A1.Gasto Sanitario por Proveedor

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Contents

1.PROCESAMIENTO DE LOS DATOS.

- En primer lugar leemos el fichero:

```r
gasto_pro<-read.csv("C:/temp/GastoSanitario_Proveedor.csv",sep= ",")
```

- Realicemos una breve inspección de los datos:

```r
str(gasto_pro)
```

```
## 'data.frame':    2000 obs. of  6 variables:
##  $ TIME             : int  2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 ...
##  $ GEO              : Factor w/ 40 levels "Austria","Belgium",..: 15 15 15 15 15 16 16 16 16 16 ...
##  $ UNIT             : Factor w/ 1 level "Million euro": 1 1 1 1 1 1 1 1 1 1 ...
##  $ ICHA11_HP        : Factor w/ 5 levels "All providers of health care",..: 1 3 2 4 5 1 3 2 4 5 ...
##  $ Value            : Factor w/ 1259 levels ":","0.00","1 001 514.67",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ Flag.and.Footnotes: Factor w/ 3 levels "","b","d": 1 1 1 1 1 1 1 1 1 1 ...
```

```r
colnames(gasto_pro) #Nombre de las variables
```

```
## [1] "TIME"              "GEO"               "UNIT"
## [4] "ICHA11_HP"         "Value"             "Flag.and.Footnotes"
```

```r
nrow(gasto_pro) #Número de registros
```

```
## [1] 2000
```

```r
ncol(gasto_pro) #Número de variables
```

```
## [1] 6
```

*Observamos las siguientes variables:

- **TIME**: variable cuantitativa. Indica el año en el que se ha realizado la medida, en este caso el valor de la variable "Value". Se ha cargado bien como número entero.
- **GEO**: variable cualitativa. Indica el país o región en el que se ha realizado la medida.Se ha cargado bien como factor.
- **UNIT**: variable cualitativa. Indica la medida de la variable valor.Se ha cargado bien como factor.
- **ICHA11_HP**: variable cualitativa. Entidad a la que se destina el gasto sanitario
- **Value**: Variable cuantitativa. Indica el valor en Millones de Euros de este gasto sanitario.Se ha cargado mal como factor. Haremos la transformación a valor numérico.
- **Fal.and.footnotes**. Notas sobre etiquetas. Eliminamos esta columna.

*Años de las mediciones:

```r
unique(gasto_pro$TIME)
```

```
##  [1] 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
```

*Paises:

```r
unique(gasto_pro$GEO)
```

```
##  [1] European Union - 27 countries (from 2020)
##  [2] European Union - 28 countries (2013-2020)
##  [3] European Union - 27 countries (2007-2013)
##  [4] European Union - 15 countries (1995-2004)
##  [5] Euro area - 19 countries  (from 2015)
##  [6] Euro area - 18 countries (2014)
##  [7] Euro area - 12 countries (2001-2006)
##  [8] Belgium
##  [9] Bulgaria
## [10] Czechia
## [11] Denmark
## [12] Germany (until 1990 former territory of the FRG)
## [13] Estonia
## [14] Ireland
## [15] Greece
## [16] Spain
## [17] France
## [18] Croatia
## [19] Italy
## [20] Cyprus
## [21] Latvia
## [22] Lithuania
## [23] Luxembourg
## [24] Hungary
## [25] Malta
## [26] Netherlands
## [27] Austria
## [28] Poland
## [29] Portugal
## [30] Romania
## [31] Slovenia
## [32] Slovakia
## [33] Finland
## [34] Sweden
## [35] Iceland
## [36] Liechtenstein
## [37] Norway
## [38] Switzerland
## [39] United Kingdom
## [40] Bosnia and Herzegovina
## 40 Levels: Austria Belgium Bosnia and Herzegovina Bulgaria Croatia ... United Kingdom
```

*Unidad de las mediciones:

```r
unique(gasto_pro$UNIT)
```

```
## [1] Million euro
## Levels: Million euro
```

*Variable que indica la entidad a la que se destina el gasto sanitario:

```r
unique(gasto_pro$ICHA11_HP)
```

```
## [1] All providers of health care
```

```
## [2] Hospitals
## [3] General hospitals
## [4] Mental health hospitals
## [5] Specialised hospitals (other than mental health hospitals)
## 5 Levels: All providers of health care General hospitals ... Specialised hospitals (other than mental
```

- Eliminamos la columna Fal.and.footnotes.

```
gasto_pro<-gasto_pro[,-6]
```

- Tendríamos que convertir la columna Value a numérico porque se ha cargado como factor y es erróneo. El resto de variables tienen el tipo correcto.

```
gasto_pro$Value<-as.character(gasto_pro$Value)
gasto_pro$Value<-(gsub(',','.',gasto_pro$Value))
gasto_pro$Value<-(gsub(' ','',gasto_pro$Value))
gasto_pro$Value<-as.numeric(gasto_pro$Value)
```

```
## Warning: NAs introducidos por coerción
```

