THE IMPACTS OF COVID-19 PANDEMIC ON ROAD TRANSPORTATION

(A STUDY OF RIVERS JOY TRANSPORTATION COMPANY PORT HARCOURT, RIVERS STATE.)

BY

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CERTIFICATION

This research on the impacts of covid-19 pandemic on road transportation: a study of rivers joy, port Harcourt carried out by elechi chigozie prince (20194197168) is hereby approved as a satisfactory project for the award of Master of Science (M.Sc) Degree in the department of Transport Management Technology.

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DEDICATIONS

This research work is specifically dedicated to Almighty God in Heaven, the one who loves me dearly, unconditionally, and eternally. He is the source of the strength with which I have been able to overcome the challenges that came with this work, and I ask him for his protection and guidance over my life from the start and towards the successful completion of this academic program. I would also like to thank my parents, Mr. and Mrs. ELECHI JOSEPH OBUOMA, for their moral and financial support in helping me complete this important endeavor. In Jesus' name, I hope that you will reap the rewards of your effort. Amen.

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ABSTRACT

The COVID-19 pandemic resulting in significant disruptions to road transport operations worldwide. This study on Rivers Joy Transport Company operations in Port Harcourt city, Nigeria tries to look at how the COVID-19 pandemic impacted the company's operations and income, and how this two parameters significantly affected the organization during the pandemic, causing operational disruptions and financial challenges for the company. It is however noted that Road transport system is closely related to socio-economic changes in the society, as it is concerned with the mobility of people, freight and services from one point to the other. The major actors in this business are the drivers and the passengers. The aim of this study was to assess the impacts of COVID-19 on the incomes and operations of Rivers Joy Transportation Company during the pandemic. The study area was Port Harcourt city and its metropolis, located in the south southern part of Nigeria. The major factors considered were incomes, operations of the company during the pandemics, using the numbers of trips and vehicles/drivers available at the time to form the sample frame for this study. The study used a survey design method with the help of a structured questionnaire. Two hundred copies of the questionnaire were distributed to the parks and registered terminals used for this study. One hundred and forty-two of this copies were eventually correctly filled and returned for analysis. Findings revealed that the pandemic has a significant positive impact on the incomes of company at 5% significance level ($\beta 1 =$ 126.5 $p<0.05$). It is recommended that transportation policy in the case of road transport should be strengthened to ensure strict compliance by all users of the road.

Key words*: Road, transport, COVID-19, Pandemic, income, operations, vehicles, economy, goods, travel, Disease, virus, Passengers.*

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND INFORMATION

The global impact of the 2019 corona virus (2019-ncov) has been properly documented as a pandemic that the world will live to remember. The disease which belongs to the family of viruses that causes sickness like cold, Severe Acute Respiratory Syndrome (SARS), and middle East respiratory Syndrome (MERS) with symptoms such as Sore throat, cough, running nose, fever, tiredness, body aches and difficulty in breathing, manifesting between three to fourteen days after one is exposed to it,

COVID-19 originated in Wuhan, a city in China. It was a condition caused by the Corona virus, which was originally discovered in non-human animals. In the year 2019, which is the year of discovery, the abbreviation COVID-19 stands for Co-Corona, Vi-Virus, and D-Disease, and 19 for the year 2019. So COVID-19 was named. This illness was categorized as a type A [initially prevalent among people with blood group A (Zietz, M.; Sucker, J.; & Tatonetti, N.P. 2020)], and because of the human-to-human spreading nature of the virus, occurring due to close contact with an infected person exposed to coughing, sneezing, and respiratory droplets (Shereen et al., 2020), this outbreak was later, on March 11, 2020, recognized by the World Health Organization (WHO), the organization that rules over global health, as a pandemic.

Till date, there have been cases of the occurrence of the virus confirmed in almost all the countries of the world, according to the world health organization (WHO, 2020). This has caused unprecedented measures to be taken by many countries of the world in order to survive or curb the menace of the disease. This measures includes but are not limited to travel restrictions and possible ban, regular wearing of nose mask by persons, restrictions on social activities, etc. (De Vos, 2020), and all these are due to the number of millions of death that have occurs around the world as a result of the virus in 2019 and 2020. Shereen, et al, (2020) stated also that covid-19 is a highly transmitted and pathogenic viral disease that is caused by severe acute respiratory syndrome corona virus 2 (SARS-COV-2).

Nigeria, like most other nations of the world, was never left out of the experience seen in other countries of the world, as a result of the pandemic, with her first confirmed case of the virus being an Italian citizen from the capital city Milan, who came to Nigeria through Lagos

and went to Lafarage cement company at Ogun state, for a meeting at the company's factory

at Ewekoro. The second case was that of a Nigerian, who had contact with the index case. Thereafter, the news of discovery of cases and symptoms of the sickness begin to emerge from different parts of the country on a daily basis. Below is a table of confirmed cases of covid-19, death recorded and number of cases treated in Nigeria as at Sunday September 12, 2021.

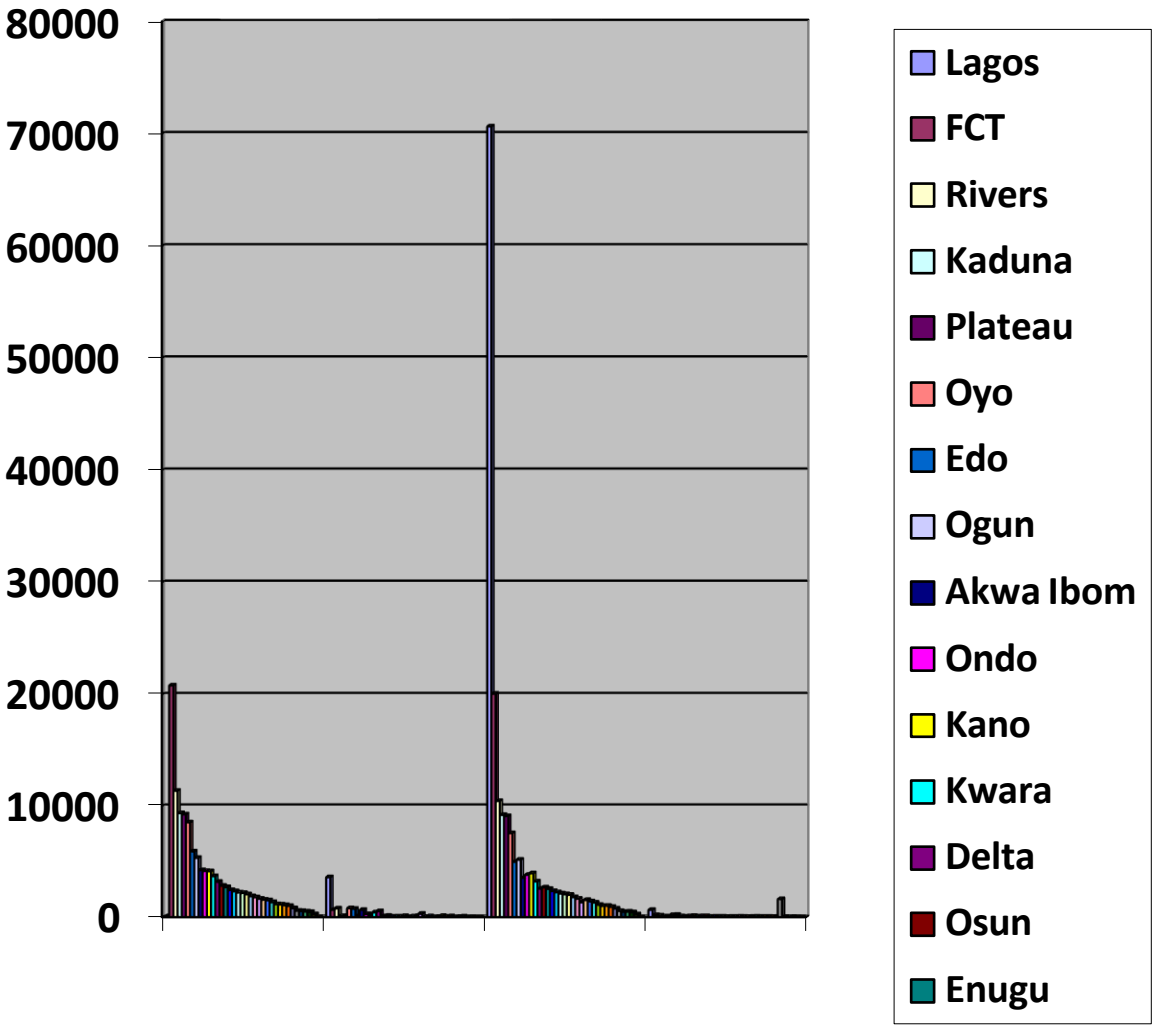
Table 1

CONFIRMED CASES OF COVID-19 BY STATE OF NIGERIA

S/N	States Affected	No. of cases (lab confirmed)	No. of cases (on admission)	No. Discharged	No. of Deaths
1.	Lagos	74.881	3,591	70,638	652
2	FCT	20,801	654	20,068	178
3	Rivers	11,376	780	10,458	138
4	Kaduna	9,359	93	9,200	66
5	Plateau	9,246	92	9,093	61
6	Oyo	8,530	794	7,553	183
7	Edo	5,914	741	4,967	206
8	Ogun	5,329	86	5,164	79
9	Akwa Ibom	4,221	645	3,534	42
10	Ondo	4,148	272	3,800	76
11	Kano	4,129	76	3,942	111
12	Kwara	3,688	422	3,207	59
13	Delta	3,173	532	2,556	85
14	Osun	2,820	68	2,667	85
15	Enugu	2,695	112	2,534	29
16	Nasarawa	2,426	42	2,345	39
17	Gombe	2,328	50	2,234	44
18	Kastina	2,214	50	2,123	35
19	Anambra	2,173	97	2,057	19
20	Ebonyi	2,048	13	2,003	32
21	Abia	1,880	59	1,796	25
22	Imo	1,784	95	1,650	39
23	Ekiti	1,651	294	1,332	25
24	Bauchi	1,568	13	1,538	17
25	Benue	1,512	70	1,418	24
26	Borno	1,344	0	1,306	38
27	Adamawa	1,153	23	1,098	32
28	Bayelsa	1,132	101	1,004	27
29	Taraba	1,074	36	1,014	24
30	Niger	1,001	67	914	20
31	Sokoto	796	2	766	28
32	Jigawa	573	12	545	16
33	Cross River	542	52	469	21
34	Yobe	501	2	490	9
35	Kebbi	458	9	433	16
36	Zamfara	258	2	243	8
37	Kogi	5	0	3	2

SOURCE: NCDC 2021

Fig 1.1: confirmed cases of covid-19 by states in Nigeria as at the time of research



The total confirmed cases going by the table was 198,796, active cases 10,038, discharged cases stood at 186,168 and the total number of death was 2,590, and this is according to the Nigeria center for disease control (NCDC) and the multi-sectorial National Emergency Operations Centre (EOC).

More so, as a result of this daily upsurge in the number of confirmed cases in the nation, remedial strategies had to be put in place by the government, individuals and corporate organizations in order to reduce the rising number of cases of the disease. These various organizations and the government adopted strategies like, total or partial lockdown depending on the severity of the cases in that area, social distancing of not less than 1 meter, regular hand washing with alcoholic base hand sanitizers etc., in order to stem the tide and to curtail the rate of spread of the disease nationwide. The introduction of these remedial strategies or measures as the case may be, posed unprecedented challenges on the society at large and a drastic change in the way of living of the people. For instance,

the nation's major cities that were characterized by thronging traffic, car-splitting honks from vehicles and very large sea of commuters, which held the cities together were crippled and rendered sterile, leading to the hustling and bustling in these city centers eventually gave way for desertion on the streets and a sullen silence suddenly became a forces feature of life, owing to the isolation measures necessary to ensure survival from the pandemic in the nation.

The Port Harcourt setting in Nigeria was particularly essential due to several reasons, first, Port Harcourt is the country's treasures base, where the most of oil mining activities are done in the nation, and city also serves as a commercial hub. Consequently, it has a high surge in population and is experiencing rapid urbanization with an estimated population of 3.1 million people in 2020, across 1,900km2 (730 Sq.mil) area, hence Port Harcourt city is the fifth highest populated city in the country (UN, 2021). Secondly, the city operates in an emerging economy, which is facing institutional adversity, underlying and persistent economic challenges, as it tries to cope with the pandemic. Thirdly, according to Nwafor and Onya, 2019, the road means of transport is the most prevalent and extensively used form of transportation and Port Harcourt city and its metropolis are not left out of this situation. However, the dilapidated road network and inadequate fleet of road transport vehicles present significant concerns for the city and its metropolis. Finally, as the growing population in the city is steadily struggling with the poor infrastructure, there is seeming increasing number of cars on the city's roads, which causes traffic congestions and gridlock, leading to commuters loss of up to 25% of their daily working time and incomes because of the lockdown measures introduced to steady the tidy by government (Obi, 2018).

1.1.1 COVID-19 AND ROAD TRANSPORTATION

Over 80% of commercial land transportation of mobility and logistics services (in tons and passenger kilometers) is provided by the road transportation sector in Nigeria (IRU, 2020). Road transportation is vital to economies, communities, supply chains of goods and services, and their mobility networks. Hence, road transportation in Nigeria guarantees steady movement across the country and is essential to the economic and social development of the nation.

Consequently, in the bid to control and possibly reduce the spread of the pandemic across the nation, the government of the day had to place restrictions on domestic transit and closed border crossing across states and cities for road transportation except for those on essential duties. The result was a total decline in trade and disruption of the supply chain, which further impacted adversely on the people and further heighten the challenges been faced by the populace. This also led to the shortage in supply of essential goods and services, increased prices of goods and services, etc. in the nation.

According to the Arab Trade Union Confederation (ATUC, 2020.), the road transportation industry then finds itself in an unprecedented situation, one of which its essential roles of bringing the nations together, enabling citizens meet face to face and is considered as the main facilitators of social interaction have to be performed to ensure peoples survival. Now that the function has to be drastically reduces due to restrictions on movement put in place around the nation. Road transportation must find a way to continue with its function, where moving people and goods is a very important activity that needs to be continually performed. This is because the role of transport is fundamental and cannot be depreciated as it contributes to nourishing and supplying of other sectors that are immensely impacted by the covid-19 pandemic, such as businesses, the health sectors, manufacturing, etc. For instance, essential workers must be able to get to work, medical centers need to receive necessary supplies, and citizens restricted from movement also rely on provisions being delivered to shops to cope.

1.2 STATEMENT OF PROBLEM

Corona virus pandemic opened a huge gap in the road transportation sector of the Nigeria economy and this gap needed to be addressed urgently, else it will lead to a greater challenge in the nearest future. The use of motor bikes, tricycles, trucks, poor road transportation infrastructures and lack of modern transportation technological system in driving the sector, lack of modern transport policies, very little or no attention by the government to the sector, lack of professionalism, are some of the areas with gaps that needs to be urgently addressed for maximum efficiency, repositioning and growth of the sector. Hence, the already existing poor road transportation system in the nation urgently needs to be well regulated or monitored by the government and operators of the system in order to help achieve the developmental goals of the nation.

These existing gaps in our nations road transport system before the coming of corona virus pandemic which includes but are not limited to bad roads, use of old and obsolete vehicles, Touts managing road transportation policies, overloading of road transport vehicles, high cost of road transportation, etc., has been further widened, because of the advent of the pandemic and so, our government need to begin strategizing towards taking urgent steps to address these wide gap created.

Again, the needs for steady supply of food, medicals, emergency goods with minimal delays and other essential services, needed to maintain a balance in our nations supply chain networks for the sustenance of life and our economy, are all in dear needs of urgent attention in the Nigeria environment today, and the world at large, no thanks to the pandemic.

It is rather unfortunate that the government of the nation gives very little or no attention to the sector, this is evident in the amount allocated to the road transportation sector of the economy in our

annual budget at the local, state and national levels. The government is also leaving the management of the sector in the hands of people with little or no formal trainings in the sector to manage its affair at all levels of governance. That notwithstanding, the National Union of Road Transport Workers (NURTW); an independent Nigerian trade union responsible for the interest of road transportation workers, who are supposed to be calling for collective obtaining and pushing for social stability for all workers in the sector have been turned into an organization for extorting money from passengers, oppressing workers and other genuine investors in the sector.

Another challenge to be considered is the fact that transportation services providers are faced with financial crisis, deeper by the pandemic (Arellana, et al, 2020). Most transportation services operators in Nigeria have lost a significant part of their incomes because of the lockdown that made movement restricted in the cities, communities and society at large, while for individuals that don't have a vehicle of their own, it increased the cost of road transportation, where they could find such mode of movement (Aloi, et al, 2020).

Many of these challenges mentioned above and more, are questions begging for answers in the sector, with little or no research work being done to ascertain solutions to these challenges. Possible relationship between the covid-19 pandemic and transportation in the society, especially in the road transportation sector, where much have not been done and how it impacted on the people elicited the interest of the researcher in this direction. This relationship mentioned above cannot be determined without due consideration, considering the explanatory variables on one hand and the people on the other. The use of road transportation in Nigeria when properly considered in relation to the pandemic will lead to proper distribution of both goods and services, especially for individual and commercial purposes, especially when similar issues occurs. It is against this background that this study was conceived.

1.3 AIM AND OBJECTIVE OF THE STUDY

As a guide to the evaluation of this research work, it sorts to ascertain how the covid-19 pandemic immediately impacted road transportation in Nigeria, taking into special considerations Rivers joy Transport Company, Port Harcourt city. While specifically looking at how the covid-19 pandemic affected the incomes of Rivers joy Transportation Company in Port Harcourt city, Nigeria.

