Introduccion manejo de Datos Geoespaciales con R

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Abstract En este NoteBook encontraras codigo para manejar Datos Geoespaciales con R

```
# Install the package if you haven't already
# install.packages("sf")
# install.packages("sf", dependencies = TRUE)
```

```
# Load the library
library(sp)
library(sf)
library(readxl)
```

```
Linking to GEOS 3.12.1, GDAL 3.8.4, PROJ 9.4.0; sf_use_s2() is TRUE
```

https://klaothongchan.medium.com/getting-r-into-vscode-5d1c8bf7f745

```
municipi<-read_sf("../mg_2025_integrado/conjunto_de_datos/00mun.shp")
```

```
#install.packages("geojsonio")
```

```
municipi$geometry
```

```
MULTIPOLYGON (((2488980 1117358, 2489013 111666...

MULTIPOLYGON (((2453327 1143576, 2453363 114357...

MULTIPOLYGON (((2483638 1120034, 2483946 111990...

MULTIPOLYGON (((2481826 1149055, 2481589 114814...
```

```
MULTIPOLYGON (((2476760 1150329, 2476784 115031...

Registered S3 method overwritten by 'geojsonsf':
  method        from
  print.geojson geojson
```

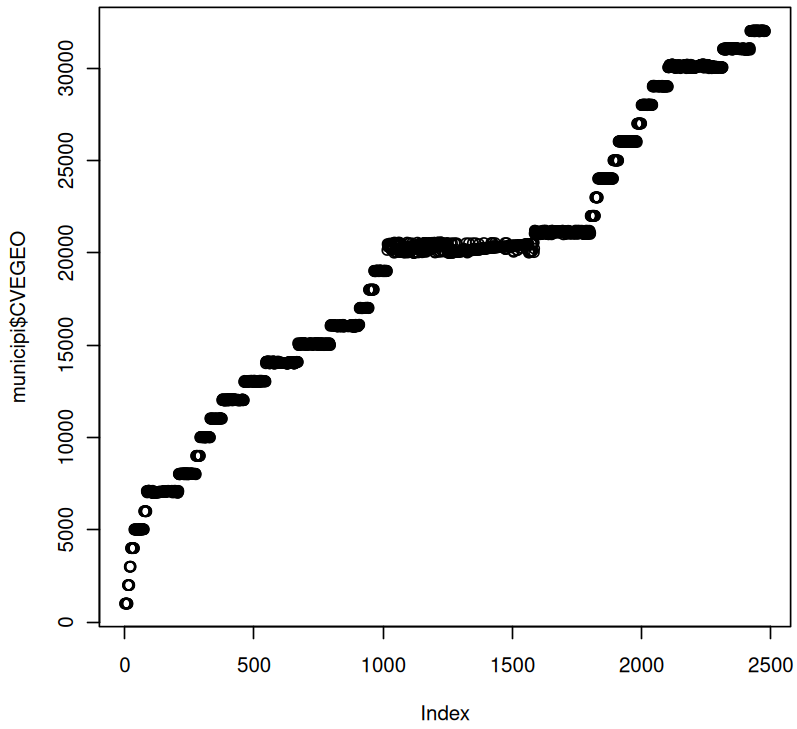
```
Geometry set for 2478 features
Geometry type: MULTIPOLYGON
Dimension:     XY
Bounding box:  xmin: 911292 ymin: 319149.1 xmax: 4083063 ymax: 2349615
Projected CRS: MEXICO_ITRF_2008_LCC
First 5 geometries:
```

```
municipi[1:3,]
```