- Comprobamos que valores tenemos en la columna **Value**:

```
table(gasto_pro$Value, useNA = "ifany")
```

```
##
##         0     1.01     1.04     2.44     2.61      2.8     2.86
##        26        1        1        1        1        1        1
##      2.97      3.2     3.32     3.54     3.56     3.64     3.67
##         1        1        1        1        1        1        2
##      3.71      3.8     3.92     4.31     4.36     4.51      5.3
##         1        1        1        1        1        1        1
##      5.46     5.57     5.78      5.9     6.23     6.35     6.49
##         1        1        1        1        1        1        1
##       6.5     6.55     6.74     6.83     7.25     7.48     7.85
##         1        1        1        1        1        1        1
##      8.98    10.28    10.39    10.65    11.29    11.51    11.67
##         1        1        1        1        1        1        1
##     11.92    12.02    12.21    12.58    13.16    13.42     14.5
##         1        1        1        1        1        1        1
##     14.64    14.68    15.18    15.23    15.45    15.64    15.84
##         1        1        1        1        1        1        1
##     15.89    17.56    20.14    20.84    21.01    21.78    22.02
##         1        1        1        1        1        1        1
##      22.1    22.27    22.65    22.86    22.98    23.26    23.49
##         1        1        1        1        1        1        1
##     23.64    23.65    24.15    24.77    25.03    25.38    25.49
##         1        1        2        1        2        1        1
##     25.57    25.93    26.13    26.59    26.81    26.85     26.9
##         1        1        1        1        1        1        1
##     27.44    27.85     27.9    28.14    28.25    28.53    28.66
##         1        2        2        1        1        2        1
##     29.69    29.75    29.79    29.95    29.96    30.29    30.95
##         1        1        1        1        1        1        1
##     31.07    31.25    31.53    32.46       33    33.15    33.29
##         1        1        1        1        1        1        1
##     33.58    34.31    34.76     35.8    36.47    36.48    37.39
##         1        1        1        1        1        1        1
```

```
##     37.43     37.89     38.24     38.36     40.98     41.34     41.37
##         1         1         1         1         1         1         1
##     42.09      43.3     43.57      43.9     45.74     47.46     49.69
##         1         1         1         1         1         1         1
##     50.15     51.01     51.38     51.71     51.79     52.07     52.11
##         1         1         1         1         1         1         1
##     52.19     52.61     53.39     53.51     54.55     55.14     55.26
##         1         1         1         1         1         1         1
##     56.22     56.43     57.08     57.42     59.79     59.84     61.45
##         1         1         1         1         1         1         1
##     61.49     62.82     66.22     66.39     66.65     67.34     67.49
##         1         1         1         1         1         1         1
##      67.8     67.96     71.18     71.24     72.11     73.58     74.94
##         1         1         1         1         1         1         1
##     77.17     77.65     78.27     78.54     78.55     79.63     80.27
##         1         1         1         1         1         1         1
##     82.13     82.76     83.47     84.47     86.05     88.56     88.99
##         1         1         1         1         1         1         1
##     90.68     91.16     92.58     96.01     96.88     96.92     97.05
##         1         1         1         1         1         1         1
##     99.13    104.78     105.2    109.95    110.37    116.26    116.88
##         1         1         1         1         1         1         1
##    117.58    118.99    120.17    122.78    124.66    126.57    128.45
##         1         1         1         1         1         1         1
##    133.73     141.5    143.95    146.83    154.65    155.89    160.95
##         1         1         1         1         1         1         1
##    173.28    176.87     183.5    193.96     205.3       208    227.03
##         1         1         1         1         1         1         1
##     227.2    228.21    229.39    229.95    232.81    238.84    244.51
##         1         1         1         1         1         1         1
##     246.8    249.81    253.54    257.28    258.99    264.26    264.32
##         1         1         1         1         1         1         1
##    265.16    267.18    272.77    273.15    276.68    278.47    282.27
##         1         1         1         1         1         1         1
##    283.02    286.35    286.53    287.89    292.73    294.31    295.54
##         1         1         1         1         1         1         1
##    297.32    298.16     298.3    310.91    320.34     320.5     324.9
##         1         1         1         1         1         1         1
##    325.15    325.71    326.25    328.21    328.44    329.92    331.86
##         1         1         1         1         1         1         1
##    331.99    332.03    332.36    333.01    333.75    338.87    339.47
##         1         2         1         1         1         1         1
##    340.77    342.76    344.05    344.77    350.02    350.97    351.73
##         1         1         1         1         1         1         2
##    352.66    355.55    360.71    364.18    364.78    367.47    372.05
##         1         1         1         1         1         1         1
##    373.66    376.49    378.53     384.9    385.21     387.5    391.59
##         1         3         1         1         1         1         1
##    395.11    396.93    398.87    405.28    407.76    408.48     409.4
##         1         1         1         1         1         1         1
##    416.38    418.67    420.03    420.23    420.61    420.95    423.01
##         1         1         1         1         1         1         2
##    424.78    427.48    427.51    433.26    434.22    436.46    439.97
##         1         1         1         1         1         1         1
```