1.4 RESEARCH QUESTION

How did the covid-19 pandemic affect the incomes of Rivers joy Transportation Company in Port Harcourt city, Nigeria? In a bid to achieve this research question, this question was further sub-divided into the following question for administration on respondents***;***

1. Covid-19 lead to reduced road transportation incomes, by Rivers Joy Transportation Company in Port Harcourt?
2. COVID-19 lead to a relative increase in the prices of transport fares in Rivers joy Transportation Company?
3. Covid-19 also lead to introductions of news innovations (hand washing, wearing of nose masks, reduced number of passengers in a vehicle, etc.) by road transportation workers in the company?
4. It also lead to reduced operations during the period as noticed by the company?
5. It lead to overall change in travelling behavior of Rivers Joy transport company passengers in the city?

1.5 ASSUMPTIONS TO BE TESTED

Ho: ***there was no significant immediate impacts of Covid-19 pandemic on the incomes of Rivers Joy Transportation Company in Port Harcourt city.***

1.6 SIGNIFICANCE OF THE STUDY

The study will be very significant to students, road transportation policy makers, government, institutions, road transport operators and commuters at large. The study will give a clear insight on the immediate impact, of infectious epidemic on road travels, a case study of Coronavirus disease. The study will give insights into the challenges the road transport sector faced during the pandemic, while also serving as a reference to other researchers that will embark on studies of related topics and assessment to this subject matter.

1.7 JUSTIFICATION FOR THE STUDY

The justification for this study lies in the overall impact of covid-19 pandemic on the road transportation sector of the Nigerian economy, using Rivers joy road Transportation Company Port Harcourt, as a parameters for assessment of the process. It should be noted that, though the road

movement of people and goods didn't in any case contribute to the importation of the virus into the country, the rapid spread of the virus after importation from other countries using road transportation network cannot be overlooked. It is against this background that the study is informing road users, government, stakeholders in the road transportation industry, and Nigerians in general, of the extent to which covid-19 spread has resulted to social, economic and environmental challenges, such as loss of jobs, increased road transportation fares, restrictions of movement on the parts of both persons and goods, financial difficulties, reduction in air pollutions and noise, etc. within the city of Port Harcourt and the entire country at large.

Hence, concerted efforts must be put in place inorder to curtail and control the spread of the virus, and future occurrences of similar diseases especially in our urban centers, as the general transportation industry continues to suffer as these viruses spread and increases across the various cities of the nation. It becomes imperative to either curtail or control the movement of persons while putting in place measures to ensure that human comforts are still sustained to the fullest, as we continue to study strategies of overcoming future occurrences of events of similar nature in our cities in particular and the nation at large.

More so, due to the complexity of covid-19 issues when related to road transportation, deductions and findings from this study can be applied to other road transportation company operating within and outside Port Harcourt city and it's environment, especially those with similar characteristics and in other areas of road transportation studies, including medical and government agencies, particularly along the lines of infectious diseases and transportation, as an aspect that needs further research exploration in the nation.

1.8 SCOPE OF THE STUDY.

The scope of the study was between 2020 and 2023, immediately after the Federal government of Nigeria partially lifted the ban on inter-state travels around the country**. During this period,** the corona virus pandemic has impacted different aspects of transportation (Air, water, land) in Nigerian economy. The road transportation sector of the Nigerian economy, which is an integral part of the land system of transportation using taxis, buses, mini buses, tricycles motorcycles, bicycles etc.; and moving through highways, major and arterial roads etc., was also never left out during the period. As the emphasis of road transportation in Nigeria which was focused on the people, goods and services along the road network was shifted to proffering ways of operating the system inorder to ensure the survival of the freight system that was most

essential during the period, and that key essential workers that are necessary for the survival

of the human race can move around to perform their functions necessary for human survival. This sudden change impacted sources of revenue of the government, road transport operators and the general public.

This work doesn't take into account transportation routes mostly patronized as a result of the pandemic, how the pandemic affected inter modal linkage between road transportation and other land transportation modes like rail and pipelines, peak and off peak periods of road transportation during the pandemic etc.

1.9 LIMITATION OF THE STUDY.

In the course of conducting this research, some challenges were encountered. These challenges include but are not limited to the following.

Firstly, by the virtue of the busy nature of road transport operatives during the period, there was reluctance on their parts to volunteer information, some respondents, especially road transport operators delayed the completing of the questionnaires and it took personal influence of the researcher and the assistance of some of their colleagues, and in exception cases, it took telephone conversations with lectures from the department of transport management technology, Owerri. (FUTO). To convince them in order to obtain their eventual impressive responses. As a result, the researcher has to take time to allay the fears of such respondents by educating them properly about the essence of the research, that it would not in way expose them to imposition of levies, charges or any liability within the city or in the course of doing their works, but would rather lead to an improvement in their working conditions, if the results of finding from this research are implemented by government or stakeholders in the field.

Again, the various opinions of individuals, aged 18years and above, whether professionals or not in the road transportation industry were relied upon, as the nature of confidentially of covid-19 information all around the world and Nigeria in particular did not allow the researcher, the ability to lay hands on firsthand information from government agencies, private organization saddled with such responsibilities to give such information. Even road transportation companies hardly disclosed their Companies Covid-19 information, not minding that the result of the research could help them in the course of their operations in future.

Finally, due to time constrain for the period of the study (Research) and finance, the researcher was limited to materials on the internet, from little books available at the time of the study and from individuals interviewed.

These limitations did not however, in any way affect the quality of data collected for the purpose of this study nor did it affect the conclusions drawn from this research work.

1.10 DEFINITION OF TERMS

TRANSPORTATION: Transportation is the movement of persons, goods and services from one location to another. In other Words, the action of transport is defined as a particular movement of an organism or object from point A to another point B.

ROAD: A hard surface, where vehicles, animals, people and other objects can move on.

TRAVEL: The act of moving from one point or position to another.

PANDEMIC: Something occurring over a wide range of area and affecting an exceptionally high number of the population of people or organisms living in a given area.

DISEASE: An illness that affects a person, animal or plant, and in most cases prevents the body or mind from functioning properly or normally.

ECONOMY: The process or system, by which goods and services are produced, sold and brought in a region or area.

COVID-19: A transmittable and pathogenic viral infection caused by severe acute respiratory syndrome (SARS- COV-2), which appeared or gained ground in the year 2019 around the world.

OPERATION: Performance of a practical work or of something involving the practical application of principles or processes.

VIRUS: An extremely small living thing that causes a disease and that spreads from one person to another or from one animal or plant to another.

INCOME: A gain or recurrent benefit usually measured in money that derives from capital or labor.

VEHICLE: A machine or means that is used to carry people or goods from one place to another.

GOODS: Something that has economic utility or satisfies an economic want.

PASSENGERS: A person who is traveling from one place to another in a car, bus, train, ship, airplane, etc., and who is not driving or working on it.

CHAPTER 2

LITERATURE REVIEW

2.1 CONCEPTUAL LITERATURE REVIEW

According to Maxwell, et al, (2021). The novel corona virus disease 2019 (covid-19) (as it is well known) was described as the most crucial global health calamity of the century, and the greatest challenges that mankind have faced since the end of the Second World War. For them, it fundamentally disrupted individuals' lives, families, organizations, transportation, supply chain, markets, global trade etc. Mogaji, et al, (2021) opined that the arrival of covid-19 pandemic changed the provisions and delivery of transportation services especially in the road sector.

2.1.1 POLICY, IMPLEMENTATION AND EFFECTS ON ROAD TRANSPORT DURING THE PANDEMICS

Zhang, et al. (2020) argued that lockdown measures, have a severe social-economic cost and may not be a feasible solution for every countries, this according to them is because there was no strong connection between population flow and cross-regional infection except at the very early stage of the outbreak. They asserted that non-lockdown-type measures may have outcomes similar to lockdowns, if the measures are quickly prepared and strictly executed. Muller, et al. (2020) also claimed that a single restriction strategy (i.e., a complete removal of infections in childcare, primary schools, or workplaces) is not sufficient to control infection dynamics. For Arellana, et al. (2020), they stated that, even if most covid-19 restriction strategies results show positive effects, some of these measures do not work everywhere. Dalkmann and Turner's (2020) opined that African countries should develop its own specific set of policies and regulations to tackle the effects of COVID-19 on urban transport. They suggested that such policies should focus on seven major areas. These include COVID-19 response, formal transport operations, informal transport operations, taxi operations, active transport, accompanying policies, and fiscal policies. They advocates a long-term action that uses the opportunity presented by the pandemic for transport sector reform and an inclusive low-carbon transformation. Pullano, et al. (2020) on their path slated that, policy announcement and implementation timing is important because unexpected anomalous behaviors can occur in transportation during the period.

De vos (2020), said that, measures such as travel limitations or outright bans, restricting or outright bans on social gathering in public and private locations, frequent hand washing, etc. are possible ways of reducing the spread of the virus. Mogajl (2020) on his own, opines that mitigation

measures should follow strictly the COVID-19 safety protocols developed by the health authorities. While Medlock, et al, (2021) avers that the pandemic will cause a decline in the demand for public road transport in favor of lower-density alternative transport modes. This scenario presents serious implications for fuel use, congestion, accident rate, and air quality. Tirachini and Cats (2020) also said that, because public transport vehicles and stations are perceived as high risk arenas, and fear of contagion between travelers was related to higher passenger density in a limited physical space, governments in many countries should therefore implemented restriction policies inorder to limit or discourage public transport use, which will subsequently lead to public transport operators reducing their services.

Similarly, Budd and Isan (2020) propose a new concept of responsible transport to help inform and shape transport policy and practice responses to the COVID-19 pandemic. They opined that the novelty of this proposal lies in the fact that it incorporates not only environmental considerations concerning sustainability but also encompasses considerations of individual and community health and well-being. They argue that Responsible Transport delivers safe, secure, and equitable mobility that embeds social, economic, and environmental well-being at the heart of post-COVID transport policy, planning, and operations, and enables individuals to make considered transport choices. They revealed clearly that any transition toward Responsible Transport will occur in a rapidly changing policy and service environment. In another related development, Dalkmann, et al, (2020), call for collective action for international transport stakeholders to respond to the COVID-19 pandemic. They suggested that, such a collective action should ensure the establishment of a wider coalition that can speak with a single voice to coordinate and act on policy advocacy and ensure that the COVID-19 is combined with delivering on the Paris Agreement and Sustainable Development Goals.

Tinto, (2020) saw on his part that, several African countries measures, introduced to curtail COVID-19 spread have proven unsuitable for road transportation, for instance, the Vanguard News Nigeria,(9 May, 2020) said that curfews, on top of transport restrictions (especially on the road) caused crowding, as citizens rush to get home in time, increasing the risk of infection. This negates Muley, et al, (2020) believe that, Travel restrictions are effective tools for controlling infectious disease spread at the initial stages, while behavioral changes are important to limiting spread at a later stage. Jaekel and Muley (2022) explained that due to the outbreak of the pandemic, most cities around the world are experiencing a decrease in traffic volume, resulting from a combination of restrictive policies rather than the impact of the outbreak itself. For Karithik and Sharereh (2021), the total number of people commuting to work fell drastically because of the work from home policy implemented for most workers by their various organizations during the period as stipulated by various governments during

the period. However, Anzai, et al. (2020) posited that the effectiveness of diverse measures during the virus has been a subject of debate because studies report inconsistent results or findings showing less effectiveness than expected, and identify controversial issues, such as control strategy side effects. Moreover, for Fang, et al. (2020), they on their part, saw that it was difficult in most cases to quantify and distinguish covid-19 measure effects from other potential contributing factors. This according to them is because it may be unreasonable to draw one conclusion based on a single standard in this case, because the timing and method of government policy implementation, citizen compliance, analysis data and methodologies are different in each city.

Du, et al, (2021) averts that Physical distancing is the most significant and consequential non-pharmaceutical preventative method to reduce the spread of COVID-19 on road and other modes of transportation for pedestrians and public transportation users. According to them, Physical distancing significantly lowers the number of vehicles and public transit stations to take passengers from one point to another. For them, physical distancing is incompatible with the idea of public road transportation. This precautionary principle has recently been used to advocate for widespread usage of face masks during the COVID-19 pandemic, a situation which Javid, et al, (2020) claimed that, the potential benefits to public health will likely outweigh the risks on road transportation during the pandemic. Musselwhite, et al. (2020) on their path, argued that, although infectious diseases spread in dense public transport vehicles, this does not support the effectiveness of restricting public transport services to prevent spread. For Pan, et al. (2020) they proposed a social distancing index, which indicated that both government orders and local outbreak severity were significantly associated with the strength of social distancing.

Dahlberg, et al, (2020), asserted that even less restrictive and mild public recommendations convince people to comply with social distancing and avoid unnecessary travel. Pullano, et al. (2020) slated, policy announcement and implementation timing as important because unexpected anomalous behaviors can occur during the period. Chinazzi, et al. (2020) saw it to be more effective to introduce a combination of different types of control policies for the virus. They argued that travel restrictions or bans are considered most effective when combined with the closing of public gatherings like markets, entertainment centres, etc. While in a related development, Askitas, Tatsiramos and Verheyden, (2021) claimed that in terms of reducing the spread of the virus, it has been found that the most effective measure have been those that reduced contact e.g. cancellation of public events, restrictions of public gathering in schools and workplaces, etc. Anzai, et al. (2020), also argued that travel restriction decisions, such as a complete lockdown, should be carefully applied by comparing the resulting estimated epidemiological impact and predicted economic outcomes. Pan, et al. (2020)

proposed a social distancing index, which indicated that both government orders and local outbreak severity were significantly associated with the strength of social distancing.

Kraemer, et al. (2020) asserted that travel restrictions may have effectively reduced the flow of case importations in most cities. For them however, restrictions may have been less effective once the outbreak was more widespread, thus other local mitigation measures may have been more important to mitigating spread. But for Musselwhite, et al. (2020), there is no clear evidence that suspending mass movement will reduce the virus spread. Lu, et al. (2021) posited that, if the virus is widespread, implementing restrictions in hub cities is much more efficient than imposing the same travel restriction across the country. Liu, et al. (2022) saw the effects of coercive policies as very effective in the short-term during covid-19. But for Limsawasd, et al. (2022), The COVID-19 pandemic led to changes in public transit services, where some public transport operators reallocated their services and provided minimum operations to meet essential travel demands, while considering government regulations and maintaining a safe transport mode.

2.1.2 PASSENGERS BEHAVIOR DURING COVID-19 PANDEMICS

Hörcher, et al, (2020) clinched to the fact that, though studies of the spread of COVID-19 in public transport vary widely in their assumptions, the virus dynamics, demand or operational characteristics, many show that the virus is transmissible in public transport to some degree. But by reducing the contact and exposure of customers within public or shared transport, it is hoped that the spread of the virus can be curtailed. Abdullah, et al. (2020) saw, the significant predictors of mode choice during the pandemic to included gender, car ownership, employment status, travel distance, primary purpose for travel, and pandemic-related underlying factors. In Zubair, et al, (2022) they stated that prior to COVID-19, factors such as travel time saving, safety, security, comfort and others including distance and duration of travel were important influencing factors in the choice of modes, but for Mussone and Changizi (2023) during the pandemic, concerns about infection, social distancing, wearing a mask, and worry about using public transport became important influencing factors.

Abdullah, et al. (2020), said that, the fear of contagion and perceived risk, significantly impacted travel patterns. While Cho and Park (2021) saw the awareness of overcrowding during the COVID-19 pandemic to be higher than before the pandemic, Schaefer, et al. (2021) posited that Women tend to be more sensitive than men to fear of infection and in the use of face masks on public transport. On the other hand, according to Basnak, et al. (2022) younger and low-income people are relatively less sensitive to overcrowding. Beck and Hensher (2020) on their own, saw Working from home (WFH) to have increased, and emerging as one of the government policies during the pandemic.

Huang, et al. (2023) found more significant reductions of trip distance, travel time, travel frequency, and morning peak hour's trips, among the Walking from Home group. Loo and Huang (2022) saw promoting walking from home to also decreased traffic congestion, especially during morning peak hours. However, for Kalter, et al. (2021), the main factor influencing Walking from Home during the lockdown period was job characteristics; e.g office workers and teaching staff were more likely to spend more time working from home. As for Deloitte (2020), it is important to avoid disrupting industries that depend on social relationships, as the virus outbreak has dramatically changed the way travelers behave in the world. Gao, et al. (2020) reported that stay-at-home orders led to a reduction in transport and car traffic, thereby reducing travel volume, travel time, and traffic accidents.

Dahlberg, et al, (2020) asserted that even less restrictive and mild public recommendations convince people to comply with social distancing and avoid unnecessary travel. Arellana, et al. (2020) cited that COVID-19 is spread through person-to-person contact and the impact may vary depending on individual's movements, demographic, socioeconomic characteristics, travel frequencies, activity frequency and those directly associated with trips taken. Anzai, et al. (2020) on their path, argued that travel restriction decisions, such as a complete lockdown, should be carefully applied by comparing the resulting estimated epidemiological impact and predicted economic outcomes, they further stated that during pandemics, the estimated delay of contagion was smaller than expected depending on the model scenarios. Kraemer, et al. (2020) asserted that travel restrictions may have effectively reduced the flow of case importations. For them however, restrictions may have been less effective once the outbreak was more widespread, thus other local mitigation measures may have been more important to mitigating spread. Schwartz (2020) emphasized that COVID-19 cases are primarily associated with local community spread, rather than public transit ridership rates. Furthermore, Musselwhite, et al. (2020) argued that, although infectious diseases spread in dense public transport vehicles, this does not support the effectiveness of restricting public transport services to prevent spread.