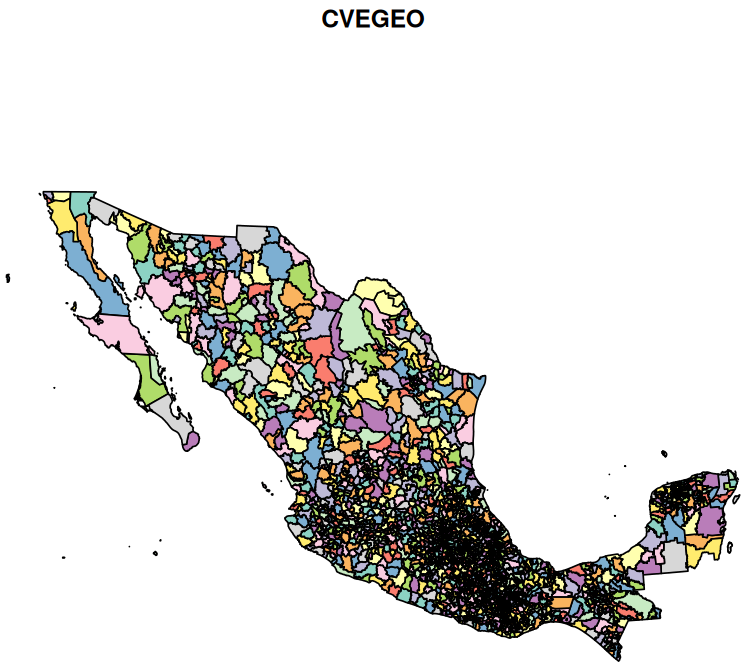
A sf: 3 × 5

CVEGEO <chr>	CVE_ENT <chr>	CVE_MUN <chr>	NOMGEO <chr>	geometry <MULTIPOLYGON [m]>
01001	01	001	Aguascalientes	MULTIPOLYGON (((2488980 111…
01008	01	008	San José de Gracia	MULTIPOLYGON (((2453327 114…
01011	01	011	San Francisco de los Romo	MULTIPOLYGON (((2483638 112…

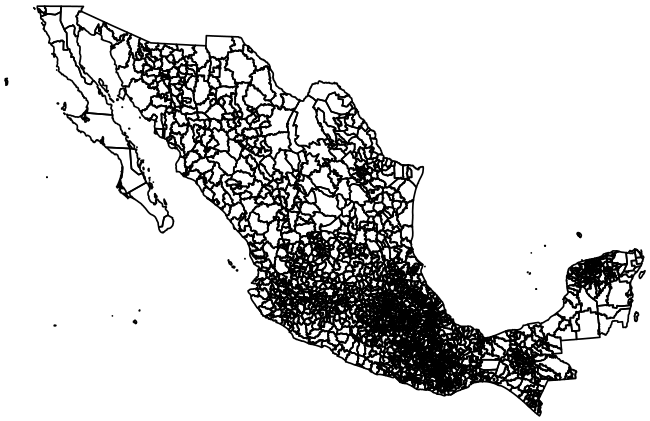
```
plot(municipi$CVEGEO)
```




```
plot(municipi["CVEGEO"])
```

