# Background

Yannis G., Folla K., Chaziris A., Nikolaou D., Kallidoni M., Georgiopoulos S., Parissis M.

- In 2020, Greece recorded 579 fatalities in road crashes, achieving a 54% reduction compared to 2010. Despite this significant improvement, additional efforts are required in order to further improve road safety performance.

- The EC has elaborated a set of Key Performance Indicators (KPIs) in order to monitor road safety progress and were collected in 2021 and 2022 under a common methodological framework by most EU Member States.

- The Ministry of Infrastructure and Transport in collaboration with the National Technical University of Athens participated in the Baseline project, with aim the data collection and calculation of the KPIs for road safety in Greece.

# Objective & Methodology

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- The objective of this research is to assess drivers' road safety behavior in Greece based on the KPIs on speeding, seat-belt use, helmet use and driver distraction and evaluate the characteristics that are associated with these behavioral patterns.

- Roadside surveys on vehicle speed, use of seat-belt by drivers, use of helmet by riders and use of hand-held mobile phone while driving were carried out.

- A Binary Logistic Regression model was applied in order to explore the influence of multiple factors (driver's age, gender, type of vehicle, type of road, time period) on a negative/positive outcome of each KPI.

# Data Collection

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- Roadside surveys were carried out in spring 2022 in order to collect data for the road safety KPIs.

- The roadside surveys were carried out in appropriately selected locations in 15 regions of Greece.

- 150 locations in total; 10 locations per region covering all road types (urban roads, rural roads and motorways).

- All roadside surveys were carried out during daytime, on weekdays and at weekends.

- Speed measurements were carried out in free flowing traffic conditions with the use of hand-held radar guns.
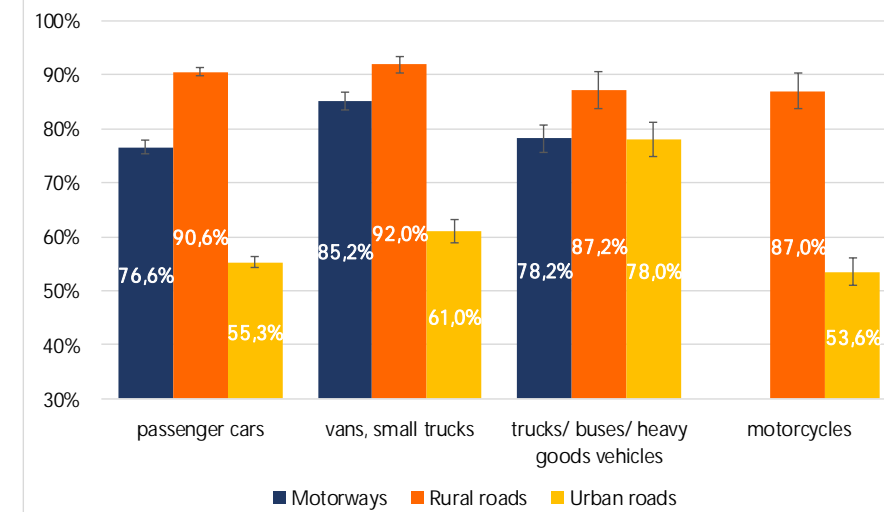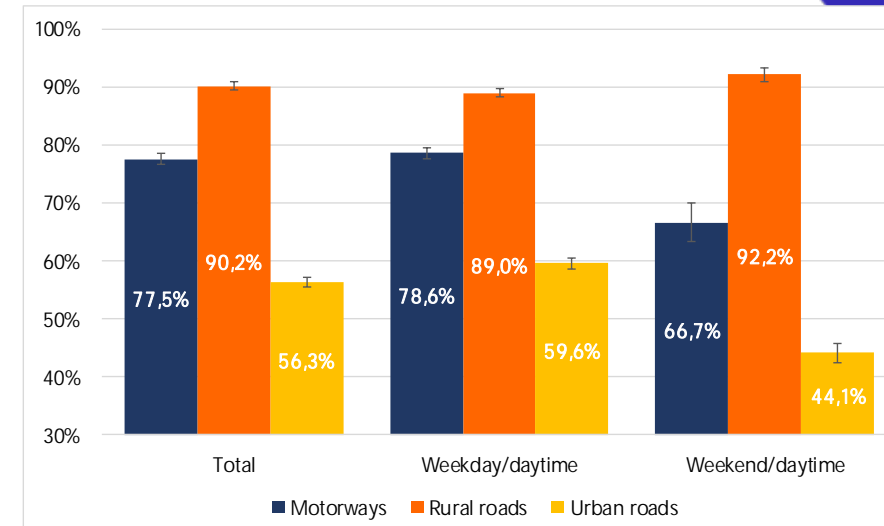
# KPI speed

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- Speed data were collected for 36.346 vehicles:
    - urban roads: 14.354; rural roads: 14.178; motorways: 7.814
    - weekdays: 28.727; weekends: 7.619
    - passenger cars: 26.794; vans/small trucks: 4.794; trucks/ buses/ heavy goods vehicles: 2.484; motorcycles: 2.274

- The lowest percentage of vehicles moving within the speed limits was observed on urban roads (56%), while the highest percentage on rural roads (90%).

