POST-COVID-19 TRAVEL PATTERNS: A LITERATURE REVIEW

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ABSTRACT

The COVID-19 pandemic disrupted the travel patterns of people globally. These changes could be attributed to the travel restrictions imposed by governments worldwide. Studies have shown that these changes persist somewhat in the post-COVID-19 era. Understanding post-COVID-19 travel patterns is essential for various aspects of society, but most importantly, for transport planners to ensure sustainable mobility and positive traffic flow. This paper aims to explore the travel pattern in the post-COVID-19 period in the global south using a comprehensive literature review. Research articles and conference papers from Google Scholar, Science Direct and Scopus were gathered and selected based on the title. The findings show a major shift in the mode of travel, especially an increase in the use of the private car. The paper will further recommend future research.

1. INTRODUCTION

The COVID-19 pandemic affected people worldwide. To contain the spread of the virus, governments implemented restrictions encompassing stay-at-home orders, closure of schools and workplaces, ban on public events, flight restrictions, curfews, and complete lockdowns. These restrictions and the fear of contagion impacted the transport industry as people's mobility decreased, leading to significant lifestyle changes for many people (e.g., working from home, online learning, and online shopping).

These transitions reshaped people's travel patterns worldwide and will continue to some extent in the post-COVID-19 era. Lee and Eom (2023) have already published a systematic literature review on studies that explored the impacts of COVID-19 on mobility, focusing primarily on the immediate and near-term impacts. However, a systematic organisation of the body of research around the long-term changes in travel patterns due to COVID-19 particularly in the global south is still lacking. Such a comprehensive analysis is crucial for identifying positive and negative trends in post-Covid-19 travel patterns. Furthermore, it will equip transportation planners and policymakers with critical knowledge to identify effective interventions that foster sustainable post-pandemic transportation systems.

This paper addresses this research gap by comprehensively analysing literature published in peer-reviewed databases and academic research search engines. This paper explores the travel pattern in the post-COVID-19 era in the global South region.

The rest of the paper is structured as follows: Section 2 discusses the methodological framework for obtaining the literature review, detailing the search strategy, utilised keywords, and the inclusion/exclusion criteria for literature selection. Section 3 presents the research findings. Section 4 discusses the identified trends and implications. Finally, Section 5 concludes the paper with a summary and highlights areas for future research.

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2. METHODOLOGY

2.1 Article Retrieval Strategy

An in-depth search was conducted to identify peer-reviewed articles, conference proceedings and reports using electronic databases and web-based academic search engines such as Scopus, Science Direct, Taylor and Francis, Springer, and Google Scholar. The search employed a broad range of keywords, including COVID-19, pandemic, lockdown, travel pattern, travel demand, traffic volume, traffic congestion, public transport, private car, cycling, modal split, travel behaviour, mobility, transportation policy and post-Covid-19 coupled with long-term impact. The long-term period was defined as the period spanning from easing travel restrictions to the present day.

The initial search yielded 60 articles, and afterwards, a critical review was done. Only literature of studies conducted in the global south was selected, resulting in only 13 peer-reviewed articles, 3 conference proceedings, and 1 report. The backward snowballing technique was used to identify additional relevant articles, resulting in adding 5 peer-reviewed articles and 1 report. Table 1 below shows the literature sources.

Table 1: Literature Sources

Sources	Number of Articles	Percentage (%)
Peer-reviewed articles	18	78
Conference Proceeding	3	13
Reports	2	9
Total	23	100

2.2 Selection Criteria

Journal articles, conference proceedings, and reports published between March 2020 and March 2024 that investigated the impact of COVID-19 on travel patterns in the post-pandemic period were selected for inclusion. Furthermore, only literature written in English was selected. Literature about freight and air transportation was excluded.

2.3 Data Analysis

The literature was systematically analysed, and the findings were extracted, and organised according to geographical locations.

