabled family member also highlights the challenges he faces in supporting his family member using public transport, especially with the use of a wheelchair and the lack of support.

7.5. Revenue for government

Transport operators highlight a reduction in their revenue, this, however, excludes the Danfo drivers who seem to have an unregulated pricing policy which suggests that those plying a particular route may be able to increase their fares, but for BRT buses that are owned by the government, there is a considerable loss of income. BRT buses with high capacity passenger buses were only allowed to carry 21 passengers instead of 70 usually loaded in the buses pre-COVID-19 era. At the same time, Train transportation has been stopped since March 2020 when the lockdown was imposed. There are also calls for palliative care for travel operators which may also reduce the anticipated revenue for the government.

I am aware we are losing a lot of money by not carrying full capacity. People want to come on the bus, but we have to observe social distancing. It is not economically viable, but I am sure this will not go on for long. BRT Driver, M.

However, there are also possibilities for an increase in revenue for the government through taxes and levies. Commuters thinking of buying a new car or considering using their car instead of public transport feels the government may be taxing them to recuperate some money spent on palliative care. These commuters envisage that toll gate fees might increase. Commercial vehicle drivers also recognise that there may be an increase in charges as the government aims to generate more income since they have lost money during the pandemic.

8. Discussion of results

This study sets out to identify the impact of the pandemic on transportation and how it can inform policy development post-covid in developing countries. Stakeholders' experiences were qualitatively explored to establish and capture the understanding of these impacts and provide transport policy implications. This study extends previous studies on transportation in Lagos pre-pandemic (Salau, 2015) and how it is evolving post-pandemic (Mogaji, 2020b; Mogaji et al., 2021). Qualitative data was collected within an interval of one year to better understand how these impacts have evolved.

Findings revealed five key themes affecting both the commuters and the operators. Evidence suggests that in one year during the pandemic, things have not considerably improved even as stakeholders find their ways around the challenges they face on their daily commute and transport service provision. Consumers are experiencing hardship through the lack of infrastructure to support their travel needs, and this pandemic has further exposed the implications of these poor infrastructures and the huge reliance on the road as a means of transportations.

8.1. Contribution to policy

This study highlights key policy contributions both on the short and long term to address the impact of this pandemic on transportation. These contributions recognise the inherent challenges with infrastructures within the country, the changing consumer attitude due to the impact of the coronavirus pandemic and the lifting of restrictions across many states and countries in the world. The coronavirus may not have been fully defeated, but we have to live with it and therefore put measures in place to manage the risk. It is anticipated that these recommendations will be applicable to cities in many other developing countries as they share the same characteristics with regards to infrastructure, accessibility and policy making (Mogaji et al., 2021).

8.1.1. Short term recommendations

8.1.1.1. Implementation. It is paramount for the government and policymakers to work with other stakeholders, especially union members, to implement existing safety measures to curb the spread of the virus through public transportation. Even though one year after the initial interviews, these measures have not been strictly followed and with many countries lifting restrictions, there may be reasons to further evaluate these safety measures. Commuters should still be encouraged, may be not enforced to use face masks and disinfect their hands - to reduce the spread. At least if social distancing cannot be observed due to economic reasons, basic hygiene and face masks can reduce the spread of the virus. For example, the London Mayor insisted that face coverings

must be worn on London's transport network despite restrictions being eased in the UK. Transport network can still be a hub for transferring this infection and therefore effective communication and awareness are an essential part of the implementation policy (Gökerik et al., 2018). Commuters must see the reasons for wearing the mask, i.e. protecting themselves and protecting others on public transport.

8.1.1.2. Inclusivity. The impact of the pandemic on transportation has provided opportunities to recognise the vulnerability of other commuters (Mogaji and Nguyen, 2021). Disabled commuters struggling to access limited transport options, older people not being able to struggle for buses and children being forced to compete with adults due to insufficient transport infrastructure. It is therefore paramount to immediately address this inequality in access to transportation and ensure policies are in place to support inclusivity. Mogaji and Nguyen (2021) reported on the bad experiences of disabled commuters and the challenges they face; this calls for a socially inclusive transportation for those who may be less able to use public transportation (Lucas, 2006). This includes measures to support older people, less abled people and children. Transportation can be subsidised for these groups; dedicated seats and spaces should also be provided. Public awareness to recognise the rights of these individuals are also important. As all commuters struggle for a place, less abled commuters should be remembered.

