

Covid-19: Impact on travel behavior and public transportation in Lagos, Nigeria

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Abstract

Background: Public transportation system plays a significant role in Nigeria as majority of the populace depend on it for daily commuting. However, the outbreak of the first wave of Covid-19 portends salient issues for public road transport system. Therefore, the study evaluated the effect of Covid-19 on travel behavior and public transportation in the Lagos, Nigeria.

Materials and Methods: The study was conducted in Lagos, as the city remained the epicenter of the outbreak in Nigeria while 384 respondents were sampled via emails while data gathered were analyzed using both descriptive and inferential statistics.

Results: The multiple regression model revealed that Covid-19 has a significant effect on travel behavior and public transportation in Lagos, Nigeria indicated by $R = 0.280$; $R^2 = 0.078$; Adjusted $R^2 = 0.061$; F -value = 4.593, $p < 0.05$. However, only four independent variables namely: increase in transport fare; lack of alternative transport means; inadequate transport means and road traffic congestion were significant while social distancing was insignificant. Furthermore, significant changes during the lockdown when some socio-economic activities were banned included reduced trips, increasing private car use, walking and cycling for short distance trips.

Conclusion: The study concluded that there is a decrease in the number of trips made by commuters and an increasing use of private cars as a result of Covid-19. Finally, Covid-19 has a significant effect on public transportation in Lagos, Nigeria with a concomitant increase in transport fare.

Keywords: Covid-19, Travel Behavior, Road Transport, Commuter, Fare, Nigeria

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I. Introduction

Coronavirus disease (Covid-19) is an infectious disease caused by a newly discovered coronavirus (World Health Organization, WHO, 2020). However, in March, 2020, WHO declared Covid-19 a global pandemic with virtually all the countries of the world recording cases of Covid-19 with mortalities while there have also been recoveries.

Globally, there are 172 million confirmed cases of Covid-19, 72.9 million recoveries and 2.81 million deaths as at March, 2021 (WHO, 2021). However, Nigeria which did not record any case until February 27, 2020 now has 163,000 confirmed cases, 152,000 discharged and 2052 deaths as at March, 2021. Meanwhile, Lagos which is the epicenter of the disease recorded 1,845 confirmed cases, 469 recoveries and 33 mortalities on May 10, 2020 after the lockdown was gradually eased in the State on May 4, 2020. This shows a spike as the number of cases stood at 1,107, 30 fatalities and 247 recoveries according to the Nigerian Centre for Diseases Control (NCDC) Statistics on May 3, 2020 before the easing of the lockdown in the State. But, as at August 20, 2020, the State had a total of 17,902 confirmed cases with 14,496 discharged and 201 mortalities (NCDC, 2020).

Due to its rapid spread, many countries closed their borders and were forced to impose lockdowns and curfews as they deem fit in the prevailing circumstance. Towards this end, the transportation industry has been significantly impacted with passenger movements restricted within and between countries around the globe. The public transportation system which represents a significant part of the transport system in both developed and developing countries has had its fair share of the impact of Covid-19, with organizations being shut down and many people required to work from home and schools being closed. A ban on social/public gatherings which often required the need for people to travel have resulted in a decline for transport demand, also the need to observe physical distancing in a bid to curb the spread of the disease is practically changing the travel behavior of the populace as well as impacting on the public transport system in Lagos State.

Over 12 million people use public transportation daily in Lagos State (Abdullateef, 2018) and this includes the use of the road, railway, and the inland waterway. Based on these, the risks of transmission of

Covid-19 is high, since a larger percentage of the users of public transportation in the state are concentrated on the road using paratransit modes such as the Danfo/Yellow buses and taxis with low carrying capacity as it is popularly referred to.

Van Bavel et al., (2020) human behavior is influenced by social norms, that is, what they perceive that others are doing or what they think others approve. Hence as stated by West *et al.*, (2020), researchers have suggested applying the principles of behavioral change to “nudge” people into desirable behaviors to help control the spread of Covid-19 Van Bavel et al., (2020). According to Kraemer et al., (2020); Zhang et al., (2020), the use of face mask and physical distance has emerged as a key mitigation strategy. This translates in some form of mobility restrictions. In the case of Wuhan, China, where the first case was reported, control measures were drastic, but it has been shown that these measures substantially mitigated the spread of Covid-19 (Kraemer et al., 2020; Zhang et al., 2020).