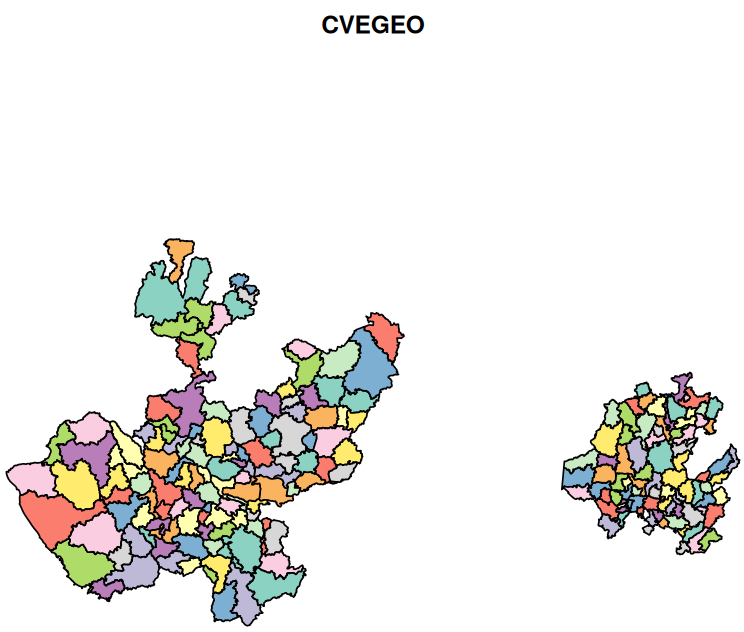



```
plot(municipi$geometry)
```

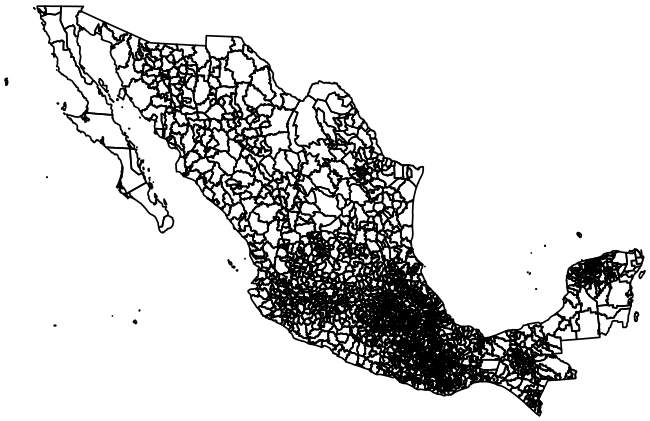


```
Jal_hid<-municipi[municipi$CVE_ENT%in%c(13,14),"CVEGEO"]
```

```
plot(Jal_hid)
```




```
plot(st_geometry(municipi))
```



```
imm<-read_excel("IMM_2020.xlsx",sheet = "IMM_2020")
```

```
summary(imm)
```

```
   CVE_ENT            NOM_ENT            CVE_MUN            NOM_MUN
 Length:2469        Length:2469        Length:2469        Length:2469
 Class :character   Class :character   Class :character   Class :character
 Mode  :character   Mode  :character   Mode  :character   Mode  :character



    POB_TOT            ANALF             SBASC            OVSDE
 Min.   :     81   Min.   : 0.3534   Min.   : 5.535   Min.   : 0.0000
 1st Qu.:   4489   1st Qu.: 4.4278   1st Qu.:35.738   1st Qu.: 0.6519
 Median :  13552   Median : 8.2028   Median :46.339   Median : 1.4283
 Mean   :  51038   Mean   :10.1645   Mean   :45.853   Mean   : 3.1600
 3rd Qu.:  35284   3rd Qu.:13.7873   3rd Qu.:55.856   3rd Qu.: 3.3426
 Max.   :1922523   Max.   :53.0713   Max.   :88.328   Max.   :64.4504
     OVSEE             OVSAE              OVPT             VHAC
 Min.   : 0.0000   Min.   : 0.0000   Min.   : 0.000   Min.   : 3.95
```

```
 1st Qu.: 0.3661   1st Qu.: 0.8785   1st Qu.: 1.655   1st Qu.:18.73
 Median : 0.8282   Median : 2.4523   Median : 4.714   Median :25.00
 Mean   : 1.5008   Mean   : 6.1181   Mean   : 7.987   Mean   :26.57
 3rd Qu.: 1.6783   3rd Qu.: 7.2859   3rd Qu.:11.030   3rd Qu.:32.82
 Max.   :53.0655   Max.   :81.7884   Max.   :68.150   Max.   :69.56
    PL.5000           PO2SM           IM_2020        GM_2020
 Min.   :  0.00   Min.   : 28.45   Min.   :21.41   Length:2469
 1st Qu.: 40.13   1st Qu.: 74.62   1st Qu.:51.84   Class :character
 Median :100.00   Median : 84.64   Median :54.42   Mode  :character
 Mean   : 69.90   Mean   : 82.14   Mean   :53.96
 3rd Qu.:100.00   3rd Qu.: 91.62   3rd Qu.:56.70
 Max.   :100.00   Max.   :100.00   Max.   :62.40
    IMN_2020
 Min.   :0.3352
 1st Qu.:0.8118
 Median :0.8522
 Mean   :0.8449
 3rd Qu.:0.8878
 Max.   :0.9771
```

```
mun <- sp::merge(municipi,imm,by.x ="CVEGEO",by.y = "CVE_MUN")
```

