Análisis Demográfico con R

Universidad de la República - Facultad de Ciencias Sociales - Doctorado en Ciencias Sociales

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Sobre el curso

1. Docente

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Profesora de tiempo completo en la Facultad de Ciencias Políticas y Sociales, UNAM. Doctora en Estudios de Población por El Colegio de México y cuenta con nivel I en el Sistema Nacional de Investigadores.

2. Descripción del curso

La demografía utiliza diferentes fuentes de información para el análisis demográfico y los estudios de población. La consulta, la limpieza y la evaluación de los datos demográficos se realiza con distintos softwares, entre los cuales destaca R. Desde el software *R*, la comunidad de usuarios ha creado paquetes y códigos replicables y de fácil acceso que tienen un uso cada vez más extendido en la disciplina. En este curso se utilizarán estos insumos para el caso específico de América Latina y de Uruguay. Es decir, el objetivo general del curso es que el estudiantado sea capaz de aplicar conceptos demográficos y estadísticosm fuentes de información latinoamericana y mundiales, y sobre todo, actuales utilizando *R*.

Para ello, la mecánica del curso consistirá en lo siguiente:

1. La exposición de la facilitadora. Durante la primera parte de la sesión, se expondrán los comandos necesarios para trabajar cada tema. Se dará una introducción sobre la temática y se presentarán ejemplos concretos para facilitar el aprendizaje. Se espera que las personas asistentes expongan sus dudas o comentarios a lo largo de la explicación.

2. Realización de ejercicios prácticos. Al final de cada sesión, corresponderá al estudiantado realizar individualmente o en parejas un ejercicio relacionado con lo visto en la primera parte de la clase.

3. Consulta autónoma de material. Tanto la exposición como los ejercicios serán acompañados de material de consulta preparadopara el curso, de tal manera que el estudiantado pueda volver a los códigos y a las explicaciones posteriormente.

3. Carga horaria

15 horas

4. Créditos

3 (tres)

5. Estructura del curso

Día 1

1. Introducción a R y Rstudio (1 hora)

***Objetivo**: que el estudiantado se familiarice con la interfase de trabajo y la programación por objetos, y sea capaz de realizar tareas básicas como crear un script, un proyecto, objetos, ambientes e instalar paqueterías.*

2. Importación de información y primera revisión de fuentes demográficas (2 horas)

a. Importación de información a R en diferentes formatos

b. Importación de información de proyecciones de población utilizando {wppExplorer}

c. Consulta y descarga de información con paquetes como {IPUMSr}, {WDI} y otras API

***Objetivo:** que el estudiantado sea capaz de: importar información desde diferentes formatos (.txt, .csv, .xlsx, .dta, .dbf) a R, así como de exportar sus resultados en estos formatos; revisar de manera preliminar los objetos de tipo "data.frame", funciones "glimpse()", "skim() de {skimr}; manejar etiquetas; hacer subconjuntos de información, y consultas.*

Día 2

3. Evaluación de información (1.5 horas)

a. Tipo de de errores en las fuentes de información

b. Evaluación de la calidad de información en fuentes de stock

c. Suavizamiento de datos

***Objetivo:** Que el estudiantado pueda identificar los errores en el levantamiento de información y su naturaleza, adquiriendo capacidades para corregir y suavizar datos para el análisis estadístico con el paquete {DemoTools} y otras aplicaciones.*

4. Pirámides y diagramas de Lexis (1.5 horas)

a. Pirámides de población: crear una función

b. Hacer múltiples pirámides y automatización

c. Diagramas Lexis

Objetivo: *que el estudiantado sea capaz de crear y utilizar funciones específicas para el análisis demográfico, crear pirámides y la colocar eventos en el diagrama de Lexis*

Día 3

5. Crecimiento y tasas (3 horas)

a. Estandarización de tasas y gráficos de crecimiento, manejo de series de tiempo

b. Cálculos automatizados de población media

c. Cálculo de tasas de natalidad y mortalidad

d. Descomposición del cambio de tasas de natalidad y mortalidad según Kitagawa

Objetivo: *que el estudiantado sea capaz de calcular tasas brutas, tasas específicas y descomponerlas utilizando R.*

Día 4

6. Tasa de fecundidad con datos de encuestas (1.5 horas)

Objetivo: *que el estudiantado sea capaz de calcular tasas brutas y específicas de fecundidad con encuestas de hogares.*

