

31st Virtual Meeting of the
International Safety Data
and Analysis Group (IRTAD)
22 October 2020



Impact of COVID-19 on traffic safety behavior in Greece and worldwide

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Presentation Outline

1. Introduction
2. Literature Review
3. Data Collection
4. Results
5. Conclusions



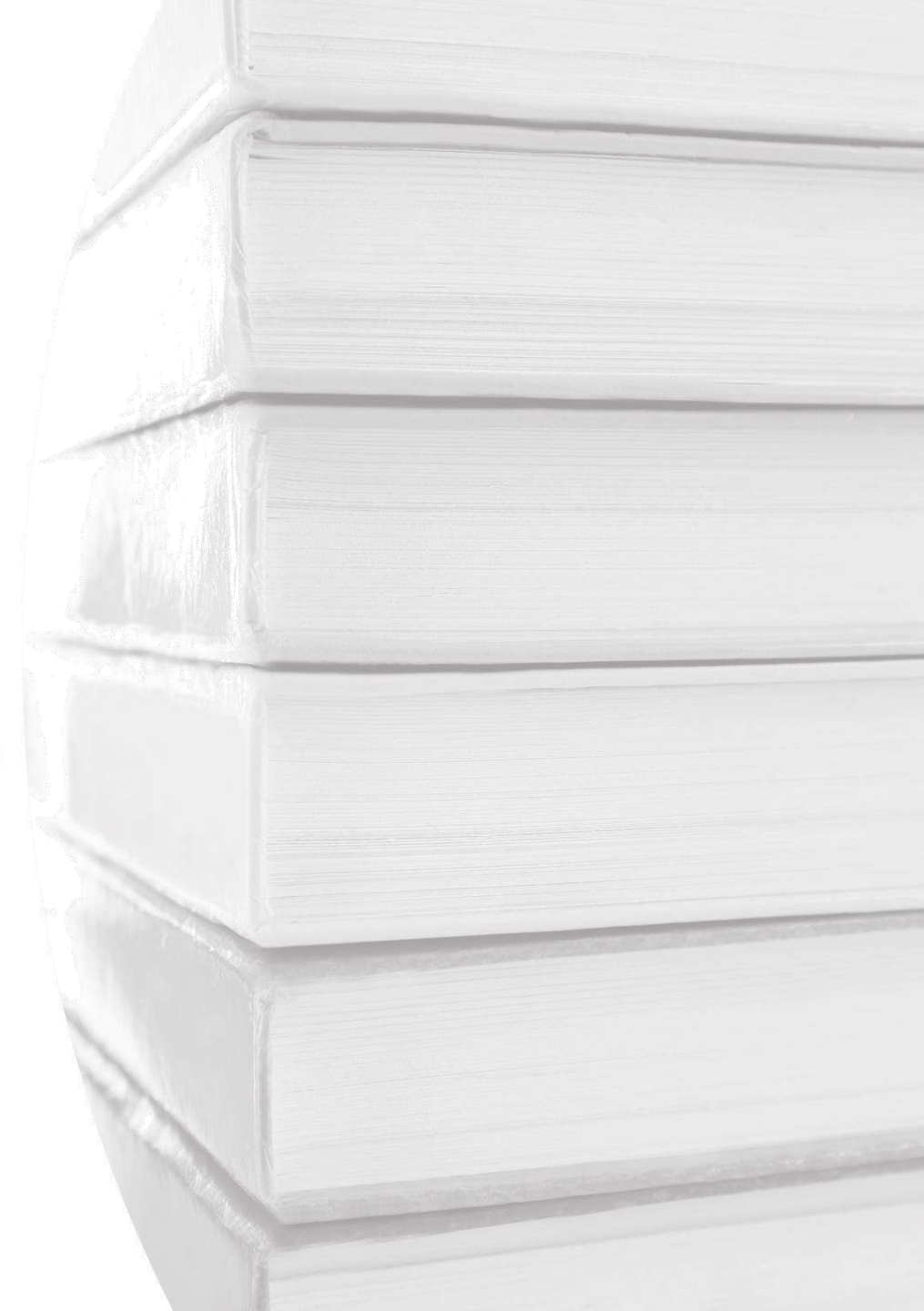
Introduction

- **COVID-19** initially diagnosed in patients in Wuhan, China in December 2019 (Zhu et al., 2020),
- Declared as **a pandemic** on the beginning of March 2020 (WHO, 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 (Clarke, 2020; Google LLC, 2020).