Sun, et al, (2020) confirmed that in the past, movement of persons and goods have influenced the outbreak and spread of infectious diseases. Deepti, et al, (2020) also agreed with the information that human interactions have a direct contribution to the spread of infectious diseases particularly during period like pandemics. Yelzi and Khan, (2020) supported this argument when they posited that due to the fact that transportation (especially public road transport) brings people together in close contact and in a confirmed space, it therefore increases the risk of exposure of the individuals undertaking the system to the spread of the virus. Konig and Dreblers, (2021) on their own saw human mobility in the environment to be playing an important role in the growth and dissemination of virus in a nation. While for Shen, et al. (2020), a bus with air recirculation may increases the risk of illness

for its passengers. Brought, et al, (2021) suggested that the difference in mobility responses is explained by an inability of the lower income and less educated individuals to work from home, and a greater need to travel to work for essential jobs.

David Spielfogel, (2020) called the covid-19 era, a micro mobility moment. This according to him is because during the pandemic, most road transportation companies concluded plans to reactivated small fleets of scooters to meet the growing demands for micro-mobility This micro-mobility devises according to him included bicycles, electric skateboards, shared bikes, electric pedal assisted bicycles, etc. Farinloye, et al, (2019) thinks that such development should be supported by infrastructural changes that will be built into the environment to support the system. This will further open opportunities for new service system for individuals looking for alternative mode of road transportation especially within short distances. For instance, Mogaji, et al, (2021) cited that in the united Kingdom, the oxford council had to temporary reallocate roads to allow people to walk and cycle safely and this was achieved through road closure, traffic light controlled one-street, cycling park. According to them, London also ban cars from plying certain roads in order to reduce overcrowding and made daily exercise more accessible and safer for citizens. Mogaji, et al, (2021) further stated that France announced a scheme to encourage people to cycle more. Similarly, Paris also had some streets closed to vehicles after the lockdown and subsequently turned some of the streets to cycling highways. In Auckland, the road transportation authorities had to announce changes to some significant roads to increase space for walking, cycling and more areas at intersections and crossings to reduce crowding and give people space to cross the roads more, While for Maxwell, et al, (2021) Lagos in Nigeria government increased inter-agency co-operation among actors in road transport sector in the state, a factor that stimulated policy measures. According to Mogaji (2021) these instances highlighted, how various governments during the covid-19 period worked with road transportation service providers to ease the traffic and contacts during the period and by so doing encourage other modes of road transportation to strive.

2.1.3 ROAD TRANSPORTATION INNOVATIVE IDEAS DURING THE PANDEMIC

COVID-19 infection is significantly reduced when people maintain at least a two-meter distance from each other (Chu, et al 2020). WHO in its guidelines of 5 June 2020, recommending the application of face masks in public settings, including public transportation, and medical masks for people susceptible to respiratory diseases (WHO, 2020). According to Prather, et al, (2020), Information based on epidemiological features shows that countries that have successfully halted the

spread of COVID-19, have mandated compulsory usage of face masks in both public and private vehicles.

It have been noted that, anyone having contact with physical vehicle surfaces that have been exposed to the COVID-19 virus is a likely carrier and possible spreader of the COVID-19 virus. This means that public transportation and bus stations regular cleaning of public surfaces is a proposed preventive solution. The sanitization of public transportation has been widely acknowledged worldwide depending on the different types of stages of intensity based on the availability of resources. Some countries regulations on COVID-19 already advised pedestrians and motorists to make sure that they sanitize potentially infected surfaces and dressing meeting room surfaces, not excluding management offices (UITP. 2020). During Post COVID-19 lockdown, it is important to have personal hygiene protection equipment and materials in public and office places to safeguard staff and motorists and also improve their confidence in using public road transportation systems for their day-to-day activities, even though the risk of being infected is at an elevated level (UITP.2020). Giz (2020) averts that, appropriate and useful information needs to be provided to motorists and pedestrians, including the conduct of hygiene, the appropriate ways to use a face mask in public, and what to do when a passenger exhibits COVID-19 symptoms. Hence according to them regular ventilation in closed places is usually recommended, especially in public spaces like bus stations, as a preventive measure for COVID-19 (CDC, 2019). These preventive measures are imperative to public motorists who spend several minutes with people inside public vehicles. However, suppose there are inadequate precautionary measures in public transportation systems. The drastic decline in the use of public transportation systems due to COVID-19 has been compounded by high expenses because of new cleaning hygiene regimens. Due to these circumstances, many public transportation institutions, both public and private, have faced financial hardship, leading to pressure on governments. (Goldbaum 2020.)

De vos, (2020) stipulated that those travelers on essential duties should be encouraged to walk and cycle more. This is because it will enhance their health and wellbeing, while still reducing the spread of the virus. Therefore, road users need to start adopting the possibilities of these modal shift in order to enhance the wellbeing of the society. Ferguson, et al, (2020) warned that if already existing intervention processes are relaxed or not monitored properly, the transmission of the virus could easily rebound. This warning means that road transportation users should continue to observe the general intervention processes put in place in order to avoid reoccurrence of the virus. For them activities like regular vehicles and environmental cleaning, regular hard washing with soap and water, etc. should be continued even after the pandemic. It now becomes the responsibilities of road transportation operators

and commuters to use this intervention processes to protect and preserve themselves in order to reduce their risk of being infected. They should also make it a point of duty to periodically remind and educate their commuters on the importance of their protection from the infection of the virus.

The need for continuous reminding by both road transportation operators and a follow up by government is what Yelzi and Khan, (2020) referred to as "Risk Communication". They said that risk communication involved the engagement with the public on the general guidelines that will help reduce the transmission of the virus in the transport sector using advertisements, social media, posters, transport company websites, etc.

Musselwhite, et al, (2020) emphasized the need of interior cleaning and cleanliness of public road transportation vehicles. Their research also noted that improved ventilation is very important to reducing the spread of the virus through airborne transmission, given the increasing evidence of the spread of the virus. Arellana, et al, (2020) stated that reducing the demand for cross-country transport during pandemics means reducing congestion, reducing transit traffic, and reducing external modes of transport.

Musselwhite, et al, (2020), noted that the pandemic highlights the importance of rethinking the essential design of the social and economic resilience of the road transportation sector. This statement is even more relevant for highly populated and congested areas. This is because, while acknowledging the challenges that the pandemic posed, it became necessary to optimize road transportation infrastructures by making sure that they are sustainable to meet the growing demands of its users. Mogaji and Erkan (2019), supported this argument when they posited that government must also address the possibilities of alternative modes of road transportation through urban development, as most of the people in these areas are now willing to use other modes of road transportation like bicycles, motorcycles, walking as alternative in order to avert the spread of the virus. Uzondu, et al, (2019) also added more bits to the issue, when they pinned that the environment should be planned in such a way to enhance the adoption of alternative modes of road and active mobility. They further suggested that, where these planning cannot be immediately implemented to mitigate the current situation, it becomes essential to plan to decongest the roads. This according to them will would increase active travelling, reduce pollution and lead to fewer road traffic injuries. De vos, (2020) saw that measures, such as travel limitations or outright bans, restricting or outright bans on social gathering in public and private locations, frequent hand washing, etc. as possible ways of reducing the spread of the virus.

2.1.4 ROAD TRANSPORTATION WORKERS INCOMES DURING THE PANDEMIC

Hu and Chen (2020), sited that, most transport sector has adversely been affected, with the road transportation operators facing revenue deficits. This is as a result of the fact that almost all around the globe, most individual road transportation operators relied on their daily incomes to survive, but these transport operators have suffered mostly due to the lockdown and suspension of road trips. According to reports prepared by the international Road Transportation Union (IRU, 2021), the revenue losses accruing from global road transportation alone considering both goods and passengers accounted for almost one trillion USD. It went further to show that concerning the performance of road transportation, revenue losses due to goods transportation during the pandemic exceeded five hundred and fifty billion (550B) Euros in Europe, while passenger transport losses were between eighty billion (80B) Euros and above. For the IRU (2021), this regional predictions were pessimistic and it show that with the wave of the pandemic in place, the roads transportation industry was in a serious challenging period.

Thiearous and Mawala, (2020) stated that, in a bid to curb the spread of the Covid-19 virus, communities, livelihoods, trade and productions suffered both directly and indirectly due to the travel bans, boarder closures and other preventive measures that were necessary to human survival. Again, Mogaji, (2020) stated that due to lack of government support for road transportation operators in Nigeria, the implementation of social distancing in vehicles have driven up fare prices for those who will continue to travel, thereby putting their livelihoods at risk and in some cases rendering them stranded.

In some South American countries like Chile, the Chilean government came out with a package to compensate operators of the public sectors in Santiago for the financial loss they incurred during COVID-19 (DF. MTT, 2020). In Europe, the Netherlands came out with a financial package of up to €1.5 billion to soften the financial impact of COVID-19 on the Dutch Railway System and the major public road transportation stations in the three most developed and congested cities, Amsterdam, The Hague, and Rotterdam (NOS. 2020). Another significant problem most public road transportation organizations face is the inability to secure funds from the government; this is due to the decimation of so many countries' economies due to the impact of COVID-19. This has led to inadequate funding from governments because of the competition from other socio-economic sectors also requiring financial assistance from the government. Mawala, (2020) stated also that, there are direct and indirect losses due to travel ban, closure of parties and other preventive measures to prevent the spread of the covid-19 virus, necessary for human survival. While Mogaji (2020), saw lockdowns and restrictions

on mobility to have increased the cost of road transportation. It should also be noted that according to

Goldbaum, (2020.) drastic decline in the use of public transportation systems due to COVID-19 has been compounded by high expenses because of new innovations like cleaning hygiene regimens. Due to these circumstances, many public transportation institutions, both public and private, have faced financial hardship, leading to pressure on their operations.

Giz (2020) asserted that, with regard to the payment of public transit fares, new regulations and guidelines for public transportation usage may have detrimental effects on revenue reduction. The paper went further to state that, Principles such as requiring mandatory boarding using the rear door can be suggested to reduce and eliminate physical contact between pedestrians and drivers, if drivers are not separated physically from their commuters during pandemics. This principle has been applied in major metropolises. However, in public transportation systems that are dependent on commuters entering the bus from the front door to pay their fares, this can lead to enormous financial implications, for example forcing non-payment of bus rides. Also, further problems such as the conventional bus ticket checking of commuters, if they hold a genuine bus ticket might not be feasible due to the increased likelihood of being infected by COVID-19. This problem may increase transport fare evasion if no optional transportation fare payment method is feasible. Another study on covid-19 related impacts on service adjustment done by Deweese, et al, (2020) found that reduced trip frequency has disproportionately affected low income and vulnerable population. They also found change in public transit availability negatively impacting low income and vulnerable persons. Porter (2020) posited that substantial percentages of women who make their livelihoods in the informal transport sector in low-income countries were not served by emergency aids that were provided to aid their vulnerability during the covid-19 pandemic. She suggests that consideration needs to be given to the design and delivery of financial social protection measures for women so that their livelihoods can be maintained, to ensure that they can continue to be users or workers in the road transport system.

Commercial bus drivers were one of the areas where the pandemic had a significant impact, but less attention has been given to this. Commercial bus drivers' finances have been severely impacted because they were completely off work throughout the pandemic. For instance, the World Bank (2020) discovered that Covid-19 responses, such as the implementation of social distance and lockdown policies, are having a significant impact on passenger transport services, particularly mass transit systems that are intended to move a large number of people in dense urban areas. Transit agencies are struggling financially as a result of the sharp decline in transit ridership. Public transport in underdeveloped nations is primarily unofficial and privately run. Bus drivers and owners only make money when they transport people. These groups are, therefore, very vulnerable. Kauri, (2021) asserted that factors such as anxiety, cancellation, job loss, and income reduction were among the negative

outcomes of the pandemic lockdown on transport services providers. Kraemer, et al. (2020) argued that instead of favoring economic activity during pandemics, policymakers should always take measures to stop the virus from spreading.

2.2 EMPIRICAL LITERATURE REVIEW

Li and Ma, (2006) showed that the rapid development in road transportation infrastructures and the liberalization of migration restriction in the recent decades had contributed to around 24% of the infections of transmitted diseases. Budd and Ison, (2020) investigated the association between charges in traffic volume and the spread of Covid-19, in both road transport and other modes, they found out that the heavier the traffic, the greater contract between people, and hence the greater the risk of infections. Tatem, et al, (2006) reviewed important events of infectious diseases and vector movements and then outlined potential approaches for further research on infectious diseases campaign, focusing on vector invasion and vector-borne disease input. They saw that pathogens and their vectors can move further and faster than ever before, because land transport network especially road, always continue to expand in reach, speed of travel and volume of passengers and goods being convoyed. Cheng (2012) chose to build an artificial road transportation system to study the impacts of road traffic on the spread of infectious disease. It was discovered by Xu, et al, (2014) that the presence of roads, accelerates the spread of diseases (like Covid-19) and shapes transmission patterns of their infection. They also discovered in their research that wet conditions accelerates the spread of human plagues. Brought, et al, (2020) analyzed data on travel volume, modes and preferences for different demographic groups. Konig and Drebler, (2020) showed that psychological and individual factors like age, education level, have association with engagement in protective behaviors during pandemic. They also stated that a recent study have revealed differences in perceived vulnerability and perceived risk as well as in preventive behavior, according to age, gender and other demographic characteristics. For this study, it found out that women expressed a significantly higher perceived risk and fear of the new corona virus and that they show higher commitment to preventive, compared to their male canter parts on the roads. However, the first earlier mentioned study suggested an important role of demographic disparities with regards to reactions to Covid-19 situation as observed, e.g. there is a higher likelihood that persons that are richer in status will evade the city more, and given the fact that highly populated areas like mega cities reports a faster spread of the virus. It is considered that such situation will increase the rate of infections. Loske (2020), Proved that the increasing freight volume for dry products in retail logistics depends on the strength quantified through the total number of new infections per day. De

Vos (2020) on his own, found out that walking and cycling, recreation or utilitarian could be an important way to maintain satisfactory level of well-being.

Frank, et al, (2020) estimated the viability of people to engage in remote work and social distancing, while Zhou, et al, (2020) proposed routine and practical pandemic prevention strategies for urban public transport system from three aspects; infections source, transmission route and susceptible population of Covid-19. Mogaji, (2020) stressed the role of individuals as a responsible autonomous actor in delivery socially desired transport outcomes on the roads. Shamshiripour, et al, (2020) investigated how travel behavior of passengers changed during the Covid-19 pandemic. This research focused on the economically vulnerable group and the dynamics of working from home. Niang, et al, (2020) also analyzed the changes in the characteristics of taxi trips at different period and found a sharp drop in the number of taxi trips during the covid-19 pandemic. On this path, Mogaji (2020) also studied the present and long term impact of covid-19 on transportation in Nigeria. Jingpin, et al, (2020) stated that the C2SMART research team at New York University (NYU) conducted an investigation into temporal changes in road travel trends and also reviewed the initial impacts of Covid-19 on transportation in the Metropolises before and after the issuance of the stay-at-home order. With a detailed analysis of tolled vehicle trips, transit ridership, travel time, and weigh in motion data, crash rate and parking citations. It was discovered that the stay-at-home order put in place impacted the usages of road transport in the metropolises.

The possible impact of Covid-19 was considered in De Vos's (2020) further pertinent research, but no modeling or quantitative results were provided. Maxwell, et al, (2021) conducted Principal Component Analysis (PCA) on how road transport operators in Nigeria have coped with the Novel Corona Virus disease challenges. The result shows that road transport operators perceived responses to Covid-19 Pandemic in Nigeria stood at 90.7% effective. The PCA result also shows a breakdown of opportunities that may influence transition to low carbon and cleaner road transport system in Nigeria. This according to Maxwell, et al, (2021) includes adopting of other climate change mitigation measures, investment in green energy infrastructures and adopting it. In addition, the result indicates that road transport operations in the nation emphasized inclusiveness in their operations during the pandemic, especially in the areas of accessibility of transport facilities and the provision of special facilities for vulnerable groups.

According to Deepti, et al. (2020), their research indicated a significant association between the volume of passengers, the number of road trips, and the number of domestic Covid-19 cases, underlining the contribution of road transportation to the pandemic's spread. They claim that it was highlighted that if travel restrictions are put in place at the proper time, it may aid in preventing a

widespread epidemic of the virus. Therefore, it was discovered that local travel restrictions were more effective at stopping the spread of the disease in its early stages. Gao and Zhang (2020) analyzed data from 44 Chinese localities to demonstrate a 70% decrease in mobility after the implementation of travel prohibitions. Similar situation was also found in Spain, where mobility was shown to have decreased overall by 75% (Aloi, et al., 2020), around 90% of Karachi, Pakistan's residents ceased traveling outside of their houses to crowded places out of concern about contracting the virus (Balkhi, et al., 2020). According to Shilling and Waetjen (2020), throughout the early pandemic times, the maximum and average speed of traffic on the roadways increased significantly by 1 to 4mph. Following the confirmation of the first case, Lee, et al. (2020) on their own path observed an initial increase of 17.3% in traffic, followed by a later decline of approximately 23% to 26% as the pandemic severity increased.

More specifically, Cortes, et al. (2011) concentrated on creating short turning lines to meet the high demand in congested line portions. They concluded in a subsequent study that this field of study is especially promising for the Covid-19 era because public road transport providers not only need to adjust service frequencies to best meet the current and changing demand patterns, but also implement service variations that only serve a portion of the demand. According to a research by Krisknakuman and Cats, (2020), a vehicle can only carry 18% of its overall capacity when using a 1.5-meter separation and 10% when using a 2-meter separation while transporting people via road. Additionally, Gkiotsalitis and Cats (2020) demonstrated that by enacting social distancing policies of 1 meter, 1.5 meter, and 2 meter, respectively, the average bus occupancy can be decreased to approximately 11.6%, 8.7%, and 6.5%. They also shown that when 1.5 meters of distance is implemented and 2 meters of distance is implemented, respectively, 23% and 43% of the total number of trips made by road passengers might stay dissatisfied during peak hours. For Hughes (2020), the maximum number of passengers for city buses should be 15. A fascinating time series study of Covid-19 instances was also carried out by Islam, et al. in 2020 using data from 149 different nations and taking physical distance treatments into account as a natural experiment. Once they took into account other events like the closure of schools, workplaces, and restrictions on large and public events, they found no evidence that closing public transportation, particularly roads, had a reducing effect on the number of cases. According to a global research mentioned in Karthik and Sharareh (2020), the amount of gas emissions from daily vehicle traffic reduced by 17% between January and April 2020 compared to the same period in 2019. According to their data, it was also the highest yearly decline in carbon emissions since World War 2.