7. Visualización de flujos migratorios (1.5 horas)

Objetivo: *que el estudiantado sea capaz de hacer gráficos de flujos con el paquete {migest} y gráficos aluviales.*

Día 5

8. Tablas de vida y esperanza de vida (3 horas)

a. Construcción de tabla de vida a "mano"

b. Construcción con {DemoTools}

Objetivo: *que el estudiantado sea capaz de calcular la tabla de vida con utilizando el paquete DemoTools*

6. Evaluación

· Entrega de un trabajo final que reúna lo trabajado en la instancia de práctica a lo largo de las cinco sesiones.

· La asistencia al 80% de las sesiones prácticas.

7. Bibliografía

El material guía construido por la facilitadora, que estará en este sitio web, será la bibliografía principal. Además se listan algunos insumos:

CEPAL, NU. 2014. "Los datos demográficos: alcances, limitaciones y métodos de evaluación".

Escoto, Ana. 2019. "Lexis en R". 2019.https://rstudio-pubs-static.s3.amazonaws.com/473169_a1348dd47070497a80fb2c0dc89e86e9.html.

Escoto Castillo, Ana Ruth. (2022) 2022. "aniuxa/paquetes_demogRaficos". R.https://github.com/aniuxa/paquetes_demogRaficos.

Moultrie, Tom, Rob Dorrington, Allan Hill, Kenneth Hill, Lan Timaeus, y Basia Zaba. 2013. *Tools for Demographic Estimation*. France: International Union for the Scientific Study of Population (IUSSP).

Poston, Dudley L., y Michael Micklin, eds. 2005. *Handbook of population*. Handbooks of sociology and social research. New York: Kluwer Academic/Plenum.

"PPgp/wpp2022". (2022) 2024. R. Probabilistic Projections Group.https://github.com/PPgp/wpp2022.

Pressat, Roland. 2000. *El análisis demográfico: métodos, resultados, aplicaciones*. Traducido por Tatiana Sule Hernández. México: Fondo de Cultura Económica.

Preston, Samuel H., Patrick Heuveline, y Michel Guillot. 2001. *Demography: measuring and modeling population processes*. Malden, MA: Blackwell Publishers.

Pujol, José Miguel. 1985. "Nuevas metodologías para evaluar y ajustar datos demográficos", diciembre.https://repositorio.cepal.org/handle/11362/12578.

Riffe, Tim. (2017) 2024. "timriffe/DemoTools". R.https://github.com/timriffe/DemoTools.

Rodríguez, Germán. s/f. "Demographic Methods".https://grodri.github.io/demography/.

Sevcikova, Hana, Adrian Raftery, y Thomas Buettner. 2023. "bayesPop: Probabilistic Population Projection".https://cran.r-project.org/web/packages/bayesPop/index.html.

Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy McGowan, Romain François, Garrett Grolemund, et al. 2019. "Welcome to the Tidyverse". *Journal of Open Source Software* 4 (43): 1686.https://doi.org/10.21105/joss.01686.

Wickham, Hadley, y Garrett Grolemund. 2016. *R for data science: import, tidy, transform, visualize, and model data*. O'Reilly Media, Inc.

Instalación de R y Rstudio

Introducción a R

https://youtu.be/YkN5urybh2A

Instalación en OS

1. Necesito que instalen la versión más nueva de R: Download R-4.4.0 of MAC. *The R-project for statistical computing*. https://cran.r-project.org/bin/macosx/

Elije la versión de acuerdo a tu procesador, intel o ARM.

2. Instalar también las herramientas Quartz, xcode y fortran

- https://www.xquartz.org/
- https://developer.apple.com/xcode/resources/
- https://mac.r-project.org/tools/gfortran-12.2-universal.pkg

3. Después de eso instalar el Rstudio, que hoy se encuentra alojado en el sitio posit, que vaya acorde con MAC

https://posit.co/download/rstudio-desktop/

Algunas indicaciones en video, pero son algo viejitas y pueden cambiar las versiones de R.

https://youtu.be/icWV8jzYOtA

Algunas indicaciones en video, pero son algo viejitas y pueden cambiar las versiones de R.