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```
##    440.97    441.95    442.33    443.65    444.73    452.04    454.49
##         1         1         1         1         1         1         1
##    454.94       457    458.39    459.91    461.49    463.49    465.17
##         1         1         1         1         1         1         1
##    465.46    471.01    473.66     475.1     475.8    477.12    481.84
##         1         1         1         1         1         1         1
##    484.43    489.11    489.73     490.9    492.36    494.23    497.15
##         1         2         1         1         1         1         1
##     499.5     499.7    500.74    505.05     509.3    509.61    511.84
##         1         1         1         1         1         1         1
##    512.02    512.63    516.65    520.36    522.11    524.43    529.04
##         1         1         1         1         1         1         1
##     532.4    537.39    540.41    546.19    556.35    557.22    559.01
##         1         1         1         1         1         1         1
##    561.19    562.58    572.99    576.23    577.07    579.82    580.36
##         1         1         1         1         1         1         1
##     585.6    587.37    592.22    593.13    598.05    605.99    609.26
##         1         2         1         1         1         1         1
##    617.73    622.76    624.48    636.29    638.76    641.92    656.43
##         1         1         1         1         1         1         1
##    658.97    668.87    679.42    692.88    693.26    698.46       704
##         1         1         1         1         1         1         1
##    704.26    705.11    706.57    708.45    709.28    716.39    722.94
##         1         1         1         2         1         1         1
##    724.79    727.21    728.24    737.65    739.41    741.17    742.86
##         1         1         1         2         1         1         1
##    745.19    751.72     752.1    757.26    757.31    759.25    759.42
##         1         1         1         1         1         1         1
##    759.54    762.85    764.54    765.16    766.83    774.08     774.2
##         1         1         1         1         1         1         1
##    786.48    788.18    795.04    800.23       804    808.73    810.01
##         1         1         1         1         1         1         1
##    813.84    824.81    831.93    834.18     835.3     835.9    849.25
##         1         1         1         1         1         1         1
##     851.1    852.35    854.65    858.79    864.47     873.9    887.08
##         1         1         1         1         1         1         1
##    889.47    890.15     890.2    898.48     901.8    908.02    922.15
##         1         1         1         1         1         1         1
##    925.55     932.1    938.06    938.09    939.05    945.12    948.67
##         1         1         1         1         1         1         1
##    948.77    949.63    961.38    966.14    969.18    970.49     975.4
##         1         1         1         1         1         1         1
##    981.36    991.84     999.5   1021.92      1036    1036.3   1039.49
##         1         1         1         1         1         1         1
##   1042.18   1045.15   1047.06      1051   1057.83   1064.28   1072.54
##         1         1         1         1         1         1         1
##      1077   1083.18   1090.49   1101.82    1108.6    1109.7   1115.41
##         1         1         1         1         1         1         1
##    1126.3   1130.83   1137.77   1141.69   1142.88   1146.93   1163.06
##         1         1         1         1         1         1         1
##   1176.06   1179.08      1199   1202.92    1211.8   1215.78   1221.36
##         1         1         1         1         1         1         1
##   1222.82   1227.09   1230.08   1232.72   1234.64   1238.05   1243.67
##         1         1         1         1         1         1         1
```

```
##      1248   1249.79  1265.08  1270.19    1274.3  1274.97  1276.23
##         1         1        1        1         1        1        1
##   1277.15      1286  1289.16  1289.82   1290.77  1298.77  1299.15
##         1         1        1        1         1        1        1
##    1318.9   1321.93  1322.65  1341.83   1350.33  1359.81  1364.93
##         1         1        1        1         1        1        1
##   1371.02   1373.33  1388.84  1403.75   1410.14  1410.35  1410.81
##         1         1        1        1         1        1        1
##   1416.28   1430.89  1430.98  1431.11   1432.71  1441.49  1442.33
##         1         1        1        1         1        1        1
##   1463.44   1485.39   1491.4  1495.58   1498.19  1501.14  1519.25
##         1         1        1        1         1        1        1
##   1522.48   1535.71  1538.75  1556.09    1556.8  1572.66  1573.97
##         1         1        1        1         1        1        1
##   1575.11   1590.43  1595.12  1609.73   1613.05   1661.3  1669.47
##         1         1        1        1         1        1        1
##   1673.66   1701.54  1706.56  1710.05   1722.69  1730.91  1734.68
##         1         1        1        1         1        1        1
##   1752.05   1763.96  1766.75  1779.73   1781.23  1804.22  1810.89
##         1         1        1        1         1        1        1
##   1811.33   1829.74  1829.89  1834.53   1841.35  1845.95  1856.47
##         1         1        1        1         1        1        1
##   1862.21   1872.65  1910.39  1969.84   1981.24   1982.3  1986.16
##         1         1        1        1         1        1        1
##    1987.7    2000.3  2007.23  2008.44   2023.88  2029.64  2031.33
##         1         1        1        1         1        1        1
##   2031.79   2051.63  2062.64  2073.28   2078.01  2090.93  2096.85
##         1         1        1        1         1        1        1
##   2099.47   2119.39   2127.5  2146.52   2172.17  2179.23  2196.31
##         1         1        1        1         1        1        1
##   2207.47   2212.12  2222.35  2227.93   2265.58  2275.59  2275.73
##         1         1        1        1         1        1        1
##   2294.23   2326.83   2366.4  2392.95   2399.46  2406.47  2423.88
##         1         1        1        1         1        1        1
##   2443.91   2460.83  2463.12  2485.88   2492.86  2501.37  2515.62
##         1         1        1        1         1        1        1
##   2570.38   2581.36  2632.12  2638.25   2652.49   2708.9  2716.61
##         1         1        1        1         1        1        1
##   2720.58   2732.83  2734.63  2751.04   2782.42  2793.27   2825.6
##         1         1        1        1         1        1        1
##   2850.33   2855.23  2866.07  2882.08   2907.78  2913.02  2946.38
##         1         1        1        1         1        1        1
##   2972.85   2987.17  2994.51  3003.51   3025.65  3027.78  3038.21
##         1         1        1        1         1        1        1
##   3127.39   3135.16  3137.22  3154.59   3174.33  3176.08  3183.72
##         1         1        1        1         1        1        1
##   3185.79   3193.84  3199.66  3251.34    3255.3   3261.3  3301.17
##         1         1        1        1         1        1        1
##   3305.61    3309.2  3310.23  3322.53   3327.75  3386.12  3397.76
##         1         1        1        1         1        1        1
##   3417.69   3428.78  3466.85  3520.39   3524.46  3636.79  3648.33
##         1         1        1        1         1        1        1
##   3768.26   3785.22  3797.15     3897   3898.81  3903.16  3920.43
##         1         1        1        1         1        1        1
```