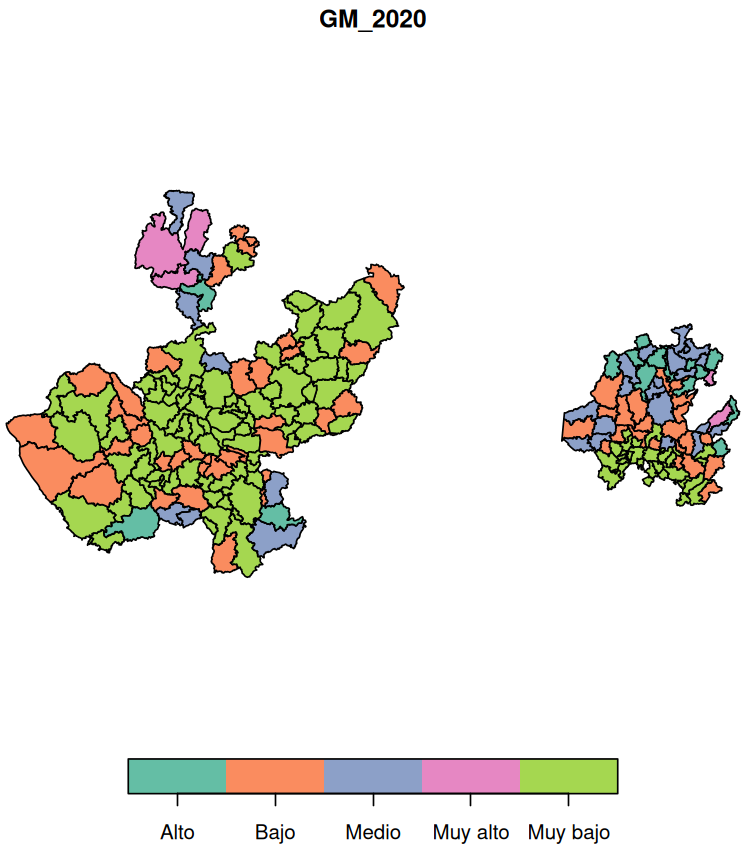
```
summary(mun)
```

```
    CVEGEO           CVE_ENT.x           CVE_MUN             NOMGEO
 Length:2469        Length:2469        Length:2469        Length:2469
 Class :character   Class :character   Class :character   Class :character
 Mode  :character   Mode  :character   Mode  :character   Mode  :character



  CVE_ENT.y           NOM_ENT            NOM_MUN             POB_TOT
 Length:2469        Length:2469        Length:2469        Min.   :     81
 Class :character   Class :character   Class :character   1st Qu.:   4489
 Mode  :character   Mode  :character   Mode  :character   Median :  13552
                                                          Mean   :  51038
                                                          3rd Qu.:  35284
                                                          Max.   :1922523
     ANALF             SBASC            OVSDE             OVSEE
 Min.   : 0.3534   Min.   : 5.535   Min.   : 0.0000   Min.   : 0.0000
 1st Qu.: 4.4278   1st Qu.:35.738   1st Qu.: 0.6519   1st Qu.: 0.3661
 Median : 8.2028   Median :46.339   Median : 1.4283   Median : 0.8282
 Mean   :10.1645   Mean   :45.853   Mean   : 3.1600   Mean   : 1.5008
 3rd Qu.:13.7873   3rd Qu.:55.856   3rd Qu.: 3.3426   3rd Qu.: 1.6783
 Max.   :53.0713   Max.   :88.328   Max.   :64.4504   Max.   :53.0655
     OVSAE              OVPT             VHAC          PL.5000
```

```
 Min.   : 0.0000   Min.   : 0.000   Min.   : 3.95   Min.   :  0.00
 1st Qu.: 0.8785   1st Qu.: 1.655   1st Qu.:18.73   1st Qu.: 40.13
 Median : 2.4523   Median : 4.714   Median :25.00   Median :100.00
 Mean   : 6.1181   Mean   : 7.987   Mean   :26.57   Mean   : 69.90
 3rd Qu.: 7.2859   3rd Qu.:11.030   3rd Qu.:32.82   3rd Qu.:100.00
 Max.   :81.7884   Max.   :68.150   Max.   :69.56   Max.   :100.00
     PO2SM           IM_2020        GM_2020            IMN_2020
 Min.   : 28.45   Min.   :21.41   Length:2469        Min.   :0.3352
 1st Qu.: 74.62   1st Qu.:51.84   Class :character   1st Qu.:0.8118
 Median : 84.64   Median :54.42   Mode  :character   Median :0.8522
 Mean   : 82.14   Mean   :53.96                      Mean   :0.8449
 3rd Qu.: 91.62   3rd Qu.:56.70                      3rd Qu.:0.8878
 Max.   :100.00   Max.   :62.40                      Max.   :0.9771
          geometry
 MULTIPOLYGON :2469
 epsg:NA      :   0
 +proj=lcc ...:   0
```

```
Jal_hid_2<-mun[mun$CVE_ENT.x%in%c(13,14),]
```

```
plot(Jal_hid_2["GM_2020"])
```