Considering ETSC's perspective (2020), when compared to the same period in 2019, there was a 62% decrease in road fatalities and a 65% decrease in traffic volume in Spain. At the same time,

ETSC reported that a sample of fixed safety cameras found a 39% increase in speeding. It should also be noted that, based on their investigations, while traffic volumes were rising in several countries, a significant increase in the number of vehicles that were being caught speeding was also observed. They claim that this is because there was less traffic and less speed enforcement, which together led to an increase in the number of speeding vehicles.

Stavrinos, et al, (2020) particularly indicated that the result from investigations into driving time during the covid-19 restriction shows that 37% decrease of driving time per day, as well as a 35% reduction in vehicle miles driven among adolescents were identified. It is very important to mention here that from observations, older or employed adolescents, teens with lower pro-social tendencies appeared to be less likely to reduce their driving speed. It was identified that within the group, younger male drivers were more willing to exceed the speed limit and the frequency of such expedience was higher during the Covid-19 pandemics (Vingilis, et al, 2020).

Hernandez (2020) also noted that the virus spread among passengers on a bus in a way that did not follow a predictable pattern. Jones, et al. (2020) provided a summary of how the degree of risk of viral transmission is affected by environmental variables including locations, the amount of group activity, and facial covering. This combination demonstrated that transmission rates may stay low even in settings with high occupancy as long as there is adequate ventilation and face mask use. The combination also shown that the virus spreads more quickly and vice versa when contact duration is extended. Again, a working paper by Brough, et al. (2020) draws the conclusion that lower-educated individuals saw a relative decline in ridership while the intensity of travel declined significantly less among them. Another study by Almolof, et al. (2020) came to the same conclusion that people with higher socioeconomic status stopped using public transportation to a greater extent than people with lower status. The study also discovered that age, income, and education level are significant predictors of the propensity to stop using public transportation, but workplace type and sector are also important predictors.

Teixeira and Lopez (2020) conducted an analysis of data pertaining to the functioning of the shared bike and subway systems during the Covid-19 epidemic. When compared to the subway system, they found that the share bike system experienced a decline in ridership. De Haas, et al. (2020) demonstrated how sentiments regarding public transportation deteriorated as the proportion of persons who supported it decreased. Regardless of gender or age, the fear of contracting an infection has been shown to effect travel time reductions, according to Borkowski Jazdzewska-Gutta and Szmelter-Jarosz (2020). Zhang, et al. (2020) in their experiment to determine the virus related infection process in transportation, they found out that coach (inter-city bus) services were not significantly associated with

imported confirmed cases, presumably because most of coach travelers use the service for relatively short trips.

2.2.1 PANDEMIC IMPACT ON MOVEMENT IN ROAD VEHICLES.

Personal vehicle, and public transportation are the two main modes of transportation in cities. However, studies based on actual volume data are yet to examine changes in car utilization as a result of the COVID-19 outbreak. Because of the two modes' opposing qualities, the epidemic has altered how people use vehicles, which may differ from how people use buses. Because private automobiles and public transport are complementary and interchangeable, it is critical to examine how their use has changed as a result of the Covid-19 outbreak.

The COVID-19 outbreak has produced unprecedented modern-day worldwide disruption in every industry. This is especially true in the road transportation sector, where large process changes and economic consequences are prevalent (G. Gomez, 2016) to differing degrees, the transportation sector has an impact on many other domains. For example, activities like movement of goods and services to the building space was considerably restricted. Sales of specialty haulage equipment are also dropping, which is terrible news for companies that provide specialized construction equipment. Other areas of the transportation industry, including food suppliers and consumer delivery services, have seen a significant increase in demand as a result of the pandemic and subsequent lockdown (G. Gomez, 2016). Long-distance truck drivers are the focus of global preventative efforts and education-based initiatives due to their heightened risk of contracting this pandemic. The trucking industry is important in many African countries because commodity transportation is critical to the economy. Because the transportation sector is transcontinental, new national healthcare policies are required for the health plan of action to prioritized truck drivers (Beck & Hensher, 2020).

Again Suji, et al, (2020) carried out a research study to explore the impacts of COVID-19 on car and bus usage amidst covid-19 pandemic in Daejeon, South Korea. Findings demonstrated that people reduced their trips more drastically during the day and on weekends in response to the pandemic. Additionally, they decreased bus journeys and trips to business locations to avoid congested or shared spaces. As a result, many commercial bus drivers were idle, which cut their compensation greatly throughout the period. Researchers from (Beck and Hensher, 2020a, Beck and Hensher, 2020b; Beck et al., 2020; Irawan et al., 2021; Li et al., 2020; and Shakibaei et al., 2021. They reported that trip generation was reduced for a variety of trip purposes as a result of the restrictions on how many people could move from one location to another in order to slow the spread of the virus, and that people preferred more individual transportation modes to collective transportation modes. This put

commercial drivers at a disadvantage because they were not actively involved. Once more, Bian et al.

(2021) looked into how pandemic-related policies affected Seattle and New York's transit systems in the United States. After the restrictions on social distance were put in place, they claimed that both cities' vehicle and transport usage sharply decreased. A cross-sectional survey of 282 cab drivers in Jamaica's Kingston and St. Andrew Metropolitan Area was conducted in May 2020.

Seven hubs were used to choose a taxi driver using multi-stage sampling. The data was gathered using a 28-item questionnaire. The self-reported income of people before and throughout the COVID-19 pandemic was calculated, and the correlations between those changes and COVID-19 prevention methods were examined. The COVID-19 epidemic has cut cab drivers' income drastically, which has an impact on health practices and the maintenance of desired health behaviors.

The crisis has had a variety of effects on haulage companies. Food distributors and those who deliver online purchases have both been extremely busy. Others, however, have noticed a nearly complete decline in their job, for instance, if they were delivering to bars, stores, or restaurants. According to the findings in this area, little emphasis has been made to how the pandemic will influence truck drivers' wages. Dalia, P., Agbomere, O., Regina A., and Otega, B. (2021) evaluated the effects of Covid-19 on the logistics and transportation industry. Findings on the positive effects of COVID-19 reveal significant improvements in the logistics and transportation industries, such as the growth of online retailers with effective delivery options and the development of third-party logistics services as more businesses outsource supply chain operations. COVID-19 was discovered to have a considerable impact on all types of transformation based on the supply and number of voyage passengers. They discovered how the COVID-19's implications influenced three main means of transportation based on both short- and long-term concerns. Concerning the immediate implications on rail travel, problems such as virus spread through touch with infected people's bodies or droplets from infected individuals landing on different train surfaces, as well as passenger preference changes, have been mentioned. Furthermore, Ho, et al. (2021) evaluated the impacts of Covid-19 on goods movement, with a particular emphasis on China. The number of confirmed cases of Covid-19 has been shown to have a negative influence on China's road freight transportation turnover, leading to emergency stockpiling and improper management of essential resources and facilities, instability in market supply and demand, and modifications in consumer purchasing and consumption patterns, such as increased fears and declining investments.

2.2.2 IMPACT OF COVID-19 ON OVERALL MOBILITY

Gonzalez et al. (2021) found that public and private mobility at the peak of the pandemic dropped to 95% and 86% of pre-COVID-19 levels in Spain. C2SMART (Connected Cities with Smart Transportation Center) releases monthly reports on mobility changes in New York and Seattle, US as case studies to analyze transit ridership, bridge and tunnel traffic, travel time, and number of crashes during the pandemic (Gao et al. 2020). After the stay-at-home order was implemented in New York, both transit ridership and general traffic volume dropped, with transit ridership severely impacted, dropping 94% in the peak period as of March 23, 2020 according to Gao, et al. (2020) compared to the 2019 statistics. Reduced traffic volumes owing to the stay-at-home policy resulted in a decrease of average travel times as well, leading to a drop by 38% during the third week of February. In contrast, cycling increased by 55% in a temporary mode shift, and all traffic safety indicators improved (vehicle collisions dropped up to 77%, pedestrian injury/fatality decreased 51%, and cyclist injury/fatality in crashes decreased 31%). Highway traffic volume in the US state, Florida, also decreased by 47.5%, compared to the 2019 statistics (Parr et al. 2020). Koreas average daily traffic volume in early 2020 also differed substantially from the 2019 volume, decreasing from 149 million vehicles in 2019 to about 144 million vehicles in 2020, a 9.7% decrease (Lee, et al. 2020). Canada's mobility trends showed a clear, large reduction in mobility to non-residential locations after the state of emergency was declared (Chen, 2020). COVID-19 also significantly reduced taxi trips, and affected taxi trips travel speed (increased by 29.4%), travel time (decreased by 22.6%), and average distance (increased by 2.4%) (Nian, et al. 2020). Average daily taxi trips in February 2020 were only 11.3% of those in May 2019. Nighttime taxi trips (9 PM to 5 AM) were significantly impacted dropping to 8.5% of the normal period.

The impact of COVID-19 was greatest at the beginning of the epidemic, and the next waves of the pandemic seem to be less than the initial ones (Konecny, et al. 2021). For example, Lee et al. (2020) found that US nationwide mobility trends changed rapidly around March 13, when the national emergency was declared, and daily movements in general decreased; the percentage of people staying home rapidly increased from 20% on normal days (benchmark week, Feb. 3 to Feb. 16, 2020) to 35% after the outbreak (Apr. 6 to Apr. 12, 2020); out-of-county trips decreased from 28 to 23%; average trip distance dropped from 40 miles to 23 miles; and number of trips per person decreased from 3.7 to 2.7. Based on Google Mobility Report data, even comparing two countries with different characteristics, Germany and Qatar, the impact on the transport sector (e.g., correlations between traffic volume and government measures) was found to be similar (Jaekel and Muley 2022). Using smart card and private vehicle records in Korea, Lee, et al. (2023) found that trip frequency was

significantly decreased during non-peak hours on weekdays and during weekends. In addition, private vehicle usage increased for shorter trip distances, while bus usage dropped regardless of trip distances. Mobile phone data and Google and Apple reports were also used for other studies to find a correlation between the outflow of people and the reported COVID-19 cases with an eight-day time lag (Heiler, et al. 2020), develop daily time-series of different mobility metrics (Pepe, et al. 2020), investigate the impact of COVID-19 on changes in community mobility and variation in transport modes during COVID-19 alert levels (Wen et al. 2021), and examine changes in population density and visualize spatial population distributions (Arimura, et al. 2020). (Guzman, et al. 2021) found significant inequalities between income groups with respect to access to essential services in Bogota. Lee, et al. (2020) found that a higher income group was more likely to stay home after the national emergency declaration, and a higher density group tended to have lower trip distance after the outbreak. Yang, et al. (2021) also found different rates of reduced mobility owing to COVID-19 for high- and low- income groups, called the mobility gap. The second phase of the pandemic also showed heterogeneous changes in travel behavior according to individual attributes (e.g., age, gender, education level, marital status, income, etc.).

2.2.3 IMPACT OF COVID-19 ON PUBLIC TRANSPORTATION

Jiang and Cai (2022) found that for each additional local COVID-19 cumulative case within 14 days, subway ridership decreased by 0.091% in Beijing and 0.112% in Shanghai. Because public transport vehicles and stations are perceived as high risk, and fear of contagion between travelers was related to higher passenger density in a limited physical space, governments in many countries implemented restriction policies to limit or discourage public transport use, and some public transport operators reduced their services (Tirachini and Cats 2020; Gkiotsalitis and Cats, 2021). However, public transportation is one of the most important modes of mobility, because it is sustainable and transports people on a large scale. Many transit dependent riders do not have access to a private vehicle (Pawar, et al. 2020), especially low income and historically marginalized people, who experience further loss of mobility when public transport is restricted (Wilbur et al. 2020). public transport ridership decreased by about 80%, while the percentage of people using a car increased from 43 to 65%, and cycling (reduced by 23%) and bike sharing (reduced by 2%) were not significantly impacted in Budapest, Hungary (Bucsky 2020). A similar trend was reported in New York City. Subway ridership dropped 96% on April 12, 2020, compared to that before the pandemic (Kaufman et al. 2020). In three regions of Sweden, which relied on recommendations instead of government mandates, public

transport ridership was severely impacted (declining by 40% in Vastra and Gotland and 60% in

Stockholm) (Jenelius and Cebecauer 2020). Public transit users changed their mobility patterns by switching from monthly period tickets to single tickets and travel funds. Jenelius and Cebecauer (2020) also found that bus ridership in Coruna, Spain, was only 8, 16% of 2017, 2019 ridership. Lozzi, et al. (2020) found that public transit dropped by 76% in April 2020 in 62 countries and 89 cities, compared to a baseline date of January 13, 2020. Almlof, et al. (2021) found that public transport use decreases were associated with income levels, house ownership, and high employment levels. Similarly, Liu et al. (2020) found uneven impacts on transit systems and social groups in an analysis of 113 public transit systems in US communities. The study showed higher levels of transit demand during the pandemic in areas with higher proportions of essential workers, vulnerable populations (African American, Hispanic, female, and people over age 45), and more coronavirus Google searches. In a case study of Nashville and Chattanooga, TN, US, fixed-line bus ridership dropped by 66.9% and 65.1%, respectively, with a significant impact on low-income groups (Wilbur et al. 2020) investigated factors affecting public transport ridership, including the cleanliness of public transport, income inequality index, unemployment rate, poverty, education, and percentage of foreign-born residents.

Milan and Barcelona reduced vehicle occupancy to a maximum of 25% and 50%, respectively. Catalonia provided app users with bus occupancy levels in real time. The city of Hamburg adopted flexible bus routes to increase service on the busiest routes and reduce service frequency on lower demand routes (Lozzi, et al. 2020).

2.2.4 IMPACTS ON ENVIRONMENT, TRAFFIC SAFETY AND BICYCLES

During the pandemic, bike-sharing use decreased in London (Li, et al. 2021), and Slovakia and increased in Washington DC (Chen, et al. 2022). Ten cities in Germany also showed inconsistent results; the bicycle traffic volume decreased where the ratio of bicycle means was high and increased where the ratio of means was low, while pedestrian traffic decreased with higher local infectiousness and government measures (Mollers, et al. 2022). In the case of London, shared bicycle usage immediately decreased due to the effect of the first lockdown but bicycle use increased during the lockdown period and showed a much larger increase after the first lockdown was lifted (Li, et al. 2021). However, the number of bicycle trips connecting subway stations in major university districts increased significantly after the pandemic. There were also a few studies on changes in shared transportation and micro-mobility, and it was found that ridership was mostly decreased due to COVID-19 (Teixeira and Lopes 2020). In the case of Beijing, the overall share of shared mobility was kept constant between 36% and 38% both before and after COVID-19, but the proportion of ride-

sharing decreased by 4.5% after COVID-19, while that of ride hailing, car sharing, and bike sharing

increased by 3.11%, 2.02%, and 0.89%, respectively. Studies that examined COVID-19 impact on environment and safety demonstrated that travel restrictions and reduced travel activities owing to COVID-19 resulted in improved air quality and safety (Muley, et al. 2020). Many studies have shown significant reductions in vehicle fuel consumption and emissions (Aloi, et al. 2020).. COVID-19 and travel restriction policies have had a positive impact on traffic accidents, dropping by 67% in Santander, Spain (Aloi, et al. 2020), 41% during the first month of COVID-19 in Greece, and 76% during the lockdown (March 16 to April 26, 2020).

2.2.5 CHANGES IN TRAVEL BEHAVIOR

While 77% of workers from low-income households had to go out to work, 80% of workers from high income households worked from home. In the UK, 81.9% of private commuters responded that they would continue to use their car even when restrictions are lifted, while only 3.6% and 6.5% said they could switch to walking and biking, respectively (Harrington and Hadjiconstantinou, 2022). On the other hand, public transportation users from diverse locations in the world were 31.5, 10.6, and 6.9 times more likely to change their commuting mode than car users, motorcycle users, and pedestrians, respectively (Bhandari, et al. 2020) analyzed the effect of traveler's socio-demographic characteristics on travel mode choice. About 95% of respondents said that both their daily commute and discretionary travel behavior were affected by the pandemic. Although there were differences in degree, mode choice changes were similarly observed in other surveys, including Palermo and Catania in Italy (Moslem, et al. 2020), and China (Tan and Ma 2021). The COVID-19 pandemic has also changed the factors influencing mode choice (Das, et al. 2021). Prior to COVID-19, factors such as travel time saving, safety, security, and comfort and factors including distance and duration of travel, were important influencing factors in the choice of modes, but during the pandemic, concerns about infection, social distancing, wearing a mask, and worry about using public transport became important influencing factors (Zubair, et al. 2022).

Abdullah et al. (2020) found that the percentage of respondents who traveled for a short trip (a distance less than 10 km) dropped from 71% before the pandemic to 45% during the pandemic. The average work trip distance was 3.6 km and 2.6 km before and during the pandemic, respectively. In fact, these numbers are much smaller than expected, probably due to the analysis of diverse countries, including underdeveloped countries. Travel distance differences before and during the pandemic were also reported by other studies (De Haas, et al. 2020).