8.1.1.3. Innovation. It is expected that this pandemic will drive up innovation within the travel sector as commuters change their travel behaviour and operators react to the demand and supply dynamics within the market. This could be reflected in many ways. First, the government need to establish Travel Demand Management (TDM) plans (Ferguson, 2018; Ko and Kim, 2017) which will alleviate congestion and enhance mobility (Meyer, 1997) by using existing infrastructure capacity to reduce the impact of the pandemic. Second, policy should support different innovations by private companies or technology developers to enhance the commuters' experience. Ideas for Mobility as a Service (MaaS) needs to be explored and developed. Start-up companies providing carpooling and ride-sharing to reduce single-occupancy vehicles should also be encouraged. While people may not want to use public transport but use their car instead, carpooling offers a more economical and sustainable alternative. Third, analysing travel data through smartcards, bluetooth perimeters and big data should be encouraged (Tardivo et al., 2020; Dwivedi, 2019) as it can aid traffic management and travel demand plans. While these innovations can leverage technologies to safeguard public health, ethical collection and usage of this information are essential. Fourth, there should be a drive for social, behavioural change policies which encourages a change from inefficient, wasteful and motorised means of travelling to cleaner, greener, healthier and more economical means such as walking, cycling and public transportation (Batur and Koç, 2017).

8.1.1.4. Incentivising. The pandemic has changed travel behaviours and people are making adjustment to their commuting (De Vos, 2020). Organisations and individuals should be incentivised for developing initiatives that support change in travel behaviour towards sustainable transportation. Initiatives such as encouraging working from home as they reduce the pressure on the road and reduce traffic congestion, staggering opening times for businesses and organisations should be incentivised by the government. These actions can change travel behaviours resulting in less need for commuting and less congestion at terminals and bus stops. More employers could also support their staff with staff buses or incentivised travel options (Lachapelle, 2018). Transport unions and Regulators could also provide incentives and financial support for the transport operators. This support will ensure that commuters are not unnecessarily burdening with the increased cost of transportation.

8.1.1.5. Income. Income generation of the government, like any organisation, has been affected by the pandemic. On a positive note, the government can generate more income through the travel demand management policies that raise revenue through charges for parking prices, tollgate fees and congestion charges, often for private car owners in a bid to also control traffic and save the environment. Government will have to look for options to raise more money to support their infrastructural developments without necessarily exploiting the commuters. There are opportunities for private investment, partnership, outsourcing and franchising some of the transport operations.

8.1.2. Long term recommendations

8.1.2.1. Regulating the sector. As with many other developing countries, public transport is unorganised and unregulated (Oshodi, 2016), the Government needs to move towards regulating the transportation sector to allow market force to shape service provision. This is considered a long-term plan as it may be very inconvenient for if the sector is disrupted now when we are just coming out of lockdown and with impeding economic challenges. In regulating the sector, other means of transport should be allowed to operate, routes should be appropriately identified with designated operators, and the travel demands on the route should be monitored for planning and strategic directions. The assurance of government effort to regulate will bring in investors and partners which will enhance the transport service provision and improve customers' experience.

8.1.2.2. Investment in infrastructure. Infrastructures to ease pressure on the transport network are important and should be planned for. Long Term recommendation including exploring other means of transportation, developing the built environment to support non-motorised transportation and encourage sustainable transportation. Considering the under-explored waterways in Lagos State (Mogaji, 2020b; Mogaji et al., 2021), the government should encourage Park and Ride to explore the Waterways. Car Parks should be created around the Water Terminals and Jetty for commuters to park their cars and use the ferries. The built environment and the infrastructure around the jetty and destination should also be enhanced, to ensure that people feel safe, can walk and possibly cycle to their places of work and continue their journey.

8.1.2.3. Sustainable transportation. The government needs to make long term plans towards Sustainable Urban Mobility Plans (SUMPs) in the state, and there is need to provide an additional mode of transportation which relieves stress on the road. Cycling and walking should be integrated into the plans (Mogaji, 2020b; Mogaji et al., 2021) The design of the built environment will also influence the adoption of these sustainable mobilities (Farinloye et al., 2019). No doubt, this will require finances, private partnership and investment; however, they are the guarantee for the type of transport network that a mega city like Lagos deserves.

The Government needs to start considering the prospects of electric vehicles (EVs). This includes the manufacturing, adoption and infrastructure to support its usage. Considering electricity is a challenge in developing countries, long term implications involve addressing this power need and possibly looking at other sources of energy to encourage users to buy and use electric vehicles. Ultimately, sustainable transportation is beyond just EVs, there should be infrastructure, education and policy in place to support many other sustainable forms of transportation such as walking, cycling and scooters, making sure the built environment is safe for the commuters and public.

A summary of the policy implication is presented in Table 2. While long-term investment in infrastructure is still needed, the government needs to work with all stakeholders to ensure that the impact of this pandemic is addressed as soon as possible.

Table 2
Summary of the policy implications.