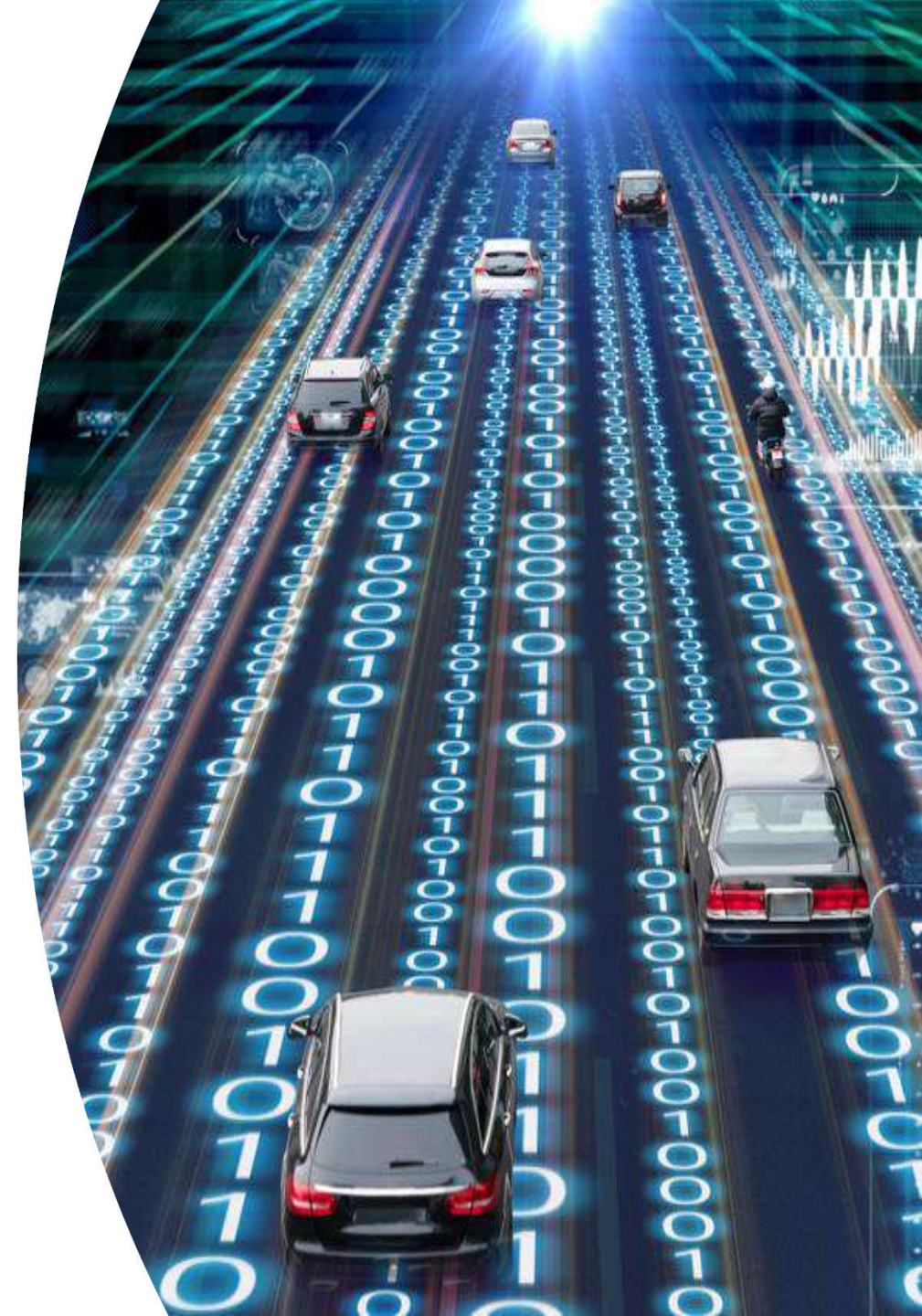
Literature Review (before summe

- During the lockdown period in Spain, a 62% reduction in **road deaths** as well as a 65% decrease of **traffic volume** was observed (ETSC, 2020).
- Fixed safety cameras detected that **speed violations** have been increased by 39%.
- A 37% decrease of **driving days per week** as well as a 35% reduction in **vehicle miles driven** among adolescents was identified.
- Consequently, **a gap in the literature** exists, with regards to driver behavior characteristics and COVID-19.



Data Collection (1/5)

- OSeven has provided a representative subset of trips from its database for Greece and the KSA (Kingdom of Saudi Arabia) for a 4-month timeframe from 29/12/2019 to 03/05/2020.
- The data from the smartphone sensors (e.g. GPS, accelerometer data, and gyroscope data) are collected using the smartphone applications technology that has been developed by OSeven.
- This data are processed by Oseven using filtering, signal processing, machine learning algorithms and safety/eco scoring models).



Data Collection (2/5)

- **Driving indicators** of the analyzed data

Indicator	Unit
Total duration	sec
Total distance	km
Driving duration	sec
Risky hours driving	km
Harsh accelerations	-
Harsh braking	-
Speeding duration	sec
Average speeding	km/h
Average total speed	km/h
Average driving speed	km/h
Mobile phone usage duration	sec



Data Collection (3/5)

- **Descriptive statistics** for the available parameters for the entire database:

	Greece (122,275 Trips)				KSA (325,664 Trips)			
	Mean	Standard deviation	Max	Min	Mean	Standard Deviation	Max	Min
Average speeding	26.4	36.2	60	0	30.4	39.9	91.9	0
Speeding duration/driving duration	0.09	0.01	0.12	0	0.10	0.02	0.13	0
Average total speed (km/h)	43	19.3	168.4	1.97	53.7	21.8	216.11	1.92
Average driving speed (km/h)	54.2	17.9	184.7	7.01	64.8	20.4	216.11	1.92
Harsh accelerations per 100km	8.6	29.2	550.5	0	7.3	22.2	457.3	0
Harsh braking per 100km	13	33	819.7	0	14.8	31.6	534.6	0
Total duration (sec)	932.7	1058.3	23880	61	1229.5	1315.5	34781	61
Driving duration (sec)	738.3	924.3	21213	61	1019.4	1367.2	32971	61
Total distance driven per trip (km)	11.1	21.7	525.1	0.5	18.3	33.3	1006.7	0.5
Risky hours driving per trip (km)	0.3	3.7	353.9	0	1.3	10.5	635.9	0
Mobile phone usage duration/driving duration	0.05	0.01	0.08	0	0.14	0.03	0.20	0



Data Collection (4/5)

- **Descriptive statistics** for the available parameters for the months of COVID-19:

	Greece (46,614 Trips)				KSA (120,852 Trips)			
	Mean	Standard deviation	Max	Min	Mean	Standard Deviation	Max	Min
Average speeding	26.6	39.9	78.4	0	31.1	40.3	53.8	0
Speeding duration/driving duration	0.09	0.01	0.11	0	0.12	0.01	0.13	0
Average total speed (km/h)	44.1	19.7	183.1	3.12	54.6	22.1	186.8	3.75
Average driving speed (km/h)	54.9	18.3	156.4	7.89	65.7	20.7	189.07	8.18
Harsh accelerations per 100km	8.5	29.3	508.5	0	7.5	22.9	457.3	0
Harsh braking per 100km	13.1	34.3	550.1	0	15.2	32.8	415.5	0
Total duration (sec)	889.3	915.9	15194	61	1115.3	1171.2	34781	61
Driving duration (sec)	714.1	885.7	14786	61	926.8	1239.6	32971	61
Total distance driven per trip (km)	10.9	20.3	428.7	0.5	16.9	31.1	1006.7	0.5
Risky hours driving per trip (km)	0.2	3.27	142.2	0	1.2	9.2	555.9	0
Mobile phone usage duration/driving duration	0.05	0.01	0.07	0	0.16	0.02	0.19	0

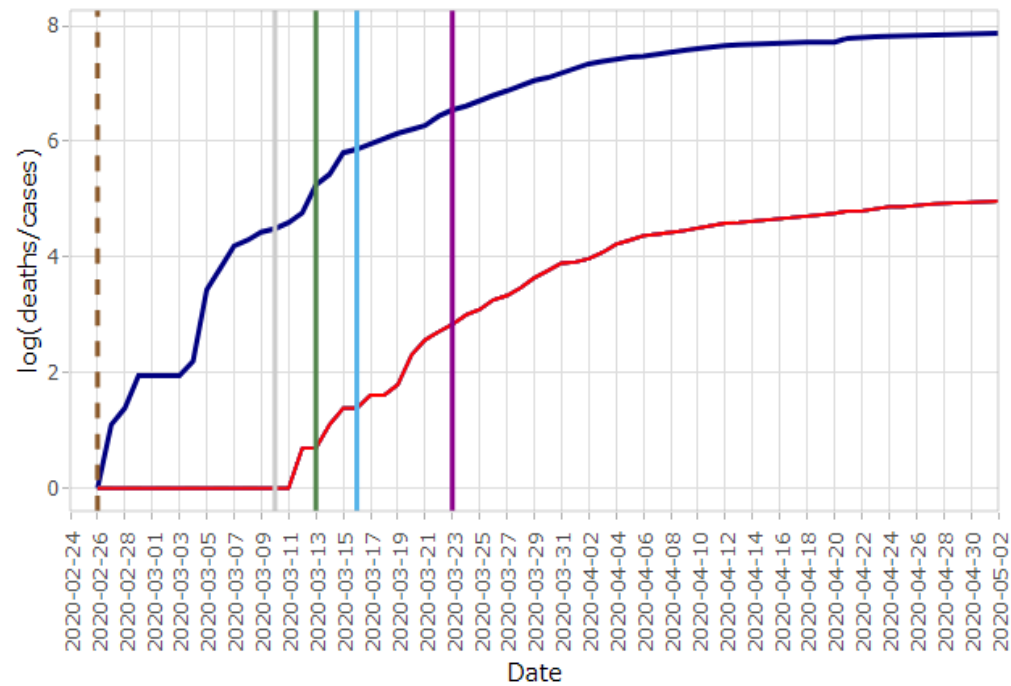
(Source: OSeven)