- Among the different vehicle types, passenger cars and motorcycles inside urban areas present the lowest KPI values.

# KPI Seat belt use for drivers

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- Data for 37.046 drivers were collected:
    - Motorways: 10.208; rural roads: 12.225; urban roads: 14.613
    - Weekdays: 29.338; weekend: 7.708
    - Passenger Cars: 29.054; goods vehicles: 7.992
- Seat belt use rates are higher for drivers of passenger cars compared to goods vehicles.
- For all types of vehicles, seat belt use rates are higher on motorways and during the weekends.

| Road Type | Passenger Cars | Goods Vehicles |
|---|---|---|
| Motorways | 83,5% (82,6%-84,4%) | 47,9% (46,18%-49,57%) |
| Rural Roads | 70,3% (69,4%-71,2%) | 43,5% (41,5%-45,6%) |
| Urban Roads | 71,2% (70,4%-72,9%) | 22,2% (20,6%-23,9%) |
| Total | 71,0% (70,5%-71,5%) | 36,2% (35,1%-37,2%) |

| Time Period | Passenger Cars | Goods Vehicles |
|---|---|---|
| Weekdays | 69,8% (69,2%-70,4%) | 33,8% (32,6%-34,9%) |
| Weekend | 73,6% (72,5%-74,7%) | 43,6% (40,7%-46,4%) |
| Total | 71,0% (70,5%-71,5%) | 36,2% (35,1%-37,2%) |

# KPI Protective systems (Helmet)

Yannis G., Folla K., Chaziris A., Nikolaou D., Kallidoni M., Georgiopoulos S., Parissis M.

- Data for 3.464 motorcyclists were collected:
  - urban roads: 2.524, rural roads: 755, motorways: 185
  - weekdays: 2.697, weekends: 767
- 80,3% of motorcycle riders wear a helmet
- The highest rate of helmet use was observed on motorways and the lowest on urban roads.

| Road Type | Rider |
|-----------|-------|
| Motorways | 94,9% (91,7%-98,0%) |
| Rural Roads | 83,7% (81,1%-86,4%) |
| Urban Roads | 75,5% (73,8%-77,2%) |
| Total | 80,3% (79,0%-81,6%) |

| Time Period | Rider |
|-------------|-------|
| Weekdays | 80,9% (79,4%-82,4%) |
| Weekend | 79,0% (76,2%-81,9%) |
| Total | 80,3% (79,0%-81,6%) |

# KPI Distraction

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- Data for **38.020 drivers** were collected:
  - urban roads: 15.123; rural roads: 12.471; motorways: 10.426
  - weekdays: 30.157, weekends: 7.683
  - passenger cars: 29.054; light goods vehicles: 7.992; buses/coaches: 974

- **92,3%** of drivers are not using a mobile phone while driving, with the highest KPI value being observed for bus drivers.

- As for car drivers, the highest use of mobile phone while driving is observed on **urban roads**.

| Road Type | KPI |
| --- | --- |
| Motorways | 92,0% (91,5%-92,5%) |
| Rural Roads | 93,6% (93,1%-94,0%) |
| Urban Roads | 90,6% (90,1%-91,1%) |
| Total | 92,3% (92,0%-92,6%) |

| Time Period | KPI |
| --- | --- |
| Weekdays | 91,5% (91,1%-91,8%) |
| Weekend | 92,4% (93,9%-94,9%) |
| Total | 92,3% (92,0%-92,6%) |

| Vehicle Type | KPI |
| --- | --- |
| passenger car | 92,0% (91,7%-92,4%) |
| light goods vehicle | 90,5% (89,6%-91,3%) |
| bus/coach | 98,0% (97,1%-98,9%) |
| Total | 92,3% (92,0%-92,6%) |

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| Independent Variable | Driver_seatbelt | | | | Driver_distraction | | | |
|---|---|---|---|---|---|---|---|---|
| | Beta Estimate | Std. Error | z value | p-value | Beta Estimate | Std. Error | z value | p-value |
| (Intercept) | 1.307 | 0.087 | 14.986 | **<0.001** | -1.404 | 0.106 | -13.234 | **<0.001** |
| Driver_gender1 | 0.943 | 0.076 | 12.365 | **<0.001** | - | - | - | - |
| Driver_age2 | -0.534 | 0.068 | -7.817 | **<0.001** | -0.621 | 0.091 | -6.757 | **<0.001** |
| Driver_age3 | -0.487 | 0.178 | -2.729 | **0.006** | -0.845 | 0.321 | -2.631 | **0.009** |
| Vehicle_type2 | -1.308 | 0.096 | -13.503 | **<0.001** | 0.527 | 0.127 | 4.137 | **<0.001** |
| Vehicle_type3 | -2.631 | 0.129 | -20.363 | **<0.001** | 0.249 | 0.134 | 1.850 | 0.064 |
| Road_type2 | -0.615 | 0.086 | -7.142 | **<0.001** | -0.534 | 0.122 | -4.371 | **<0.001** |
| Road_type3 | -0.719 | 0.074 | -9.679 | **<0.001** | -0.588 | 0.102 | -5.756 | **<0.001** |
| Weather_conditions2 | - | - | - | - | -0.240 | 0.115 | -2.080 | **0.038** |
| AIC | 7610.5 | | | | 4045.3 | | | |
| Hosmer & Lemeshow | 0.475 | | | | 0.938 | | | |
| Accuracy (test data) | 0.661 | | | | 0.901 | | | |