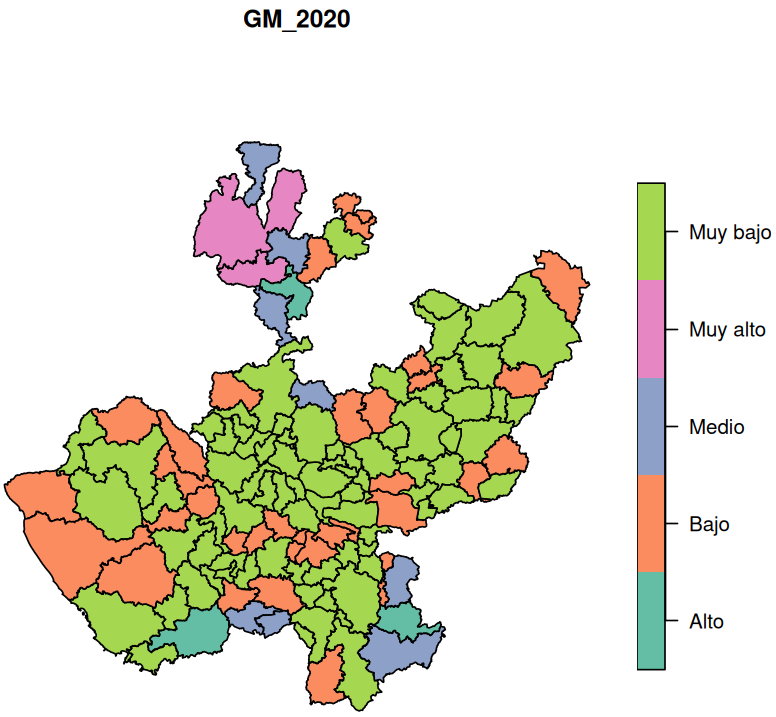

```
Jal<-mun[mun$CVE_ENT.x==14,]
```

```
summary(Jal)
```

```
   CVEGEO            CVE_ENT.x           CVE_MUN             NOMGEO
 Length:125         Length:125         Length:125         Length:125
 Class :character   Class :character   Class :character   Class :character
 Mode  :character   Mode  :character   Mode  :character   Mode  :character



 CVE_ENT.y           NOM_ENT            NOM_MUN             POB_TOT
 Length:125         Length:125         Length:125         Min.   :   1815
 Class :character   Class :character   Class :character   1st Qu.:   7302
 Mode  :character   Mode  :character   Mode  :character   Median :  18982
                                                          Mean   :  66785
                                                          3rd Qu.:  36316
                                                          Max.   :1476491
    ANALF            SBASC           OVSDE              OVSEE
 Min.   : 1.526   Min.   :19.64   Min.   : 0.01041   Min.   : 0.01678
```

```
 1st Qu.: 3.868   1st Qu.:37.85   1st Qu.: 0.29296   1st Qu.: 0.18929
 Median : 5.265   Median :45.58   Median : 0.73813   Median : 0.32410
 Mean   : 5.785   Mean   :43.93   Mean   : 2.34607   Mean   : 1.12907
 3rd Qu.: 6.909   3rd Qu.:50.36   3rd Qu.: 1.68834   3rd Qu.: 0.82588
 Max.   :24.747   Max.   :63.11   Max.   :60.41567   Max.   :30.72658
     OVSAE              OVPT              VHAC          PL.5000
 Min.   : 0.03113   Min.   : 0.2418   Min.   : 8.67   Min.   :5.770e-04
 1st Qu.: 0.46741   1st Qu.: 0.9050   1st Qu.:14.24   1st Qu.:2.600e+01
 Median : 0.81963   Median : 1.4817   Median :17.50   Median :4.292e+01
 Mean   : 1.69010   Mean   : 2.9392   Mean   :18.05   Mean   :5.577e+01
 3rd Qu.: 1.46316   3rd Qu.: 3.2088   3rd Qu.:20.94   3rd Qu.:1.000e+02
 Max.   :31.01290   Max.   :46.0770   Max.   :41.58   Max.   :1.000e+02
     PO2SM          IM_2020        GM_2020             IMN_2020
 Min.   :46.15   Min.   :31.31   Length:125         Min.   :0.4902
 1st Qu.:64.55   1st Qu.:56.04   Class :character   1st Qu.:0.8776
 Median :69.07   Median :57.25   Mode  :character   Median :0.8965
 Mean   :68.84   Mean   :56.62                      Mean   :0.8866
 3rd Qu.:73.72   3rd Qu.:58.18                      3rd Qu.:0.9111
 Max.   :88.57   Max.   :60.76                      Max.   :0.9515
          geometry
 MULTIPOLYGON :125
 epsg:NA      :  0
 +proj=lcc ...:  0
```