When investigating the mode choice behavior before and during the pandemic, Abdullah, et al. (2022) found that during the pandemic, monthly household income and epidemic-related factors were

important predictors for short-distance (i.e., < 5 km) mode choice, whereas gender, car ownership, and monthly household income were significant predictors for longer distances (i.e., > 5 km). In a survey administered in Sicily, Italy, women were 1.5 times more likely to reduce walking frequency than men (De Haas, et al. 2020) found that about 80% of respondents in the Netherlands panel data reduced their outdoor activities. In particular, older people tended to reduce activities more than before the pandemic Respondents in Lagos, Nigeria showed a positive correlation between transportation influenced by COVID-19 and its impact on economic (correlation coefficient of 0.442), social (0.313) and religious (0.274) activities (Mogaji 2020).

Working from home (WFH) increased, emerging as one of the government policies during the pandemic (Beck and Hensher 2020). About 71% of Chicago US respondents reported that they had not experienced working from home before the pandemic, while about 63% reported that they did experience working from home during the pandemic (Shamshiripour, et al. 2020). The value of travel time has changed due to the WFH policy, increasing by 12.55% compared to before the pandemic in Australia (Hensher, et al. 2021). Using GPS tracking data in Switzerland, Huang et al. (2023) found more significant reductions of trip distance, travel time, travel frequency, morning peak hour's trips, and trips to the CBD among the WFH group. Promoting WFH also decreased traffic congestion, especially during morning peak hours, in Hong Kong (Loo and Huang 2022). The main factor influencing WFH during the lockdown period in the Netherlands was job characteristics; office workers and teaching staff were more likely to spend more time working from home (Kalter, et al. 2021). In South America, for example, older adults and women are more likely to have WFH compared to other countries analyzed, and income has a positive effect on the number of WFH days in Australia and Chile. Fear of contagion and perceived risk also significantly impacted travel patterns (Abdullah, et al. 2020). Awareness of overcrowding during the COVID-19 pandemic is about 1.04 to 1.23 times higher than before the pandemic (Cho and Park 2021). On the other hand, younger and low-income people are relatively less sensitive to overcrowding (Basnak, et al. 2022). When exploring risk perception effects on human mobility for 58 countries using Global Preferences Survey data, Chan, et al. (2020) found that regions with risk-averse attitudes were more likely to adjust their mobility behavior in response to the WHO declaration of a pandemic even before official government lockdowns. Parady, et al. (2020) examined pandemic related factors affecting behavioral changes in non-work-related activities in Japan, which focused on the effects of risk perception and social influence. In addition, when Pawar, et al. (2020) investigated the impact of COVID-19 on mode choice during the transition to a lockdown period in India, they found that commuter's safety perceptions did not have a significant effect on transportation mode choice.

2.2.6 IMPACTS OF TRAVEL RESTRICTION POLICIES

Wuhan lockdown reduced inflows by about 77%, outflows by about 56%, and within-Wuhan movements by about 56% (Fang et al. 2020). In addition, without the Wuhan lockdown, it was estimated that the number of positive COVID-19 cases would be 105% higher (Fang, et al. 2020). Although not as strong as China, several other countries have implemented city lockdowns and have shown effectiveness in controlling traffic (Hadjidemetriou, et al. 2020): that is, lockdown restrictions reduced human mobility by 65% in France (Pullano, et al. 2020)

However, several case studies show that a lockdown is not the only effective means of reducing traffic volume. Dahlberg, et al. (2020) study analyzing Sweden's less restrictive policy are interesting. When using mobile phone data to investigate COVID-19 causal effects, they found that even less restrictive and mild public recommendations convince people to comply with social distancing and avoid unnecessary travel (i.e., residential area daytime population increased by 64%; industrial and commercial area daytime population decreased by 33%; travel distance decreased by 38%; share of short trips less than one kilometer from home increased by 36%; and mobility change effects did not differ across socioeconomic and demographic characteristics). In addition, when comparing lockdown measure effects on mobility patterns in France, Italy, and the UK. When examining the mobility impact of different non-pharmaceutical countermeasures for 41 cities worldwide

Similarly, government interventions reduced overall mobility by about 50% in several major US cities (Klein, et al. 2020) and reduced all station ridership by about 40.6% in Seoul, Korea (Park 2020). National social distancing measures were effective for intra-city vehicle movement, particularly at night, but not for inter-city movement in Korea (Sung 2022). Stay-at-home orders in the U.S. and Japan also showed a positive effect in reducing mobility (Gao, et al. 2020). Although social distancing might negatively affect subjective well-being and limit physical activity, many studies supported the positive effects on travel behavior to prevent social contact and COVID-19 spread (De Vos, 2020). The public geo-located US Twitter data showed a significant 61.83% overall travel reduction after social distancing policies were implemented (Xu et al. 2020). In particular, larger reductions were found in states that were early adopters of social distancing practices, whereas smaller changes were found in states without such policies. Analysis using Google Community Mobility reports in the US showed that state-of-emergency declarations had only a modest effect on mobility (about a 10% decrease), but implementing one or more social distancing policies resulted in an additional 25% mobility decrease (Wellenius, et al. 2021).The implications of the studies discussed above are: (1) the

effects of coercive policies are effective in the short-term (Liu et al. 2022); (2) policy announcement and implementation timing are important because unexpected anomalous behaviors can occur (Pullano, et al. 2020; Liu et al. 2020b); and (3) it is more effective to introduce a combination of different types of control policies (Chinazzi et al. 2020; Anzai et al. 2020).

Travel restrictions implemented by local cities outside Hubei also decreased confirmed cases by 22.4% in the first two weeks after the Wuhan lockdown (Liu et al. 2020b). Without intra-city travel restrictions, the confirmed cases were estimated to increase by 33.1%. Based on these results, the authors asserted that if travel restrictions were implemented in advance in the entire Hubei province, the number of confirmed cases might have decreased by another 10.5%, emphasizing the importance of a timely and coordinated response to mitigate the pandemic. Another study found that travel restrictions may have reduced expected cumulative incidence by 39% in Wuhan by February 29, 2020 (Shi and Fang 2020). Staying in the same county also effectively limited COVID-19 cases and deaths.

Other studies suggest that simply implementing one restriction measure does not have a significant effect on decreasing new infections. When estimating the impact of travel restrictions, including lockdown in Wuhan, China, on COVID-19 incidence, Anzai, et al. (2020) found that the estimated delay was smaller than the authors expected depending on the scenario. Therefore, they argued travel restriction decisions, such as a complete lockdown, should be carefully applied by comparing the resulting estimated epidemiological impact and predicted economic outcomes. Pan, et al. (2020) analysis of mobile phone location data showed a similar trend. The authors proposed a social distancing index, which indicated that both government orders and local outbreak severity were significantly associated with the strength of social distancing

2.2.7 CONTROVERSIAL ISSUES RELATED TRAVEL RESTRICTION POLICY EFFECTS

COVID-19s spatial distribution in China was well explained by human mobility data in the early stages of the pandemic (until February 10, 2020) outside of Wuhan, China (Kraemer, et al. 2020). However, after control measures were implemented, this correlation dropped and pandemic growth rates became negative in most China locations. The authors asserted that travel restrictions may have effectively reduced the flow of case importations from Wuhan in the early stages of the pandemic. However, restrictions may have been less effective once the outbreak was more widespread, thus other local mitigation measures may have been more important to mitigating spread. Another study using data from China also found that the fastest and most widespread way to prevent the spread of COVID-19 infection is to control the route connected to the epicenter in the early stages of the epidemic (Lu,

et al. 2021). If the virus is widespread, implementing restrictions in hub cities is much more efficient than imposing the same travel restriction across the country (Lu, et al. 2021).

Askitas, et al. (2020) conducted a study that examined the impact of various non-pharmaceutical interventions on COVID-19 incidence and mobility patterns for 135 countries. The findings showed that canceling public events and restricting gatherings had the largest effects on limiting the pandemic. Workplace and school closures and stay-at-home requirements also had an effect, but it was not as large. Conversely, internal movement restrictions, public transport closures, and international travel controls did not have a significant impact on reducing new infections. City lockdowns and travel bans are also controversial and do not always successfully control COVID-19 infections. Muller, et al. (2020) also claimed that a single restriction strategy (i.e., a complete removal of infections in childcare, primary schools, or workplaces) is not sufficient to control infection dynamics. In addition, the estimated delay of contagion was smaller than expected depending on the model scenarios (Anzai, et al. 2020). Therefore, even if the results show positive effects, some measures do not work everywhere (Arellana, et al. 2020).

Two interesting studies discussed unexpected effects of social distancing. US state and local government interventions decreased daily mobility by between 45% and 55% as of late April 2020, and person-to-person contact events decreased further by 65, 75% on average (Klein et al. 2020a). However, after social distancing guidelines expired on April 30, 2020, mobility and contact patterns increased slightly by 14% as of early May 2020.

Although many governments discouraged public transit to limit COVID-19 spread, whether public road transport actually spreads the virus is another debate, because there is currently a lack of comprehensive research or scientific evidence on that (Liu et al. 2022). Bucsky,(2020) found a negative but insignificant relationship between human mobility changes in public transport and the number of confirmed COVID-19 cases in Poland, although the strength and statistical significance of the correlation varied substantially across regions. However, there was a strong, negative, and significant correlation between public transport mobility changes and the stringency of government anti-COVID-19 policies. Therefore, the authors argued that forced lockdowns effectively enforced social distancing in public transport, and government travel restrictions contributed to decreased mobility. However, Schwartz (2020) concluded that there is no direct correlation between urban public transit ridership and excess mortality or COVID-19 transmission. When comparing 418 policy measures from six developed countries (Australia, Canada, Japan, New Zealand, the UK, and the US. Zhang et al. (2021) also found that none of the measures in public health and transport is associated with a reduction of

either cumulative deaths or cumulative infection cases. Based on US case studies,

Schwartz (2020) emphasized that COVID-19 cases are primarily associated with local community spread, rather than public transit ridership rates. Furthermore, Musselwhite, et al. (2020) argued that, although infectious diseases spread in dense public transport vehicles, this does not support the effectiveness of restricting public transport services to prevent spread.

2.3 THEORETICAL REVIEW

Budd and Ison (2020), put up a fresh theoretical idea of "Responsible Transport." In this proposal, they attempted to investigate the impacts of Covid-19 pandemic on different forms of mobility and road transportation. They went further to discuss the inadequacies of existing road transportation policies approaches to respond to the new challenges that Covid-19 have passed. It should be stated here however that, due to the fact that these researches were limited to only theoretical contexts, they were unable to provide significant results in terms of Covid-19 effect on road transportation safety. Ghader, et al. (2020) observed a similar trend when examining COVID-19 and social distancing policy effects on human mobility in the US. They found that when COVID-19 cases first emerged (i.e., early- to mid-March, 2020), social distancing statistics (i.e., percentage staying home, number of trips per person, trip distance, etc.) began to improve, regardless of government social distancing orders. However, these statistics stopped improving after about two weeks, despite continuously increased COVID-19 cases and government stay-at-home orders. The authors called this unexpected mobility and COVID-19 case trend social distancing inertia. This phenomenon was universal throughout US states, despite different COVID-19 case timelines and government orders in each state. The authors concluded that: (1) those able to follow social distancing orders had already done so before government intervention was adopted, and (2) there is a natural behavior inertia on social distancing, which limits improvement related to social distancing (Ghader, et al. 2020).

Paradya, et al, (2020) developed three models separately via, Pooled OLS, Random-Effect Model, and First Difference Regression, to estimate out-going frequency of individuals during infectious diseases outbreak. . For the frequency setting theory, Yu et al. (2009) suggested a bi-level programming model that, while taking into account fleet size constraints, minimizes the total trip time of passengers to arrive at the best frequencies. While Gkiotsalitis and Cats, (2018) proposed a reliable frequency settings model that took service variations into account, and in 2022, they further developed optimization models to redesign public transport services, one of such which they called optimal service frequencies. Though aggressive investigations on these cogent guidelines in public road transportation systems are seriously inadequate but the model is ongoing. Cats and Gluck, 2019, considered the optimal frequency setting and allocation of a mixed fleet. Szeto and Wu, (2011)

integrated the frequency setting route design while Arbex and Da Cunha, (2015) used meta-heuristic to integrate frequency setting. Gkiotsalitis, et al, (2019) on their path, developed a frequency setting model that consider flexible virtual line (e.g. Short-turnings) to allocate the available vehicle to the most efficient and effective routes. All these were major considerations during the pandemic by experts in the field of transportation.

Gkiotsalitis and Van Berkum, (2020) introduced a method for time tabling, striving to minimize the average passengers waiting time by allowing for irregular headways, According to Yap, et al, (2019), Timetabling models that considers the transfers among multiple lines of public road transport network can provide substantial benefits to the planning of services during pandemic. This is because, they can be used to identify locations for transfer coordination, or in the words of Ibarra-Rojas, et al, (2015) for the coordination of services and minimization of overcrowding at major transfer stations. In another development, Muller, et al, (2020) demonstrated how designing public road transport services to avoid crowded situation is believed to be instrumental in mitigating the spread of the virus. This was achieved when they constructed a contact graph, based on individual trajectories and the application of a compartmental epidemiological model that can facilitate such an analysis. Such a coupling allows for answering questions such as, how many passengers are likely to get infected, if a certain supply of passengers is offered for a certain assumed demand given an initial infection rate. What is the infection rate under which restoring a certain demand level can be considered permissible?

Tan and Ma (2020) built a logistic regression analysis model to analyze survey data and demonstrate how occupation, pre-pandemic commuting modes, walking distance to the closest subway station, and the risk of transmission in vehicles all impacted commuters' travel decisions. Carteni et al. (2021) focused on the hypothesis that areas with higher accessibility were more easily reached by the virus. Based on data from Italy, the regression model showed that transport accessibility, population, population density, and particulate matter (PM), were significantly related to COVID-19 cases. Using MATSim, an agent-based simulation model, and assuming that the mode preference during the pandemic is maintained, Wang et al. (2020) predicted that a full reopening scenario of the NYC transportation system would result in 73% of pre-COVID transit ridership owing to changed mode preferences, while increasing car traffic as much as 142% of pre-pandemic levels. When limiting transit capacity to 50%, transit ridership would decrease by as much as 64% of pre-COVID ridership, while increasing the number of car trips to as much as 143% of pre-pandemic levels. The social distancing policy of maintaining at least six feet between people emerged as a widely accepted non-pharmaceutical intervention to mitigate the pandemic (Chen, et al. 2022a).

According to a scenario simulation results using data from China, if lockdown and decreased population mobility policies were not implemented, the total number of infectious cases would have reached 138,824 in February 2020, corresponding to 4.46 times the actual case number (Wei et al. 2021). Another interesting simulation determined when mobility restrictions effectively reduced the pandemics size within and between heterogeneous neighboring communities, including one with a high infection risk and another with a low infection risk (Espinoza et al. 2020). The study found that the number of secondary cases increased with the level of mobility, increasing the overall final pandemic magnitude. However, the cordon sanitaire did not always minimize the overall number of infected individuals. Accordingly, the authors argued that mobility restrictions may not always effectively contain disease spread that is evaluated by overall final pandemic size. According to Chinazzi, et al. (2020) transmission model, 90% travel restrictions to and from mainland China only modestly affected pandemic spread, delaying it for two weeks at best, unless it was combined with a strong reduction (i.e., 50% or higher) in community transmission. China and worldwide data analyzed with the susceptible-exposed-infectious-recovered (SEIR) model showed that more rigorous government control policies were associated with a slower infection rate, and isolation and quarantine procedures were less effective for controlling the pandemic (Fang et al. 2020a).

Martin-Calvo, et al. (2020) used a SEIR model to evaluate the impact of different social distancing strategies under various what-if-scenarios for control and mitigation in Boston, US. The results showed that passive social distance strategies were not enough to contain the pandemic, while active strategies (i.e., large scale testing, remote symptom monitoring, isolation, and contact tracing) are needed. In addition, full confinement was not feasible and did not solve the problem without active measures in place after confinement in case a new outbreak occurred. Based on the susceptible-infection-recovery (SIR) model, Zhang et al. (2020a) argued that lockdown measures, for example those adopted by China, have a severe social-economic cost and may not be a feasible solution for other countries, because there was no strong connection between population flow and cross-regional infection except at the very early stage of the outbreak. The authors asserted that non-lockdown-type measures may have outcomes similar to lockdowns if the measures are quickly prepared and strictly executed.

2.4 THEORETICAL FRAMEWORK

The major aim of theories in academics and research is to develop an analytical scheme of the empirical world where such theories will be connected and practiced. This can be achieved by conceiving the envisaged world abstractly, and then developing an idea that will be functionally

implementable to the real world where the conceived idea (theory) will be used. Allan, (2006) stated that theories can be used to create a testable proposition called hypothesis, about the society. This can be seen in the numerous theories that are applicable to the society today, which all started in form of hypothesis using existing theories to proof them in different fields of life endeavors as is been recorded.

For the purposes of this research work, like every other academic research, it is anchored on three well established theories

i) The situational Attribution theory

ii) The information-Processing Theory

ii) The Social Theory.

Crombs, (2007) saw the situation attribution theory as the group or individuals actions that is based on their interpretation and judgments of the causes and effects of events that are external to them. This statement tells us that individuals or group behaviors and decisions can be explained from the point of view of the individual or the groups. And based on the flexibility natures of these theories in defining groups and individual behaviors, the theory varies in applications (Lalonde, 2004). Hence, using this information for the purpose of this research, it may be argued that the decision of transport operators, government, passengers and their various choices of dealing with the covid-19 pandemic should be such that emanates from their understanding of the content in question. Meaning that for the methods of responses to the covid-19 pandemic to be effective, response strategies to be chosen, in order to overcome the disease should emerge from the individual or the organizations' models and solutions, approaches should be anchored on the experiences or shared interpretation of the situation by members or groups.