Instalación en PC

1. Necesito que instalen la versión más nueva de R: Download R-4.4.0 for Windows. *The R-project for statistical computing.* https://cran.r-project.org/bin/windows/base/
2. Instalar también la herramienta RTools https://cran.r-project.org/bin/windows/Rtools/rtools44/rtools.html
3. Después de eso instalar el Rstudio, que hoy se encuentra alojado en el sitio posit, que vaya acorde con Windows https://posit.co/download/rstudio-desktop/

Algunas indicaciones en video, pero son algo viejitas y pueden cambiar las versiones de R.

https://youtu.be/TNSQikMfgJI

Ojo

Desde octubre de 2022, RStudio se volvió **"Posit"**

1 Introducción a R y Rstudio

1.1 Primer acercamiento al uso del programa

Usaremos la IDE RStudio — pronto habrá *positron*

En RStudio de *posit* podemos tener varias ventanas que nos permiten tener más control de nuestro "ambiente", el historial, los *scripts¨ o códigos que escribimos y por supuesto, tenemos nuestra consola, que también tiene el símbolo >

Podemos pedir operaciones básicas

```
2+5
```

```
[1] 7
```

```
5*3
```

```
[1] 15
```

```
#Para escribir comentarios y que no los lea como operaciones ponemos el símbolo de gato
## Lo podemos hacer para un comentario en una línea o la par de una instrucción
1:5               ## Secuencia 1-5
```

```
[1] 1 2 3 4 5
```

```
seq(1, 10, 0.5)   ## Secuencia con incrementos diferentes a 1
```

```
 [1]  1.0  1.5  2.0  2.5  3.0  3.5  4.0  4.5  5.0  5.5  6.0  6.5  7.0  7.5  8.0
[16]  8.5  9.0  9.5 10.0
```

```
c('a','b','c')  ## Vector con caracteres
```

```
[1] "a" "b" "c"
```

```r
1:7             ## Entero
```

```
[1] 1 2 3 4 5 6 7
```

```r
40<80           ## Valor logico
```

```
[1] TRUE
```

```r
2+2 == 5        ## Valor logico
```

```
[1] FALSE
```

```r
T == TRUE       ## T expresion corta de verdadero
```

```
[1] TRUE
```

R es un lenguaje de programación por objetos. Por lo cual vamos a tener objetos a los que se les asigna su contenido. Si usamos una flechita `<-` o `->` le estamos asignando algo al objeto que apunta la flecha.

```r
x <- 24         ## Asignacion de valor 24 a la variable x para su uso posterior (OBJETO)
x/2             ## Uso posterior de variable u objeto x
```

```
[1] 12
```

```r
x               ## Imprime en pantalla el valor de la variable u objeto
```

```
[1] 24
```

```r
x <- TRUE       ## Asigna el valor logico TRUE a la variable x OJO: x toma el ultimo valor
x
```

```
[1] TRUE
```

1.1.1 Vectores

Los vectores son uno de los objetos más usados en R.

```r
y <- c( 2, 4, 6)      ## Vector numerico
y <- c('Primaria', 'Secundaria') ## Vector caracteres
```

Dado que poseen elementos, podemos también observar y hacer operaciones con sus elementos, usando `[ ]` para acceder a ellos

```r
y[2]              ## Acceder al segundo valor del vector y
```

```
[1] "Secundaria"
```

```r
y[3] <- 'Preparatoria y más' ## Asigna valor a la tercera componente del vector
sex <-1:2         ## Asigna a la variable sex los valores 1 y 2
names(sex) <- c("Femenino", "Masculino") ## Asigna nombres al vector de elementos sexo
sex[2]            ## Segundo elemento del vector sex
```

```
Masculino
        2
```

1.1.2 Funciones

Algunas funciones básicas son las siguientes. Vamos a ir viendo más funciones, pero para entender cómo *funcionan*, haremos unos ejemplos y cómo pedir ayuda sobre ellas.

```r
sum( 10, 20, 30)    ## Función suma
```

```
[1] 60
```

```r
rep( 'R',  times=3) ## Repite la letra R el numero de veces que se indica
```

```
[1] "R" "R" "R"
```

```r
sqrt(9)           ## Raiz cuadrada de 9
```

```
[1] 3
```

1.1.3 Indentación

En otros paquetes la indentación es muy importante (i.e. Python). En R no es necesario

```
sum( 10, 20, 30)
```

```
[1] 60
```

```
sum(10,
    20,
    30)
```

```
[1] 60
```