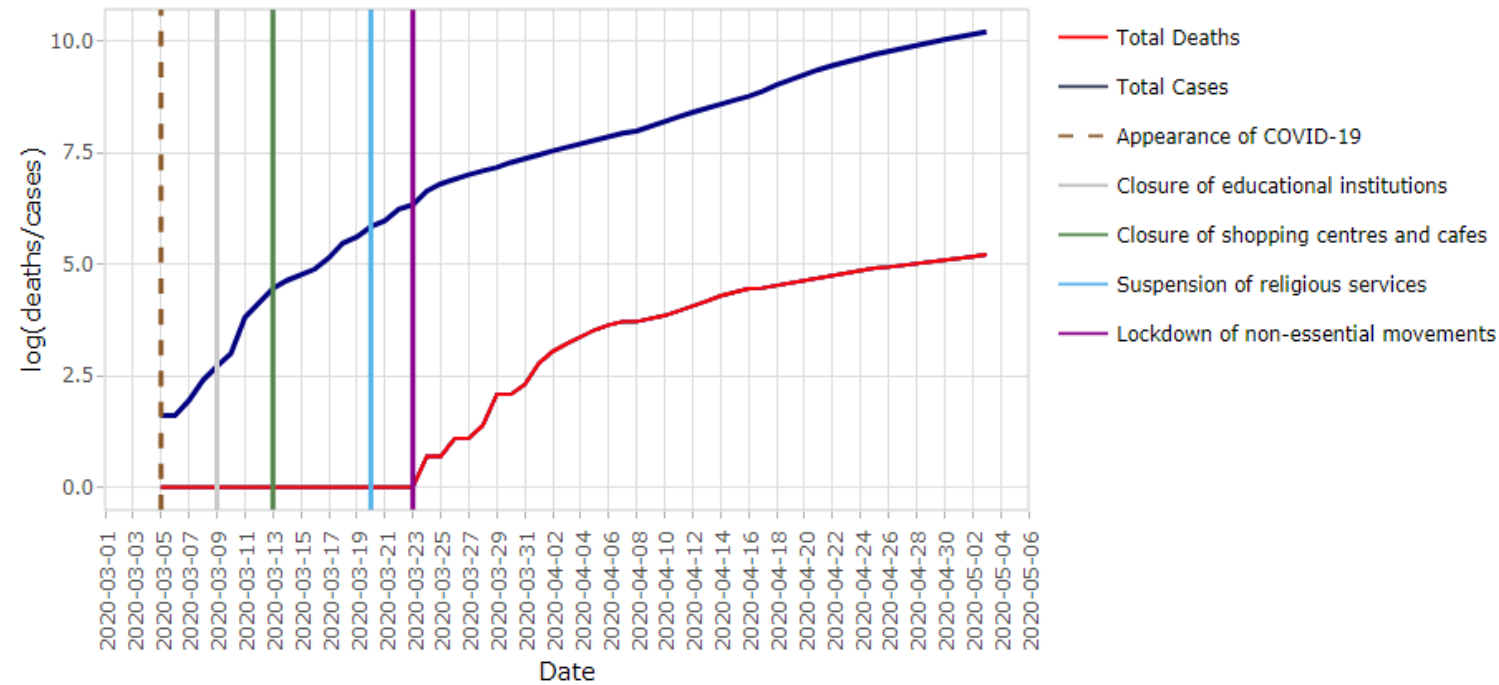
Data Collection (5/5)

- Evolution of **total deaths** and **cases** due to COVID-19 in Greece and the KSA

Total deaths and cases from COVID-19 (Greece)



Total deaths and cases from COVID-19 (Kingdom of Saudi Arabia)

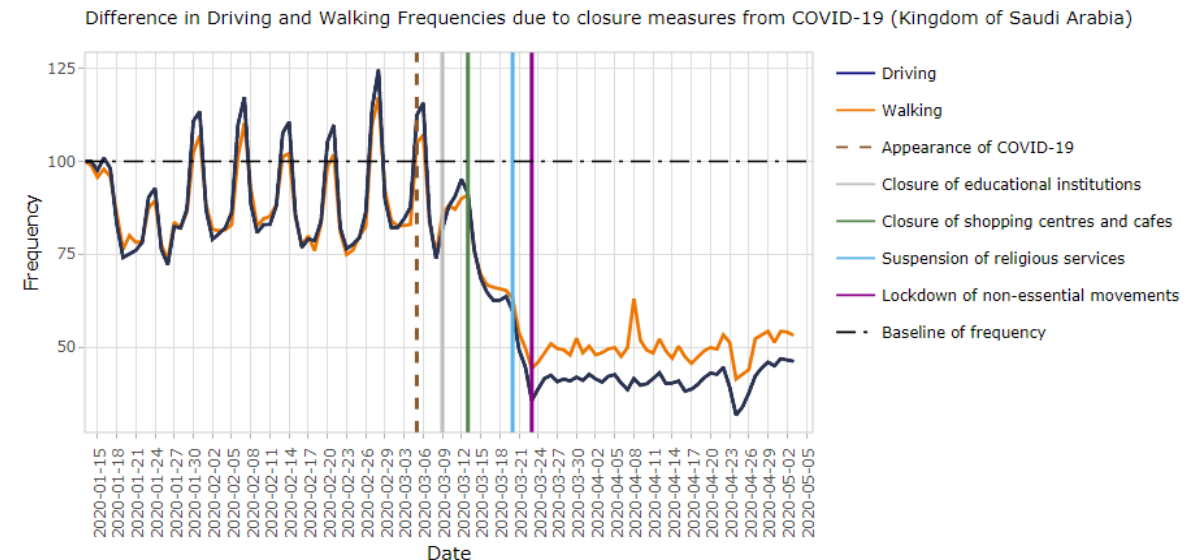
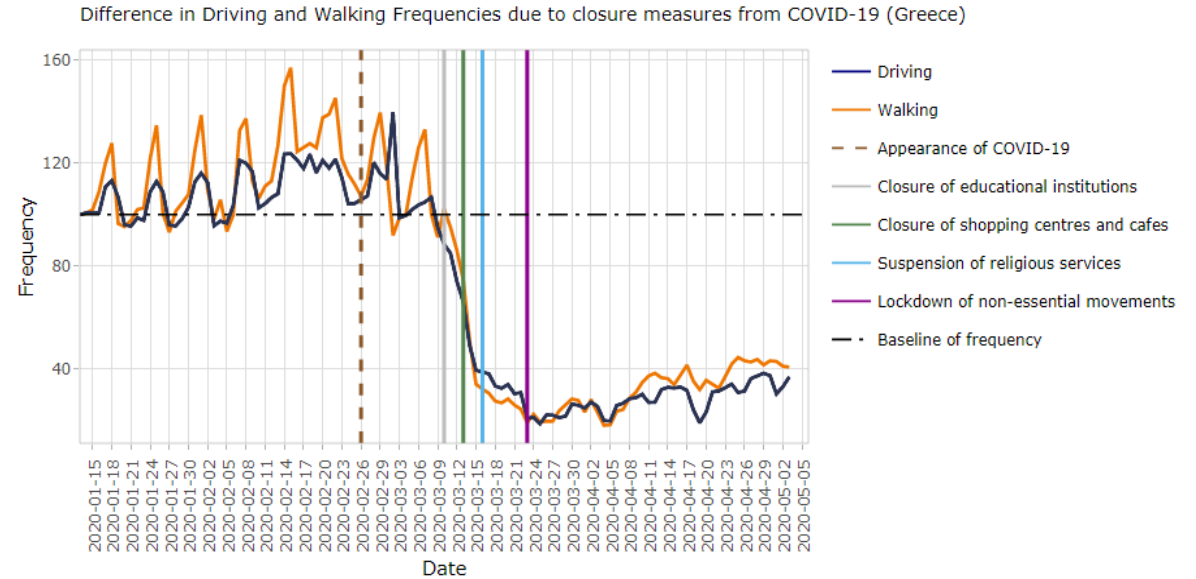


(Sources: Greek and KSA Governments)



Driving and Walking Frequencies

- **Greece:** From the beginning of March and especially after the initiation of the lockdown in the middle of the month, a 62% reduction of people driving and a 58% reduction of people walking is observed.
- **Saudi Arabia:** was observed a 56% and 47% reduction for driving and walking, respectively.