```
##      3940.46     3950.85        3954        4084     4102.67     4120.53     4271.85
##            1           1           1           1           1           1           1
##      4464.49     4476.73     4504.33     4535.09     4969.89     4971.52     5018.38
##            1           1           1           1           1           1           1
##       5033.7     5139.26     5256.33      5286.5     5370.39     5372.83     5403.29
##            1           1           1           1           1           1           1
##      5418.25     5429.49     5436.97     5459.95     5548.61     5550.07     5563.62
##            1           1           1           1           1           1           1
##       5564.5     5583.37     5614.17     5620.52      5649.7     5659.83     5666.47
##            1           1           1           1           1           1           1
##      5669.18     5721.14     5857.84     5920.78     5991.41     6025.97     6199.11
##            1           1           1           1           1           1           1
##      6224.56     6232.66     6253.16     6258.62     6272.13     6281.85     6299.07
##            1           1           1           1           1           1           1
##      6322.76     6325.17     6363.97     6398.72     6415.83      6439.5     6488.64
##            1           1           1           1           1           1           1
##      6493.82     6520.04      6521.5     6533.87     6534.72     6534.82     6535.34
##            1           1           1           1           1           1           1
##      6541.27     6569.63     6635.32     6638.67     6650.15     6662.75     6671.41
##            1           1           1           1           1           1           1
##       6703.2     6758.27     6770.32     6781.05     6782.62     6786.28     6792.78
##            1           1           1           1           1           1           1
##      6821.59     6828.42     6832.62     6927.88      6975.5     7037.91      7093.5
##            1           1           1           1           1           1           1
##       7139.9     7145.47     7174.82     7180.12     7220.07     7290.26     7393.65
##            1           1           1           1           1           1           1
##      7396.44     7423.47     7428.99     7431.57     7467.03     7488.05     7522.09
##            1           1           1           1           1           1           1
##      7568.11     7597.53     7603.44     7611.27      7642.3     7730.72      7842.2
##            1           1           1           1           1           1           1
##       7849.1     7922.96     7975.93     7999.64     8002.66     8008.44     8058.73
##            1           1           1           1           1           1           1
##      8123.68        8173        8202        8213     8219.03     8348.05        8364
##            1           1           1           1           1           1           1
##      8509.07     8531.31        8685        8686     8766.72     8771.66     8873.59
##            1           1           1           1           1           1           1
##       8963.5        8981     9118.38     9209.42     9232.26        9277        9452
##            1           1           1           1           1           1           1
##      9497.78     9514.29     9671.85     9692.38        9727     9728.21     9921.99
##            1           1           1           1           1           1           1
##        10101    10109.63    10110.91    10185.76    10235.45    10448.19    10487.59
##            1           1           1           1           1           1           1
##     10520.53    10599.99    10612.42    10662.26    10714.35     10738.4    10837.73
##            1           1           1           1           1           1           1
##     10913.86    10919.71    10950.14    11008.91     11058.4    11092.27    11236.97
##            1           1           1           1           1           1           1
##     11329.61    11337.12    11357.76    11371.07    11438.37    11487.69    11533.99
##            1           1           1           1           1           1           1
##     11661.88    11673.56    11731.26     11734.8    11863.15    11937.86    11989.32
##            1           1           1           1           1           1           1
##     11998.47    12015.68    12057.11    12060.33    12155.36    12168.07    12179.23
##            1           1           1           1           1           1           1
##     12202.11    12314.41    12323.38    12323.48    12379.85     12501.4    12609.76
##            1           1           1           1           1           1           1
```

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```
##    12713.06  12747.46     12815  12875.56  12935.19  12982.74  13037.21
##           1         1         1         1         1         1         1
##    13047.23  13113.92  13162.41  13230.37   13264.9  13272.43  13366.41
##           1         1         1         1         1         1         1
##    13395.01  13403.95  13454.33  13537.87  13572.45  13607.77  13631.18
##           1         1         1         1         1         1         1
##    13639.85  13657.74  13761.43  13782.25  13857.59  13864.05  13873.72
##           1         1         1         1         1         1         1
##    13965.69  13966.05  13996.61  14005.61  14024.42  14147.96  14175.07
##           1         1         1         1         1         1         1
##     14210.2  14230.13  14251.31  14251.47  14331.44   14337.4  14354.74
##           1         1         1         1         1         1         1
##    14498.42  14799.28  15028.19  15096.53  15200.71  15214.52   15224.8
##           1         1         1         1         1         1         1
##    15367.62   15476.7  15615.76  15742.27  15811.55  15871.89  16099.04
##           1         1         1         1         1         1         1
##    16132.19  16198.17  16270.61  16374.63  16563.05  16594.87  16606.97
##           1         1         1         1         2         1         1
##    16650.25  16790.72  16811.38  16850.57  17200.09  17332.44  17415.33
##           1         1         1         1         1         1         1
##    17565.51  17668.16   17679.6  17732.71  17933.09  18261.42  18281.97
##           1         1         2         1         1         1         1
##    18292.67  18505.51  18541.29  18591.09  18690.74  18692.08  18714.64
##           1         1         2         2         1         1         1
##    18850.22  18941.68  19231.95     19271  19303.39  19415.89  19468.58
##           1         2         1         1         1         1         2
##    19721.07  19855.92     19865  19923.82  20034.38   20143.2  20148.98
##           1         2         1         2         1         1         1
##       20188  20236.91  