1.1.4 Ayuda

Pedir ayuda es indispensable para aprender a escribir nuestros códigos. A prueba y error, es el mejor sistema para aprender. Podemos usar la función help, example y ?

```
help(sum)     ## Ayuda sobre función sum
?sum()        ## ídem
example(sum) ## Ejemplo de función sum
```

```
sum> ## Pass a vector to sum, and it will add the elements together.
sum> sum(1:5)
[1] 15

sum> ## Pass several numbers to sum, and it also adds the elements.
sum> sum(1, 2, 3, 4, 5)
[1] 15

sum> ## In fact, you can pass vectors into several arguments, and everything gets added.
sum> sum(1:2, 3:5)
[1] 15

sum> ## If there are missing values, the sum is unknown, i.e., also missing, ....
sum> sum(1:5, NA)
[1] NA
```

```
sum> ## ... unless  we exclude missing values explicitly:
sum> sum(1:5, NA, na.rm = TRUE)
[1] 15
```

1.1.5 Mi ambiente

Todos los objetos que hemos declarado hasta ahora son parte de nuestro "ambiente" (environment). Para saber qué está en nuestro ambiente usamos el comando

```
ls()
```

```
[1] "has_annotations" "pandoc_dir"      "quarto_bin_path" "sex"
[5] "x"               "y"
```

```
gc()           ## Garbage collection, reporta memoria en uso
```

```
         used (Mb) gc trigger (Mb) limit (Mb) max used (Mb)
Ncells  628436 33.6    1354192 72.4         NA  1354192 72.4
Vcells 1176888  9.0    8388608 64.0      16384  1962707 15.0
```

Para borrar todos nuestros objetos, usamos el siguiente comando, que equivale a usar la escobita de la venta de environment

```
rm(list=ls())  ## Borrar objetos actuales
```

1.2 Directorio de trabajo

Es muy útil saber dónde estamos trabajando y donde queremos trabajar. Por eso podemos utilizar los siguientes comandos para saberlo

Ojo, checa, si estás desdes una PC, cómo cambian las " " por"/" o por "\"

```
getwd()           # Directorio actual
```

```
[1] "/Users/anaescoto/Dropbox/2024/R_UY/r_demo_uy"
```

```
list.files()      # Lista de archivos en ese directorio
```

```
 [1] "LICENSE"              "Mi_Exportación.xlsx" "P1.qmd"
 [4] "P1.rmarkdown"         "README.md"           "_quarto.yml"
 [7] "códigos"              "datos"               "docs"
[10] "index.html"           "index.qmd"           "instala.html"
[13] "instala.qmd"          "ipums.R"             "ipumsi_00016.R"
[16] "ipumsi_00016.dat.gz" "ipumsi_00016.xml"    "mi_exportacion.sav"
[19] "p1.html"              "p1_files"            "r_demo_uy.Rproj"
[22] "site_libs"
```

1.3 Proyectos

Pero… a veces preferimos trabajar en proyectos, sobre todo porque nos da más control.

Hay gente que lo dice mejor que yo, como Hadley Wickham: https://es.r4ds.hadley.nz/08-workflow-projects.html

Hagamos un proyecto. Este proyecto debe tener **adentro** una carpeta que se llame datos.

Descarga algunos de los datos que usaremos en el curso acá

1.4 Instalación de paquetes

Los paquetes son útiles para realizar funciones especiales. La especialización de paquetes es más rápida en R que en otros programas por ser un software libre.

```
#install.packages("foreign", dependencies = TRUE)
#install.packages("haven", dependencies = TRUE)
```

Este proceso no hay que hacerlo siempre. Si no sólo la primera vez. Una vez instalado un paquete, lo llamamos con el comando `library()`

```
library(foreign)
library(haven)
```

`{foreing}` nos permite leer archivos en formato de dBase, con extensión `.dbf`. Si bien no es un formato muy común para los investigadores, sí para los que generan la información, puesto que dBase es uno de los principales programas de administración de bases de datos.

He puesto un ejemplo de una base de datos mexicana en dbf, en este formato.

```
ejemplo_dbf<-foreign::read.dbf("datos/ejemplo_dbf.DBF") #checa cómo nos vamos adentro de n
```

1.5 Paquete {pacman}

En general, cuando hacemos nuestro código querremos verificar que nuestras librerías estén instaladas. Si actualizamos nuestro R y Rstudio es probable (sobre todo en MAC) que hayamos perdido alguno.