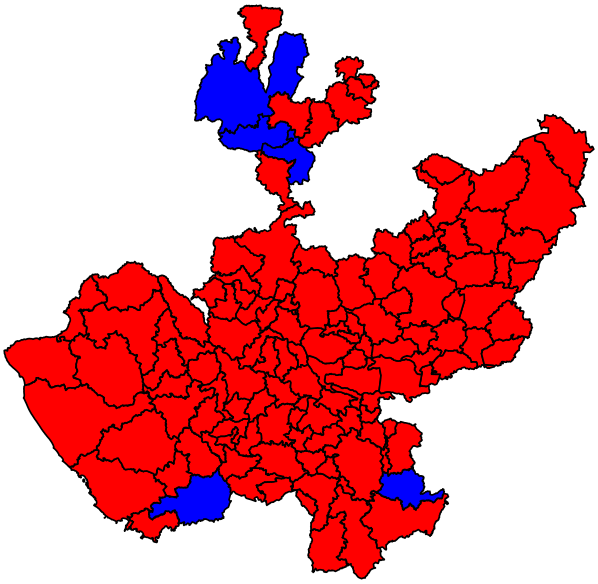
```
plot(Jal["GM_2020"])
```



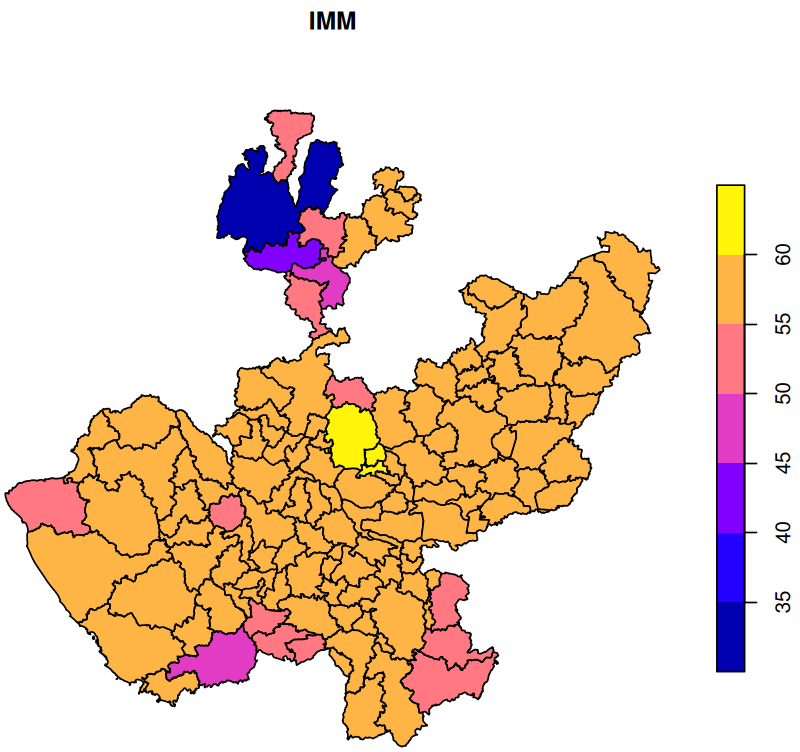

```
#Jal$GM_2020<-factor(Jal$GM_2020,ordered = TRUE, levels = c("Muy
Bajo","bajo","medio","alto","muy alto"))
#plot(Jal["GM_2020"], main = "IMM")
```

```
colores<-ifelse(Jal$GM_2020%in%c("Muy alto","Alto"),"blue","red")
```

```
plot(st_geometry(Jal),col=colores)
```



```
plot(Jal["IM_2020"],main = "IMM")
```