20349.88  20388.59  20398.75  20501.06  20584.24
##           1         1         1         1         1         1         1
##    20653.82  20855.13   20917.6     20965  21040.43  21116.97     21216
##           1         1         1         1         1         1         1
##    21259.26  21508.34  21552.72  21843.44  22344.57  22451.65  22602.77
##           1         1         1         1         1         1         1
##    22805.43  24063.72     24856  25126.67     25136   25166.2  25167.02
##           1         1         1         1         1         1         1
##    25422.52  25508.61  25681.21  26072.23  26104.38  26104.49     26248
##           1         1         1         1         1         1         1
##    26313.05  27032.54  27280.04  27756.39  27921.96  28720.24  29454.88
##           1         1         1         1         1         1         1
##    29597.66  30243.65  30449.93   30663.8  31093.91  31493.31  31501.68
##           1         1         1         1         1         1         1
##    32499.92  33316.59  34540.89  34806.36  35129.57  35132.03  35220.23
##           1         1         1         1         1         1         1
##    35318.92  35692.35  35765.07  35879.39  36447.73  36959.02  36971.09
##           1         1         1         1         1         1         1
##    37020.51  37032.05  37084.54  37154.64  37162.79  38218.56  38347.31
##           1         1         1         1         1         1         1
##    38500.55  39071.17  39631.72  39790.92  39845.77  39894.36  39914.26
##           1         1         1         1         1         1         1
##    40031.29  40192.49  40574.75  41164.82  41494.19  41793.44  42073.83
##           1         1         1         1         1         1         1
##    42652.57  43024.65  43189.04  43350.76  43449.59  44235.18  44954.44
##           1         1         1         1         1         1         1
```

```
##    45327.09    46166.63    46406.61    46596.06    47417.47    48043.85       48178
##           1           1           1           1           1           1           1
##    49180.41    50545.47    51296.32    51775.18    52119.65     55183.3    56143.31
##           1           1           1           1           1           1           1
##    58808.84    62439.91       64715    64910.43       65633       65954       66174
##           1           1           1           1           1           1           1
##     66554.7       67203       67258       67644    68816.48    69581.96    69655.06
##           1           1           1           1           1           1           1
##    69900.51    70902.02    70964.21    71046.79       71192    71236.22    71389.15
##           1           1           1           1           1           1           1
##    71640.74       72629     73665.6       74154       74256    75839.33       76452
##           1           1           1           1           1           1           1
##       77202    77922.77       78244       79394    81422.85       81577       82328
##           1           1           1           1           1           1           1
##    82760.97    82777.86    84315.37    84547.12     84700.1       84816       85009
##           1           1           1           1           1           1           1
##    86195.82    86360.17       86930    87269.89       88241    89646.33       90262
##           1           1           1           1           1           1           1
##       91629     91690.9     92518.8    93210.11    93824.25       93897       93989
##           1           1           1           1           1           1           1
##    94417.66    95418.11    96783.74       96922    97194.49    97384.01       97518
##           1           1           1           1           1           1           1
##    97532.09    97815.78    98350.22    98679.72    98738.77    99715.25   100001.51
##           1           1           1           1           1           1           1
##   100473.63   100742.59      101081      103625   103899.87      107023    108109.7
##           1           1           1           1           1           1           1
##    108694.5      141526      142676      144317      146613      147963      150697
##           1           1           1           1           1           1           1
##      153085   209392.49   218751.88   224272.75   229998.79   230575.03   232178.14
##           1           1           1           1           1           1           1
##   236311.46   240259.87   242123.42   242300.03   248958.59   252075.88   256954.86
##           1           1           1           1           1           1           1
##   261567.48    261667.4   265763.66      274841      284568      290266      297784
##           1           1           1           1           1           1           1
##      309020      322481      338267      352045   358609.81   361966.76      369091
##           1           1           1           1           1           1           1
##   372249.58   377162.12   377926.66      383636   383906.03   389134.37    389966.3
##           1           1           1           1           1           1           1
##   393675.98   399054.14   399962.16   402148.26   407731.29   408679.95   411422.55
##           1           1           1           1           1           1           1
##   417509.37    418567.2   430796.21   444547.49   456184.35   469913.64   476558.23
##           1           1           1           1           1           1           1
##   483524.84   496066.46   522720.33   523922.06   524006.33   525859.13   532380.49
##           1           1           1           1           1           1           1
##    543353.2   551868.65   553241.98   554754.75   556185.86   565569.38   567108.13
##           1           1           1           1           1           1           1
##   580535.08   582204.55   986082.66  1001514.67  1028595.97  1041576.67  1043842.25
##           1           1           1           1           1           1           1
## 1058398.22  1071957.52   1074381.4  1086019.02  1100315.44  1102896.79  1121902.15
##           1           1           1           1           1           1           1
## 1136718.59  1139451.42  1155302.55  1171170.68  1174143.54  1177858.74  1213033.51
##           1           1           1           1           1           1           1
##  1245981.9  1285398.21  1290781.83   1331242.9  1333671.16  1397068.08  1404949.74
##           1           1           1           1           1           1           1
```

```
##   1405544.6 1407857.52 1435453.13 1471573.21    1474601 1479348.83 1483058.05
##           1          1          1          1          1          1          1
## 1486241.77 1519632.22 1522959.97 1570018.47 1573542.93       <NA>
##           1          1          1          1          1        694
```