Over the last 300 years, ten major influenza pandemics have occurred. The 1918 pandemic (Spanish Flu) is considered to be yet the most severe. 30% of the world’s population became ill and between 50 and 100 million died. One important factor why the Spanish Flu spread so quickly and so extensively was through modern transportation, which at the beginning of the 20th century offered global coverage. The virus was spread around the world by infected crews and passengers of ships and trains and severe epidemics occurred in shipyards and railway personnel. With ubiquitous and fast transportation comes to a quick and extensive diffusion of a communicable disease. From an epidemiological perspective, transportation can thus be considered as a vector, particularly for passenger transportation systems (Rodrigue *et al.*, 2020).

However, based on the mode of transmission of Covid-19, buses and trains are obviously excellent ways of spreading the disease, while the available paratransit systems in developing nations are undoubtedly also a major means through which the disease can spread. In Nigeria, for example, a sizeable number of commuters rely on the motorcycle (Okada) and the tricycle (KekeNapep) to move them either directly to their final destinations or to the terminals before they can join the buses or trains to their final destinations. Although, prior to the outbreak of COVID-19 in Nigeria in February, Lagos State had banned the use of the paratransit system on major highways for safety concerns, while the masses were still grappling with the new reality of having to trek to the terminals to join conventional public transport system. Thus, in Nigeria, a significant change in travel behavior was expected in the short-medium time as some people continued to work from home thereby reducing the need to travel except for essentials and some people embracing walking, cycling and teleconferencing.

Furthermore, with the outbreak of Covid-19, the economic impact of the virus outbreak on the public road transport sector may be severe since the sector is directly linked to economic development and dependent on fares, hence, loss of revenue is most likely inevitable. Besides the loss of revenue, higher costs for frequent decontamination of vehicles (buses, trains, taxis, tricycles) and facilities or increased train frequency over a longer period of time and the provision of hand sanitizers, checking of temperatures, as well as provision of other measures to curb the spread can put additional financial burdens on public transport companies. Private transport companies providing public transport services are also not left behind as they are also likely to suffer economic losses from plummeting demand leading to increasing financial pressure and risks for their companies, and in particular job losses.

Similarly, the public transport operators in Lagos are likely to suffer more economic losses since they are required to operate at 50% capacity of the available seats during the pandemic coupled with the reduced demand for travel and the imposition of a dusk to dawn curfew. As a result of these, public transport operators are left with either the option of increasing fare to cover for losses incurred as a result of reduced capacity to enforce physical distancing between passengers or carry more than the maximum number of passengers they are expected to carry during this period or both.. Increased fare on the other hand rather may seem not feasible as commuters might be unable to pay for the hike in fare and also arguably based on the fact that the pump price of petrol had recently been reduced hence it should cover for loss of revenues from those unoccupied seats in the vehicles.

The study therefore sought to evaluate the impact of the COVID-19 pandemic on travel behavior and public transportation in Lagos, Nigeria.

Hypothesis of the Study: *That Covid-19 has no effect on public transportation in Lagos, Nigeria.*

III. Materials and Methods

The study was carried out on Lagoscommutersfrom May 2020 to February 2021. A total of 384 commuters were sampled from the target population of over 16 million

Study design:Survey method

Study location: The study covered only Lagos State since it is the epicenter of Covid-19 outbreak. Lagos has a rich history of economic growth and transformation, accounting for over 60% of industrial and commercial activities in the nation. Today, Lagos has emerged as a major hub for the headquarters of national and global companies and the complex business and professional services that support them. With a population well over 16 million, Lagos is the seventh fastest growing city in the world, and the second largest city in Africa. Lagos is not only becoming a “megacity” in terms of population but it is a global city with a substantial and growing foreign-born population and non-stop flights to hundreds of destinations around the world (Nwagwu& Oni, 2015).

Study duration: May 2020 to February 2021.

Sample size: 384 commuters.

Sample size calculation: The sample size was estimated on the basis of Krejcie and Morgan Table (1970) for sample size determination of population of 1 million. The sample size actually obtained for this study was 384 commuters.

Subjects & selection method: The study population was drawn from all residents in Lagos, Nigeria.

Procedure methodology

A well-designed online survey was used to collect the data from the sampled respondents. The survey included socio-demographic characteristics such as job status, trip volume before the emergence of Covid-19 and after its emergence, means of transport used before the emergence of Covid-19, means of transport used after the emergence of Covid-19, and the effect of covid-19 on travel behavior and public transportation.