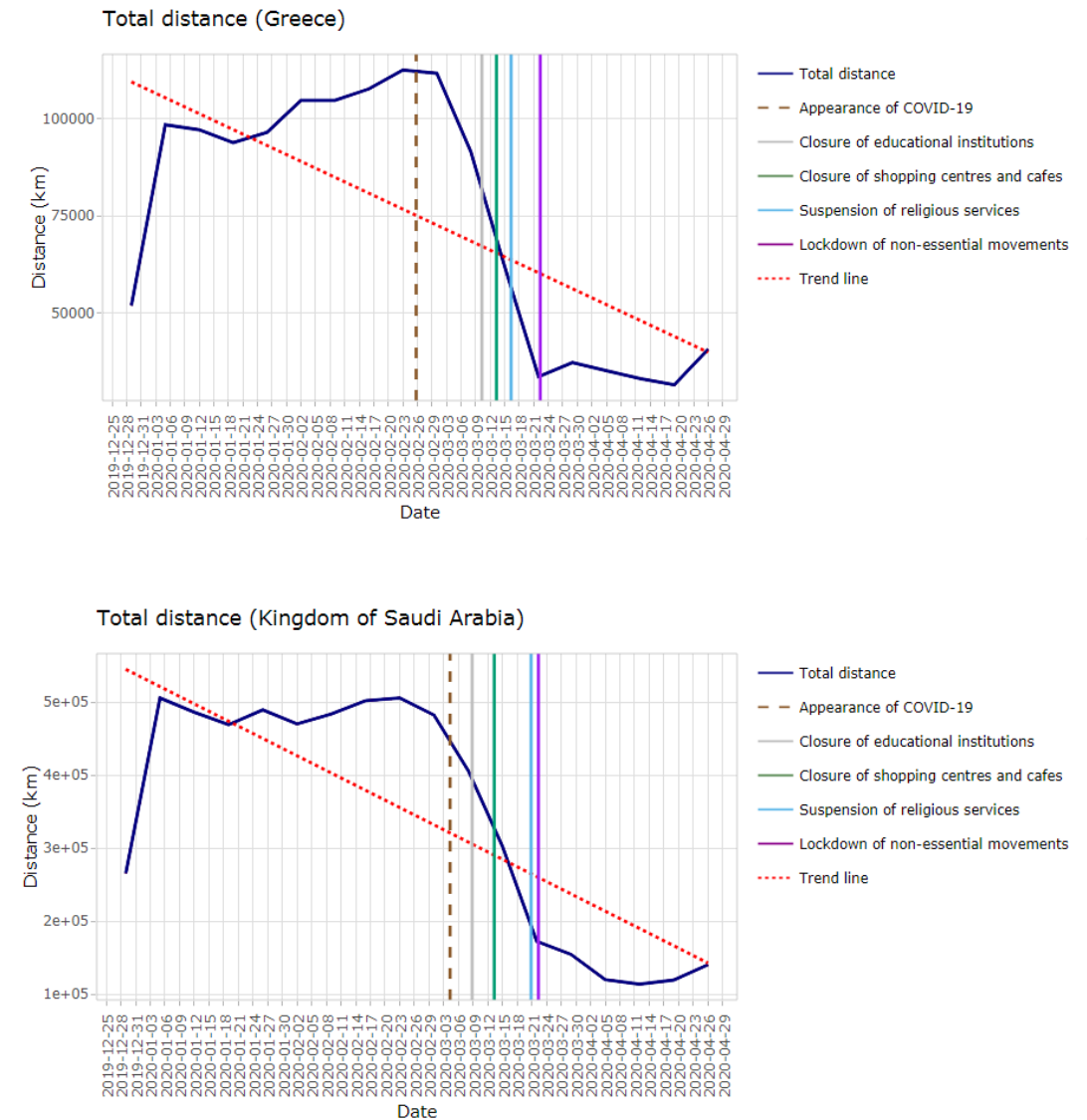


(Source: Apple)



Travel Distance

- **Greece:** In Greece a 31% decrease in driving duration was found during March and a significant 74% was illustrated during April.
- **Saudi Arabia:** The reduction was greater in KSA, with 32% in March and 75% shorter trips during April.
- The **Travel Time** followed the same trend.

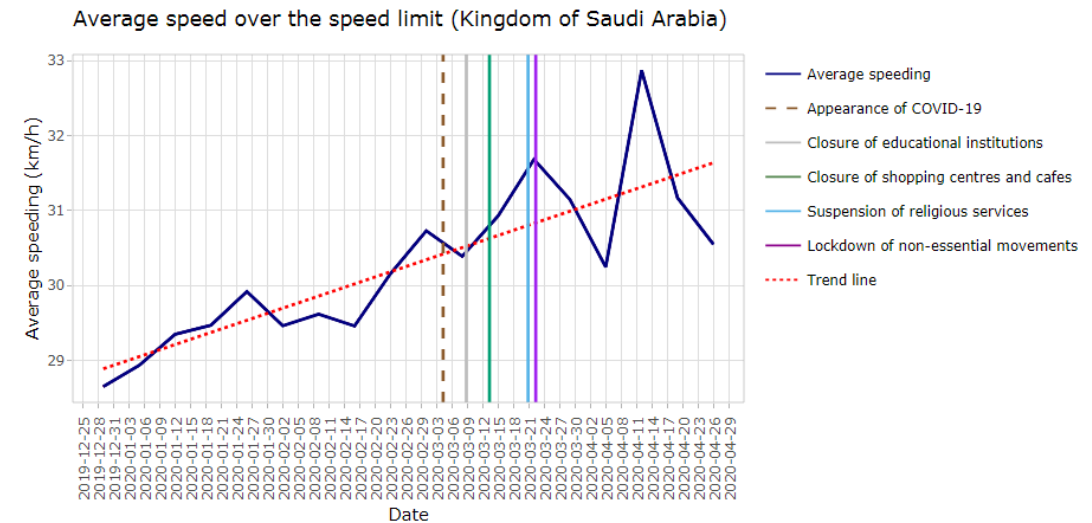
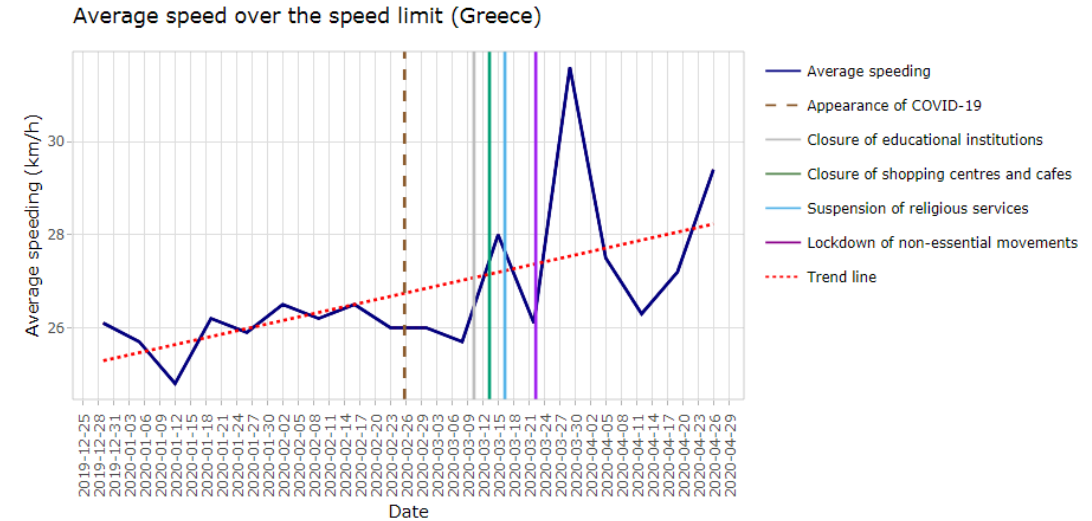


