Key factors of COVID-19 impact on mobility and safety

29th Annual Conference of the Research Institute of Human Factors in Road Safety

Online meeting, 8 July 2021

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Introduction

- **COVID-19** disease initially diagnosed in patients in Wuhan, China in December 2019
- Declared as a **pandemic** on the beginning of March 2020
- The majority of countries in a “lockdown” restricting everyday life activities to only the most essential
- As a result, road **traffic volumes and mobility activities** in general have immensely dropped
Background

Traffic Volumes
- Travel demand was decreased and many countries have witnessed sizeable drops in car traffic and public transport ridership
- A 37% and 35% decrease in driving days per week and vehicle miles driven, respectively among adolescents was identified

Driving Behavior
- Fixed safety cameras detected that speed violations have been increased by 39% and average driving speed by 6–11%
- Reduced traffic volumes due to lockdown, led to more frequent harsh accelerations and harsh brakings per 100km (up to 12%)

Road Traffic Crashes
- The total number of road traffic crashes, serious and slight injuries was decreased by half, mainly due to the dramatic traffic reduction
- Fewer fatalities were observed but, unfortunately, the rate of reduction has slowed
Data Collection and Analyses

- Data from the Mobility Trend Report of Apple

- Data from the smartphone sensors were collected using the smartphone applications technology that has been developed by OSeven

- Monthly road traffic crashes, fatalities, and slight injuries data were derived from the Hellenic Statistical Authority

- Advanced Statistical Analyses
  - Machine Learning (XG Boost, Clustering, Neural Networks)
  - Time-series (ARIMA, SARIMA, SARIMAX)
Traffic Volumes

- The total number of **trips and distance travelled** reduced by 70% (1st lockdown) and 37% (2nd lockdown) for people driving and walking compared to the period before the appearance of COVID-19 pandemic.

- Increased **driving and walking volumes**, roughly by 100%, during the 2nd COVID-19 lockdown compared to the 1st one.

Source: Apple
Driving Behavior

- During the 1st lockdown period, an **overall 10% increase** in average speed was identified compared to the period before the appearance of COVID-19 pandemic. Interestingly, during the 2nd lockdown period, a **3% increase** in average speed was identified in Greece compared to the period before.

- **Comparison** between normal evolution and COVID-19 period data
  - Higher **speed** values up to 7.5 km/h more than the “normal” time-series evolution
  - Values for harsh brakings/100km were **much higher** than the forecasted values

Source: OSeven
Road Traffic Crashes

- A **significant annual reduction** (16%) was recorded in traffic fatalities in 2020 compared to 2019, mostly due to the pandemic.
- During the 1**st** lockdown period, an **overall 50% reduction** in road traffic crashes was observed compared to the period before the appearance of COVID-19 pandemic.
- During the 2**nd** lockdown period, a **26% decrease** in the total number of road traffic crashes was identified compared to the period before the appearance of COVID-19 pandemic.

![Road accidents in Greece graph](image-url)

**Source:** ELSTAT
Road collisions and fatalities were found to be lower than the forecasted values, as the traffic volume was reduced at the same period.

- Bringing traffic volume into account, however, it can be concluded that road safety performance was worsened.

- The rate of fatalities per collision was increased in lockdown months (i.e., March and April 2020).

- Empty roads led drivers to be more aggressive and accelerate more, even in terms of sudden events, such as pedestrians crossing an empty road.

Source: ELSTAT
Mobility and Response Measures – The X factors

- **School closure** was the most influential measure.

- **Lockdown** was found to be less significant.

- **International travel controls** was significant for countries with more flexible measures (e.g. Slovenia, Latvia, Croatia).

- Countries with flexible measures did not provide **reliable results** (e.g. Finland, Sweden, Lithuania).

- Mobility in **subsequent waves** cannot be reliably predicted if first wave was relatively “mild.”

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Mobility and Response Measures – Forecasts

Italy: Driving & “Stay-at-home”

Greece: Walking & “Stay-at-home”

Netherlands: Driving & School Closure

Romania: Walking & school closure
Most Significant Factors for Predicting Mobility Patterns

- **Strictness of measures and number of cases** were found to be significant mobility predictors.

- **Number of trips to pharmacies, grocery stores and parks** were also found to influence mobility patterns.

- **Visits to transit stations and retail or recreation spots** were usually insignificant.

- **A pan-European model for predicting mobility patterns** is currently developed.
Overall Findings

- A dramatic change in traffic was observed and traffic volumes were substantially increased when comparing the 1\textsuperscript{st} and the 2\textsuperscript{nd} lockdown.
- As traffic levels reduced and police time was spent on other things, speeding went up and in some cases more casualties per traffic were occurred.
- Increased average speed and more frequent harsh events per distance were demonstrated. This indicates that with fewer vehicles on city streets, slightly more drivers were blowing the speed limit.
- The fatality and slight injuries rates per collision were increased compared to assumed conditions without COVID-19.
Scientific and Social Impact

- The COVID-19 pandemic has shown how quickly **global mobility and safety conditions** can change.

- **Road safety is also a pandemic**, and should also be treated as such.

- On a positive note, as cities put in place new cycling infrastructure, **cycling use numbers increased**.

- After the pandemic, we need to build a safer and more equal system for all road users – giving back separated space for healthier and sustainable **active travelling**.
Key Lessons

- The COVID-19 Pandemic led to major behavioural changes which might stay after the pandemic (as it happened with the economic crisis in Greece).

- The society might embrace the new road safety culture and will not get back to previous unsafe behaviours.

- COVID-19 Pandemic might be more the trigger for safety change than just an unusual year.

- Authorities should exploit the new opportunities with consistent actions targeting all levels of road safety (behaviour, infrastructure, vehicles).
**Key Opportunities**

- New patterns of **social responsibility** (triggered by the pandemic) – better respect of the others than before the pandemic
- **Teleworking** with less mobility miles per road user (especially longer distance commuters)
- **Active travelling** increase (walking, cycling) brings up safety in numbers for the Vulnerable Road Users and leads to safer speeds in cities
- Widespread urban zones with **20m/h speed limits** will also lead to safer speeds
- New **recovery and resilience funds** directed also to road safety (infrastructure, vehicles, etc.)
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