To get an overview we first load the data into R and print the available regions (data for countries and many cities are available) and transportation types (“driving”, “transit” and “walking”):

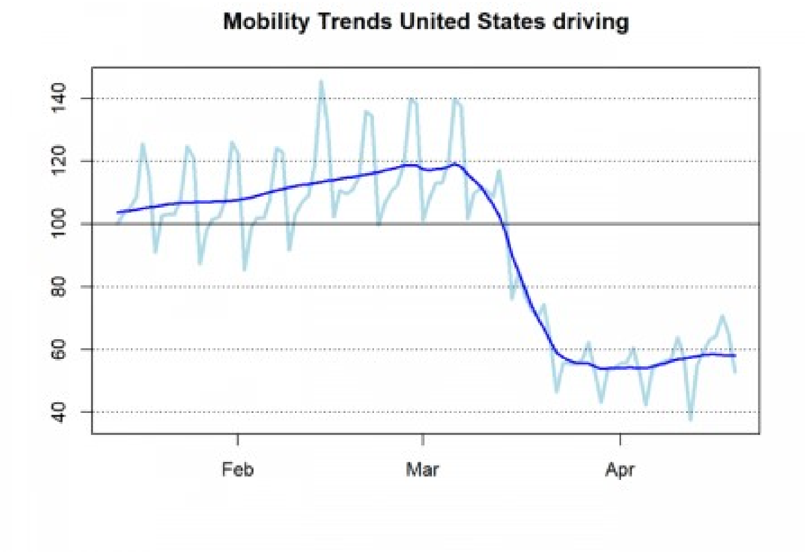
```
mobility <- read.csv("data/applemobilitytrends-2020-04-19.csv") # change path
and file name accordingly
levels(mobility$region)
##   [1] "Albania"                   "Amsterdam"
##   [3] "Argentina"                 "Athens"
##   [5] "Atlanta"                   "Auckland"
##   [7] "Australia"                 "Austria"
##   [9] "Baltimore"                 "Bangkok"
##  [11] "Barcelona"                 "Belgium"
##  [13] "Berlin"                    "Birmingham - UK"
##  [15] "Bochum - Dortmund"         "Boston"
##  [17] "Brazil"                    "Brisbane"
##  [19] "Brussels"                  "Buenos Aires"
##  [21] "Bulgaria"                  "Cairo"
##  [23] "Calgary"                   "Cambodia"
##  [25] "Canada"                    "Cape Town"
##  [27] "Chicago"                   "Chile"
##  [29] "Cologne"                   "Colombia"
##  [31] "Copenhagen"                "Croatia"
##  [33] "Czech Republic"            "Dallas"
##  [35] "Delhi"                     "Denmark"
##  [37] "Denver"                    "Detroit"
##  [39] "Dubai"                     "Dublin"
##  [41] "Dusseldorf"                "Edmonton"
##  [43] "Egypt"                     "Estonia"
##  [45] "Finland"                   "France"
##  [47] "Frankfurt"                 "Fukuoka"
##  [49] "Germany"                   "Greece"
##  [51] "Guadalajara"               "Halifax"
##  [53] "Hamburg"                   "Helsinki"
##  [55] "Hong Kong"                 "Houston"
##  [57] "Hsin-chu"                  "Hungary"
##  [59] "Iceland"                   "India"
##  [61] "Indonesia"                 "Ireland"
##  [63] "Israel"                    "Istanbul"
##  [65] "Italy"                     "Jakarta"
##  [67] "Japan"                     "Johannesburg"
##  [69] "Kuala Lumpur"              "Latvia"
##  [71] "Leeds"                     "Lille"
##  [73] "Lithuania"                 "London"
##  [75] "Los Angeles"               "Luxembourg"
##  [77] "Lyon"                      "Macao"
##  [79] "Madrid"                    "Malaysia"
##  [81] "Manchester"                "Manila"
##  [83] "Melbourne"                 "Mexico"
##  [85] "Mexico City"               "Miami"
##  [87] "Milan"                     "Montreal"
##  [89] "Morocco"                   "Moscow"
##  [91] "Mumbai"                    "Munich"
##  [93] "Nagoya"                    "Netherlands"
##  [95] "New York City"             "New Zealand"
##  [97] "Norway"                    "Osaka"
##  [99] "Oslo"                      "Ottawa"
```

```
## [101] "Paris"                        "Perth"
## [103] "Philadelphia"                 "Philippines"
## [105] "Poland"                       "Portugal"
## [107] "Republic of Korea"            "Rio de Janeiro"
## [109] "Riyadh"                       "Romania"
## [111] "Rome"                         "Rotterdam"
## [113] "Russia"                       "Saint Petersburg"
## [115] "San Francisco - Bay Area" "Santiago"
## [117] "Sao Paulo"                    "Saudi Arabia"
## [119] "Seattle"                      "Seoul"
## [121] "Serbia"                       "Singapore"
## [123] "Slovakia"                     "Slovenia"
## [125] "South Africa"                 "Spain"
## [127] "Stockholm"                    "Stuttgart"
## [129] "Sweden"                       "Switzerland"
## [131] "Sydney"                       "Taichung"
## [133] "Taipei"                       "Taiwan"
## [135] "Tel Aviv"                     "Thailand"
## [137] "Tijuana"                      "Tokyo"
## [139] "Toronto"                      "Toulouse"
## [141] "Turkey"                       "UK"
## [143] "Ukraine"                      "United Arab Emirates"
## [145] "United States"                "Uruguay"
## [147] "Utrecht"                      "Vancouver"
## [149] "Vienna"                       "Vietnam"
## [151] "Washington DC"                "Zurich"
```

```
levels(mobility$transportation_type)
## [1] "driving" "transit" "walking"
```

