A1.Gasto Sanitario por Función

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Contents

1.PROCESAMIENTO DE LOS DATOS.

- En primer lugar leemos el fichero:

```
gasto_fun<-read.csv("C:/temp/GastoSanitario_Funcion.csv",sep= ",")
```

- Realicemos una breve inspección de los datos:

```
str(gasto_fun)
```

```
## '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_HC         : Factor w/ 5 levels "Curative care",..: 3 2 1 4 5 3 2 1 4 5 ...
##  $ Value             : Factor w/ 1378 levels ":","1 001 514.67",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ Flag.and.Footnotes: Factor w/ 2 levels "","b": 1 1 1 1 1 1 1 1 1 1 ...
```

```
colnames(gasto_fun) #Nombre de las variables
```

```
## [1] "TIME"               "GEO"                "UNIT"
## [4] "ICHA11_HC"          "Value"              "Flag.and.Footnotes"
```

```
nrow(gasto_fun) #Número de registros
```

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

```
ncol(gasto_fun) #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_HC**: variable cualitativa. Indica cómo se aplica el gasto sanitario por función.
- **Value**: Variable cuantitativa. Indica el valor en Millones de Euros de este gasto por función.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:

```
unique(gasto_fun$TIME)
```

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

*Paises:

```r
unique(gasto_fun$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_fun$UNIT)
```

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

*Variable que indica cómo se aplica el gasto sanitario.

```r
unique(gasto_fun$ICHA11_HC)
```

```
## [1] Current health care expenditure (CHE)
```

```
## [2] Curative care and rehabilitative care
## [3] Curative care
## [4] Inpatient curative and rehabilitative care
## [5] Inpatient curative care
## 5 Levels: Curative care ... Inpatient curative care
```

- Eliminamos la columna Fal.and.footnotes.

```
gasto_fun<-gasto_fun[,-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_fun$Value<-as.character(gasto_fun$Value)
gasto_fun$Value<-(gsub(',','.',gasto_fun$Value) )
gasto_fun$Value<-(gsub(' ','',gasto_fun$Value) )
gasto_fun$Value<-as.numeric(gasto_fun$Value)
```

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

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

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

```
##
##      70.51       70.7      79.23      79.41      79.85      79.94      82.68
##          1          1          1          1          1          1          1
##      84.22      88.96       89.4      90.39      94.64     140.24     154.02
##          1          1          1          1          1          1          1
##     157.24     166.27     174.11      175.6     175.95     177.38     177.86
##          1          1          1          1          1          1          1
##     178.51     179.89     193.03     197.21     198.57     199.95     202.63
##          1          1          1          1          1          1          1
##     207.39     207.86     218.87     220.38     221.62     225.86     229.26
##          1          1          1          1          1          1          1
##     232.95     243.25     245.83      247.4     247.97     248.56     249.15
##          1          1          1          1          1          1          1
##     252.35     252.81     253.54     257.19     264.88      269.7     270.16
##          1          1          1          1          1          1          1
##     273.78     275.47     276.68     277.25     279.79     282.84     283.02
##          1          1          1          1          1          1          1
##     284.15     291.18      291.9     293.54     296.03     296.62     299.19
##          1          1          1          1          1          1          1
##     300.49     303.97     310.45     314.57     316.95     318.69      320.5
##          1          1          1          1          1          1          1
##     321.83      324.9      325.4     325.68     325.71     327.85     329.92
##          1          1          1          1          1          1          1
##     331.96     339.92      349.6     349.79        350     352.27     354.85
##          1          1          1          1          1          1          1
##     355.29     358.94     361.48     362.46     365.72      369.1     373.64
##          1          1          1          1          1          1          1
##     374.19     374.82     376.51     378.69     379.28     381.93     385.01
##          1          1          1          1          1          1          1
##     386.34        391     391.02      391.3     394.71     397.73     404.01
##          1          1          1          1          1          1          1
##     406.87      410.5     414.01     415.46     417.94     418.24     426.21
##          1          1          1          1          1          1          1
```