- Observamos que tenemos **694 valores perdidos**.Guardamos en la variable **idx** los índices de los registros con valores **NA** de la variable **Value**.

```
idx<-which(is.na(gasto_pro$Value))
length(idx)
```
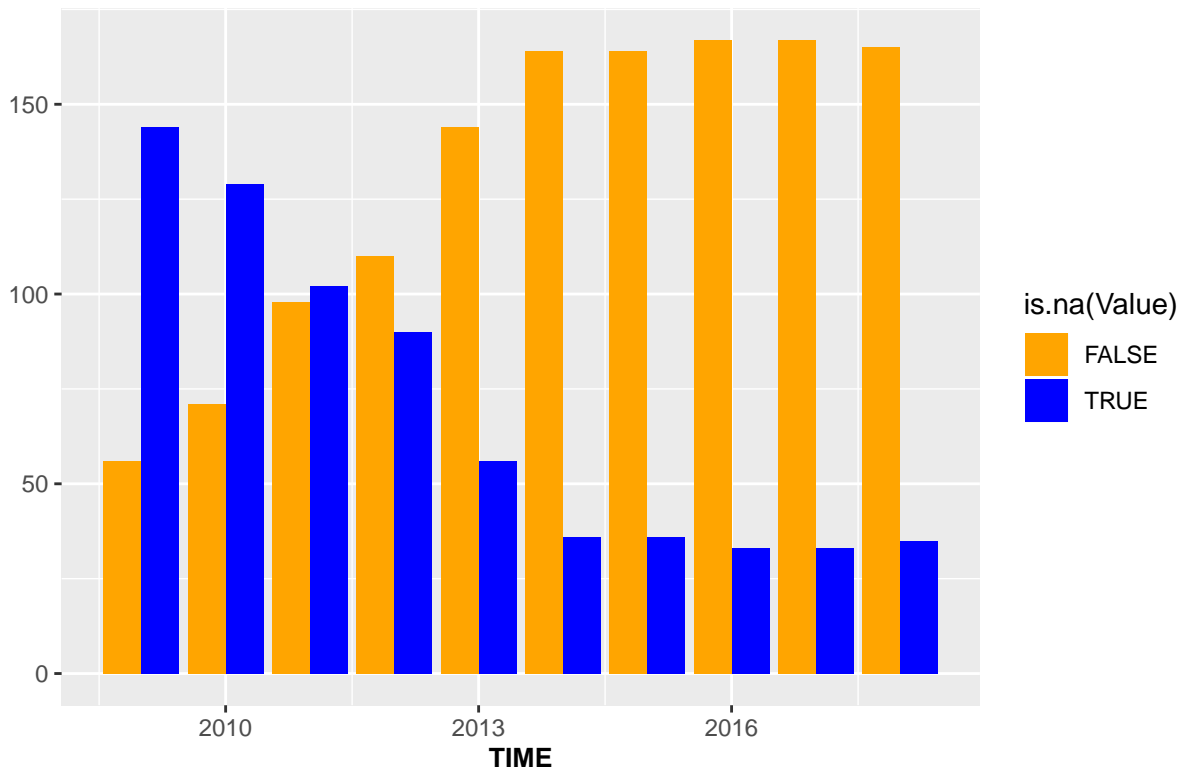
```
## [1] 694
```