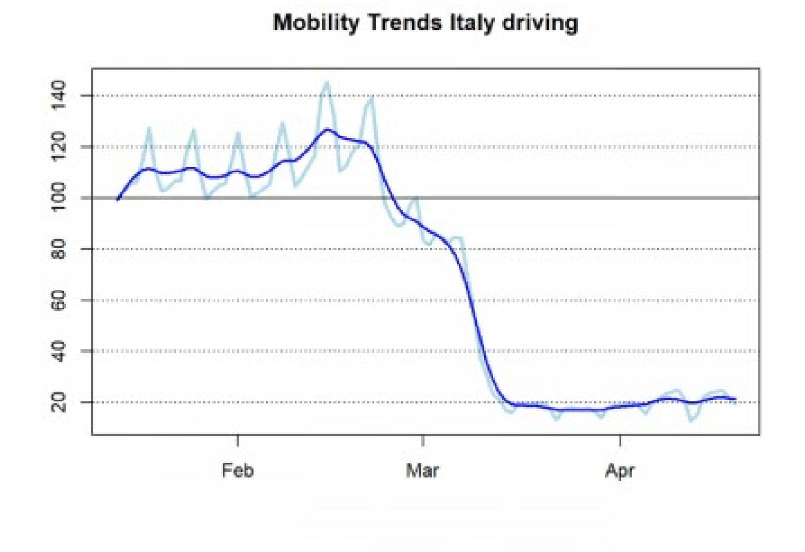
We now create a function `mobi_trends` to return the data in a well-structured format. The default `plot = TRUE` plots the data, `plot = FALSE` returns a named vector with the raw data for further investigation:

```
mobi_trends <- function(reg = "United States", trans = "driving", plot = TRUE,
addsmooth = TRUE) {
  data <- subset(mobility, region == reg & transportation_type == trans)
[4:ncol(mobility)]
  dates <- as.Date(sapply(names(data), function(x) substr(x, start = 2, stop =
11)), "%Y.%m.%d")
  values <- as.numeric(data)
  series <- setNames(values, dates)
  if (plot) {
    plot(dates, values, main = paste("Mobility Trends", reg, trans), xlab = "",
ylab = "", type = "l", col = "blue", lwd = 3)
    if (addsmooth) {
      lines(dates, values, col = "lightblue", lwd = 3)
      lines(supsmu(dates, values), col = "blue", lwd = 2)
    }
    abline(h = 100)
    abline(h = c(0, 20, 40, 60, 80, 120, 140, 160, 180, 200), lty = 3)
    invisible(series)
  } else series
}
mobi_trends()
```