```
##     437.44     437.93     442.28     443.94     444.94     453.06     457.09
##          1          1          1          1          1          1          1
##     467.36     473.58     477.44     481.37     486.81      498.3     498.88
##          1          1          1          1          1          1          1
##     499.18     499.97     508.86     509.67     511.05     514.61     519.45
##          1          1          1          1          1          1          1
##     523.52     525.08     527.56     527.85     529.87     533.71     534.32
##          1          1          1          1          1          1          1
##     537.15     544.25     545.12     549.25     553.46     560.61     561.55
##          1          1          1          1          1          1          1
##     562.57     574.87     582.07     582.72     589.71     590.42     603.61
##          1          1          1          1          1          1          1
##     610.66     617.54     618.56     619.19     620.63     624.19     629.61
##          1          1          1          1          1          1          1
##     632.53     633.38     639.95     640.26     640.73      641.1     641.76
##          1          1          1          1          1          1          1
##     650.58     652.62     652.78     654.68     656.53      664.5     667.33
##          1          1          1          1          1          1          1
##     670.13     670.75     676.01     676.13      679.1     684.05     684.13
##          1          1          1          1          1          1          1
##     685.76     686.47     689.73     692.84      694.3     694.41     696.15
##          1          1          1          1          1          1          1
##     699.66     700.57     702.53     705.34     709.59     710.18      710.3
##          1          1          1          1          1          1          1
##     722.33     724.82     726.24     726.79     731.69     739.41     739.48
##          1          1          1          1          1          1          1
##     740.22     740.63     740.68     741.36     745.06     745.96     746.56
##          1          1          1          1          1          1          1
##     748.44     749.78     751.96     752.06     761.67     762.91     763.08
##          1          1          1          1          1          1          1
##     764.97     767.16      770.7     774.98     779.03     781.05     782.45
##          1          1          1          1          1          1          1
##     783.79     786.15      793.1     795.04     798.23     801.67     801.69
##          1          1          1          1          1          1          1
##     803.76     804.74     808.76     820.06     820.81      821.3      829.3
##          1          1          1          1          1          1          1
##     835.76     845.49     846.73     851.57     854.08     857.73     869.75
##          1          1          1          1          1          1          1
##      879.4     883.38     887.01     889.47     898.48     899.49     901.45
##          1          1          1          1          1          1          1
##      907.6     909.69     910.51      916.8     925.55     931.47     931.66
##          1          1          1          1          1          1          1
##      932.1     932.22     939.05     945.12      955.4     959.59     960.47
##          1          1          1          1          1          1          1
##     964.45     968.36     970.49     978.25     991.84     995.38     999.27
##          1          1          1          1          1          1          1
##    1003.69     1003.9    1004.15    1007.56    1029.26    1038.25    1042.18
##          1          1          1          1          1          1          1
##     1042.3    1045.15    1047.44     1050.7    1069.68    1077.84    1089.97
##          1          1          1          1          1          1          1
##     1092.5    1093.12    1093.37    1098.03     1108.6     1109.7    1116.77
##          1          1          1          1          1          1          1
##    1134.58    1136.58    1137.77    1142.45    1156.42    1192.78    1194.02
##          1          1          1          1          1          1          1
```

```
##  1194.24  1198.61  1200.14   1211.8  1227.09  1232.72  1234.64
##        1        1        1        1        1        1        1
##  1247.53  1249.79  1263.17  1265.08   1274.3  1274.97  1277.15
##        1        1        1        1        1        1        1
##  1289.16  1289.82  1290.77  1302.82  1305.46   1318.9  1322.65
##        1        1        1        1        1        1        1
##  1325.36  1326.96   1327.2  1350.33  1350.97  1360.66  1361.01
##        1        1        1        1        1        1        1
##  1364.93  1369.89  1374.97  1388.84  1406.06  1407.85  1410.14
##        1        1        1        1        1        1        1
##  1410.81  1415.85  1426.48  1430.98  1432.02  1432.71  1438.34
##        1        1        1        1        1        1        1
##  1441.84  1448.32   1449.8  1454.31  1463.24  1475.85  1476.95
##        1        1        1        1        1        1        1
##  1493.35  1503.17  1510.06  1519.25  1521.82  1522.48  1529.55
##        1        1        1        1        1        1        1
##  1531.85  1534.61  1534.73  1555.56  1555.87  1556.09  1557.77
##        1        1        1        1        1        1        1
##  1568.48   1569.2  1572.65  1572.66  1607.79  1608.72  1609.06
##        1        1        1        1        1        1        1
##  1609.73  1609.99  1610.43  1610.48  1623.96  1636.07  1638.15
##        1        1        1        1        1        1        1
##  1642.64   1654.3  1666.82  1667.96  1675.25  1681.94  1708.14
##        1        1        1        1        1        1        1
##  1715.82  1716.13  1717.67  1726.84  1730.93  1734.68  1740.79
##        1        1        1        1        1        1        1
##  1742.69  1752.83  1767.62  1772.37  1775.08  1775.25  1781.95
##        1        1        1        1        1        1        1
##  1804.22  1806.74  1810.89  1820.78  1834.32  1835.11  1842.82
##        1        1        1        1        1        1        1
##  1855.73  1862.21  1862.67  1871.95   1879.4  1891.42  1909.96
##        1        1        1        1        1        1        1
##  1910.05  1910.39   1919.4  1936.41  1942.66  1946.54   1959.7
##        1        1        1        1        1        1        1
##  1962.09  1981.24  1987.23  1996.37  2000.78  2006.41  2012.98
##        1        1        1        1        1        1        1
##  2013.92  2024.35  2031.79  2046.92  2057.48  2096.85  2126.88
##        1        1        1        1        1        1        1
##  2131.08  2138.73  2144.43  2146.52  2194.46  2201.73   2223.5
##        1        1        1        1        1        1        1
##  2235.84  2265.58  2312.04  2371.31  2407.83  2423.88  2463.12
##        1        1        1        1        1        1        1
##  2478.92  2532.98  2541.21  2570.38  2581.36  2615.61  2638.25
##        1        1        1        1        1        1        1
##  2657.63  2664.47  2665.54  2678.67  2684.93  2695.35  2696.89
##        1        1        1        1        1        1        1
##  2708.07   2708.9  2709.57  2718.47  2727.35  2732.83  2745.32
##        1        1        1        1        1        1        1
##  2749.67  2751.04  2752.49  2758.15  2792.01  2826.82  2838.16
##        1        1        1        1        1        1        1
##  2838.54  2843.22  2844.01  2849.05  2849.82  2850.33  2855.23
##        1        1        1        1        1        1        1
##  2865.44   2871.5  2901.69  2907.78  2914.26  2923.72  2946.38
##        1        1        1        1        1        1        1
```