For Ulmer, Seeger and Sellnow (2007), key players within the organization and individuals can be regarded as the society, as their activities drive and provides for the growth, development and overall wellbeing of everything in the society. Coombs & Holladay, (1996) sees society as being complex, comprising of a mixture of different factors interacting daily and providing positive and negative impacts on the functionality of the individuals or group. This is to say that while some societal situations produces benefits for the individuals or groups, there are also times when such situations would also produce an advice effect on the individual or group, thus making the situation risky and uncomfortable for both the individuals or the groups: This is the scenario that covid-19 pandemic posed for the road transportation industry in Nigeria and the world at large, where it disrupted its activities, operations, related markets and economics across the entire globe.

However, for the situational attribution theory, where individuals or groups have understanding

and good knowledge of how an event could affect them, they will be more informed, in order to design

necessary responses strategies for addressing the situation in their favor, and as such, they will put in place the requirements need to put the situation in their favor as soon as such occasions arises. This will make response to these events to be channeled toward vulnerable features and functionality protection of the individuals or groups. Hence, Lalonde (2004), agreed that crisis management in the society is a primary function of management officers of the groups and individuals of intellectual abilities that have the capabilities to create a functional environment.

The second theory used in this research work is the information-processing theory. This theory aided the collection and dissemination of data and other relevant information gotten in the process of this research. According to Novick and Bassock (2005), cited in Mayer, R.E. (2012) Information-process theory of solving problem focuses on a problem space and finding a solution to the problem. From the above information, it become categorically clear that once a problem is presented as a challenge to the society or within an organization, solutions on how to solve the problem should be of paramount importance to the society or the organizations. This is exactly what happened to the road transportation system during the period of the pandemic in Nigeria as both individuals and groups in the society were seeking solutions to either curtail or put an end to the impacts of the virus all around the world.

It should also be noted, that during the covid-19 pandemic in Nigeria, Some misleading conspiracy theories otherwise called fake news were being propagated especially in the road transportation sector of the economy for reasons best known to the propagators. It was later found that reasons like (increment of fares, means of passage of bounders, extortion, etc.) were reason for such propagandas. Hence, it was imperative that the research distinguish between information that are real and others that are false in the system through the action of re-visitation and testing of information collected for the study. This can be typically seen in Miller, (1960) Statement cited in Barbara and Jeffery, (2014). Which states that for the individual or group, problem solving was a cyclical process that centered on information collection, revisions, predictions and the testing of such collected information in order to ascertain their truthfulness in applicability to the individual or the society.

The last theory used for this research was the social theory. Social theory addresses the relationship between knowledge. The theory according to Green, et al, (2007) is an explanation of social phenomenon that makes findings generalizable to other settings, thus providing better evidence for knowledge purpose. A typical example is in the use of Nose masks, social distancing, regular cleaning and washing of surfaces in road transport vehicles which was adopted in Europe as a measure to curtail the spread of the virus and was subsequently adopted by other parts of the globe and hence

became a generalized and accepted means of curbing the spread of the pandemic.

The social theory was considered very relevant to this study because it addresses the alternative forms of societal organization, the relationship and nature of covid-19 pandemic and its related immediate impact on road transportation in Nigeria. This theory was also used because it linked the actions of individuals and organizations during the pandemic to social context, taking into recognition the fact that the beliefs and actions of individuals or groups are generally shaped by social structure and communication patterns of the society. This view was supported by Harrington, (2005) when he said that social theory shows how societies changes and develop, and the methods of explaining social behaviors, structures etc.

These three theories stated above when combined in the course of this research, offers the required framework and foundations for the study and its assessment of the immediate impacts of covid-19 pandemic on road transportation in Nigeria.

2.5 SUMMARY OF LITERATURE REVIEW

From the general literature reviews that guide this investigation as outlined in the various sections, even well gathered information might be deceiving if the assumptions and context are flawed. The conceptual background, which offers the research's underlying idea, is an important component of the study's design. Theory connects the pieces of a causal chain to provide a more comprehensive explanation of the specifics that must be observed. The conceptual framework discussed in Chapter 2 contends that the covid-19 pandemic has had a significant impact on people's lives as they relate to road transportation on one hand, and that government and industry stakeholders should assist in offering solutions through the development and implementation of policies on the other. As seen from the discussions, and from the various literatures reviewed, some analysts have argued that covid-19 brought untold hardship on the people through reduction in their incomes and working conditions in Nigeria, whilst other analysts claimed that it is the inabilities of the people and governing institutions to properly formulate policies, and implement such that have led to the sufferings of the people notwithstanding the unprecedented nature of the time of the pandemic in the country. The primary concerns, important ideas, and variables under study, as well as the assumed relationships between them, were arranged earlier on in chapter one. However, because theory is multi-causal, it is important to remember that the ways in which the concepts are related should not be seen as mutually exclusive. As a result, it should be well known and understood that, there are other factors that have an impact on the performance of the sector during the relevant period but are not directly related to COVID-19, such as infrastructure, geographic location, social characteristics, education levels, and the managerial business strategies of the transportation operators.

It has been suggested from debates in the literature that just shutting down an economy is insufficient to stop the pandemic's spread since it involves some harsh steps that could not be good for the country's ability to support both its people and its economy. In reality, there is unequal road transportation exchange between some of the advanced industrial economies and some of the underdeveloped, primary producing economies. International transportation assumes that all factors of production are fully employed, which is least realistic in some States. It also assumes that economies have equal influence on their road transportation with one another.

CHAPTER 3
METHODOLOGY

This chapter discusses the overall approach to studying the research topic and particular research techniques which have been employed and adapted. All the methodological issues which will to be used for the purposes of this research work, such as population coverage, information sought, how this information was collected, how it was processed and interpreted, including reasons for the chosen research techniques and rationale will be discussed here. The study approach, methods and other design decisions will also be guided by the research objectives specified in Chapter One and the Conceptual Framework.

Chapter One, was viewed as the map of the researchers investigation and the focus of the research originated from the literature and theoretical concepts discussed in Chapter Two. The framework links concept to empirical data, and deductive reasoning was used to move from the large context to generate the specific questions in the questionnaire. As the central theme of this study concerns the immediate impacts of Covid 19 pandemic on road transportation in Nigeria: a study of Rivers joy Transport Company, Port Harcourt. The researcher came up with the some basic research questions to aid in developing the research objectives outlined in Chapter One.

These research questions included but are not limited to;

1. Covid-19 lead to reduced road transportation incomes, by Rivers Joy Transportation Company in Port Harcourt?
2. COVID-19 lead to a relative increase in the prices of transport fares in Rivers joy Transportation Company?
3. Covid-19 also lead to introductions of news innovations (hand washing, wearing of nose masks, reduced number of passengers in a vehicle, etc.) by road transportation workers in the company?
4. It also lead to reduced operations during the period as noticed by the company?
5. It lead to overall change in travelling behavior of Rivers Joy transport company passengers in the city?

After examining and refining these questions, the aim and the objective statements, outlined in Chapter One were clarified, and were thought to be researchable and worth investigating. The

questions were formulated as a way of explicating any theoretical assumptions and orienting the

researcher about the research objectives. The objectives had direct implications for the choice of methodology and tools that were used to obtain the information.

This research was hypothesed and the statistical testing of hypothesis done using the comparative system of data analysis in order to ascertain the result of the researchers' findings in the course of this research work as required by every academic research where large scale samples are used. A precise statement of objectives was thought to be quite sufficient, as long as it was clear on how and what was being investigated. The research objective had direct implication for the choice of methodology and tools that were used to obtain the information. The researcher is confident that the methods opted for and discussed in the following sections helped in meeting the research objective.

3.1 METHODOLOGICAL APPROACH

Different types of methodological approaches may be used in a thesis work. The researchers used a linear regression analysis research approach of fact-finding in the execution and investigation of this research work in order to have a thorough understanding of the research work's subject matter, obtain trustworthy answers to the questions being investigated, and achieve the research's objectives. The quantitative approach was used for this study because it aims to provide a comprehensive knowledge of behavior and other phenomena in a variety of situations and groups. The regression analysis research approach is thus often quick, narrowly focused, scientific, and relevant (Yin, 2003). Even though it doesn't allow for in-depth interaction between the researchers and the participants, it aids in giving a thorough understanding of the problem being researched.

3.2 DIFFERENT TYPES OF DATA USED

Data was sourced through primary and secondary means. Archival records, documentations, direct observations, participants' observations, and interviews. These are means through which data for quantitative approach of fact findings can be assessed and utilized according to Yin (2003).

3.2.1 PRIMARY DATA

Primary data are referred to as first hand data mainly because, this data is collected specifically for the purpose of the research by the researchers. A good advantage of this means is that it gives appropriate answers to the questions under investigation in a research work. And a key point here is that the data collected is unique to the researchers and the research and until the work is published no one else has access to it. Ghauri and Gronhaug (2005) identified some sources of primary data to be observations, surveys, interviews, experiments. In this case the primary source of data was through

interviews and questionnaire.

This study adopted a survey research design. Data were collected through a primary source. The primary data were collected through the administration of a questionnaire on respondents and a detailed interview with the Manager of the company in Port Harcourt city. The respondents in this case were mainly management staffs and the drivers who registered under the umbrella of Rivers Joy Transport Company in Port Harcourt. Apart from these, a sample was drawn from a number of passengers using the company services.

The questionnaire had 23 questions and covered socio-demographic information (gender, age category, marital status, highest level of education, number of people living in the home, and whether the driver was the only provider for the family), vehicle characteristics (small car, bus, sienna, truck) and ownership status, and perceptions of government actions (school closures, police presence, transporting the recommended number of people). COVID19 alleviation package, COVID19 prevention practices (hand sanitization and wearing a mask while carrying passengers), and COVID19 challenges (increased fuel price, increased food price, takes a longer time to get required number of passengers and increased competition from other drivers). The survey was distributed in 200 copies to the various study parks and stations. We discovered that the majority of the drivers lacked literacy and were unwilling to accept our questionnaire, forcing us to request the help of park management for distribution and collecting.

The questionnaire was designed with the study's objectives in mind, as well as elements discovered through a literature review to be relevant to the company and the COVID-19 outbreak. The questionnaire took about 15-20 minutes to complete. The questionnaire was pretested in another metropolitan area with 30 drivers. All factors in this study were assessed using a 5-point Rensis Likert scale, with 5 representing Strongly Agree, 4 representing Agree, 3 representing Neutral, 2 representing Disagree, and 1 representing Strongly Disagree. Only 142 (142) of the 200 (200) copies of the questionnaire distributed to respondents were correctly completed and returned for analysis. The data collected from the respondents was subjected to regression analysis using SPSS version.

3.2.2 SECONDARY DATA

Secondary data are information collected by others for some certain purposes which could be different from or similar to that of a researcher who opts to use the same information (Ghauri and Gronhaug 2005). Also secondary data can be referred to as second - hand data mainly because the data is not gathered for a single purpose but it could be used for different purposes by different researchers at different times. In gathering secondary data internal and external sources can be employed (Ghauri and Gronhaug 2005). Through internal sources, data can be retrieved from employees, customers and

suppliers, competitors etc. and through external sources data can be retrieved from published articles books, research reports, accessing Webpages of companies, organizations, governments, and by going online, a good source of secondary data could be achieved. A typical advantage of secondary data is that it saves the researchers time and resources.

In the course of gathering the secondary sources of data, the researcher performed an extensive retrieval of published materials in the forms of articles, literatures, reports, commentaries, documentaries, interviews and reviews on the impacts or effects of covid-19 on road transportation around the globe. According to katrakazo, et al, (2020), the impact of covid-19 on transportation can be evaluated through reports of individual academic institutes (Molloy 2021), or data companies such as Google, Apple, Ask, Mama, Tom Tom, etc. Which have published materials on activities especially of road transportation during the covid-19 pandemic.

In this work, the researcher focused on analysing the impacts of trip volume of Rivers joy Transport Company on the income of the company over the pandemic period. It is worth doing mainly because of the great difference between the period preceding the covid and that of during the pandemic periods, their conditions, and opportunities. The methodology for analysing Rivers Joy Transport Company's income in Port Harcourt city, during the COVID-19 period would include several steps. The first step would be to collect data on Rivers Joy Transport Company's operations in the city during the COVID-19 pandemic. These data could include data on the number of passengers, revenues, and number of trips operated. These data could be obtained from the company's sources, operators, and industry associations. The next step would be to analyze the data collected to identify trends and patterns in the company’s incomes. Qualitative data can be obtained through interviews with the company’s management staffs, operators, and industry experts to complement quantitative data. Surveys can also be conducted to gather information from passengers and staff about their experiences at the park during the pandemic. It is important to note that the methodology used in this research would need to be adjusted based on data and resource availability as well as ethical considerations when conducting research during a pandemic.

3.3 STUDY LOCATION

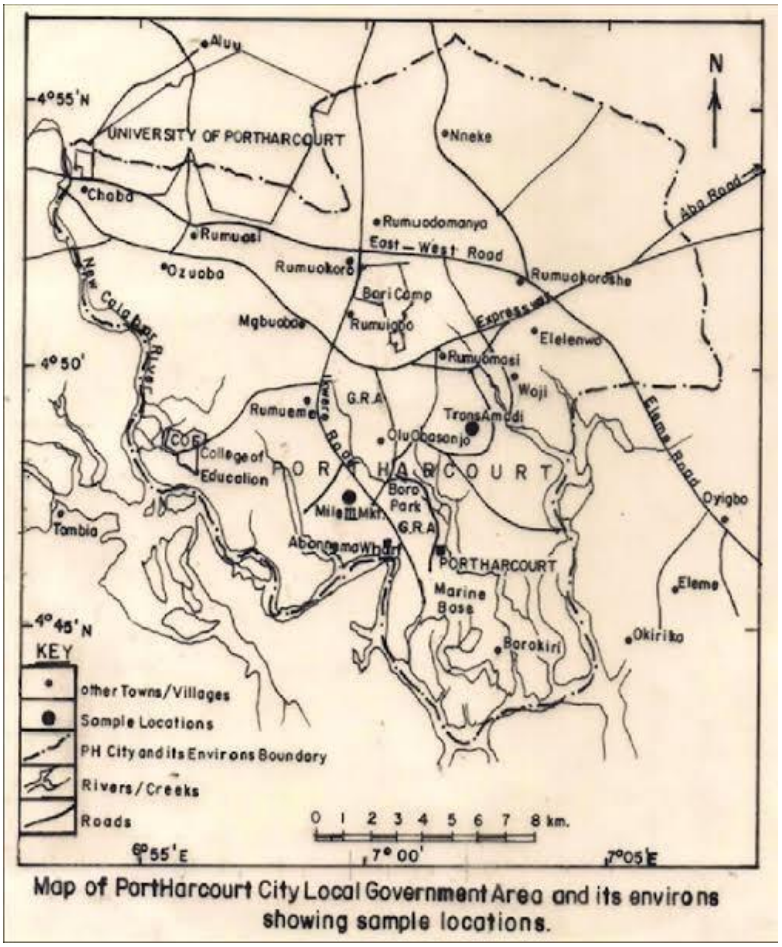


Fig 3.2: Diagram of road network of Port Harcourt city.

The Port Harcourt city and its environs includes the Port Harcourt Local Government Area and its metropolis. It is located around 40 kilometers (25 miles) northwest of Bori and 52 kilometers (32 miles) southeast of Ahoada. Its borders are Okrika to the south, Eleme to the east, Obio-Akpor to the north, and Degema to the west. Its whole area is 109 square kilometers (42 square miles). Towns, urban communities and neighborhoods of port Harcourt city includes Nneke, Abuloma, TransAmadi , Borokiri, Elelenwo, D-line, Diobu, Eagle Island, Elekahia, Fimie Ama, Marine Base, New GRA, Nkpogu, Nkpolu, Oroworukwo, Ogbunabali, Old GRA, Old Port Harcourt Township, Rumuigbo, Rumukwurushi, Abonemoa, okirika, Ozuoba, Oromeruezimgbu, Oroworukwo, Rumumasi, Ozuboko Ama, Rebisi, Rumuodomanya, Rumuibekwe, woji, Tombia, Mgbuoba, Aluu, etc.

3.4 DATA COLLECTION METHODS

We gathered data from both primary and secondary sources in accordance with the regression analysis research technique that we used for this study. In order to have a thorough understanding of

the research that has been done on the topic under consideration, secondary data was gathered from relevant literatures such as books, journals, articles, prior research papers, electronic databases, and from Rivers joy transport company in port Harcourt. In-depth information was acquired via interviews. There are several methods for conducting questionnaire research surveys; they may be done in person, over the phone, or over email. The questions in this case included closed ended questions, which only required respondents to just give the researcher specific direct answers. The questions were streamlined and organized such that respondents may reply with pertinent information while also avoiding prejudice or irritability in their responses. In order to record accurately how the COVID-19 epidemic affected the Nigerian road transportation business taking Rivers Joy Transport Company as a case study, as well as to be able to critically assess it, we used this strategy to gather high-quality information and as much information as we could. We believe that by using this technique, people will be willing to explain themselves clearly and simply.

3.5 RESEARCH POPULATION AND SAMPLE

It was almost difficult for the researchers to evaluate every single person who used Rivers Joy Transport Company, their management and drivers in Port Harcourt city. Because it will be a huge task and will also take a lot of time, neither of which we can afford for this research. As a result, a judgmental sample of people and organizations that use and operates road transportation in Nigeria's Port Harcourt metropolis was conducted for this study project. According to Hair et al. (2003), quoted by Mostaghel, 2006), judgmental sampling entails selecting a group of individuals that the researchers think to be knowledgeable about the specific issue they are researching. The selected persons evaluated for this study are those who have been in the industry for some time. The youngest of these people will be eighteen, and from the beginning until the present, every single one of them has worked in the city of Port Harcourt. Additionally, all of these people have experience in the city's passenger and freight transportation industries. Therefore, we believe that these people ought to be well-versed in the benefits and drawbacks of the researched topic.