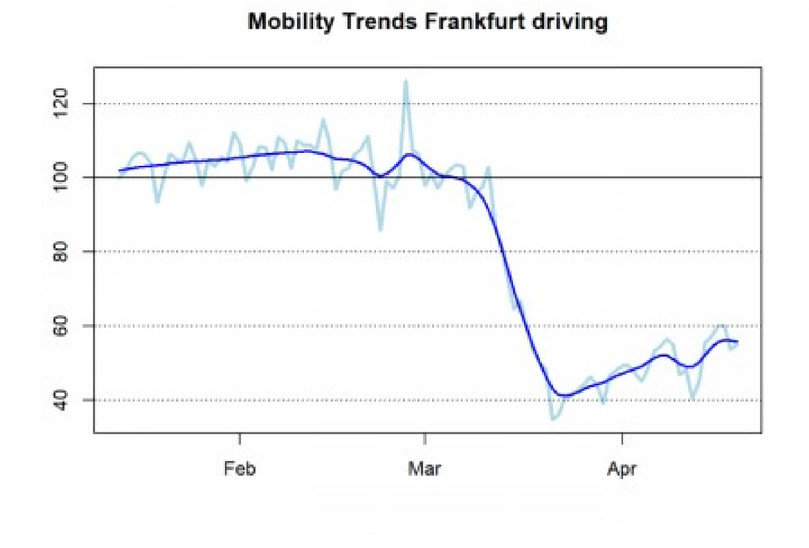
The drop is quite dramatic… by 60%! Even more dramatic, of course, is the situation in Italy:

```
mobi_trends(reg = "Italy")
```



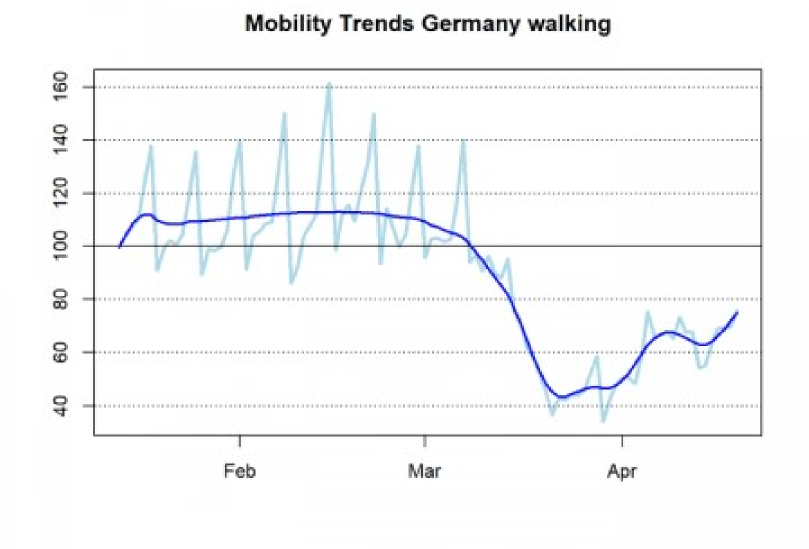
A drop by 80%! The same plot for Frankfurt:

```
mobi_trends(reg = "Frankfurt")
```



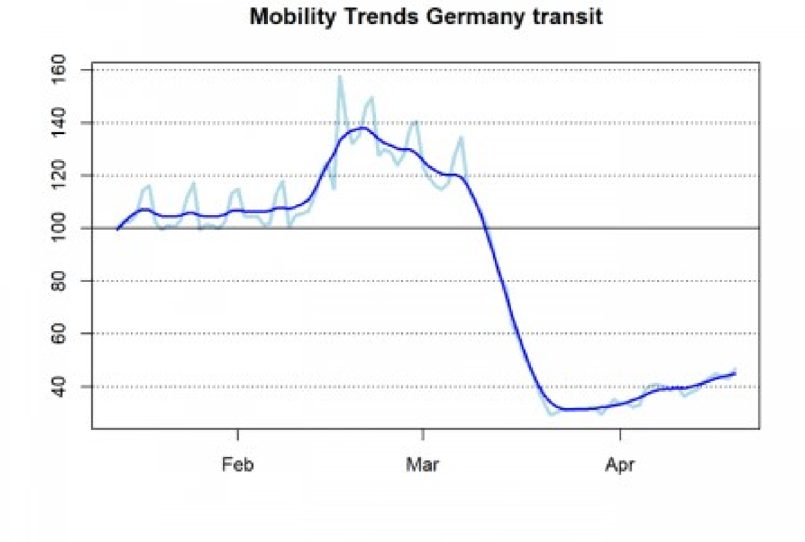
Obviously in Germany people are taking those measures less seriously lately, there seems to be a clear upward trend. This can also be seen in the German “walking” data:

```
mobi_trends(reg = "Germany", trans = "walking")
```