```
##    2961.77    2970.55    2971.72    2972.85     2978.2    2982.27    2982.34
##          1          1          1          1          1          1          1
##    2987.17    3003.51     3008.9    3022.05    3027.78    3033.75    3043.39
##          1          1          1          1          1          1          1
##    3075.55    3078.74    3083.64     3085.1    3117.22    3122.19    3134.48
##          1          1          1          1          1          1          1
##    3174.33    3180.03    3183.72    3185.79    3199.66    3223.69    3230.05
##          1          1          1          1          1          1          1
##    3286.49    3305.61     3309.2    3327.75    3375.86    3380.47    3383.49
##          1          1          1          1          1          1          1
##    3386.12    3424.06    3428.09    3428.78    3438.14    3515.64    3520.39
##          1          1          1          1          1          1          1
##    3524.46     3537.1    3609.32    3626.78    3636.79    3644.34    3645.27
##          1          1          1          1          1          1          1
##    3674.62     3689.1    3722.95    3781.18    3797.15    3814.98    3840.77
##          1          1          1          1          1          1          1
##    3868.83    3878.41    3897.18     3898.8    3929.24    3955.48    3966.79
##          1          1          1          1          1          1          1
##    3981.15    4023.91    4079.23    4111.88    4120.53    4147.06    4213.64
##          1          1          1          1          1          1          1
##    4263.11    4270.49    4271.74    4408.97    4409.36    4424.37    4433.68
##          1          1          1          1          1          1          1
##     4453.2    4454.94    4473.48    4490.29    4500.24    4542.19    4587.13
##          1          1          1          1          1          1          1
##    4591.09    4631.01    4642.08    4668.58    4685.47    4693.03    4752.04
##          1          1          1          1          1          1          1
##    4779.58    4804.78    4866.63     4893.7    4898.13    4981.47    5077.71
##          1          1          1          1          1          1          1
##    5256.33    5258.72    5339.38    5418.25    5550.07    5583.37    5666.47
##          1          1          1          1          1          1          1
##    5719.96    5721.14    5794.71     5882.2    5898.35    5905.25    5940.23
##          1          1          1          1          1          1          1
##    5960.18    5968.01    5991.41    5997.15    6002.84    6005.52    6073.26
##          1          1          1          1          1          1          1
##    6083.22    6111.12    6119.85    6130.85    6199.11    6240.86    6278.55
##          1          1          1          1          1          1          1
##    6281.85     6438.1    6529.74    6545.97    6664.54    6689.46    6705.95
##          1          1          1          1          1          1          1
##    6728.05    6736.15    6832.62     7008.4    7083.67    7097.67    7162.92
##          1          1          1          2          1          1          2
##    7177.57    7184.58    7233.54     7357.2    7395.51    7396.44    7428.99
##          2          2          2          1          2          1          1
##    7431.57     7449.6    7467.03    7488.05    7518.47    7567.56    7568.11
##          1          1          1          1          2          2          1
##     7642.3    7655.15    7655.19    7730.72    7922.96    7973.77    7975.02
##          1          1          1          1          1          1          1
##    8123.68    8156.45    8161.78    8392.73    8472.46    8478.03    8492.45
##          1          1          1          1          1          1          1
##    8500.55    8508.72    8509.07    8531.31    8550.44    8612.36    8683.29
##          1          1          1          1          1          1          1
##    8685.66    8686.14    8686.64    8699.04    8719.27    8727.69    8728.97
##          1          1          1          1          1          1          1
##    8737.91    8746.76    8757.97    8765.23    8774.24    8778.55    8789.69
##          1          1          1          1          1          1          1
```

