EXPLORING THE IMPACT OF COVID-19 ON MOBILITY IN COLOMBO METROPOLITAN REGION, SRI LANKA

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ABSTRACT - To combat the COVID-19 pandemic, the Sri Lankan government has initiated a variety of travel restrictions, particularly in the Colombo Metropolitan Region (CMR). With over 50% of cases and significantly different CMR mobility patterns, the CMR has evolved as the focal point of the COVID-19 outbreak in Sri Lanka. However, only a few research have been carried out to assess the impact of the COVID-19 pandemic on mobility in Sri Lanka. Therefore, the objective of this paper is to investigate the influence of COVID-19 on CMR mobility at different times throughout the COVID-19 epidemic. The mobility change in Sri Lanka was examined using the Google COVID-19 Community Mobility Change data. 934 questionnaire survey samples were used to analyze the change in CMR mobility. The results indicate that whereas residential mobility in Sri Lanka increased by up to 50% following the epidemic, mobility in the workplace, transportation, parks, pharmacies, and retail decreased. According to the survey's findings, daily travel frequency has dropped by more than 50%, and people prefer their private vehicles over public transportation. Therefore, the study gives essential and practical information to transportation engineers, planners, and decision-makers to take effective actions to regulate the pandemic situations and mobility.

Keywords: Mobility; COVID-19 Peak Time; COVID-19 Off Peak Time; Colombo Metropolitan Region

1. INTRODUCTION

In recent years, the COVID19 pandemic has become a severe global concern [1]. People's health has been jeopardized as a result of the epidemic's rapid spread, and also mobility has been altered all over the world [2]. To combat the outbreak, the government had to take drastic steps, such as restricting transportation across the country which had a significant influence on changes in mobility [1] [2]. Researchers have examined how mobility and socioeconomic status related throughout the epidemic [3] [4]. Changes in domestic and international mobility [5], mobility components [2], human mobility [6], and their tendencies in different parts of the world [1] have all been studied in the international context. High-density regions are more susceptible to the COVID-19 pandemic, and the rate of transmission within highly urbanized areas is much higher [6]. When pandemic cases grow, people limit their movement patterns to avoid the pandemic, according to the basic idea of protection motivation theory [7].

Sri Lanka is also one of the nations affected by the COVID-19 pandemic, and the Sri Lankan government has implemented different travel and mobility restrictions to limit the daily COVID-19 cases and fatalities, including nationwide lockdowns, regional and local lockdowns, and curfews. With more than half of all cases, the CMR has become the hub of the COVID-19 epidemic in Sri Lanka, and mobility patterns in the CMR have radically changed due to travel restrictions. However, investigating mobility patterns during the COVID-19 epidemic requires conducting research in the Sri Lankan context. Because such research and its conclusions can aid in the development of effective measures and policies to control the severity of the pandemic and to sustainably tackle future pandemic scenarios [2]. Consequently, the objective of this study is to examine the impact of COVID-19 on CMR mobility at various periods throughout the COVID-19 pandemic. The investigation took place in this study within the CMR, Sri Lanka, from March 2020 to August 2021.

2. MATERIALS AND METHODS

This research examined the following time periods.
1. Before the COVID-19 situation
2. 1st Lock Down Time (March-May 2020)
3. COVID-19 Off-Peak Time (June - September)
4. COVID-19 Peak Time with Brandix and Peliyagoda clusters (October - December 2020)
5. COVID-19 Off-Peak Time (January - April 2021)
6. 2nd Lock Down Time (May - June 2021)
7. July – 15th August 2021

The research process is divided into two stages. In the initial stage, Google COVID-19 Community Mobility Change data used to analyze the mobility change in Sri Lanka. The data may be retrieved by going to https://www.google.com/covid19/mobility/. The percentage of mobility change in the workplace, transit, parks, supermarkets, pharmacy, retail, and residential was examined in the study.

To gather primary data for CMR, a questionnaire survey was conducted in the second phase. The sampling technique used is stratified random sampling, and the population of Colombo Metropolitan in 2012 was 5.85 million. Based on practical factors, including the COVID-19 problems and the investigation's time limits, the study chose a sample size of 750–1000 (99% confidence level and 5% margin of error), and this study covered 934 samples in CMR.

3. RESULTS AND DISCUSSION

The google mobility change indicates that whereas residential mobility in Sri Lanka increased by up to 50% following the epidemic, mobility in the workplace, transportation, parks, pharmacies, and retail decreased. For example, COVID-19's effect has resulted in a downward mobility shift trend in the workplace, which has persisted in every period. Work mobility was reduced by up to 79 % on March 25th, 2020, during the first lockdown in the first wave of COVID-19. The shift in residential mobility, on the other hand, is the opposite of the shift in work mobility, and it has remained positive.

When the epidemic hit, there were 68% daily travelers, which decreased to 8% during the first shutdown and marginally increased during off-peak periods to 25%–29% (Figure 1). At the same time, the choice of bus and rail modes of transportation has decreased by less than 2% during peak times while the choice of private car modes has increased (Figure 2).

4. CONCLUSION

The findings demonstrate a negative mobility change percentage in the workplace, transit, parks, supermarkets, pharmacies, and retail, except in residential. Furthermore, the results indicate that mobility decreases during peak periods and increases during off-peak periods with travel frequency and transport mode choice. Therefore, future research may employ a variety of data sources and methodologies to investigate the relationships between mobility types and COVID-19 in Sri Lanka's various contexts.
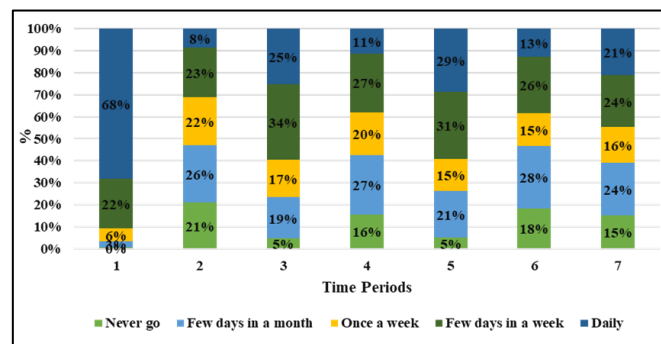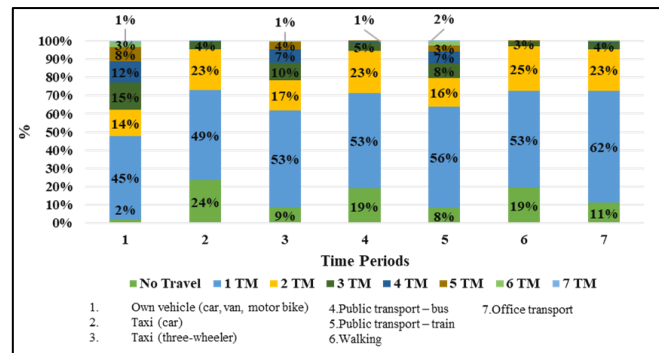

Figure 1. Changes in Overall Travel Frequency in CMR

Figure 2. Changes in Travel Mode Choice in CMR

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