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EFFECT OF DECREASED MOBILITY ON TRAFFIC SAFETY DURING THE COVID-19 PANDEMIC

Key Words

Mobility
Traffic
Safety
Travel

Abstract

Mobility analysis is used to determine how people change travel behavior, and safety analysis focuses on how traffic safety can change. The integration of mobility, safety and behavioral data related to COVID-19 is expected to provide valuable insights to decision makers. Today, the wide availability of mobile sensors has given us the opportunity to be able to assess changes in the performance and mobility of transport systems in near real time. The researchers also measured the impact of COVID-19 on human mobility using public mobile location data available from many companies such as Google and Apple, which is very useful for changing human mobility. The platforms produce aggregated metrics of daily mobility, including the purpose of travel, the mode of travel, and imputations of social demographics. Based on a comprehensive data set of people who participated in the collected accident data and mobile device data, we record the impact of COVID-19 on traffic safety. The paper systematically and statistically approaches the assessment of road safety during the COVID-19 pandemic. To sustain the spread of COVID-19, a natural experiment is being conducted that dramatically reduces traffic and provides unprecedented data. While such measures cannot be replicated, understanding their impact can help us devise more effective policies and interventions on road safety.

1. INTRODUCTION

Recently, on March 11, 2020, the World Health Organization declared a new infectious coronavirus, also known as COVID-19, a global pandemic. All countries were affected by the coronavirus epidemic. In response, national governments have implemented suppression measures focused on reducing people's mobility and social interactions. Strict restrictions and policies have been introduced in various countries to limit the spread of COVID-19, including quarantines, job restrictions, education, shopping, physical activities, and ban social gatherings. All the measures adopted to protect human health were actually aimed at preventing the movement of people and their contact. To limit the occurrence of the virus and the likely casualties, most governments around the world have conducted quarantines. Due to the relatively limited space, public transport stations and cars are considered to be the area with the highest risk of COVID-19 spread [1].

Reduced mobility also indirectly affected the reduction in traffic volume. Prohibitions on leaving the place of residence, less burden on public transport and the like, have led to a smaller number of personal vehicles and public transport vehicles on the roads. Following the available data and traffic analyzes, the question arises whether all this together led to a reduction in the number of traffic accidents and injuries in traffic in the past 2020. This article analyzes in detail the traffic safety situation during the COVID-19 pandemic in the Republic of Croatia. This study looks at traffic safety according to the records of traffic accidents with injured and fatalities in the time before and during the COVID-19 pandemic. This is a preparatory study and when more data becomes available the report will be updated with better estimates.

2. METHODOLOGY AND RESOURCES

Google released community mobility reports that show movement trends by region, across different categories of places. For each category in a region, reports show the changes in two different ways. Compares mobility for the report date to the baseline day. Calculated for the report date and reported as a positive or negative percentage. Using anonymous data provided by apps like Google Map, the company has created a regularly updated dataset that shows how people's movements changed during a pandemic. Since road transport and air transport were two key dimensions for the spread of COVID-19, one of the restrictions imposed was the restriction of personal mobility [2].

This Google data set measures the number of visitors to certain categories of places on a daily basis and compares this change to the starting day before the outbreak. Baseline days represent the normal value for that day of the week, which is given as the average over five weeks from January 3 to February 6, 2020.

Apple released a series of mobility data related to the COVID-19 pandemic. Data are collected from requests for instructions in Apple Maps and are provided nationwide, as well as for the selection of major cities around the world. Apple has released time series data for countries and cities for each of the two modes of movement: driving and walking.

2.1. Mobility Trends in Croatia

The chart shows the relative volume of requests for driving and walking in Republic of Croatia, compared to the base volume of January 13, 2020. In a part of the country, on March 14, 2020, preventive measures will be introduced and on March 19, 2020, the implementation of measures to close most stores and cancelling public events across the country began. On March 21, 2020, the National Headquarters issued a decision to strictly limit detention on the streets, squares and other public places, as well as a decision to suspend public transport in order to prevent an increase in the number of infected people. Intercity lines for trains and buses are also being cut off.