```
##    8825.26     8832.4     8842.9    8851.12    8861.56    8868.22    8868.78
##          1          1          1          1          1          1          1
##    8914.91     8963.5    9070.05    9162.95    9165.23     9184.5     9212.5
##          1          1          1          1          1          1          1
##    9218.74    9266.42    9277.32    9311.54    9322.54    9359.63    9376.86
##          1          1          1          1          1          1          1
##    9407.45    9504.69    9517.86    9525.89    9533.83    9553.72    9589.28
##          1          1          1          1          1          1          1
##    9589.39     9598.4    9600.47    9644.18    9662.26    9671.85    9679.76
##          1          1          1          1          1          1          1
##    9760.23     9785.1    9802.62    9818.06     9850.8    9854.81    9933.07
##          1          1          1          1          1          1          1
##    9955.94    9968.09     9991.5   10023.74   10039.02   10081.61   10101.32
##          1          1          1          1          1          1          1
##    10113.5   10115.93   10134.28   10142.04   10180.91   10223.87    10227.9
##          1          1          1          1          1          1          1
##   10231.97   10236.64   10317.39   10326.96   10326.97   10340.96   10346.97
##          1          1          1          1          1          1          1
##    10363.9   10379.69   10448.36   10454.87   10457.32   10463.38   10509.45
##          1          1          1          1          1          1          1
##   10517.81   10546.27      10600   10606.94   10613.45      10682    10705.7
##          1          1          1          1          1          1          1
##   10774.99   10794.54   10798.64   10800.99    10811.9   10837.66   10924.95
##          1          1          1          1          1          1          1
##   10931.21   11002.17   11020.55   11030.12   11067.97   11076.06   11089.93
##          1          1          1          1          1          1          1
##   11098.78   11131.32    11154.3   11156.38   11295.58   11355.74   11371.07
##          1          1          1          1          1          1          1
##   11420.73   11431.93   11468.16   11568.78   11601.48   11636.22    11692.4
##          1          1          1          1          1          1          1
##   11699.59   11702.65   11741.64   11813.53   11818.86   11973.41   11989.32
##          1          1          1          1          1          1          1
##   12026.84   12036.52   12093.24   12110.96   12171.97   12202.11   12216.64
##          1          1          1          1          1          1          1
##    12297.8   12314.41    12334.4   12394.05    12404.5   12503.94   12506.76
##          1          1          1          1          1          1          1
##   12535.74   12542.78   12545.84   12546.42   12578.67   12609.76   12668.17
##          1          1          1          1          1          1          1
##   12698.58   12715.62   12727.77   12731.57   12797.14   12974.46      12996
##          1          1          1          1          1          1          1
##   13035.33      13240   13253.56   13300.59   13310.17   13325.17      13365
##          1          1          1          1          1          1          1
##   13428.86   13717.63    13720.9   13760.32      13772   13864.05   13902.12
##          1          1          1          1          1          1          1
##   13971.84   14024.42      14026   14047.46   14055.96   14067.48   14111.58
##          1          1          1          1          1          1          1
##   14128.51   14164.09    14210.2   14251.47   14354.74      14437   14498.42
##          1          1          1          1          1          1          1
##   14541.32   14544.86   14569.44   14765.03   14787.85   14899.99      14912
##          1          1          1          1          1          1          1
##   14961.87   15028.19   15038.47   15122.67   15128.91   15245.48   15313.49
##          1          1          1          1          1          1          1
##    15476.7   15478.29   15549.91   15566.94   15615.76   15616.07    15698.8
##          1          1          1          1          1          1          1
```

