

# STAT40830 - Homework 1

Ashish Mohamed Usman 24201306

## *Introduction*

This analysis presents a relationship between the **number of drivers killed** and time, before and after seatbelt legislation was introduced in the UK. The legislation came into effect in **January 1983**, and its impact can be observed through changes in the number of monthly road casualties.

The R built-in dataset used in this report is **Seatbelts** from the **datasets** package. It contains monthly UK road casualty statistics from **January 1969 to December 1984**, across various categories.

## *Understanding Dataset :*

```
Time-Series [1:192, 1:8] from 1969 to 1985: 107 97 102 87 119 106 110 106 107 134 ...
- attr(*, "dimnames")=List of 2
..$ : NULL
..$ : chr [1:8] "DriversKilled" "drivers" "front" "rear" ...
```

The **Seatbelts** dataset has **192 monthly observations** and includes the following variables:

	DriversKilled	drivers	front	rear	kms	PetrolPrice	VanKilled	law
[1,]	107	1687	867	269	9059	0.1029718	12	0
[2,]	97	1508	825	265	7685	0.1023630	6	0
[3,]	102	1507	806	319	9963	0.1020625	12	0
[4,]	87	1385	814	407	10955	0.1008733	8	0
[5,]	119	1632	991	454	11823	0.1010197	10	0
[6,]	106	1511	945	427	12391	0.1005812	13	0

**DriversKilled** : Car drivers killed  
**drivers** : Car drivers killed or seriously injured  
**front** : Front-seat passengers killed or seriously injured  
**rear** : Rear-seat passengers killed or seriously injured  
**kms** : Distance driven (km)  
**PetrolPrice** : Petrol price  
**VanKilled** : Van driver casualties  
**law** : 1 if seatbelt law is in effect, 0 otherwise

### ***Data Summary :***

Below is a descriptive summary of the main variable - 'DriversKilled' used in the graph:

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
60.0	104.8	118.5	122.8	138.0	198.0

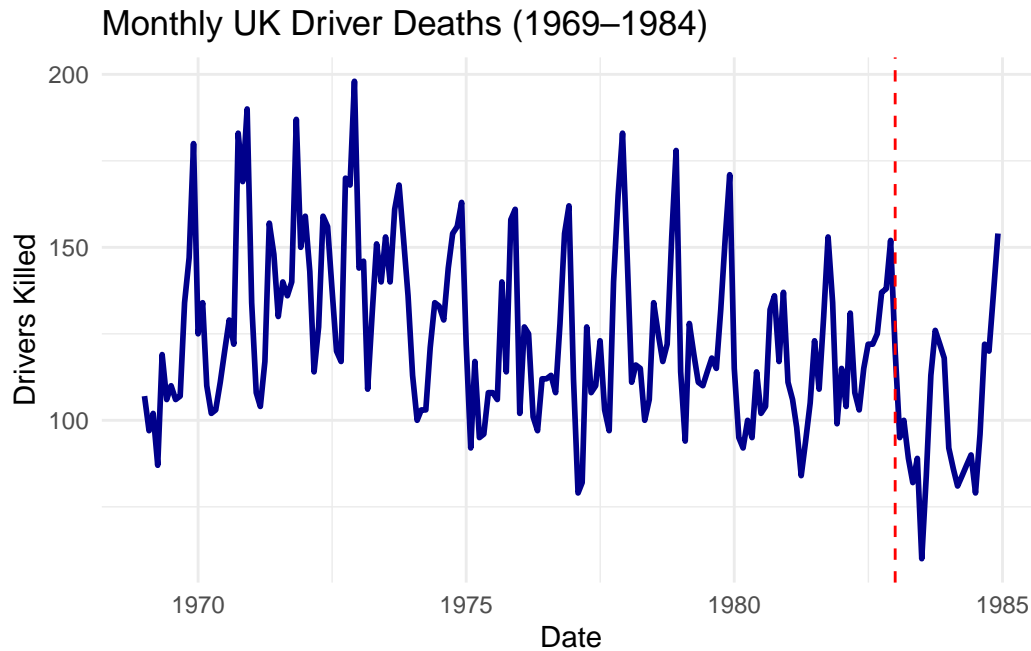
The number of drivers killed per month ranges from a **minimum of 60** to a **maximum of 198**, with a **median of 118.5**, indicating that half of the observations fall below this value.

The **mean is 122.8**, which is slightly higher than the median, suggesting a slight **right-skew** in the distribution.

The **1st quartile** is 104.8 and the **3rd quartile** is 138.0, showing that 50% of the values lie within this range.

### ***Plot :***

The following plot displays the number of **drivers killed per month**, with a red dashed line indicating the start of the seatbelt law.



#### ***Description of the Plot :***

The time series plot illustrates the **monthly number of drivers killed in the UK from 1969 to 1984**. A clear **seasonal pattern** is visible, with regular peaks and troughs occurring each year, typically higher in certain months, likely corresponding to increased travel periods.

A **red dashed vertical line** marks **January 1983**, when **seatbelt legislation** was introduced. Following this date, there is a **notable decrease in fatalities**, suggesting that the implementation of mandatory seatbelt use had a **positive impact on road safety**, reducing the number of driver deaths in subsequent months.