- Grafiquemos la información que contiene la variable **Value**

```
library(ggplot2)
library(scales)
g = ggplot(gasto_pro, aes(TIME, fill=is.na(Value)) ) +
labs(title = "Valores Nulos")+ylab("") +
theme(plot.title = element_text(size = rel(2), colour = "blue"))

g+geom_bar(position="dodge") + scale_fill_manual(values = alpha(c("orange", "blue"), 1)) +
theme(axis.title.x = element_text(face="bold", size=10))
```


- En caso de detectar algún valor anómalo (en nuestro caso los NAS) en las variables tendríamos que realizar una imputación de esos valores o bien sustituyéndolos por la media o usando el algoritmo KNN (k-Nearest Neighbour) con los 3 vecinos más cercanos usando la distancia que consideremos, en este caso usaremos Gower(Mediana), por ser una medida más robusa frente a extremos.

```r
library(VIM)
```

Loading required package: colorspace

Loading required package: grid

VIM is ready to use.

Suggestions and bug-reports can be submitted at: https://github.com/statistikat/VIM/issues

##
Attaching package: 'VIM'

The following object is masked from 'package:datasets':
##
sleep

```r
output<-kNN(gasto_pro, variable=c("Value"),k=3)
gasto_pro<-output
```

- Comprobamos que no tenemos valores nulos después de la imputación

```r
g = ggplot(gasto_pro, aes(TIME, fill=is.na(Value)) ) +
labs(title = "Valores Nulos")+ylab("") +
theme(plot.title = element_text(size = rel(2), colour = "blue"))

g+geom_bar(position="dodge") + scale_fill_manual(values = alpha(c("orange", "blue"), 1)) +
theme(axis.title.x = element_text(face="bold", size=10))
```
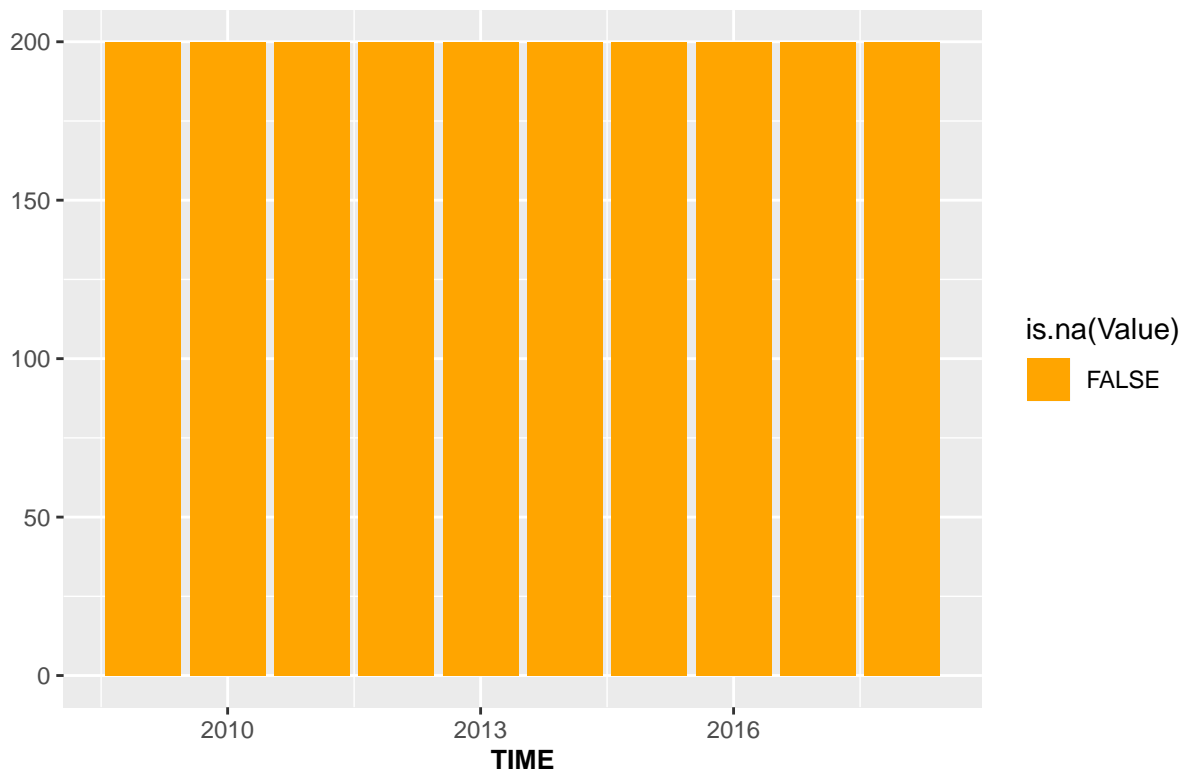

- Con el siguiente gráfico, observaremos que la variable **Value** tiene outliers o valores extremos:

```r
boxplot(gasto_pro$Value, main="Value")
```