```
##   15728.37   15742.27    15755.9   15772.61   15871.89    15913.2    16039.1
##          1          1          1          1          1          1          1
##   16132.19   16136.76   16152.34   16182.22    16212.4    16427.2   16495.25
##          1          1          1          1          1          1          1
##   16505.51   16573.53   16581.04   16635.84   16650.25    16712.2   16730.01
##          1          1          1          1          1          1          1
##   16737.53   16790.72   16811.38   16821.75    16868.7   16908.38   16909.24
##          1          1          1          1          1          1          1
##   16986.79   17084.32   17196.31   17200.09   17218.47   17259.34   17270.75
##          1          1          1          1          1          1          1
##   17274.65   17332.44   17380.66   17475.06   17502.15   17565.51   17616.95
##          1          1          1          1          1          1          1
##   17653.53   17668.16   17842.21   17889.89   17913.69   17939.56   17950.13
##          1          1          1          1          1          1          1
##   17964.68   17979.27   18019.63   18068.99   18090.42   18261.42   18264.21
##          1          1          1          1          1          1          1
##   18281.97   18292.67   18424.41   18431.69   18505.51   18553.19   18589.89
##          1          1          1          1          1          1          1
##   18671.73   18690.74   18714.64   18831.84   18850.22   18853.57   18880.37
##          1          1          1          1          1          1          1
##   19231.95      19271   19303.39   19318.21   19321.18   19352.96   19397.14
##          1          1          1          1          1          1          1
##   19480.07   19540.78   19679.76   19708.84   20034.38   20105.42    20128.3
##          1          1          1          1          1          1          1
##    20143.2   20236.91   20359.57   20388.59   20398.75    20445.2   20653.82
##          1          1          1          1          1          1          1
##   20938.29   20941.69   21012.56   21116.97   21259.26   21494.72   21508.34
##          1          1          1          1          1          1          1
##   21826.74   22079.94   22238.48   22344.57   22384.02   22451.65    22465.5
##          1          1          2          1          1          1          1
##    22688.5   22854.28   22978.31   23051.63   23064.13   23072.56   23230.08
##          1          1          2          2          2          2          1
##   23617.25   23772.32   23906.54   24013.32    24020.4   24445.55   24584.31
##          1          2          1          1          1          1          2
##   24848.87   24863.61   24917.07   25126.67    25166.2   25167.02   25406.53
##          1          2          1          1          1          1          1
##   25614.75   25681.21   25923.83    26025.3   26072.23   26203.76   26313.05
##          1          1          2          1          1          1          1
##   26550.43   26890.06   27032.54   27280.04   27470.58   27603.75   27756.39
##          1          2          1          1          1          1          1
##   27921.96   28001.05   28084.92   28156.29   28720.24   29454.88   29491.78
##          1          1          1          1          1          1          1
##   29528.06   29597.66   29755.34   29948.06   30243.65   30442.87   30449.93
##          1          1          1          1          1          1          1
##   30543.72   30592.47    30663.8   31093.91   31202.33   31481.53   31493.31
##          1          1          1          1          1          1          1
##   31501.68   31912.51   31991.92   32149.92    32277.1   32499.92   33085.28
##          1          1          1          1          1          1          1
##   33316.59   33319.52   34107.44      34490   34540.89   34753.59   34806.36
##          1          1          1          1          1          1          1
##   34872.39   34952.57   35129.57   35132.03   35220.23   35318.92      35343
##          1          1          1          1          1          1          1
##   35567.28   35692.35   35699.49   35879.39   36288.42   36447.73      36639
##          1          1          1          1          1          1          1
```

```
##   36971.09   37020.51   37162.79      37660   38192.22   38347.31   38436.67
##          1          1          1          1          1          1          1
##      38520   39001.85   39071.17    39185.9   39790.92      39958      40457
##          1          1          1          1          1          1          1
##   40574.75      40795      40885      41034      41126      41444   41494.19
##          1          1          1          1          1          1          1
##   42073.83      42348   43024.65   43449.59   44235.18   45327.09   46166.63
##          1          1          1          1          1          1          1
##   46406.61      46978   47417.47      47965   48043.85      48178   48593.48
##          1          1          1          1          1          1          1
##   48777.99   49180.41   49764.97   50545.47   50790.53   51296.32   51775.18
##          1          1          1          1          1          1          1
##   51801.07   51931.05   52119.65   52731.64   52735.09   53271.07   53393.59
##          1          1          1          1          2          1          1
##   53715.02   53870.58   54581.13   55046.13    55183.3   55356.26   55541.06
##          2          1          2          1          1          2          2
##   55591.76   55849.51   56143.31   56495.08   56626.05   57015.64   58808.84
##          1          2          1          1          2          2          1
##   59676.78   61834.43   62256.26   62279.47   62439.91   63608.56   64910.43
##          2          1          1          2          1          1          1
##   64954.38   66410.25    66554.7      67076   68072.85   68816.48   69519.87
##          1          1          1          1          1          1          1
##   69655.06   69900.51   70207.39      70275   70902.02   70964.21   71046.79
##          1          1          1          1          1          1          1
##   71128.52   71236.22   71640.74   71857.97   72475.39      72510      72629
##          1          1          1          1          1          1          1
##      74256      74268      74687      77115      77202      77889      78223
##          1          1          1          1          1          1          1
##      79760      79951      80315      80341      80893      81316      82352
##          1          1          1          1          1          1          1
##      82356      83192      83278      85135      86441      88527      88615
##          1          1          1          1          1          1          1
##      91297      91745    92518.8   93239.52   93824.25   94417.66      95154
##          1          1          1          1          1          1          1
##   95432.53   97384.01      97440   97532.09   97815.78   98303.06   98350.22
##          1          1          1          1          1          1          1
##   99715.25     100563  101086.09  103589.88  103899.87  106458.48  107793.01
##          1          1          1          1          1          1          1
##   108109.7  110122.51  112057.57  114092.21  114699.39  115369.67  117490.92
##          1          1          1          1          1          1          1
##  121151.32  124822.41  126551.13  128501.19  132228.26  132341.57     132343
##          1          1          1          1          1          1          1
##  134453.25  135823.39  136192.08  137331.85     137635  139688.13     140782
##          1          1          1          1          1          1          1
##     141526     141807  142099.18     142676     144317     144966     146150
##          1          1          1          1          1          1          1
##     146613     147533     147963     150499     150588     150697     153085
##          1          1          1          1          1          1          1
##     154062     156229     159571     161807     165640     168012     171570
##          1          1          1          1          1          1          1
##     172643     177997     178359     182998     189130  209392.49  218751.88
##          1          1          1          1          1          1          1
##  224272.75  229998.79  230575.03  232178.14  236311.46  240259.87  242123.42
##          1          1          1          1          1          1          1
```