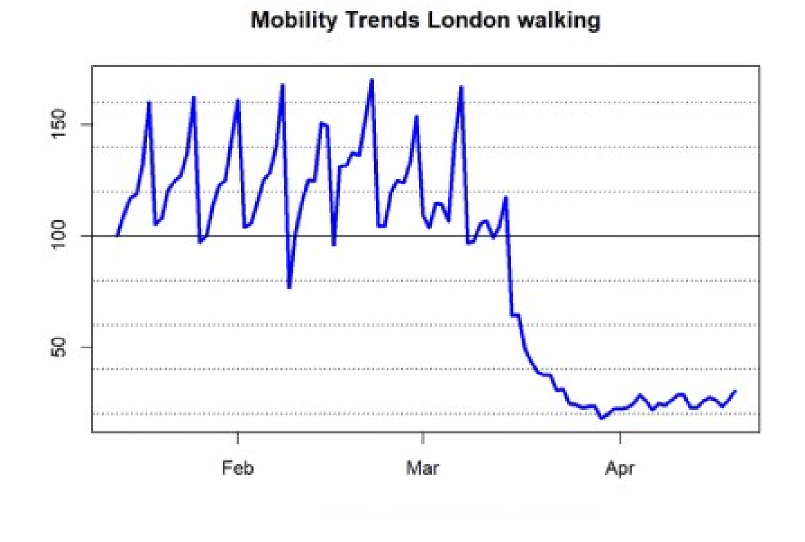
What is interesting is that before the lockdown “transit” mobility seems to have accelerated before plunging:

```
mobi_trends(reg = "Germany", trans = "transit")
```



You can also plot the raw numbers only, without an added smoother (option `addsmooth = FALSE`):

```
mobi_trends(reg = "London", trans = "walking", addsmooth = FALSE)
```



And as I said, you can conduct your own analyses on the formatted vector of the time series (option `plot = FALSE`)…

```
mobi_trends(reg = "London", trans = "walking", plot = FALSE)
## 2020-01-13 2020-01-14 2020-01-15 2020-01-16 2020-01-17 2020-01-18
##     100.00     108.89     116.84     118.82     132.18     160.29
## 2020-01-19 2020-01-20 2020-01-21 2020-01-22 2020-01-23 2020-01-24
##     105.12     108.02     120.52     124.81     127.01     137.38
## 2020-01-25 2020-01-26 2020-01-27 2020-01-28 2020-01-29 2020-01-30
##     162.41      97.16     100.01     113.27     122.75     124.96
## 2020-01-31 2020-02-01 2020-02-02 2020-02-03 2020-02-04 2020-02-05
##     144.13     161.17     103.93     105.67     115.03     125.42
## 2020-02-06 2020-02-07 2020-02-08 2020-02-09 2020-02-10 2020-02-11
##     128.43     140.65     167.80      76.79     100.51     115.26
## 2020-02-12 2020-02-13 2020-02-14 2020-02-15 2020-02-16 2020-02-17
##     125.35     124.69     150.77     149.35      96.03     131.20
## 2020-02-18 2020-02-19 2020-02-20 2020-02-21 2020-02-22 2020-02-23
##     131.72     137.59     136.05     153.95     170.22     104.41
## 2020-02-24 2020-02-25 2020-02-26 2020-02-27 2020-02-28 2020-02-29
```

```
##     104.32     119.88     125.12     123.88     133.76     153.92
## 2020-03-01 2020-03-02 2020-03-03 2020-03-04 2020-03-05 2020-03-06
##     109.26     103.64     114.68     114.25     106.50     142.09
## 2020-03-07 2020-03-08 2020-03-09 2020-03-10 2020-03-11 2020-03-12
##     167.10      96.86      97.50     105.54     106.91      98.87
## 2020-03-13 2020-03-14 2020-03-15 2020-03-16 2020-03-17 2020-03-18
##     104.19     117.44      64.28      64.53      48.95      43.31
## 2020-03-19 2020-03-20 2020-03-21 2020-03-22 2020-03-23 2020-03-24
##      38.76      37.49      37.36      30.76      31.25      24.63
## 2020-03-25 2020-03-26 2020-03-27 2020-03-28 2020-03-29 2020-03-30
##      24.09      22.89      23.40      23.40      17.83      19.72
## 2020-03-31 2020-04-01 2020-04-02 2020-04-03 2020-04-04 2020-04-05
##      22.29      22.19      22.76      24.34      28.49      26.06
## 2020-04-06 2020-04-07 2020-04-08 2020-04-09 2020-04-10 2020-04-11
##      21.63      24.64      23.87      26.13      28.59      28.58
## 2020-04-12 2020-04-13 2020-04-14 2020-04-15 2020-04-16 2020-04-17
##      22.86      22.80      25.66      27.44      26.40      23.27
## 2020-04-18 2020-04-19
##      26.36      30.40
```

…as we have only scratched the surface of the many possibilities here, there are many interesting analyses, like including the data in epidemiological models or simply calculate correlations with new infections/deaths: please share your findings in the comments below!