- The relation of **driver's gender**, **age**, **vehicle type**, **road type**, **weather conditions** with the four KPIs was explored.

- **Female drivers** are more likely to use their **seat-belt** compared to males.

- **Middle-aged** and **elderly drivers** present lower probabilities of using a **seat-belt** and a **handheld mobile phone** while driving, compared to young drivers.

- The probability of using a **seatbelt** in a **van and other vehicle types** is lower than passenger cars. The opposite is the case for the use of **handheld mobile phone**.

# Binary Logistic Regression (2/2)

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- Compared to **motorways**, the probability of using a **seatbelt**, a **helmet** and a **handheld mobile phone** while driving on rural and urban roads is lower.

- The probability of **speeding on urban roads** is higher than on motorways, while the opposite is the case for rural roads.

- **Buses** and **trucks** present lower probability of exceeding the **speed** limit compared to passenger cars.

- In **adverse weather conditions** the probability of using a handheld mobile phone while driving and exceeding the speed limit is lower in comparison with good weather conditions.

- At **weekends**, the probability of wearing a protective **helmet** increases.

| | Driver_helmet | | | |
|---|---|---|---|---|
| Independent Variable | Beta Estimate | Std. Error | z value | p-value |
| (Intercept) | 3.431 | 0.285 | 12.029 | **<0.001** |
| Driver_age2 | 0.132 | 0.081 | 1.629 | **0.103** |
| Driver_age3 | -1.256 | 0.498 | -2.520 | **0.012** |
| Vehicle_type_helmet2 | -2.056 | 0.201 | -10.218 | **<0.001** |
| Road_type2 | -1.470 | 0.404 | -3.634 | **<0.001** |
| Road_type3 | -1.658 | 0.285 | -5.804 | **<0.001** |
| Weather_conditions2 | -0.564 | 0.098 | -5.720 | **<0.001** |
| Time_period2 | 0.261 | 0.115 | 2.268 | **0.023** |
| AIC | 4132.1 | | | |
| Hosmer & Lemeshow | 0.932 | | | |
| Accuracy (test data) | 0.859 | | | |

| | Speeding | | | |
|---|---|---|---|---|
| Independent Variable | Beta Estimate | Std. Error | z value | p-value |
| (Intercept) | -0.697 | 0.082 | -8.436 | **<0.001** |
| Vehicle_type_speeding2 | -0.063 | 0.076 | -0.834 | 0.404 |
| Vehicle_type_speeding3 | -0.664 | 0.095 | -6.960 | **<0.001** |
| Vehicle_type_speeding4 | 0.025 | 0.083 | 0.305 | 0.761 |
| Road_type2 | -0.449 | 0.090 | -4.941 | **<0.001** |
| Road_type3 | 0.566 | 0.083 | 6.758 | **<0.001** |
| Weather_conditions2 | -1.073 | 0.089 | -12.016 | **<0.001** |
| Time_period2 | -0.090 | 0.060 | -1.496 | 0.135 |
| AIC | 10651.7 | | | |
| Hosmer & Lemeshow | <0.001 | | | |
| Accuracy (test data) | 0.668 | | | |

Assessing Driver Safety Behaviour in Greece

# Conclusions (1/2)

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- 27% of Greek drivers were found to **exceed the speed limits** on all roads, with higher percentages being observed on urban roads (about 44%) and motorways (about 23%).

- **Motorcyclists** tend to observe the speed limits less often than the drivers of the remaining vehicle types.

- **Passenger car drivers** and **motorcyclists** tend to use the seat-belt and helmet more often when travelling on motorways.

- The highest percentages of **using a mobile phone** while driving was recorded on urban roads.

- **Female drivers** present a safer behavior compared to male drivers.

- Drivers of the **medium age group** tend to use less often a seat-belt or a helmet, while young drivers use more often a mobile phone while driving.

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- The results of the present analysis allow to
  - evaluate **drivers' road safety behavior** and
  - identify the **driver groups** and **conditions** that are most associated with traffic violations in Greece.

- The detailed results for the Key Performance Indicators consist valuable information for documenting **targeted road safety actions** and **monitoring road safety progress** over this decade.

- Further analysis of these results, alongside with the related **exposure** and **road crash data** could reveal the real dimension and main causes of the road safety problem in Greece.

*Thank you!*

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