Value
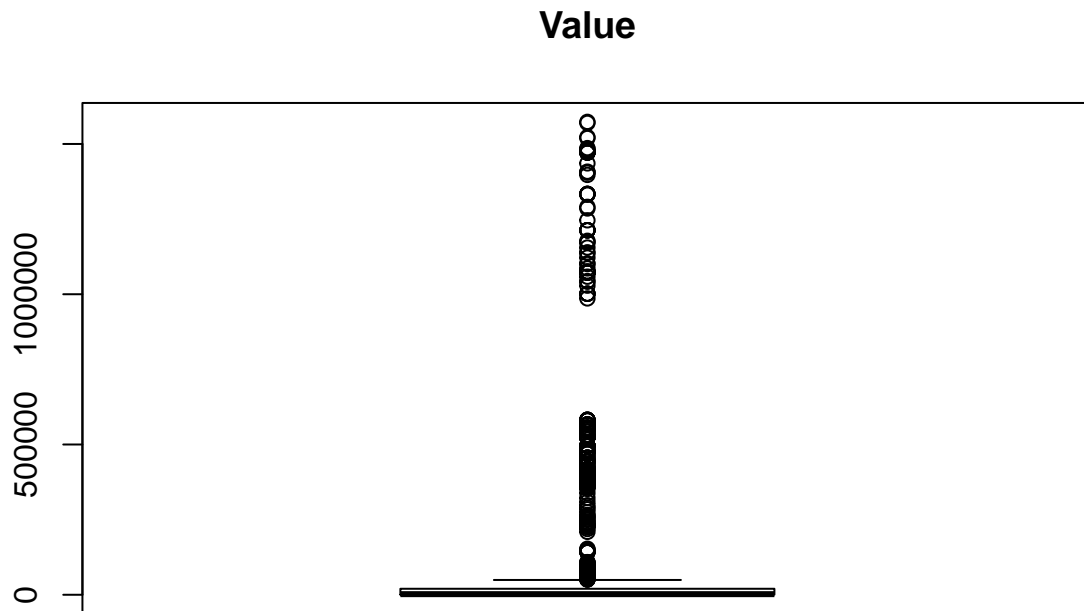
- Por otro lado, revisamos para el resto de columnas si tenemos valores NA.(desconocidos o perdidos)

```r
table(gasto_pro$TIME, useNA = "ifany")
```

```
##
## 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
##  200  200  200  200  200  200  200  200  200  200
```

```r
table(gasto_pro$GEO, useNA = "ifany")
```

```
##
##                        Austria
##                             50
##                        Belgium
##                             50
##         Bosnia and Herzegovina
##                             50
##                       Bulgaria
##                             50
##                        Croatia
##                             50
##                         Cyprus
##                             50
##                        Czechia
##                             50
```

```
##                                             Denmark
##                                                   50
##                                              Estonia
##                                                   50
##                 Euro area - 12 countries (2001-2006)
##                                                   50
##                     Euro area - 18 countries (2014)
##                                                   50
##                 Euro area - 19 countries  (from 2015)
##                                                   50
##           European Union - 15 countries (1995-2004)
##                                                   50
##           European Union - 27 countries (2007-2013)
##                                                   50
##           European Union - 27 countries (from 2020)
##                                                   50
##           European Union - 28 countries (2013-2020)
##                                                   50
##                                              Finland
##                                                   50
##                                               France
##                                                   50
## Germany (until 1990 former territory of the FRG)
##                                                   50
##                                               Greece
##                                                   50
##                                              Hungary
##                                                   50
##                                              Iceland
##                                                   50
##                                              Ireland
##                                                   50
##                                                Italy
##                                                   50
##                                               Latvia
##                                                   50
##                                        Liechtenstein
##                                                   50
##                                            Lithuania
##                                                   50
##                                           Luxembourg
##                                                   50
##                                                Malta
##                                                   50
##                                          Netherlands
##                                                   50
##                                               Norway
##                                                   50
##                                               Poland
##                                                   50
##                                             Portugal
##                                                   50
##                                              Romania
##                                                   50
```

```
##                                       Slovakia
##                                             50
##                                       Slovenia
##                                             50
##                                          Spain
##                                             50
##                                         Sweden
##                                             50
##                                    Switzerland
##                                             50
##                                 United Kingdom
##                                             50
```

```r
table(gasto_pro$UNIT, useNA = "ifany")
```

```
##
## Million euro
##         2000
```

```r
table(gasto_pro$ICHA11_HP, useNA = "ifany")
```

```
##
##                         All providers of health care
##                                                   400
##                                     General hospitals
##                                                   400
##                                             Hospitals
##                                                   400
##                               Mental health hospitals
##                                                   400
## Specialised hospitals (other than mental health hospitals)
##                                                   400
```

Observamos que no existen ahora valores perdidos después de la imputación.La suma de las cantidades de cada variable, suman el total.

- Finalmente, creamos un fichero con toda la información corregida.

```r
write.csv(gasto_pro, file="GastoSanitario_Proveedor_clean.csv", row.names = FALSE)
```