3. RESULTS

3.1 South America

Stokenberga et al. (2023) examined the ongoing changes in mobility in Bogota and Buenos Aires due to the COVID-19 pandemic in 2021, despite restrictions being lifted. The study found that trip generation rates had partially recovered in both cities. In the case of Bueno Aires, work and education travel had reached pre-pandemic levels, while in Bogota, they had surpassed pre-pandemic levels. It showed that the demand for public transport in both cities was below pre-pandemic levels. In Buenos Aires, the private mode share had persisted, especially in the metropolitan area, where it accounted for 61.1% of trips compared to 56.7% at the start of the pandemic. However, in Bogota, the private mode share had marginally decreased. Furthermore, the use of non-motorised transport was still high in Bogota, nearly 5% higher than in 2019.

Pedreira et al. (2022) analysed the shift in business meeting trips made by public officials in Brazil using the "TaxiGov" system dataset. The results indicated a gradual recovery of meeting trips but still lower than the pre-COVID-19 levels. Additionally, a forecast for a year period was done, and it showed an increase in the number of trips but still lower than the pre-pandemic levels. The gradual recovery of the meeting trips was attributed to the persistence of remote working.

3.2   Africa

Mogaji (2022) investigated the long-term impacts of COVID-19 in Nigeria by recording the commuting desires of the respondents. The results indicated a prominent desire to continue working from home; however, the respondents also noted challenges, such as the cost of access to the Internet. Some of the commuters were considering buying motorcycles. Participants who had started walking during the pandemic considered stopping for security reasons. Although the study is limited in presenting predicted and not actual or observed long-term changes, it highlights challenges that might lead commuters to revert to pre-Covid-19 travel patterns.

In South Africa, Venter et al. (2021) studied the pandemic's lasting impact on Gauteng residents' travel patterns. The study indicated that traffic volumes are staying the same post-pandemic, although economic factors might reduce their growth rate. Marole et al. (2023) also highlighted a gradual increase in traffic volumes on Gauteng freeways following the ease of restrictions. Behrens et al. (2023) studied the shift in trip timing of Golden Arrow Bus Services riders in Cape Town. The results indicated that peak-hour boardings, both in the morning and afternoon, decreased by 10.5% after the lockdown; however, the midday peak-hour boardings increased, indicating a likelihood of a decrease in shift hours of employees.

Behrens and Newlands (2022) predicted the future impacts of COVID-19 on urban transport in Sub-Saharan cities using a Delphi Expert Survey. The results indicated an increase in remote work and a decrease in work and business trips, but it was for households with more resources and a high income. The results also highlighted a decrease in the welfare of low-income households, which led to reduced accessibility and travel. Furthermore, the results also revealed a disruption in trip distribution due to changes in land-mix uses as some businesses closed, moved online or changed location during the pandemic.

3.3   Asia

Advani et al. (2021a) examined the immediate and long-term impact of Covid-19 on travel demand in Delhi. The results showed a reduction in vehicle kilometres travelled in the post-COVID-19 period compared to the pre-COVID-19 period. The reduction was 19% for Motor vehicles (two-wheelers), 5% for cars and 49% for buses. The study also highlighted increased bicycle trips and a 14% reduction in CO_2 pollution from vehicles in the post-COVID-19 period. Singh et al. (2022) also studied the post-COVID-19 travel behaviour in Delhi. The results showed that 67% of the respondents started working from home during the pandemic, and only half will continue to do so in the post-COVID-19 period.

Srikanth et al. (2023) investigated employee mode choice in Bangalore North in India post-Covid period. The study's results indicated a decrease in public transportation usage after COVID-19 of 21.31%, compared to 31.89% before COVID-19. The use of private vehicles also increased to 45.43% after the pandemic compared to 38.35% before the pandemic,

revealing a preference for private modes. The results also indicated that 19.42% of the respondents worked from home after the pandemic, whereas only 4.85% did so before the pandemic. The usage of non-motorised transport (NMT) also increased after the pandemic. However, Thombre and Agarwal (2021) indicate that there is a likelihood that the share will decrease due to a lack of safe NMT infrastructure.

In investigating the factors leading to changes in trip frequency in India, Aaditya and Rahul (2023) found that fear of contagion, age and higher job satisfaction during WFH in COVID-19 times would result in reduced trip frequency with older individuals willing to work from home.