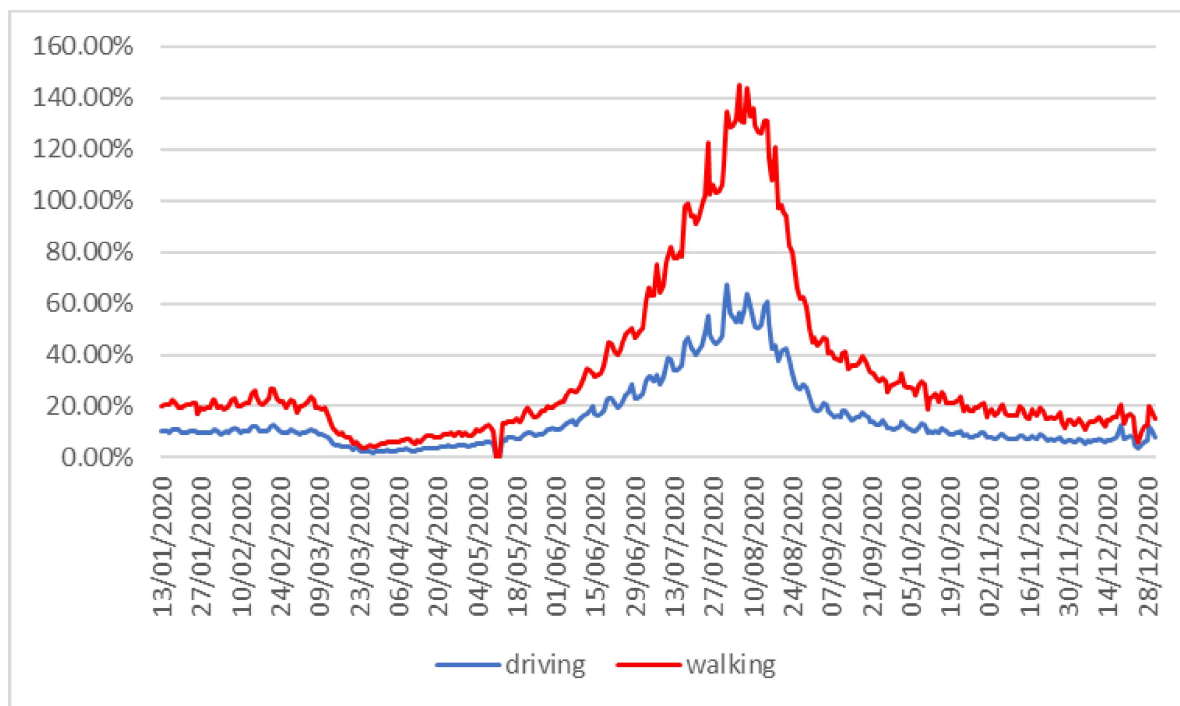


Figure 1. Mobility Trends Report from Croatia [3]

The graph shows the largest decline in mobility on March 23, 2020, and the reason is the ban on leaving the place of residence or permanent residence. By the decision of the National Headquarters on April 27, 2020, the first phase of easing pandemic protection measures in order to partially start the economy came into force. This enables the work of all business entities that perform the activity of trade, except those that perform trade activities, except for those who operate shopping centers. The third phase of easing epidemiological measures began on May 11, 2020, so schools were opened for some students, and after almost two months, shopping malls, cafes and restaurants began to operate. This establishes a long-distance road, rail and domestic air transport of passengers, as well as open bus and train stations for long-distance traffic.

2.2. Analysis of traffic safety

The Ministry of the Interior takes care of the state of road traffic safety. In order to make this part of the work as successful as possible, the condition and changes in road safety are systematically monitored. The results of this work are statistical information that provides a more detailed and complete picture of the state of road safety in the Republic of Croatia and all risk factors that threaten it. Following the available data and traffic analyzes, the question arises whether all this together led to a reduction in the number of traffic accidents and injuries in traffic, the past 2020. We compared the number of traffic accidents before and during the COVID-19 pandemic.

Table 1. Traffic accidents by months with fatalities and injured persons [4]

Month	Traffic accidents					
	Total		With fatalities		With injured persons	
	2019.	2020.	2019.	2020.	2019.	2020.
January	2.180	2.191	20	21	536	636
February	2.092	1.893	14	18	556	521
March	2.437	1.621	12	11	720	402
April	2.417	1.265	22	16	723	349
May	2.553	1.972	24	16	753	585
June	2.966	2.522	28	24	976	773
July	3.146	2.824	24	33	997	939
August	3.080	2.878	26	19	1.042	918
September	2.807	2.470	27	18	903	775
October	2.746	2.501	31	13	870	639
November	2.371	1.969	16	13	667	490
December	2.572	1.968	35	12	673	469
Total	31.367	26.074	279	214	9.416	7.496

Our findings show that the lockdown set by the Croatian government on March 21, 2020, as a measure to drastically reduce the spread of COVID-19 disease, has led to a significant reduction in traffic accidents. Although the number of accidents can vary from year to year and even from season to season, the huge difference in the number that occurred during 2020 and the equivalent period in 2019, as well as between the periods before and during isolation, can mainly be attributed locking. The probability of a traffic accident is higher if there are more vehicles on the roads.

In the year in which it will be remembered for the covid-19 pandemic, the number of deaths decreased by 65 people, i.e. from 279 in 2019 to 214 in 2020, which is a 23.30 percent lower number of deaths. It was recorded and reduce the number of road accidents, and with 31,367 in 2019 to around 26,074 in 2020, which is 5,293 fewer traffic accidents or 16.87 percent lower number of traffic accidents. Last year, there were about 20.39 percent fewer injured, or 9,416 compared to 7,496 during 2019, which is 1,920 fewer accidents with injured people, according to police statistics.