(Source: OSeven)



Average Speeding

- **Greece:** in March a 2% spike in average speeding compared to a normal period in February and a 7% increase was found in April.
- **Saudi Arabia:** a 4% increase in average speeding was found in March compared to February, while a 5% increase in April.

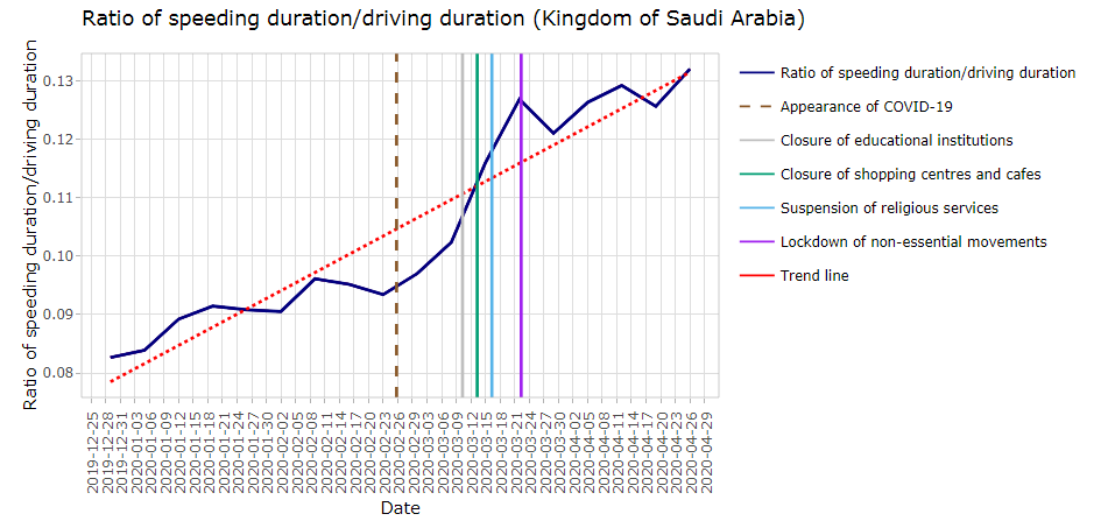
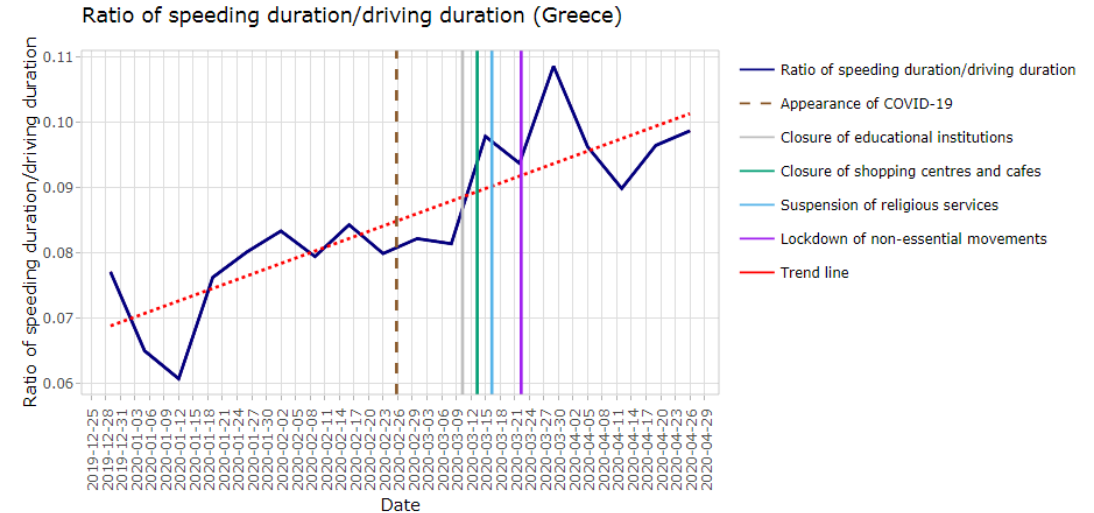


(Source: OSeven)



Ratio of speeding duration/ driving duration

- **Greece:** in March a 7% increase was observed and an 18% increase in April.
- **Saudi Arabia:** a 14% increase in March compared to February, while a 36% in April.



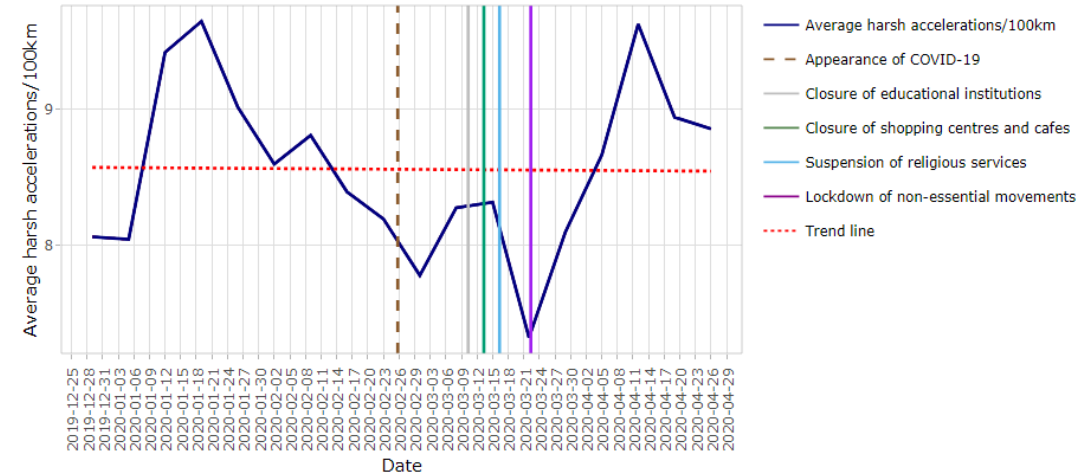
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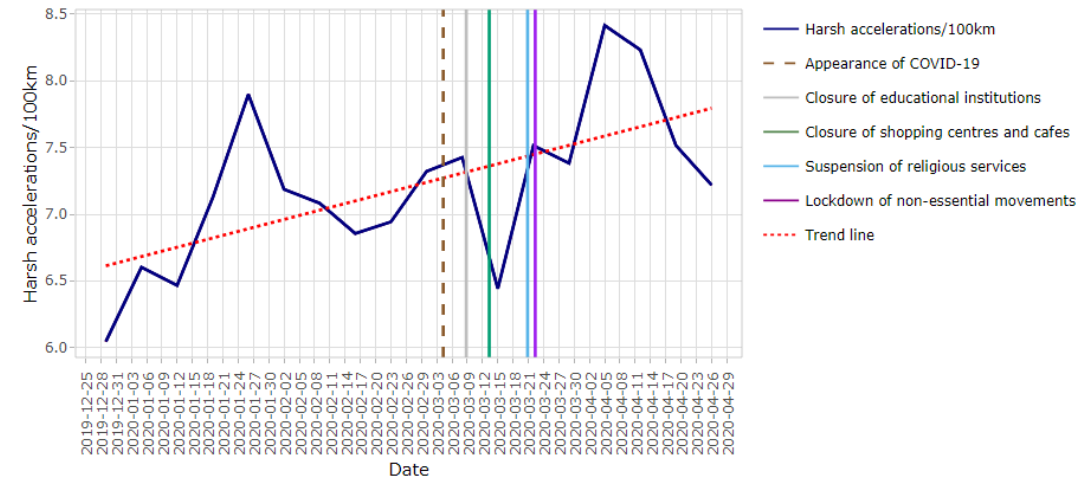
Harsh Accelerations