Statistical analysis

Data was analyzed using SPSS version 17 (SPSS Inc., Chicago, IL). Multiple regression was used to analyze the effect of Covid-19 on travel behavior and public transportation. The level $P < 0.05$ was considered as the level of significance.

IV. Results

276 complete responses were obtained from the 384 sampled respondents indicating a 71.88% response rate. Table no1 shows the socio-economic characteristics of the respondents.

Table no1ahows the socio-economic characteristics of the respondents. 35.51% of the respondents were essential workers while the remaining 64.92% were non-essential workers. The distribution of the respondents based on mostly used means of transportation before the emergence of Covid-19 showed that 59.05% of the respondents used the commercial buses while 22.10% use the private car, 8.33% use the motorcycle/tricycle, and 4.71% use the train, 4% use the ride hailing services while the remaining 1.81% often walk. Furthermore, the distribution of the respondents based on the mostly used means of transportation after the emergence Covid-19 in Lagos, Nigeria revealed that more than 50% of the respondents still used the commercial buses, and this further emphasizes the dominance of the use of public transport in the State, while 27.53% use the private car, 3.62% use the motorcycle/tricycle, 3.26% use the train. 8.33% use the ride hailing services, 5.81% walk while the remaining 1.09% use the bicycle.

This distribution reflects a sudden change in travel mode choice behavior with increase in the use of private car after the emergence of the pandemic and the evolving use of bicycle and walking for short distance journey. Commuters who had hitherto abandoned their private cars due to heavy traffic congestion usually experienced on major highways in Lagos and made use of the public transport before the emergence of Covid-19 had once again embraced the use of the private cars in order to mitigate the risk of being infected while travelling. As a result, the scenario points to an increasing use of private car by commuters as the lockdown was lifted but a curfew still in place while the government gradually reopened the economy. Also, more people embraced the ride-hailing services to ensure physical distancing in an effort to reduce the risk of contracting the virus. The choice of these ride-hailing services however was limited as a result of purchasing power. However, cycling might still be a lesser preferred option to containing the spread of the virus as the roads do not have dedicated bicycle lanes for riders.

Table no1: Socio-economic Characteristics of the Respondents

Variable	Frequency	Percentage (%)
i. Job status:		
Essential workers	98	35.51

Non-essential workers	178	64.49
ii. Trip volume during Covid-19 as compared to before its emergence:		
Increase in number of trips	41	14.86
Decrease in number trips	137	49.63
No change in number of trips	98	35.51
ii. Means of transport used before the emergence of Covid-19:		
Commercial buses	163	59.05
Private car	61	22.10
Motorcycle/Tricycle:	23	8.33
Train	13	4.71
Ride-hailing	11	4.00
Walking	5	1.81
Bicycle:	-	-
iii. Means of transport used after Covid-19:		
Commercial buses	139	50.36
Private car	76	27.53
Motorcycle/Tricycle:	10	3.62
Train	9	3.26
Ride hailing	23	8.33
Walking	16	5.81
Bicycle	3	1.09

Source:Field Survey (2021).

Table no2 shows the result of the multiple regression of the effect of Covid-19 on public transportation in Lagos, Nigeria. The result revealed that Covid-19 has a significant effect on public transportation in Lagos, Nigeria.

Table no2: Multiple regression coefficients of effect of Covid-19 on public transportation in Lqgos, Nigeria

S/N	Variables	Combined	B
1	Lack of alternative transport means	-0.236	-0.222*
2	Increase in transport fare	0.233	0.232*
3	Social distancing	-0.079	-0.077
4	Inadequate transport means	0.195	0.201**
5	Road traffic congestion	0.178	0.185**
	Constant	2.953	
	F – Values	4.593**	
	R ²	0.078**	
	Adjusted R ²	0.061	

Notes:*b*:unstandardized regression coefficient; β : standardized regression coefficient; $N = 275$ * $p \leq 0.05$; ** $p \leq 0.01$

Source: Data Analysis (2021).