```
##  242300.03  248958.59  252075.88  256954.86  261567.48   261667.4  265763.66
##          1          1          1          1          1          1          1
##  269405.47  271396.76     274841  277505.34  280956.15  281576.77  284030.67
##          1          1          1          1          1          1          1
##     284568  287646.05  288322.18     290266  290273.52  294005.17  294768.08
##          1          1          1          1          1          1          1
##  295898.79     297784  299772.89  300540.05  302723.62  306971.42     307823
##          1          1          1          1          1          1          1
##     309020  316338.98     322481  324206.51  331406.66  337290.76     338267
##          1          1          1          1          1          1          1
##  339753.63  348033.69  349351.76     352045   363394.9  364517.07  368911.75
##          1          1          1          1          1          1          1
##   368917.2     369091  369610.05  376350.26     383636  385288.98  386040.94
##          1          1          1          1          1          1          1
##  387207.44  387901.74  394074.94  394799.76  404197.56  404943.52  529351.01
##          1          1          1          1          1          1          1
##   536670.5  550826.77  557800.78  558957.21  566919.51  574309.33   575572.5
##          1          1          1          1          1          1          1
##  581156.68  588920.24  590290.13  596140.21  604208.62  605662.94  612780.82
##          1          1          1          1          1          1          1
##  621568.45  623211.09  631857.35  651214.95  668075.86   689118.5  691676.89
##          1          1          1          1          1          1          1
##  710313.05  717423.88  755408.95  756784.52  758408.48  759413.16  771537.72
##          1          1          1          1          1          1          1
##  791717.21  797030.29  798747.96  802492.85  804267.94  819588.11  821460.06
##          1          1          1          1          1          1          1
##  844140.07  846136.44  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 1213033.52
##          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 1471573.22    1474601 1479348.83 1483058.05
##          1          1          1          1          1          1          1
## 1486241.77 1519632.22 1522959.97 1570018.48 1573542.93       <NA>
##          1          1          1          1          1        595
```

- Observamos que tenemos **595 valores perdidos**.Guardamos en la variable **idx** los índices de los registros con valores **NA** de la variable **Value**.