- **Greece:** although in March and during the first phase of the lockdown a 6% reduction was observed, in April harsh accelerations were increased by 5% compared to February.
- **Saudi Arabia:** in March 3% more harsh accelerations per km were observed, while in April this percentage has risen to 11%.

Average harsh accelerations per 100km (Greece)



Harsh accelerations per 100km (Kingdom of Saudi Arabia)



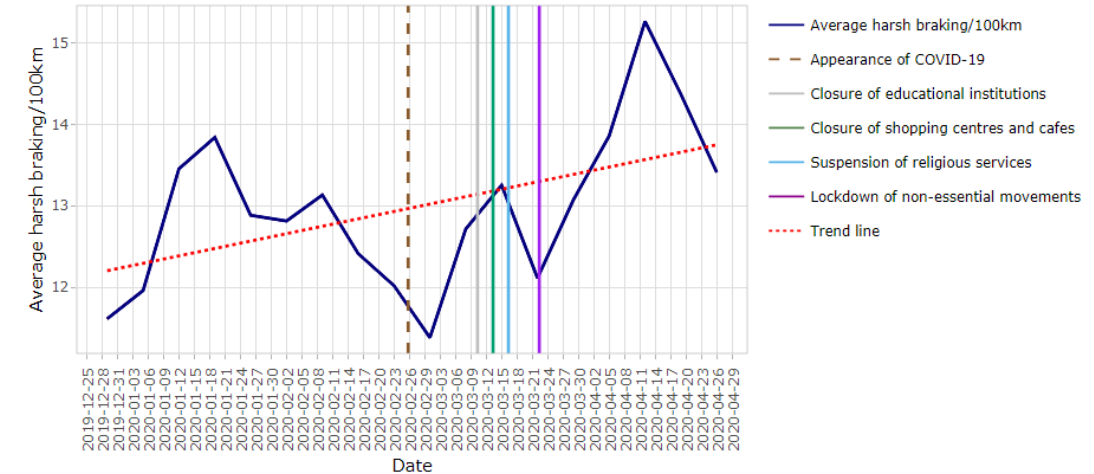
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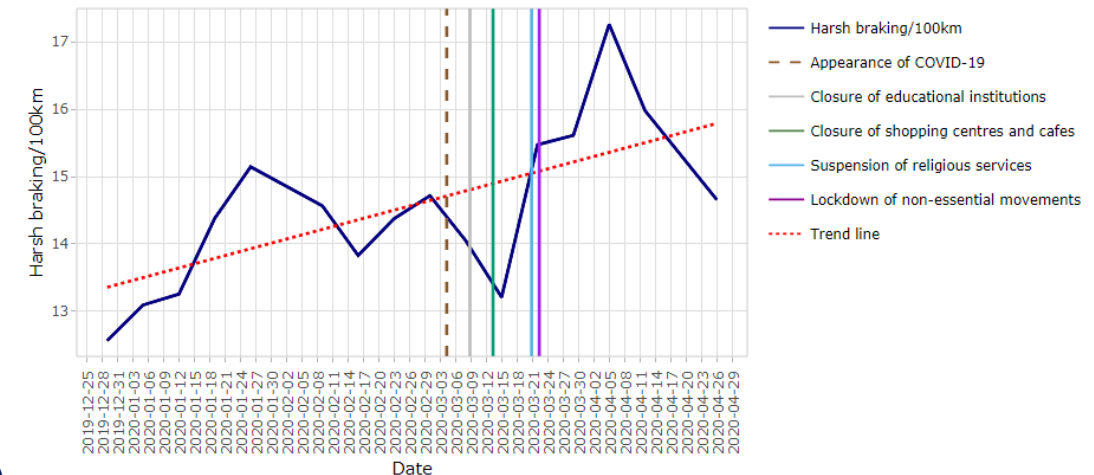
Harsh Braking

- **Greece:** data showed a minor decrease of 3% during March but a 12% increase in April.
- **Saudi Arabia:** only a 0.31% increase was found in March compared to February, while a 10% increase in April.

Average harsh braking per 100km (Greece)



Harsh braking per 100km (Kingdom of Saudi Arabia)



(Source: OSeven)