IV. Discussion

The multiple regression model in table no2 explained only 7.8% of the variance in Covid-19 having an effect on public transportation in Lagos State. This was statistically significant as it was confirmed in by F-value of 4.593, $p < .05$. Hence, the hypothesis that Covid-19 has an effect on public transportation in Lagos State was accepted. The regression coefficient revealed that increase in transport fare ($\beta = 0.232$, $p < 0.05$) has the greatest effect on travel behavior of commuters as a result of Covid-19 outbreak in Lagos. Furthermore, the result indicated that lack of alternative transport means ($\beta = 0.222$, $p < 0.05$), inadequacy of the available transport means ($\beta = 0.201$, $p < 0.05$) and road traffic congestion ($\beta = 0.185$, $p < 0.05$) also has significant effect while social distancing had no significant effect since the commuters had no choice but to board the vehicles as the available public road transport vehicles were carrying beyond the maximum carrying capacity as specified in the guidelines for public road transport operators as a measure to curb the spread of Covid-19 in Nigeria.

This implied that the fare charged by public transport operators have significantly increased due to limited carrying capacity as a measure to mitigate the spread of Covid-19. Furthermore, the rail transport services which could have served as an alternative means were not operated in the state during the period of the survey up until late July when train services resume operations in the country. On the other hand, road transport and the inland waterways which were operated were grossly inadequate as demand exceeded supply. Lastly, the roads were more congested as the lockdown was further eased thereby enabling more socio-economic activities to take place within the State particularly with those employed in the formal sector having to resume physically at work rather than working from home. Also, some commuters who owned private vehicles but had hitherto opted for the use of public transport buses and paratransit before the outbreak of Covid-19 now preferred to use their private cars as a measure to reduce the risk of contracting the virus and also the need of these commuters having to wait at the bus-stops for the public buses that are being held in gridlock is eliminated. Peradventure, the buses arrive at the bus-stops; there are limited seats or no seat(s) available for passengers intending to embark on such buses. Social distancing however did not influence travel behavior and public transportation as the public road transport operators sometimes carry more than the maximum number of passengers required and the passengers on the other hand have no choice than to board in the absence of an alternative(s) as well as the need to avoid being sanctioned for violating the curfew which started at 8pm till 6am daily in the State. Another issue of great concern is in the area of boarding/alighting from the commercial (Danfo/Yellow) buses in Lagos State relative to maintaining physical distancing. Mostly the drivers of these buses are impatient to let passengers embark on the buses at the bus-stops, thereby making passengers often run after the buses in a bid to secure a seat on the bus, and as such maintaining physical distancing becomes almost impossible as the passengers run into the each other. Another dangerous situation relates to when the passengers are about to alight from the vehicle, as they often run into the passengers who simultaneously wants to board the same bus the passengers are alighting from. This situation is prevalent during peak period and when there is traffic congestion whereby limited buses are available on a particular route, as a result, the risk of infection increases. But since there are no adequate alternatives to public transportation with the available alternative (private car use) limited, the commuters who are expected not to be on the roads at certain time of the day have no choice but to board the public transport vehicles at the fares charged by the operators, hence, resulting in a situation where the winner takes all. This situation thus strengthens the existing condition of the inadequacy of the government in the provision of public transportation system for the masses in which they can enjoy subsidized fares. The rail transport system that could have served as a better alternative is also limited in the number of passengers carried daily within Lagos.

V. Conclusion

The study concluded that Covid-19 has significant effect on travel behavior and public transportation in Lagos, Nigeria with a concomitant increase in transport fare.

While travels have been closer to home initially with the tendency for people to do more of driving tourism, there is also going to be a segment of the population that will ride in a public transport vehicle due to the absence of alternatives means of travel. Hence, the coming months and year(s) will present significant challenges to the planning and operation of the public transportation system in Lagos State during the pandemic, as the public transport operators are more likely to carry more than the required number of passengers as stipulated in the guidelines for their operations during the pandemic. There also exists opportunities for public road transport operators to cash in on the pandemic since they are more likely to increase fare unless the government regulates their operations. During peak periods, it might be difficult to enforce the “no mask no entry” rule by these operators who usually pick up passengers enroute. The government must therefore ensure that the taskforce put in place to ensure strict compliance with the measures put in place are enforcing it with adequate sanctions meted on violators, with proper and regular sensitization of these operators on the need to help curb the spread as events unfold.

Finally, the government must be prepared to engender new ways of providing alternatives in the form of high quality walking and cycling facilities and e-scooters on proposed transport networks which will serve as alternative means of transport and potentially help to reduce the carbon imprint of automobile use and promote healthy living. Although the Federal Government manages the rail transport system, more investments is needed to ensure proper connection within the state since it is a cheaper means of transportation and could also serve as an alternative to the road transport system. The Lagos State Government should also invest more in the inland waterways to relieve traffic congestion on the roads particularly from the mainland.

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