```
idx<-which(is.na(gasto_fun$Value))
length(idx)
```

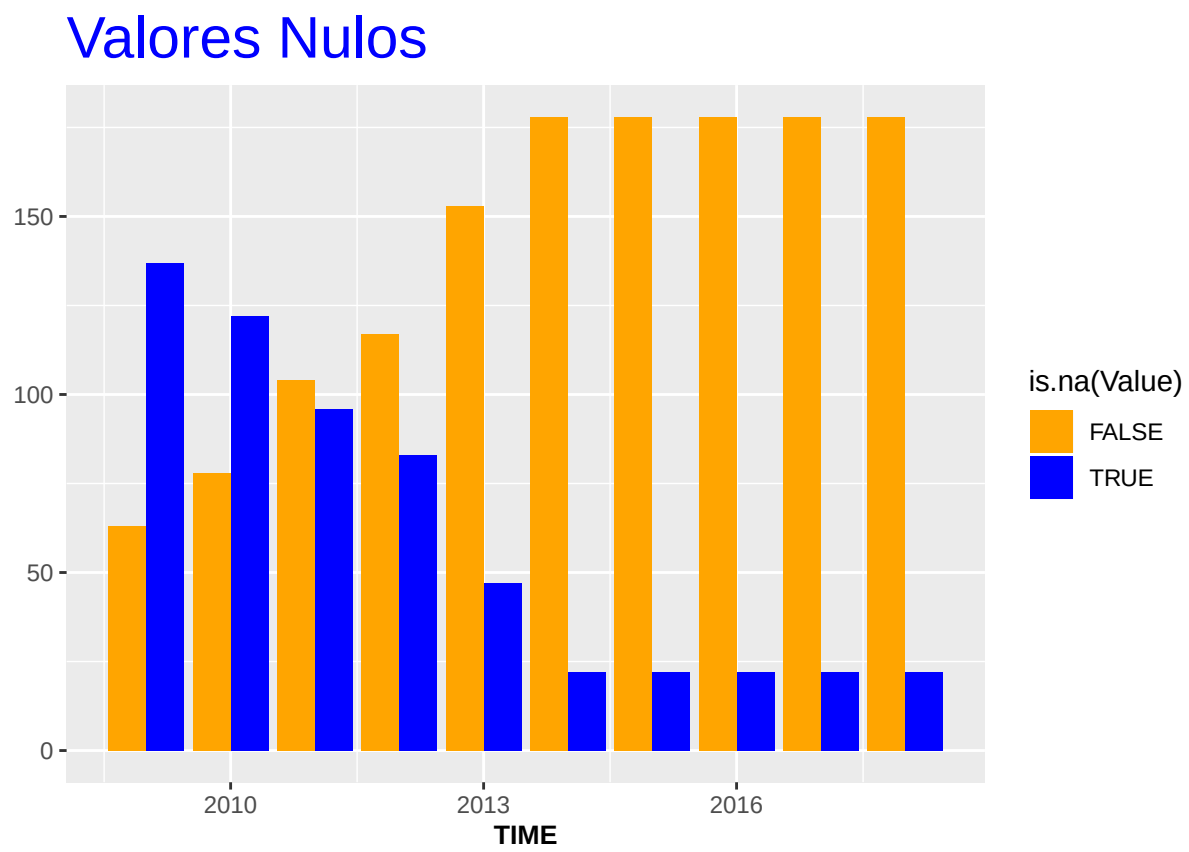
```
## [1] 595
```

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

```
library(ggplot2)
library(scales)
g = ggplot(gasto_fun, 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.

```
library(VIM)
```

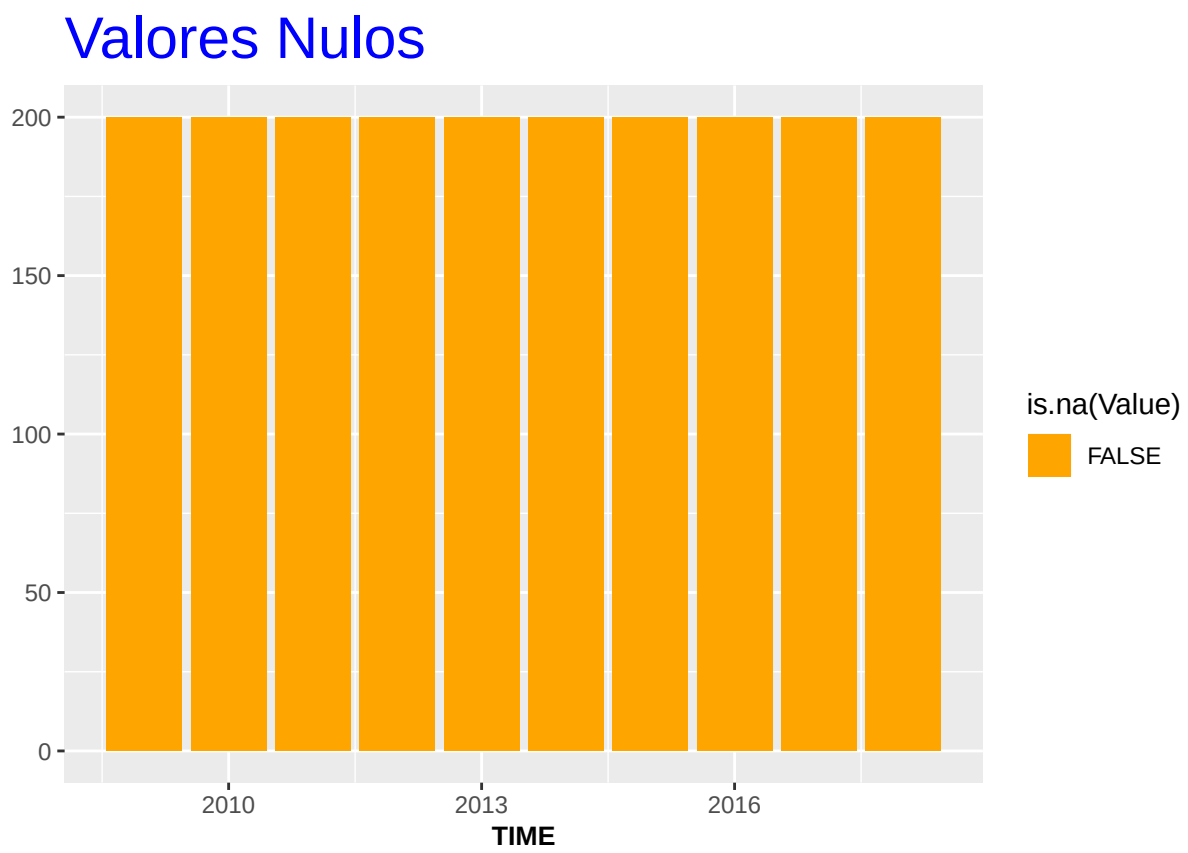
```
## Loading required package: colorspace
## Loading required package: grid
## VIM is ready to use.
## Suggestions and bug-reports can be submitted at: https://github.com/statistikat/VIM/issues
##
## Attaching package: 'VIM'
## The following object is masked from 'package:datasets':
##
##     sleep
```