Due of a lack of time, we were only able to make judgments from the responses to the questionnaire that we obtained from members of the management team and the traveling public from the company. These members of the public included drivers, owners of vehicles, and regular travelers, particularly those who had experience with Nigerian roads for transportation. For the purposes of administering this questionnaire to management staffs, passengers and drivers of the company, convenience sampling was used also in addition to the judgmental method initially used to select participants. Convenience sampling, as described by Hair et al. (2003) and quoted by Mostaghel

(2006), involves choosing sample participants who can give the necessary data and who are more readily accessible to participate in the study. This has the benefit of assisting researchers in the completing of an interview quickly and affordably. Due to our time constraints and the convenience factor, this was done, because these questions allowed us to get insightful responses to our investigation. And given the short amount of time we have for the study, it could be challenging to administer the questionnaire to more individuals who are willing to participate in the interviews. Hence, we made the decision to make do with what we had.

3.6 SAMPLE SIZE DETERMINATION

According to the National Bureau of statistics (NBS, 2019), the 2020 projected population figure of Port Harcourt city stood at approximately 1,148,665. From the population figure, a sample size of 400 was obtained using the Taro Yamani formula as follows;

$N= n/1+n (e)^2$

Where,

N= sample size
n= population under study
1= constant
e= margin error

Thus, the established sample size was calculated as

$n= 1,148,665/1+1,148,665(0.05)^2$
$= 1,148,665/1+1,148,665(0.0025)$
$=1,148,665/1+2871.663$
$=1,148,665/2872.663$
$=399.86$
$=400.$ Approx.

3.7 PRACTICAL FRAMEWORK AND RESEARCH INSTRUMENT

In order to learn how transportation companies, operators, and different people in the sector are controlling the spread of infectious diseases, as well as to determine whether they are aware of the ethical conundrum that arises when road users become infected with various viruses as a result, interview questions have been created with this issue of practical ethics in mind. Our chat with the road transportation firms centered on how the COVID-19 epidemic instantly affected their operations during and after the Pandemic in relations to what was obtainable before the pandemic, while the management provided us with the organization's daily income and trip volume during the period in question.

142 respondents from the company and it passengers participated in the interview. Some of the participants were managers who oversaw various departments. Other employees, particularly the lower level staff. We believe that the low level personnel should be included in this study since, in most businesses, they are the key players who carry out the business operations. The administration of the questionnaires took place at their places of businesses for an average of 15 minutes each.

3.8 LINKING QUESTIONAIRE AND INTERVIEW QUESTIONS WITH THEORETICAL FRAMEWORK

The research study's research interview questions were created in accordance with the theoretical framework used in the investigation. Model, closeness, social context, likelihood of impact, concentration of effect, and size of consequence, according to Jones (1991). These qualities are what make up the moral intensity model. And the criteria that affect moral decision-making and moral conduct are the qualities that make up the moral intensity model. We believe that our study topic will be addressed by asking questions that are focused on these models.

3.9 METHOD OF DATA ANALYSIS

The data gathered for the goal of the research effort is thoroughly evaluated for better interpretation in order for this research work to be understandable and valuable. In order to guarantee that the pertinent information included in this material is not lost, Yin (2003) claims that the goal of evaluating any material is to make it more obvious and distinct. Eliminate competing interpretations to be fair, and then draw strong analytical findings. But every investigation in a research paper must begin with a general analytic plan (Yin 2003). Developing a case description or relying on theoretical claims gained from the literature research are suggested approach choices for case study data analysis. According to Yin (2003), relying on a theoretical hypothesis is the same as following the hypothesis that inspired our case study.

With careful reading of the questionnaires transcripts and exploitation of points that are pertinent to the research questions, the data was carefully analyzed. Scholars in this discipline made a clear distinction between the outcomes and then compared them to the literature. From here, a conclusion was reached in light of our research's results on the Nigerian road transportation industry and COVID-19

CHAPTER 4

DATA PRESENTATION AND ANALYSIS

4.1 INTRODUTION

This chapter deals with the presentation of quantitative data collected from field study in the research area, through questionnaires administered on resourceful individuals for the purposes of this work.

4.2 DATA PRESENTATION AND INTERPRETATION

4.2.1 QUALITATIVE DATA PRESENTATION

The qualitative data collected for the purposes of this research work were reported in line with the experiences of the respondents within the organizations in Port Harcourt city and its environments.

RIVERS JOY (RIVERS TRANSPORT COMPANY)

Formerly known as Rivers Transport Company (RTC), was initially a state owned road Transportation Company with its corporate headquarters (office) located at Olu Obasanjo way, waterlines Port Harcourt. The COVID-19 pandemic lead to the state government disbandment of the transport outfit, management personnel of the then disbanded company quickly grouped themselves into one and re-registered the Organization as Rivers Joy with all its offices still operational, though there were some changes in location as a result.

The company was established to cater for the intra and inter city transportation of people in the state and beyond, with its routes spanning almost all the capital cities of all the south-southern and south Eastern states of the federation, plus Lagos, Abuja, Jos and Kano. The company uses the Toyota hiace buses, Sienna type of SUV, etc. the company also boast of a staff strength of approximately 1000 persons and above that includes, drivers, admin staffs, mechanics etc. Since the withdrawal of Sponsorship by the state government, individual vehicle owners now register their vehicles under the organization and pay a given percentage to the organization per trip of vehicle, and number of passengers onboard the Journey. Hence, it can be stated that the vehicles are on contract basis, as any vehicle owner can withdraw their vehicle when they deem fit.

An interview with the acting chief executive officer of the group as at the time of

carrying out this research disclosed that:

A fare form Port Harcourt to Abuja that initially cost Eight thousand Naira (₦8,000) has increased to Fifteen thousand, five hundred naira (₦15,500), while Port Harcourt to Lagos, which was Seven thousand naira (₦7,000), now goes for the sum of Twelve thousand, five hundred naira (₦12,500). And this increment is likewise for other destinations depending on some factors as mentioned by him.

For them also, the COVID-19 pandemic has a positive impact on their operations, given his reasons for such statement as;

The period increase the per capital income of the business. When asked how? He said that before the pandemic, the total amount received each day from their office in Port Harcourt was within the neighborhood of One hundred and fifty thousand naira (₦150,000) per day excluding Sundays; but with the hand over from government and the COVID-19 in place, the amount increased to the neighborhood of Two hundred and fifty thousand naira (₦250,000), a notable increase of 60%, which is more than half of what was originally gotten by the company. This according to him is even when the company reduced the number of passengers onboard on vehicle for a trip with a corresponding increase in price for such journeys.

Again, he also stated that the work is now easier, since they do not need to take more than five (5) passengers for their sienna buses in a trip, as against the nine (9) passengers previously carried, while for the Toyota Hiace buses, Ten (10) passenger were required as against the Eighteen (18) previously carried in the same trips.

The weight of the load on the vehicles have also reduced tremendously for the passengers drivers, as the number of passengers have reduced and consequently, in some cases, the luggage belonging to the passengers been convey also reduces alongside.

The Company also restructured it services due to the change in ownership and the needs that arose as a result of the coming of the pandemic in order to meet their customers' needs and desires, for instance, they have to create a haulage section that carter's for the movement of goods only during the period and this section brought in tremendous incomes to the company at large with lesser resource.

For the organization, the COVID-19 pandemic was a blessing in disguise, because of its positive effect on the company. Surprisingly, the researcher was told that during the pandemic period, despite the increase in transport fares, quite a number of passengers were also found waiting for chartered services especially to Abuja, Lagos, and Kano. This according to

the Port Harcourt Manager, was mostly due to the temporary closure of the airports across the nation.

Nevertheless, an inquiry into their responses strategies to curb the effect of the pandemic portrays the following;

1. Regular provision of hand sanitizers for both staffs, passengers and everyone coming into the Organizations offices and stations
2. Compulsory wearing of noise mask for all especially staffs and passengers within the organizations premises and onboard any of their vehicles.
3. Provision of temperature checks for all passengers and drivers before embarking on any journey and while disembarking at the company's other stations.
4. Provision of goods haulage section that carter's for goods and services only.
5. Provision of telephone booking and timing of departure to reduce waiting time at the park in order to reduce crowds.

4.2.2 QUANTITATIVE DATA PRESENTATION AND INTERPRETATION

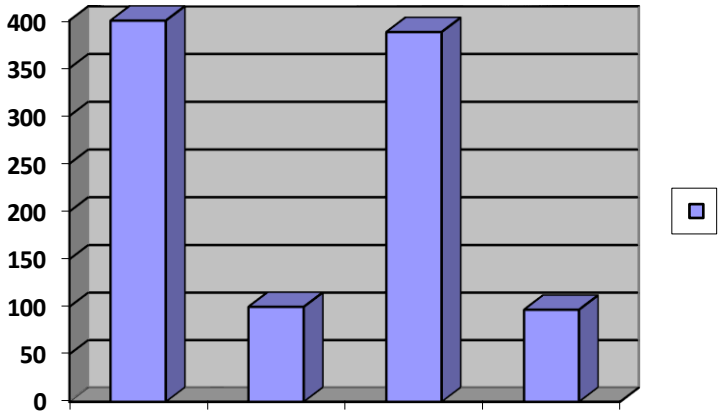
This is the presentation and possible interpretation of quantitative data collected from respondents through the questionnaire administered to respondents. Data collected will be tabulated, percentage and possibly charted using Bar chart in order to aid easy comprehension and assimilation by users of this work.

This quantitative data, as mentioned in chapter three, were gotten from two hundred questionnaires administered to various respondents in the same city. One hundred and forty two of these questionnaires were retrieved and necessary analysis were carried out based on the returned number and this is stated thus

TABLE 4.1: Questionnaire Administered

Questionnaires Number	Percentage served (%)	Questionnaires Retrieved	Percentage Retrieved (%)
400	100	388	97

Source: Researcher



Source: Researcher

4.3.2.1 PRELIMINARY FINDINGS

The preliminary findings of this study showed that all the respondents were male drivers (100%). 160 (41%) of the respondents were between 50-60 years, 81 (21%) were between 40-49 years, 72 (19%) were between 30-39 years and 75 (19%) of the respondents were between 20-29 years. 83 (21%) said they were single, 127 (33%) were married, 109 (28%) were divorced and the remaining 69 (18%) were widowers. 29 respondents accounting for 8% said they were not living with anybody while 42 (11%) had one person living with them, also, 60 (15%) had two persons living with them, 75 (19%) had three persons living with, 106 (27%) said they had four persons, while the remaining 76 (20%) also responded to having five persons staying with. As for the educational qualifications of the drivers, 78 (20%) of the respondents were B.sc holders, 74 (19%) were HND holders, 88 (23%) were OND holders, 98 (25%) were SSCE holders while 50 (13%) were holders of pry. 6 certificate. Further inquiries into the experiences of the drivers shows that, 70 (18%) have experience of twenty-one years and above, 61 (16%) of the respondents had 16-20 years of experience, 74 (19%) had 11-15 years, 64 (16%) had 6-10 years of experience while 69 (18%) of the drivers had 1-5 years of experience, with the remaining 50 (13%) having experience below one year. Also, 177 (46%) of the respondents were owner-drivers while the rest 211 (54%) were hired drivers. The summary of the findings is presented in the table below:

Table 4.2. Bio-data of Respondents

VARIABLES	FREQUENCY	%	CUM.%
SEX			
Male	**388**	**100**	**100**
Female	**-**	**-**	**100**
Total	**388**	**100**	
AGE			
50-60 Years	**160**	**41**	**41**
40-49 Years	**81**	**21**	**62**
30-39 Years	**72**	**19**	**81**
20-29 Years	**75**	**19**	**100**
Total	**388**	**100**	
MARITAL STATUS			
Single	**83**	**21**	**21**
Married	127	**33**	**54**
Divorced	109	**28**	**82**
Widower	69	**18**	**100**
Total	**388**	**100**	
Numbers of person living with you			
0	**29**	**8**	**8**
1	42	**11**	**19**
2	60	**15**	**34**
3	75	**19**	**53**
4	106	**27**	**80**
5	76	**20**	**100**
Total	**388**	**100**	
QUALIFICATIONS			
B.sc	**78**	**20**	**20**
HND	**74**	**19**	**39**
OND	**88**	**23**	**62**
SSCE	**98**	**25**	**87**
PRY 6 CERT.	**50**	**13**	**100**
Total	**388**	**100**	
EXPERIENCE			
21 years and above	**70**	**18**	**18**
16-20 Years	**61**	**16**	**34**
11 – 15 years	**74**	**19**	**53**
6 - 10 Years	**64**	**16**	**69**
1 - 5 Years	**69**	**18**	**87**
Below 1 Years	**50**	**13**	**100**
Total	**388**	**100**	
CATEGORY			
Owner-driver	177	**46**	**46**
Hired driver	**211**	**54**	**100**
Total	**388**	**100**	

Field Survey, 2021

4.3.2.2 MODEL SPECIFICATION

The generalized linear regression model employed in the study is presented below:

$$I = a + \beta t + \mu \ldots\ldots\ldots$$

Where,

I = Income
t = trip volume
a = Intercept
β = Co-efficient
μ = Error term

4.3.3 HYPOTHESIS TESTING

The major objective of the study was to assess the impact of covid-19 pandemic on Rivers Joy Transport Company's income in the study area, formulated hypothesis was tested using linear regression analysis.

Ho: there was no significant immediate impacts of Covid-19 pandemic on the incomes of Rivers Joy Transportation Company in Port Harcourt city.

The analysis is presented in the tables below:

TABLE 4.3: MONTHLY TOTAL TRIP VOLUME FROM PORT HARCOURT TO LAGOS AND ABUJA FOR 2020 AND THE THEIR INCOMES IN RIVERS JOY TRANSPORT COMPANY PORT HARCOURT HEADQUARTERS

	TOTAL NUMBER OF PASSENGER TRIPS		TOTAL NUMBER OF HAULAGE TRIPS				AVERAGE MONTHLY TRIPS INCOME (000)		AVERAGE MONTHLY HAULAGE INCOMES (000)		TOTAL INCOME (000)
MONTHS	*LAGOS*	*ABUJA*	*LAGOS*	*ABUJA*	TOTAL NUMBER OF ALL TRIPS	TOTAL NUMBER OF PASSENGERS	*LAGOS*	*ABUJA*	*LAGOS*	*ABUJA*	
JANUARY	49	59	16	8	132	108	4675	7325	4125	2230	18355
FEBRURY	40	38	16	8	102	78	4150	4630	3725	1990	14495
MARCH	33	35	16	8	92	68	3375	4065	4000	2220	13660
APRIL	39	43	16	8	106	82	3875	4505	4450	2125	14955
MAY	30	37	16	8	91	67	3000	4545	3950	1800	13295
JUNE	34	35	16	8	93	69	3500	4445	4100	1950	13995
JULY	37	32	16	8	93	69	3725	4120	3850	1800	13495
AUGUST	33	38	16	8	95	71	3375	4630	3600	1500	13105
SEPTEMBER	37	39	16	8	100	76	3775	4715	3900	1725	14115
OCTOBER	40	39	16	8	103	79	4100	4715	5300	2000	16115
NOVEMBER	39	40	16	8	103	79	3925	4800	5450	2200	16375
DECEMBER	38	39	16	8	101	77	3375	4645	6400	2735	17155

Source*: RIVERS JOY TRANSPORT COMPANY PORT HARCOURT 2020*

Table 4.4: Model of fit of Covid-19 pandemic for incomes of Rivers joy transport companies, in Port Harcourt.

MODEL	R	R^2	ADJ. R^2	Standard error of Estimate
1	0. 824[a]	0. 680	0.647	1005.975

Predictor (constant): Number of trips

Source: Data Analysis (2021) SPSS Version25

Table 4.3 above shows that the model has an R^2 co-efficient of determination of 0.680 which implies that 68.0% change in the company's' incomes during the period is accounted for by Rivers joy numbers of trips.

Table 4.5: ANOVA of Road Transport Business

MODEL	Sum of square	Df	Mean Squares	F- Stat.	Sig.
Regression	21457758	1	21457758	21.204	0.001[b]
Residual	10119849	10	1011985		
Total	31577606	11			

a. Dependent variable: income

b. Predictors: (Constant): Rivers joy number of trips.

c. Source: Data Analysis (2021) SPSS version 25

Table 4.4 above shows the ANOVA results that at 5% confident limit, P-value indicates that the overall regression model is significantly significant in terms of its goodness of fit to determine the joint effect of the identified transport business variables on Rivers joy management's incomes (F =21.204 p = 001<0.05).

Table 4.6: Co-efficient of Rivers joy transport company's number trips on Incomes

	Coefficients	*Standard Error*	*t- Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	2160.27	2787.524	0.774978	0.456287	-4050.72	8371.26
	126.5002	27.47174	4.60474	0.000973	65.28937	187.7111

Dependent variable: Rivers Joy number of trips.

Source: Data analysis (2021) SPSS version 25

The above table (Table 4.6) shows a linear regression between Rivers joy transport company's number trips and the company's incomes. Although, the identified variable, Rivers joy operations, is statistically significant, it has a very big positive contribution to the incomes of the company ($\beta 1$ = 126.5 p<0.05). As a result of this, the null hypothesis is rejected.