Results Summary

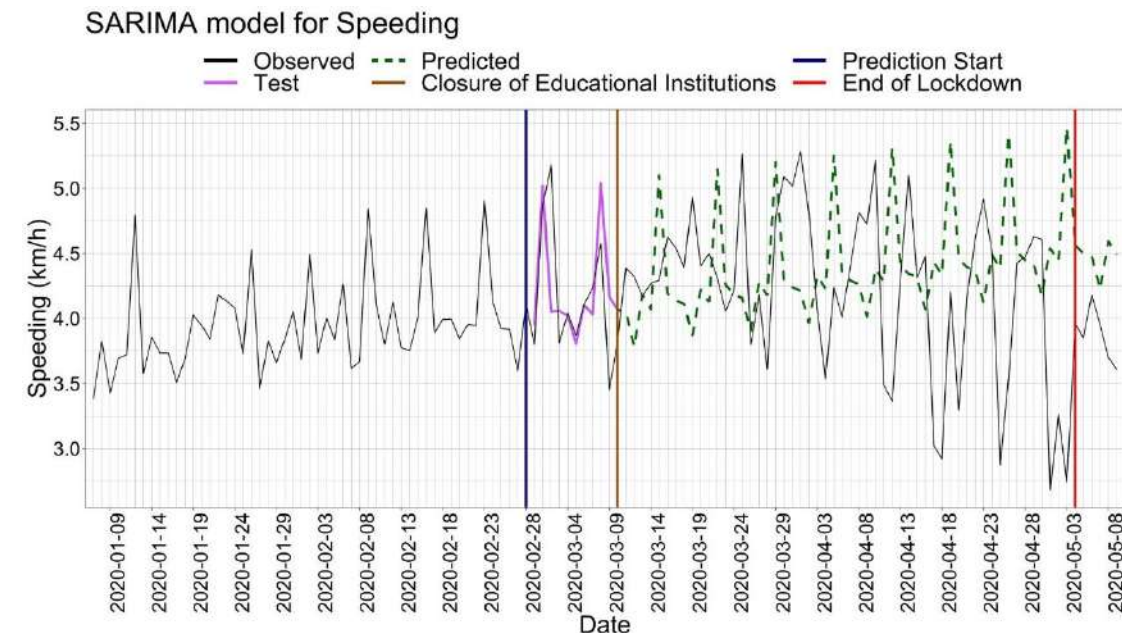
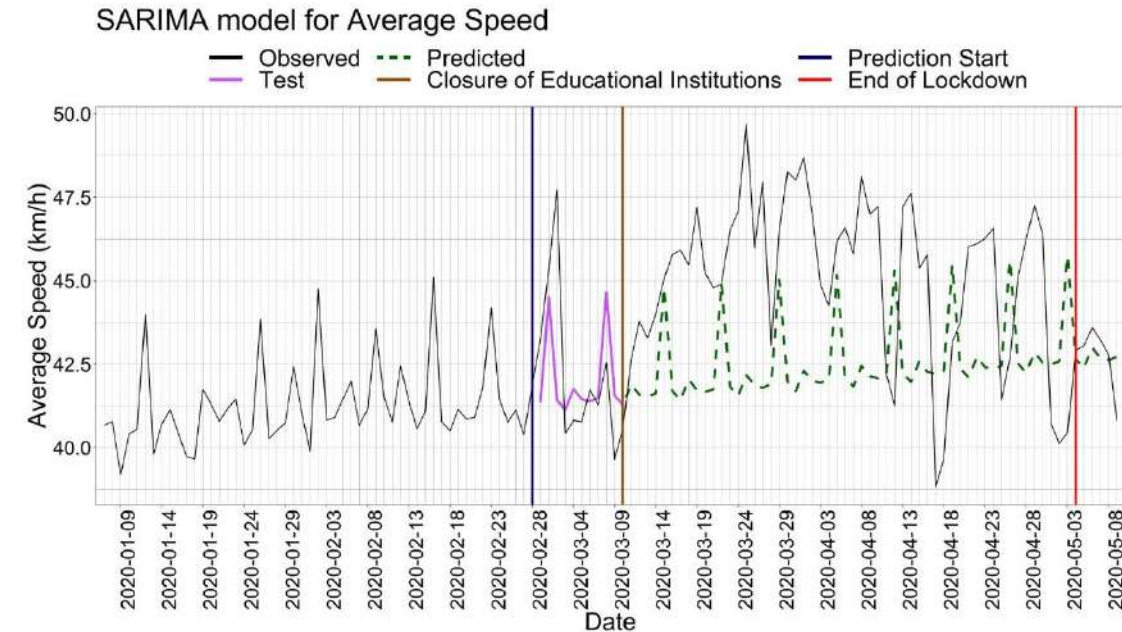
Measurement	Change compared to February	
	March	April
Greece		
Average speeding	↑ 2%	7%
Speeding duration/driving duration	↑ 7%	18%
Average total speed	↑ 6%	11%
Average driving speed	↑ 4%	6%
Harsh accelerations /100km	- -6%	5%
Harsh braking /100km	- -3%	12%
Total duration	↓ -33%	-68%
Driving duration	↓ -31%	-74%
Total distance	↓ -29%	-65%
Risky hours driving	↓ -45%	-74%
Mobile phone usage duration/driving duration	- -1%	21%
KSA		
Average speeding	↑ 4%	5%
Speeding duration/driving duration	↑ 14%	36%
Average total speed	↑ 5%	8%
Average driving speed	↑ 4%	7%
Harsh accelerations /100km	↑ 3%	11%
Harsh braking /100km	↑ 0.31%	10%
Total duration	↓ -33%	-75%
Driving duration	↓ -32%	-75%
Total distance	↓ -30%	-73%
Risky hours driving	↓ -33%	-81%
Mobile phone usage duration/driving duration	↑ 11%	42%



Quantifying the impact of COVID-19 using time-series models

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
- Increased **speeding** during March, but gradual decrease until the end of the summer



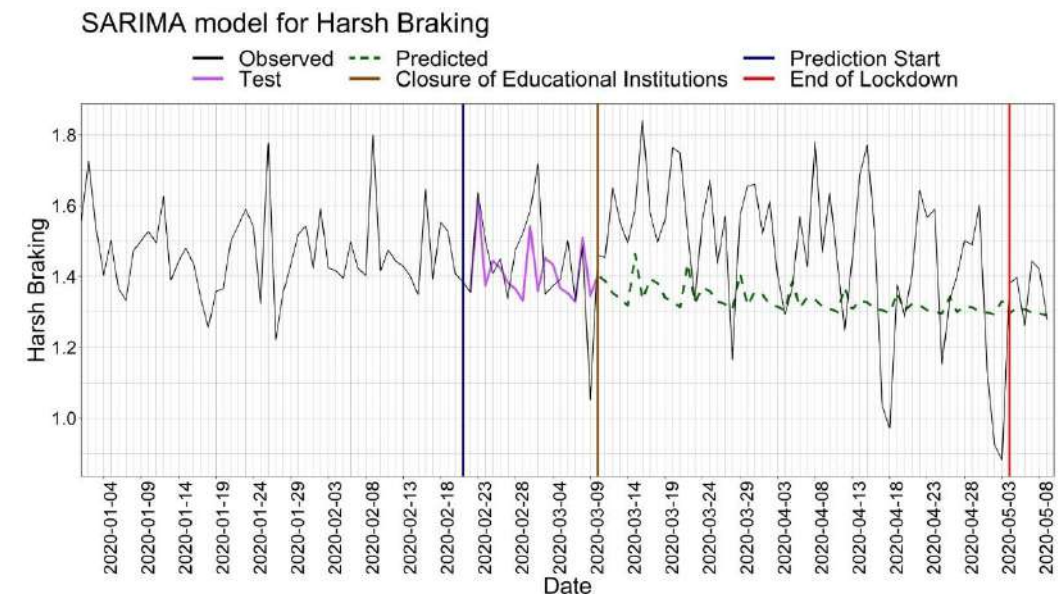
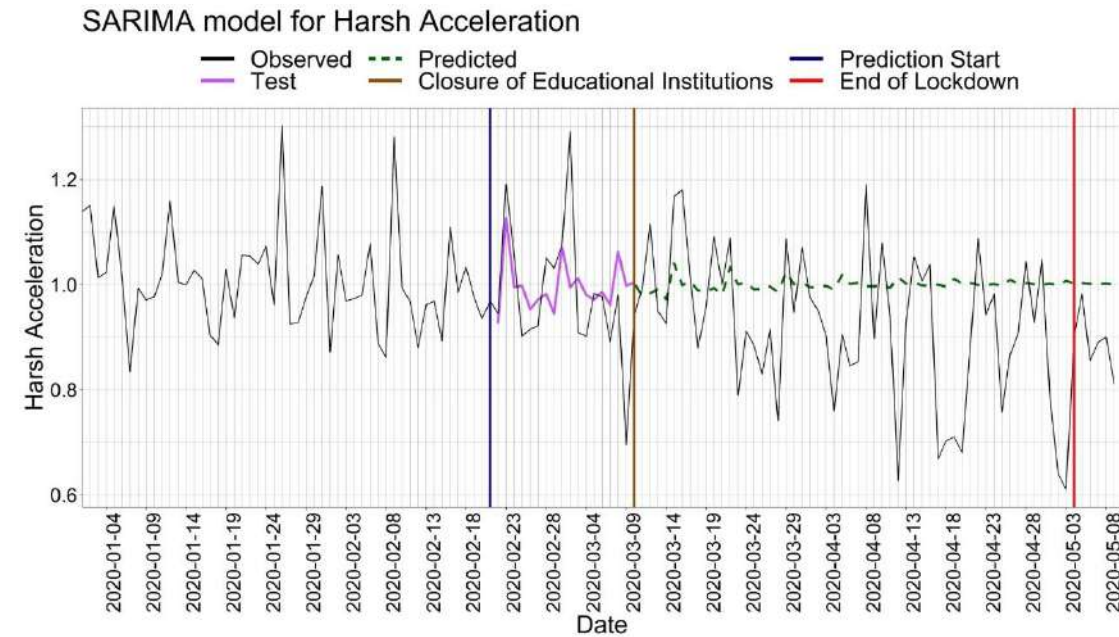
(Source: OSeven)