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

- Comprobamos que no tenemos valores nulos después de la imputación

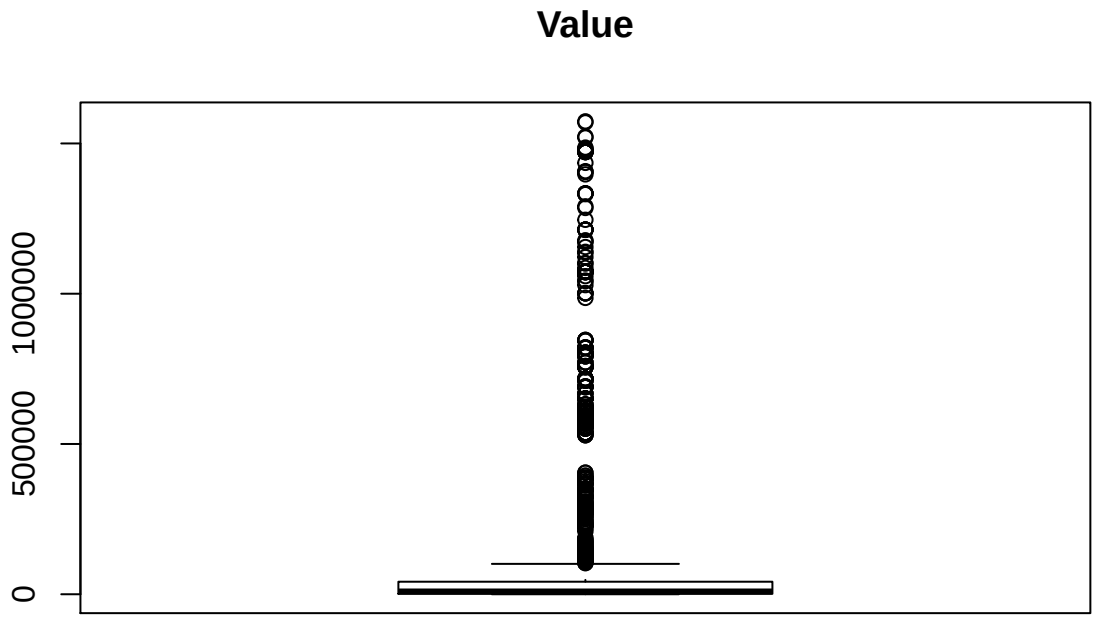
```r
g = ggplot(gasto_fun, aes(TIME, fill=is.na(Value)) ) +
labs(title = "Valores Nulos")+ylab("") +
theme(plot.title = element_text(size = rel(2), colour = "blue"))

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_fun$Value, main="Value")
```



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

```
table(gasto_fun$TIME, useNA = "ifany")
```

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

```
table(gasto_fun$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
```

```
table(gasto_fun$UNIT, useNA = "ifany")
```

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

```
table(gasto_fun$ICHA11_HC, useNA = "ifany")
```

```
##
##                               Curative care
##                                         400
##      Curative care and rehabilitative care
##                                         400
##      Current health care expenditure (CHE)
##                                         400
## Inpatient curative and rehabilitative care
##                                         400
##                     Inpatient curative care
##                                         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.

```
write.csv(gasto_fun, file="GastoSanitario_Funcion_clean.csv", row.names = FALSE)
```