Este es un ejemplo de un código. Y vamos a introducir un paquete muy útil llamado "pacman"

```
if (!require("pacman")) install.packages("pacman") # instala pacman si se requiere
```

```
Cargando paquete requerido: pacman
```

```
pacman::p_load(tidyverse,
               readxl,
               writexl,
               haven,
               sjlabelled,
               foreign,
               WDI,
               remotes)
```

1.6 Instalación de paquetes en desarrollo

Además de los paquetes que están en CRAN, hay otros repositorios desde los cuáles podemos instalar el código. Un paquete que utilizaremos mucho, es el paquete {wpp2022}

```
remotes::install_github("PPgp/wpp2022")
```

```
Skipping install of 'wpp2022' from a github remote, the SHA1 (a45518ac) has not changed since
  Use `force = TRUE` to force installation
```

1.7 Dataframes con el paquete {WDI}

Instalamos anteriormente el paquete {WDI} que nos da acceso a un grupo amplio de bases de datos que nos ayudaran a revisar y analizar algunas técnicas sencillas.

> El Banco Mundial pone a disposición una gran cantidad de datos excelentes de los Indicadores de Desarrollo Mundial a través de su API web. El paquete WDI para R facilita la búsqueda y descarga de series de datos desde WDI".

Para saber un poco más de esta librería:

- https://cran.r-project.org/web/packages/WDI/WDI.pdf
- https://www.r-project.org/nosvn/pandoc/WDI.html
- https://databank.worldbank.org/reports.aspx?source=2&country=ARE

```
WDI::WDIsearch('gender')
```

```
                                  indicator
169                             2.3_GIR.GPI
172                             2.6_PCR.GPI
709                    5.51.01.07.gender
1573                BI.EMP.PWRK.PB.FE.ZS
1575                BI.EMP.PWRK.PB.MA.ZS
1587                BI.EMP.TOTL.PB.FE.ZS
1589                BI.EMP.TOTL.PB.MA.ZS
1712                   BI.WAG.PREM.PB.FE
1716                   BI.WAG.PREM.PB.FM
1717                BI.WAG.PREM.PB.FM.ED
1718                BI.WAG.PREM.PB.FM.HE
1719                BI.WAG.PREM.PB.FM.PA
1723                   BI.WAG.PREM.PB.MA
1735                BI.WAG.PREM.PV.FM.ED
1736                BI.WAG.PREM.PV.FM.HE
1737                   BI.WAG.PRVS.ED.FM
1740                   BI.WAG.PRVS.HE.FM
1744                   BI.WAG.PUBS.ED.FM
1747                   BI.WAG.PUBS.HE.FM
1748                   BI.WAG.PUBS.PA.FM
2202                         CC.ESG.AGFE
2203                         CC.ESG.AGMA
2204                         CC.ESG.CMFE
```

2205 CC.ESG.CMMA
2206 CC.ESG.CNFE
2207 CC.ESG.CNMA
2208 CC.ESG.EUFE
2209 CC.ESG.EUMA
2210 CC.ESG.FBFE
2211 CC.ESG.FBMA
2212 CC.ESG.INFE
2213 CC.ESG.INMA
2214 CC.ESG.MAFE
2215 CC.ESG.MAMA
2216 CC.ESG.MIFE
2217 CC.ESG.MIMA
2218 CC.ESG.OSFE
2219 CC.ESG.OSMA
2220 CC.ESG.PAFE
2221 CC.ESG.PAMA
2222 CC.ESG.PSFE
2223 CC.ESG.PSMA
2224 CC.ESG.SEFE
2225 CC.ESG.SEMA
2226 CC.ESG.TCFE
2227 CC.ESG.TCMA
2296 CC.ISG.FFFE
2297 CC.ISG.FFMA
2298 CC.ISG.NAFE
2299 CC.ISG.NAMA
2300 CC.ISG.NBFE
2301 CC.ISG.NBMA
6251 FB.FCP.BREG.PR.DI.SC
8632 IC.REG.PRRT.LNDADM.GEN.XD.030.DB1719.DFRN
8904 IQ.CPA.GNDR.XQ
9755 JI.WAG.GNDR
9756 JI.WAG.GNDR.HE
9757 JI.WAG.GNDR.LE
9758 JI.WAG.GNDR.OL
9759 JI.WAG.GNDR.RU
9760 JI.WAG.GNDR.UR
9761 JI.WAG.GNDR.YG
14651 PRJ.MYS.15UP.GPI
14667 PRJ.MYS.25UP.GPI
15164 SE.ADT.1524.LT.FM.ZS
15175 SE.ENR.PRIM.FM.ZS