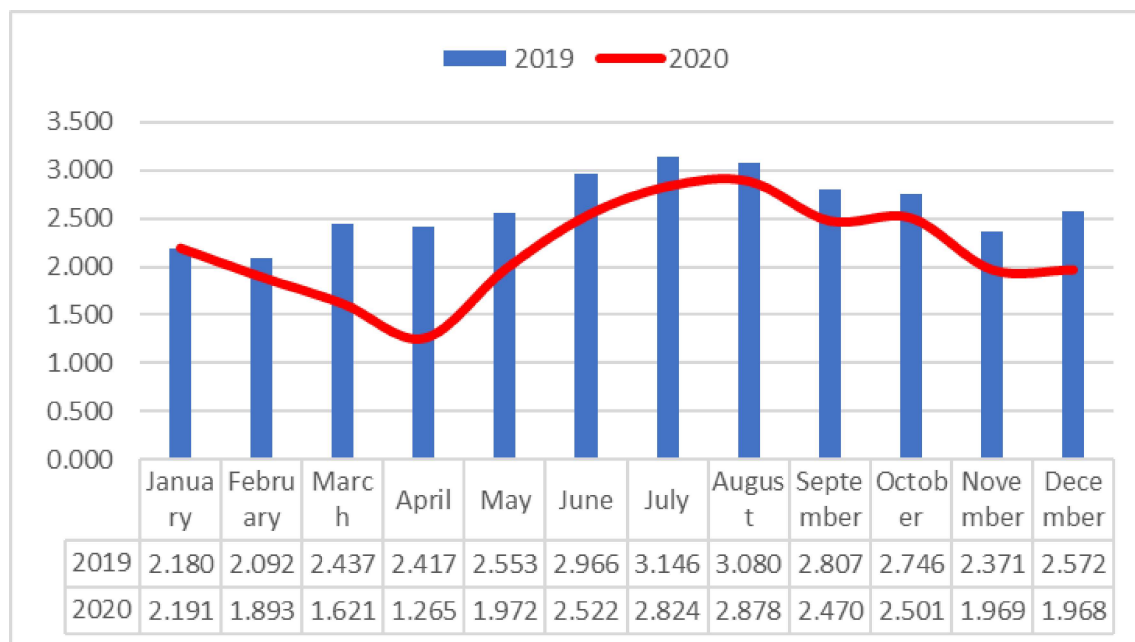


Figure 2. Comparison of the number of traffic accidents in 2019 and 2020

The results suggest that during April when the strictest measures were in place for the entire month, traffic accidents dropped approximately by 47.66 percent, deaths declined by 43 percent and injuries declined by 64 percent compared to April of last year.

The total number of registered road vehicles in the Republic of Croatia amounted to 2.312.280 in 2020, which was 1.6% more than in 2019. The total number of registered passenger cars amounted to 1.746.285 in 2020, which was an increase of 1.2% compared to 2019. The number of first registrations of road vehicles amounted to 132.572, which was a significant decrease of 31.8% compared to 2019. The decrease in first registrations was recorded for all types of vehicles. The circumstances brought about by the spread of the COVID-19 disease have directly influenced the decrease in the number of first registrations of road vehicles. The number of first registrations of passenger cars amounted to 95.577 in 2020, which was a decrease of 35.9% compared to 2019. The decrease was caused by the reduction in the number of first registrations of used cars (27.6%) and new vehicles (49.9%) [5].

3. CONCLUSION

In order to raise the state of road safety to a higher level, society must invest significantly more efforts in improving transport infrastructure and developing a transport culture. A large part of this effort belongs to the Ministry of the Interior, ie the traffic police, whose activities influence the increase of traffic discipline of all participants. The development of traffic accidents after a period of isolation should be studied.

The unexpected benefits of the crisis caused by the COVID-19 pandemic are likely to persist only if mobility restrictions are maintained or if new public policies are designed and implemented to allow for a gradual change in mobility patterns. The rapid growth in the share of bicycles and e-scooter-free documents has created new challenges for policy makers and regulators and exacerbated some pre-existing fears. Areas of concern include safety, not just the consequence of potential conflict with other means, consumer protection and external influences, especially the overcrowding of public spaces with an excessive number of sometimes neglected bicycles or scooters.

Although traffic has increased in recent months with some return to work and to school, reluctance to use public transport and parking, and a large number of delivery vehicles, many of the risk behaviors continue. The problem is further exacerbated by a significant increase in the number of pedestrians and cyclists on the roads. It has become clearer than ever that roads do not belong only to vehicles, but are common areas for cars, pedestrians, cyclists, scooters and other modes of transport. Due to the limited data and information available, no more advanced methods have been used in this study, but they will be included in future research. If sufficient quality data is available, a more detailed picture of the impact of COVID-19 and quarantine on road and transport system safety could be produced, but this could be explored in future studies.

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