4.4 SUMMARY OF FINDINGS

Immediately after the gradual return to normality after the COVID-19 outbreak, this study was done on Rivers Joy Transport Company, Port Harcourt, Nigeria. To assess the effects of the pandemic on road transportation in Nigeria. The transportation sector is concerned with the actual moving of people and goods from one location to another. To achieve the study's objectives, one hypothesis was developed, and road transportation business for Rivers Joy was captured utilizing the company's Number of Trips and its Incomes. The study's goals were to analyze the impacts of the pandemic on the incomes of the company. Findings revealed that the pandemic has a significant positive impact on the incomes of the company's ($\beta 1 =$ 126.5 $p<0.05$). As a result of this, the null hypothesis is rejected. This study contradicts the World Bank's (2020) predictions that the $8-$12 trillion global logistics market which includes transportation, inventory control, warehousing, order processing, and other supply chain activities accounting for approximately 12% of global GDP will reduce due to the virus's propagation exposing the vulnerability of the world's commodity supply chain. Hence for them, supply chain will be severely disrupted, and demand will rapidly outpace supply capacity. For example, the need for non-food requirements, particularly medical supplies, has soared. Food supply networks may collapse due to a lack of transportation to move items from the farm to the table. According to them, Covid-19 solutions, such as the introduction of social distance, movement restrictions and lockout laws, have a substantial impact on passenger transport services, particularly mass transit systems built to convey a large number of people in dense metropolitan locations. Transit agencies are struggling financially as a result of the sharp decline in transportation utilization. In developing countries, public transport is mostly unofficial and privately run. Transport companies and their workers only profit when they convey passengers. As a result, these groups are extremely susceptible. Again Suji, K, Sujin, L, Eunjeong, K, Kitae, J & Jiho, Y (2020) carried out a research study to explore the impacts of COVID-19 on car and bus usage amidst covid-19 pandemic in Daejeon, South Korea. In reaction to the pandemic, people cut their trips more dramatically during the day and on weekends, according to the findings. They also reduced bus travels and trips to work destinations to avoid congested or shared spaces. As a result, many commercial drivers were idle, which cut their compensation greatly throughout the period. As a result, groups are extremely vulnerable.

Additionally, researchers from the fields of (Beck and Hensher, 2020a, Beck and

Hensher, 2020b; Beck et al., 2020; Borkowski et al., 2021; Irawan et al., 2021; Li et al., 2020;

Shakibaei et al., 2021; Shamshiripour et al., 2020) and (Li et al., 2020; Shakiba. They reported that trip generation was reduced for a variety of trip purposes as a result of restrictions on how many people could move from one location to another in order to slow the spread of the virus, and that people preferred more individual transportation modes to collective transportation modes leading to more road transport workers not being actively engaged. And because commercial drivers were not actively engaging, they were at a disadvantage. Bian et al. (2021) investigated how pandemic-related regulations affected transit networks in Seattle and New York, both in the United States. They claimed that after the social distance restrictions were established, the use of vehicles and public transport in both cities decreased considerably.

This could be because developed countries like the United States of America, China, Canada, the United Kingdom, and others went into total lockdown. But according to Rivers Joy drivers, by paying their way through, they were able to transport their commodities, mainly food supplies, from the point of production to the cities where they were most needed. Law enforcement officials were quite accommodating and knowledgeable about the game. The majority of the movement occurred at night, when there were fewer enforcement agents on the road. So, during this time, their pay increased, and some of the drivers desired that the lockdown continue. This negates the findings of a cross-sectional survey of 282 cab drivers in Jamaica's Kingston and St. Andrew Metropolitan Area which was conducted in May 2020. Where seven hubs were used to pick a taxi driver using multi-stage sampling. The data was gathered using a 28-item questionnaire. It was determined what people's self-reported incomes were prior to and during the COVID-19 pandemic, and the correlations between those changes and COVID-19 prevention methods were examined. The COVID-19 epidemic has significantly reduced the passenger’s volume of taxi drivers, which has an impact on their various incomes.

CHAPTER 5
CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

As it has earlier being noted in this study, the functional backbone of any environment in order for vital services to be produced is the road transportation system (Nwafor and Onya, 2019) in Nigeria. This is to say that road transportation is one of the key aspects of any functional society the world over, that will encourage it development both economically, socially and otherwise. However, the coming of the COVID-19, brought crisis into the road transportation system in the nation. And for the survival and longevity of the sector, during these crisis periods, management of the challenges that arose in the country as a result of the pandemic became very essential to all and sundry. Therefore, both the government and key stakeholders in the road transportation business started planning and making arrangements in order to control or reduce the impact of the pandemic on various sectors. Their arrangements and planning were focus on revitalizing the road transportation that have been broken by the impact of the virus, with operational processes that will aid the road transportation in such a way that movement of people were largely restricted and consequently leading to the restriction of movement of goods and services as a result of the restrictions imposed on the individuals.

Consequently, the overall COVID-19 pandemic effect on road transportation in Nigeria was evaluated from the context of a developing country bedeviled by economic and social difficulties that precedes the pandemic.

The unique scenario, is that there is overcrowding in most major cities of Nigeria with Port-Harcourt city not being left out. And usually, where there is overcrowding, unhygienic communal environment are usually eminent. More so, road transportation to workplace in small buses or personal vehicles are also common phenomenon seen in such places. This makes the population of such environments to become soft vulnerable targets for the pandemics, such as the ones acknowledged (COVID-19).

The Port Harcourt case study was a government magnified world health organization (WHO) procedures to suit particular circumstances. But in the end, there was hardly any analysis on how to balance economic interest, public health with road transportation in the city, with road users in the city being at the receiving end. And indeed, the impact on the dominant road transportation sector that is disproportionate was devastating, translating to dramatic challenges on the people and the economy at large within the Port Harcourt city.

5.2 CONCLUSION

Based on the results of the regression analysis on the impact of COVID-19 on the activities of Rivers Joy Transportation Company, in the city of Port Harcourt, Nigeria. The study was able to draw a conclusion that the identified predictor variable, number of trips is good predictors because it is statistically significant at 0.05 significant level. We found out that number of trips have a significant positive contribution towards the impacts of the pandemic to the firm incomes.

5.3 RECOMMENDATIONS

As observed by the researcher, the road transportation sector of the Nigerian economy experienced a high level of success and compliance in the response to the COVID-19 pandemic. However, there is still the need to overcome most constraints at all levels of the sector in order to curtail or possibly eliminate the impacts of the virus. Hence, the researcher recommends that;

As commuting and travelling using the road during the lockdown induces stress and aids the transmission of the virus, (Porcelli, 2020) government and road transportation stakeholders should found alternatives modes to public road transportation such as bikes, trains, walking, etc. it is hoped that allocating road space to bicycles and pedestrians, will encourage people to cycle and walk more rather than taking buses (IRU, 2020). This will further enhance safer journey, reduce road traffic congestions and accidents. This will also subsequently reduce the additional load on our health sector and the environment at large due to road accident mayhems.

Road transport operators in the nation should not lower their guard in the response to the pandemic as we return to the pre-COVID-19 days; they should continue to comply with the strict applications of the new technologies, processes and procedures that have been perceived as being effective, even when the threat of the pandemic finally reduces. So, peoples procedures of going out only when the need arises, as observed during the lockdown which have shown to be very effective in the responses to the spread of the virus should be made to still apply. Practices like the wearing of face masks, regular daily cleaning of vehicles, social distancing rules among road transport users, etc. needs to be totally inculcated into the road transportation system plan in Nigeria in order to reduce or totally avert the occurrence of future diseases in the sector.

Road transport operators must continue to show strong willingness to co-operate with the government and other governing bodies of the sector in order to prevent a second wave or possible emergence of another pandemic in the nation. The willingness to co-operate by the operators of the sectors in Nigeria will help in the policy implementation for road safety, emergency and essential services provisions in the nation during periods of these natures. As this will aid in making the sector more responsive and vibrant to challenge posed by such pandemics in the nation.

COVID-19 also presented many untapped opportunities in the road transportation sector in Nigeria, most of them were in the areas of development of new business strategies and models as seen in pamdrive, bolts, labs, etc. which all have incorporated courier and logistics services into their operations in response to the challenges posed by the COVID-19 pandemic on road transportation in port Harcourt, modernization of the road transport system, application of information technology, revitalization of road transportation infrastructures and development of a sustainable work model are some other opportunities created by the pandemic on the sector.

The potentials to transition to green transportation in Nigeria, should be adopted in response to the pandemic and afterwards. This practice is imperative to be entrenched into the system, as when these policies are made, it will strengthen the existing once, thereby promoting greater use of logistics operations for the delivery of goods and services, in proper maintenance of vehicles to reduce pollution, greater adoption of ICT

to support delivery services, greater adoption of active transportation, especially in the area of the use of bikes and walking, increase inter agency co-operation among stakeholders in the road transport sector.

The government should practice investing in improving road infrastructures for non- motorized transportation system, educating and training road transport operators in Nigeria, while giving financial support to private road transport operators in the transport sector as most of them were adversely affected by the pandemic. This increased spending in road transportation will improve and boost the efficiency of the sector. This will further lead to technological advancement such as areas of road try processes & procedure, in order to improve safety and help build back public confidence and resilience in the sector, according to Shen, et al, (2020). Training and education of both employees and employers will also be very important to the well-being of this every sector of the economy.

Road transportation operators should be proactive rather than being reactive to developing supportive infrastructures and to adopting of new technological systems that will aid the transition of the sector from the COVID-19 era to the post COVID era. This will further enhance the advancement of the sector, while taking care of measures that may lead to future occurrence of any pandemic in the nation and the world at large.

Finally, as part of the services designed, it will be essential for road transport stakeholders and government to also evaluate the different measures that are put in place continually as both commuters and transportation service providers engage in the new nominal. This is because, there the possibilities that some of the measures put in place may not be strictly adhered to by the operators of the system. Hence, the government need to come on board in order to avert any challenge that may arise as a result of non-compliance with laid down policies, principles and guidelines put in place for the good of all and sundry.

5.4 CONTRIBUTIONS TO KNOWLEDGE

This research was done in the city of Port Harcourt, where no such studies of COVID-19 and road transportation has been noticed before now, using a mixture of

three theories; the situational attribution theory, the social theory and the information processing theory. The achievements of this research using these theories in the city of Port Harcourt meant that the researcher was able to tell the academic world that works of this nature could be done in this city using a mixture of two or more theories as done above. Above all, undertaking these research and making it available for government, stakeholders and individuals especially those in the academia and transportation sectors makes my contributions to knowledge.

5.5 APPLICATION OF RESEARCH

This work evaluates the immediate impacts of the outbreak of covid-19 pandemic on road transportation in Nigeria: A Study of Rivers Joy Transport Company in the city of Port Harcourt, where gained from the evaluation will be useful in planning future control and migration strategies during environmental health emergencies such as the COVID-19 pandemics or any other situation that requires prevention and control measures in the city of Port Harcourt in particular and Nigeria at large. Therefore, targeted interventions and protective behaviors can be planned to handle future outbreaks of virus or disease of these nature in the city.

More so, the inferences from this research work will help to identify target groups and specified road transport decisions to be implemented at different times of the outbreak of virus in the nation. The result of this research could also be used for testing of sceneries, which could aid road transportation system planners in managing emergency situations of disease outbreaks in the sector.

The direct application of the results of this research work are possible, because of the fact that, its findings were based on practiced real life observations. This will make it possible for decision makers to be able to compare solutions gotten from this research work with pandemics of similar nature in the road transportation sector, especially within the city of Port Harcourt and its metropolis. With the sole aim of providing result that will assist in handling of future pandemics when the need arises.

5.6 SUGGESTIONS FOR FURTHER RESEARCH

In spite the fact that many studies have been done on the latest covid-19 pandemic on transportation with most of them focusing on the general challenges face by transportation sector during the COVID-19 era, most of the works on road transportation and COVID-19 were left untouched by most of these researchers especially as it concerns the Nigerian state. Therefore, detailed studies are required to understand how the pandemic impacted road transportation using various variables like travel behavior, routes, demands. It is against this backdrop that the researcher is suggesting that future researchers are needed in the following areas;

* The effect of the COVID-19 pandemic on mobility behavior of road transportation users in Nigeria.
* The impacts of reduced road vehicle usage during the COVID-19 pandemic on the Nigerian economy.
* Assessing the impacts of planning and operations of road transportation policies during the COVID-19 pandemic in Nigeria.
* The values of road transport exposure reduction as any intervention for health safety during the COVID-19 in Nigeria.
* Effect of COVID-19 on road transportation demand in Nigeria.

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APPENDIX

INTRODUCTION OF THE RESEARCHER

The researcher Mr. Elechi Chigozie Prince is a post-graduate student of the department of transportation management and planning technology, from the Federal University of Technology, Owerri. (FUTO). He is undertaking a post graduate research work on the immediate impacts of covid-19 pandemic on road transportation in Nigeria, a c study of Rivers Joy Transportation company in Port Harcourt city.

You are kindly encouraged to lend him all the necessary assistance and support that he may require from you in the course of undertaking this project work.

Thanks for your anticipated assistance.

.....

DR. DIKE D. N.

Project Supervisor

QUESTIONNAIRE ON THE IMMEDIATE IMPACTS OF COVID-19 PANDEMIC ON ROAD TRANSPORTATION IN Port Harcourt CITY.

Please, kindly respond to the questions below, as that will help the researcher generate data for the purposes of this research work. I promise that all response to this research shall be confidential, and information obtained shall be used for the purposes of this work only.

INTRODUCTION

PLS TICK THE RIGHT OPTION IN THE SPACE PROVIDED BELOW (√)

SECTION A: Personal information.

1. **SEX:** Male ☐ Female ☐
2. **AGE:** 20 - 29 ☐ 30 - 39 ☐ 40 - 49 ☐ 50 - 59 ☐ 60 - above ☐
3. **MARITAL STATUS:** Married ☐ Single ☐ Widow ☐ Divorced ☐
4. **LEVEL OF EDUCATION:** Pri. 6 ☐ SSCE ☐ OND ☐ HND ☐ B.SC ☐
5. What category of driver are you? Owner driver ☐ Hirer driver ☐
6. **NUMBER OF PEOPLE LIVING AT HOME WITH YOU**

0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

7. **HOW LONG HAVE YOU BEING DRIVING IN PORT HARCOURT CITY?**

Below 1 year ☐ Below 5 years ☐ Below 10 years ☐

Below 20 years ☐ Above 20 years ☐

SECTION B:

Impacts of covid-19 pandemic on road transportation in Port Harcourt city.

NOTE: SA - Strongly Agreed, A - Agreed, N - Neutral D - Disagreed, SD - Strongly Disagreed

8. I am the bread winner of my family. SA ☐ A ☐ N ☐ D ☐ SD ☐

9. I am the owner of the vehicle that I am using. SA ☐ A ☐ N ☐ D ☐ SD ☐

10. Businesses closure by government affected road transport.
SA ☐ A ☐ N ☐ D ☐ SD ☐

11. Police presence on the road increases the cost of road transport during the period of covid-19 pandemic. SA ☐ A ☐ N ☐ D ☐ SD ☐

12. COVID-19 led to reduction in the number of passengers being conveyed?
SA ☐ A ☐ N ☐ D ☐ SD ☐

13. Reduction in number of passengers conveyed increased the cost of road transport?
SA ☐ A ☐ N ☐ D ☐ SD ☐

14. COVID-19 led to increase in fuel prices? SA ☐ A ☐ N ☐ D ☐ SD ☐

15. COVID-19 led to increase in food prices? SA ☐ A ☐ N ☐ D ☐ SD ☐

16. During the COVID-19 government policies or road transport were tightened?
SA ☐ A ☐ N ☐ D ☐ SD ☐

17. During the COVID-19 it took a longer time to get the required number of passengers for the trip? SA ☐ A ☐ N ☐ D ☐ SD

18. COVID-19 led to the increase competition for drivers?
SA ☐ A ☐ N ☐ D ☐ SD ☐

19. COVID-19 led to drivers increased take home?
SA ☐ A ☐ N ☐ D ☐ SD ☐

20. COVID-19 led to increase transport prices? SA ☐ A ☐ N ☐ D ☐ SD ☐

21. COVID-19 also led to decrease number of persons at the park?
SA ☐ A ☐ N ☐ D ☐ SD ☐

22. During the COVID-I9 passengers were willing to pay the increased transport fares?
SA ☐ A ☐ N ☐ D ☐ SD ☐

23. During the COVID-I9 more trips were made? SA ☐ A ☐ N ☐ D ☐ SD ☐

RIVERS JOY TRANSPORT COMPANY AVERAGED DAILY PASSENAGERS, GOODS, PRICES, AND TRIP VOLUME FOR PORT HARCOURT PARK TO SOME SELECTED DESTINATIONS IN NIGERIA DURING THE COVID-19 PANDEMICS.

	DESTINATIONS	*HIACE*	*PRICE*	*SIENNA*	*PRICE*	*HAULAGE TRIPS*	*TRIPS TOTAL*	*TOTAL NUMBER OF PASSENAGES*
1	LAGOS	3	12500	3	14000	3	9	35
2	ABUJA	2	15500	3	17000	2	9	25
3	JOS	1	20500	1	22000	-	3	15
4	KANO	1	31500	1	35000	-	2	15
5	ONITSHA	5	3000	5	3850	2	9	75
6	ABA	5	2500	5	3050	3	13	55
7	OWERRI	5	2000	6	2500	3	14	80
8	ENUGU	2	3850	3	4250	1	6	45
9	WARRI	3	2500	2	3000	2	7	30
10	BENIN	2	3100	2	3700	1	5	30
11	CALABAR	2	3000	2	3500	2	6	30
12	UYO	2	3000	2	3500	2	6	30
13	LOKOJA	1	8500	1	9500	-	2	15
14	AKURE	1	10500	1	11500	-	2	15
15	ABAKALIKI	1	3750	2	4500	-	3	20
16	IBADAN	1	11500	2	13250	1	4	20
17	ASABA	2	3500	2	4250	1	5	30
18	UGEHELLI	2	2000	2	2500	1	5	30
19	AGBOR	1	3000	2	3500	1	4	20
20	OMOKU	10	1500	5	2000	3	18	125
21	BORI	8	1000	4	1250	2	12	100
22	DEGEMA	3	1500	3	2000	3	9	45
23	OYIGBO	5	750	3	1000	2	10	65
24	EKET	1	3250	1	3850	1	3	15
	TOTAL	69		73		45	176	