15177	SE.ENR.PRSC.FM.ZS
15178	SE.ENR.SECO.FM.ZS
15180	SE.ENR.TERT.FM.ZS
15998	SG.LAW.CRDD.GR
16011	SG.LAW.NODC.HR
16027	SG.NOD.CONS
17766	SPI.D3.5.GEND
18119	UIS.AIR.1.GLAST.GPIA
18120	UIS.AIR.2.GPV.GLAST.GPIA
18129	UIS.CR.1.GPIA
18137	UIS.CR.1.Q1.GPIA
18144	UIS.CR.1.Q2.GPIA
18151	UIS.CR.1.Q3.GPIA
18158	UIS.CR.1.Q4.GPIA
18165	UIS.CR.1.Q5.GPIA
18172	UIS.CR.1.RUR.GPIA
18177	UIS.CR.1.RUR.Q1.GPIA
18181	UIS.CR.1.RUR.Q2.GPIA
18185	UIS.CR.1.RUR.Q3.GPIA
18189	UIS.CR.1.RUR.Q4.GPIA
18193	UIS.CR.1.RUR.Q5.GPIA
18199	UIS.CR.1.URB.GPIA
18204	UIS.CR.1.URB.Q1.GPIA
18208	UIS.CR.1.URB.Q2.GPIA
18212	UIS.CR.1.URB.Q3.GPIA
18216	UIS.CR.1.URB.Q4.GPIA
18220	UIS.CR.1.URB.Q5.GPIA
18228	UIS.CR.2.GPIA
18236	UIS.CR.2.Q1.GPIA
18243	UIS.CR.2.Q2.GPIA
18250	UIS.CR.2.Q3.GPIA
18257	UIS.CR.2.Q4.GPIA
18264	UIS.CR.2.Q5.GPIA
18271	UIS.CR.2.RUR.GPIA
18276	UIS.CR.2.RUR.Q1.GPIA
18280	UIS.CR.2.RUR.Q2.GPIA
18284	UIS.CR.2.RUR.Q3.GPIA
18288	UIS.CR.2.RUR.Q4.GPIA
18292	UIS.CR.2.RUR.Q5.GPIA
18298	UIS.CR.2.URB.GPIA
18303	UIS.CR.2.URB.Q1.GPIA
18307	UIS.CR.2.URB.Q2.GPIA
18311	UIS.CR.2.URB.Q3.GPIA

```
18315                    UIS.CR.2.URB.Q4.GPIA
18319                    UIS.CR.2.URB.Q5.GPIA
18327                           UIS.CR.3.GPIA
18335                       UIS.CR.3.Q1.GPIA
18342                       UIS.CR.3.Q2.GPIA
18349                       UIS.CR.3.Q3.GPIA
18356                       UIS.CR.3.Q4.GPIA
18363                       UIS.CR.3.Q5.GPIA
18370                      UIS.CR.3.RUR.GPIA
18375                    UIS.CR.3.RUR.Q1.GPIA
18379                    UIS.CR.3.RUR.Q2.GPIA
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18473                 UIS.EA.3T8.AG25T99.GPIA
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18504                   UIS.EA.8.AG25T99.GPIA
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18536          UIS.ESG.LOWERSEC.NCOG.ENJO.GPI
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18584                    UIS.GAR.5T8.Q2.GPIA
18591                    UIS.GAR.5T8.Q3.GPIA
18598                    UIS.GAR.5T8.Q4.GPIA
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18656                UIS.GAR.5T8.URB.Q4.GPIA
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18679            UIS.GCS.LOWERSEC.NCOG.GEQU.M
18682          UIS.GCS.LOWERSEC.NCOG.GLOC.GPI
18686          UIS.GCS.LOWERSEC.NCOG.MULT.GPI
18690          UIS.GCS.LOWERSEC.NCOG.PEAC.GPI
18694          UIS.GCS.LOWERSEC.NCOG.SDEV.GPI
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18702                        UIS.GER.0.GPIA
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19204 UIS.NART.3.GPIA
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19321                  UIS.OAEPG.2.GPV.GPIA
19346 UIS.ONTRACK.THREE.DOMAINS.GPIA
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19378                    UIS.PRYA.12MO.GPI
19392                     UIS.QUTP.02.GPIA
19396                      UIS.QUTP.1.GPIA
19400                      UIS.QUTP.2.GPIA
19404                    UIS.QUTP.2T3.GPIA
19408                      UIS.QUTP.3.GPIA
19463                    UIS.READ.G2T3.GPIA
19479                 UIS.READ.LOWERSEC.GPIA
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19553                    UIS.ROFST.1.GPIA.CP
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19734               UIS.ROFST.H.2.RUR.Q2.GPIA
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19946                          UIS.SLE.4.GPI
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19954 UIS.SR.1.G4.GPI
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```
WDI::WDI(country = "UY",
    indicator = "SP.POP.TOTL",
    start = 2000,
    end = 2023,
    extra = FALSE,
    cache = NULL)
```

```
   country iso2c iso3c year SP.POP.TOTL
1  Uruguay    UY   URY 2023     3423108
2  Uruguay    UY   URY 2022     3422794
3  Uruguay    UY   URY 2021     3426260
4  Uruguay    UY   URY 2020     3429086
5  Uruguay    UY   URY 2019     3428409
6  Uruguay    UY   URY 2018     3427042
7  Uruguay    UY   URY 2017     3422200
8  Uruguay    UY   URY 2016     3413766
9  Uruguay    UY   URY 2015     3402818
10 Uruguay    UY   URY 2014     3391662
11 Uruguay    UY   URY 2013     3381180
12 Uruguay    UY   URY 2012     3371133
13 Uruguay    UY   URY 2011     3361637
14 Uruguay    UY   URY 2010     3352651
15 Uruguay    UY   URY 2009     3344156
16 Uruguay    UY   URY 2008     3336126
17 Uruguay    UY   URY 2007     3328651
18 Uruguay    UY   URY 2006     3322282
19 Uruguay    UY   URY 2005     3317665
20 Uruguay    UY   URY 2004     3313801
21 Uruguay    UY   URY 2003     3310202
```

```
22 Uruguay     UY    URY 2002      3306441
23 Uruguay     UY    URY 2001      3300939
24 Uruguay     UY    URY 2000      3292224
```