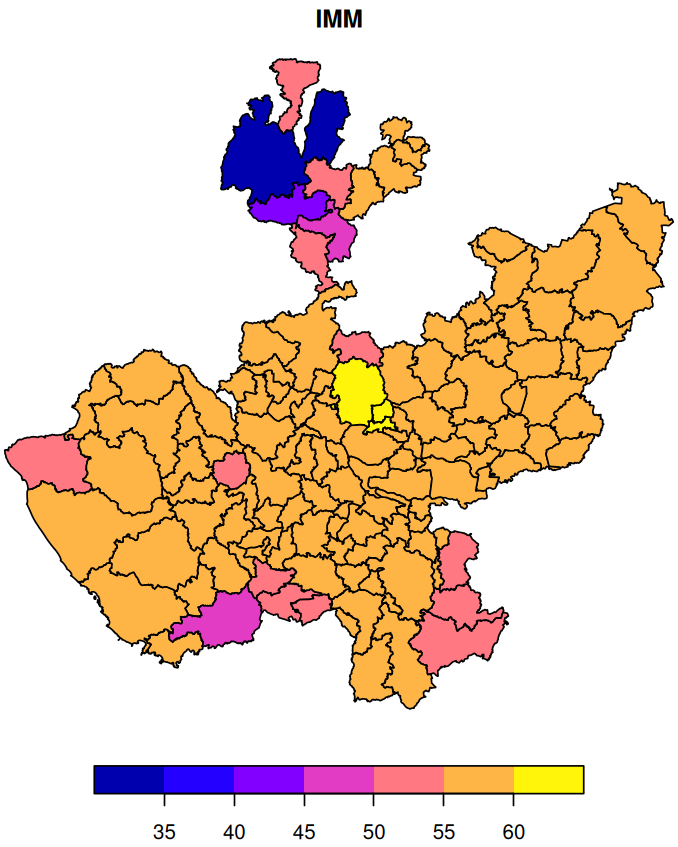

```
summary(Jal["IM_2020"])
```

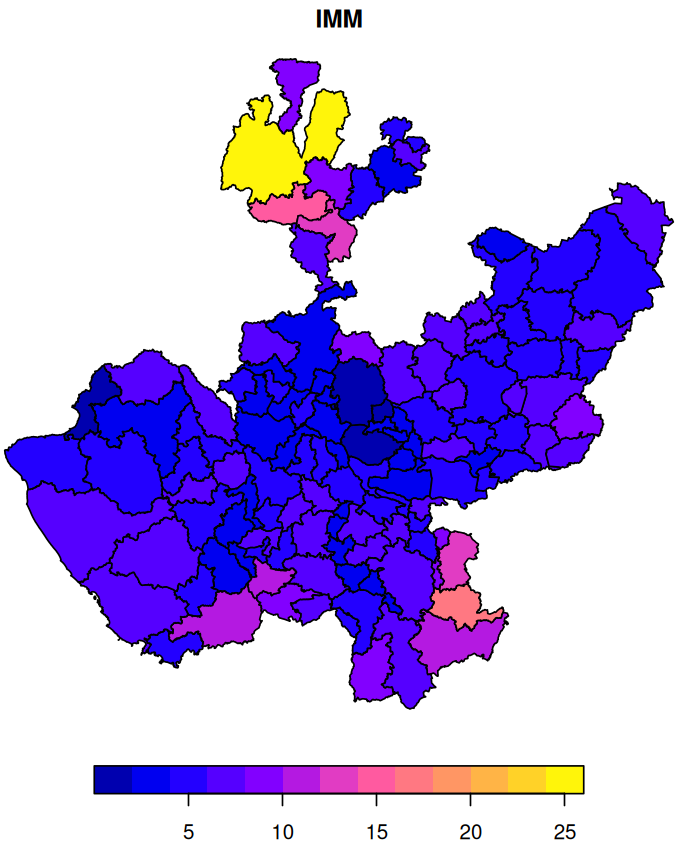
```
    IM_2020               geometry
 Min.   :31.31   MULTIPOLYGON :125
 1st Qu.:56.04   epsg:NA      :  0
 Median :57.25   +proj=lcc ...:  0
 Mean   :56.62
 3rd Qu.:58.18
 Max.   :60.76
```

```
summary(Jal$GM_2020)
```

```
   Length     Class      Mode
      125 character character
```

```
par(mfrow = c(1,2))
plot(Jal["IM_2020"],main = "IMM")
plot(Jal["ANALF"],main = "IMM")
```


IMM
35
40
45
50
55
60


IMM
5
10
15
20
25