In Beijing, Zhao and Gao (2022) used structural equation modelling to estimate individuals' post-pandemic travel choices, especially in using public transit. The results indicated that unlike in the pre-pandemic period, where people considered cost, accessibility, speed and level of comfort as factors in choosing their travel mode, residents in the post-pandemic period prioritise safety more in choosing public transit.

Wang et al. (2021) studied the changes in commuting behaviour during the early reopening period of COVID-19. The results showed a decrease in the average weekly number of commuting days from 4.88 days before the pandemic to 2.92 days for public transit and 4.91 days to 3.04 days for private modes, resulting in decreased commuting frequency. Additionally, some bus and metro users kept their mode choice, with 29.11% moving to private modes. He et al. (2023) studied the preferences of Shanghai residents related to customised bus services in the post-COVID-19 period. The results showed that participants who used the car post-COVID-19 period were willing to switch to a customised bus service. Furthermore, commuters indicated an intention to use customised bus services in the post-COVID-19 period.

Mepparambath et al. (2023) examined human mobility in Singapore using transit data for three stages: before, during, and after the pandemic. The results show that there have not been any significant changes in trip distance distribution in the period after the pandemic. The results also indicated an increase in the number of trips by bus and train but lower than the pre-pandemic levels.

Hamad et al. (2024) investigated the influence of COVID-19 on travel behaviour before, during and after the pandemic in the UAE. The study results showed that as the pandemic subsided, the post-pandemic trip patterns realigned with the pre-pandemic trip patterns and the travel time trends, possibly due to the resumption of in-office work. Additionally, it was observed that individuals preferred to travel by car in the post-pandemic period. The metro and bus usage increased from 8% during the pandemic to 11% after the pandemic, which was still 2% lower than the pre-pandemic levels. The travel behaviour of individuals was gradually returning to pre-pandemic levels.

4.   DISCUSSION

The findings of this paper highlight how travel patterns have changed in the post-pandemic period, presenting both challenges and opportunities and can be summarised as follows:

- **Modal Shift**
  The persistence of the private mode in the post-pandemic period results in challenges in urban planning and air quality. Slow recovery of public transport and lingering fear is observed, and it calls for innovative measures to be implemented to

increase its demand. Strategies such as limiting car parking areas and restricting car movement through modal filtration devices have reduced car usage in some European and North American cities (Adam et al., 2020). Additionally, introducing separate lanes for Bus Rapid Transit can attract more commuters, as is the case for Manila, Philippines (Hasselwander et al., 2021).

- **Remote Working**
  There is a significant shift towards remote working. However, this shift is only observed amongst households with more financial resources. Promoting flexible workhour policies could result in greater adoption of remote working, thus decreasing commutes and improving traffic flow. Additionally, implementing intelligent traffic management systems could improve traffic congestion post-pandemic.

- **Non-Motorised Transport**
  The increase in the use of non-motorised transport in cities like Bogota and Delhi in the post-pandemic times could be attributed to the cycling and walking initiatives implemented during the pandemic (Goetsch & Quiros, 2020; Advani et al., 2021b). Provision and expansion of pedestrian and cycling infrastructure are required to increase the cycling modal share (Thombre & Agarwal, 2021). The safety of pedestrians and cyclists is also essential, and measures should be implemented to ensure it. Cycling campaigns have also been effective in increasing its modal share (Rissel et al., 2010; Sloman et al., 2009). There has been an improvement in the promotion of active mode in African countries; however, there is still a need for an improved policy framework and implementation (Loo & Siiba, 2019). The adaptation of active modes can lead to improved traffic flow.

5.   CONCLUSION

This paper aimed to explore the travel pattern post-COVID-19. Through a comprehensive analysis of peer-reviewed literature, the paper identified long-term impacts and those anticipated to persist into the post-pandemic era, enhancing the global south's understanding of travel patterns in the post-COVID-19 period. Few studies have been done in the global south on the long-term impacts of Covid-19. Therefore, further research is necessary to improve our knowledge of travel patterns and the transport policies and intervention strategies that are most effective in the post-COVID-19 period.

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