S/N	Impact of COVID-19	Affected Stakeholder	Policy Implication
1	The increased cost of transportation	Customers Travel Operators	● Transport Subsidy and incentives for Transport Operators through the Transport Unions. ● Employer subsidised transit pass programs ● Supporting initiatives and innovators that are developing an alternative mode of transportation.
2	Financial sustainability of transport business.	Travel Operators	● Regulating the Sector. ● Working with the Union to effectively disburse financial support. ● Economic incentives to service providers for the uptake of new cleaner vehicles.
3	Health and Safety	Customers Travel Operators Government and Policy Makers	● Evaluating Existing measures. ● Encouraging and not enforcing the use of face mask and hand washing. ● Effective communication and awareness. ● Intelligent transportation system to provide real-time information about public transportation and occupancy level, allowing commuters making a safer and more co-ordinated choice about public transport.
4	Changes in Travel Need	Customers Travel Operators Government	● Establish Travel demand management (TDM) plans which use of existing infrastructure capacity to reduce environmental externalities. ● Staggering opening times for businesses and organisation. Reducing the peak period congestion by allowing some organisations to start late in the day and finish late. ● Ensure socially inclusive transportation for those who may be less able to use public transportation. ● Carpool/Vanpool to reduce single-occupancy vehicle use and encourage non-motorised modes ● Park and ride to explore other forms of transportation. Especially the Waterways.
5	Revenue for Government	Travel Operators Government	● Free or subsidised transit passes which modify the relative cost of travel by different modes. ● Income generation through the introduction of parking levies, tolls, congestion charging and other fiscal measures. ● Opportunities for private investment, partnership, outsourcing and franchising some of the transport operations.

8.2. Contributions to theory

While the focus of the study may have been policy development, theoretical insights relevant to academic researchers and practitioners are also derived from this study. Firstly, the study contributes to the growing body of literature on the impact of COVID-19 on transportation (De Vos, 2020; Mogaji, 2020b; Budd and Ison, 2020). The study recognises the inherent challenges with infrastructure, travel behaviour and informal economies in developing countries which affects how commuters engage with transport services provision. They experience an increase in the cost of transportation and engage in practices, which increases their exposure to the virus.

Second, the study contributes to understanding about travel behaviour (Van Acker et al., 2016; De Vos et al., 2016; Farinloye et al., 2019) and how commuters engage with mode choice, trip time, trip frequency and trip purposes. The study recognises how lifestyle, economic status and personal characteristics of commuters in developing countries can influence their transport mode choice and travel satisfaction. None of the participants was cycling while people seldom considered walking as a mode of transportation because of their security and the poor urban layout. This recognises how the built environment and infrastructure negatively affects the commuters' travel satisfaction.

Thirdly, the study recognises how demographic factors can affect travel choices and demands—especially age, gender and disability. Older adults are mindful of travelling because they feel the public transport system post-pandemic may not be conducive, female commuters are being mindful of the security when using public transport. At the same time, disabled passengers do not feel comfortable going out with transportation challenges.

Lastly, the study provides insight into pricing policies of transportation in developing countries, at least from the Lagos perspective. While in most developed countries, the price is set and regulated, often adjusted yearly based on inflation. In Lagos, there are different pricing strategies. First, there are regulated fixed prices on government transport modes like the BRT, like the Transport for London set the cost of travel. Second, there is the App prices strategy with hailing service providers like Uber and Bolt, and there is the third pricing strategy which is not fixed nor controlled by an algorithm but can be changed without any warning. This applies explicitly to the Danfo driver, taxi. Motorcycle and tricycles. The change in price is based on the demand (more people waiting at the bus stop), rain as they must look for the alternative road network and endure traffic congestion or during pandemics like COVID-19. It can, however, be argued that the unregulated and information economy of these transport operators have led to this.

9. Conclusion

While we await the prospective innoculation of people in developing countries (Mogaji, 2021), it is essential to recognise that social distancing, washing of hands and using protective equipment are still effective in halting the spread of the virus (Adekunle et al., 2020). In as much as commuters also are choosing to travel and engage in economic activities, the transportation services must recognise social distancing will become, at least until 2021, natural part of everyone's lives (Tardivo et al., 2020), and therefore commuters, operators and policymakers must put measures in place to support and cope with these imminent changes.

This study has made a theoretical contribution to the understanding of the impact of coronavirus on human activities with a specific focus on an emerging economy (Adekunle et al., 2020; Mogaji, 2020b; Mogaji et al., 2021) and specifically on transportation and policy development. The recognises the lack of infrastructure, substantial urban population and financing as inhibiting factors to effective implementation of sustainable urban mobility plans and therefore provides policy implications relevant to the customers, service operators, unions and regulators.

As with any study, there are limitations in this study, and therefore

the results should be interpreted with that understanding. Participants were recruited from Lagos Nigeria, a state with a population of over 20 million people. Thus, the number of participants in this study is not a representative sample. However, it does not rub the study off its generalisation capabilities in informing policy directions. This was, however, due to the time constraints and logistics in reaching out to the participants. Future studies may want to explore the impact of COVID-19 on services provision using a larger sample and to replicate the study in many other developing countries.

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