Quantifying the impact of COVID-19 using time-series models

Comparison between normal evolution and COVID-19 period data

- Large fluctuations in **harsh acceleration** events
- Up to 1.7 more **harsh braking events** during lockdown



(Source: OSeven)



Road Traffic Accidents in Greece

- A significant reduction was found in **Road Traffic Accidents**, after the COVID-19 pandemic, compared to 2019

	January	February	March	April	May	June	July
2019	676	693	839	856	978	1024	1073
2020*	788	858	507	326	751	894	978
Change	17%	24%	-40%	-62%	-23%	-13%	-9%

**provisional data*

(Source: ELSTAT)



Conclusions

- A reduction was found in **Traffic Volume** and **People Walking**
- **Average Speed**, ratio of **Speeding Duration per Driving Duration** and **Speeding** were increased. This indicates that with fewer vehicles on city streets, slightly more drivers are blowing the speed limit.
- Comparing time-series models of the normal evolution of driving indicators with actual COVID-19 data, **higher speeds** and **more frequent harsh events** were demonstrated



Proposals

Focus should specifically be given by **policymakers** to the major traffic killers (speeding being the most important) and to measures bringing results quickly. For instance, these measures could concern:

- New **speed limits** applying to all roads horizontally (with important benefits also for the environment):
 - o 30 km/h in **urban areas** (50 km/h in major urban axes), similar to the practices applies in major European cities (ETSC, 2020; ITF, 2020)
 - o 50 km/h at **rural roads**
 - o 80 km/h at **major interurban roads**
 - o 100 km/h on **motorways**

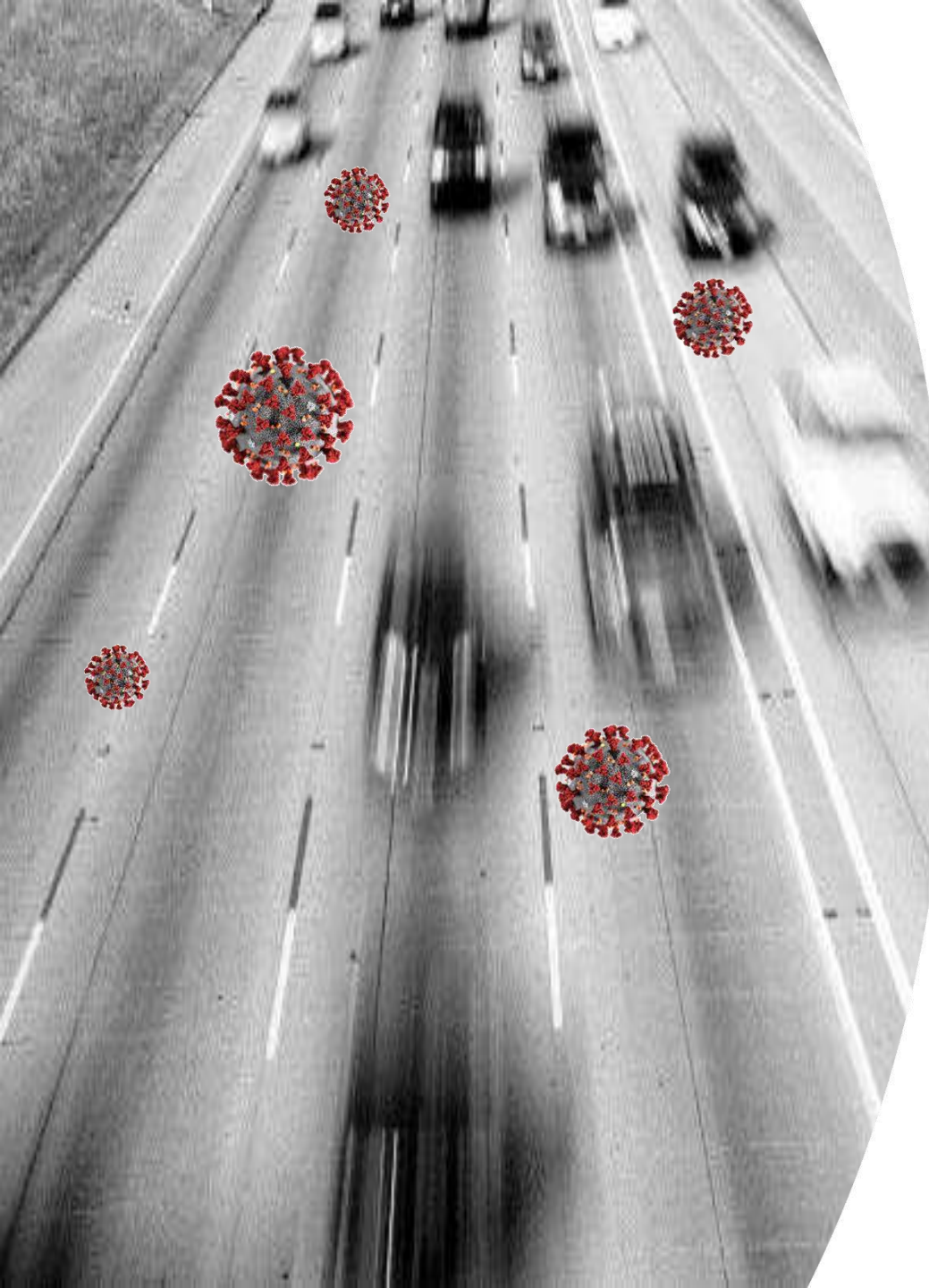


Proposals

- Speeding enforcement should be massively implemented through cameras (always on) and fines.
- Intensification of enforcement of mobile-phone use and non-use of seat belts and helmets.
- Implementation of massive campaigns raising public awareness on speeding and the other major traffic accidents factors.
- Policymakers should also seek out alternatives to public transport, allocating road space to bicycles and pedestrians, and reducing the space available for cars (ITF 2020).

"Safer road traffic and no accidents should be the first priority during and after the COVID-19 pandemic."





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