Esta información la podemos guardar en un objeto. En este caso mejor pediremos un solo país:

```
pop <- WDI::WDI(country = "UY",
                indicator = "SP.POP.TOTL",
                start = 1990,
                end = 2023)
```

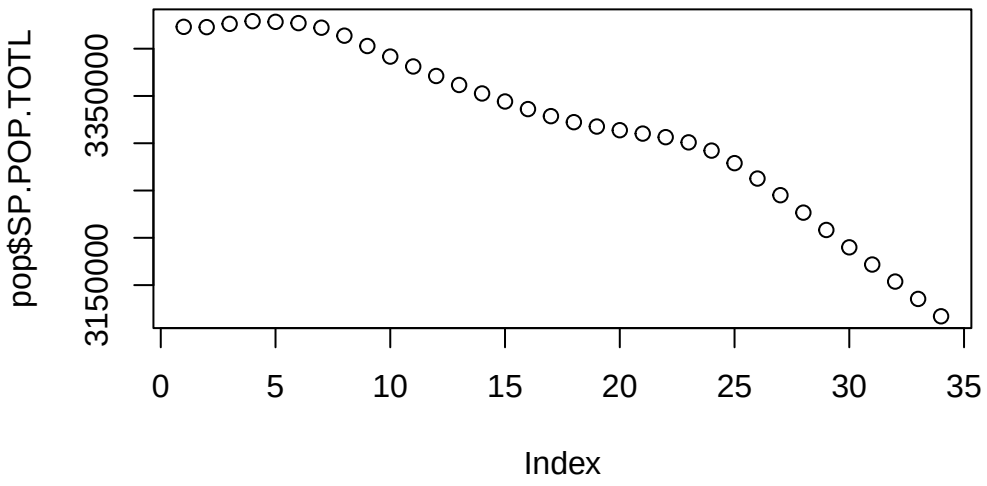
Vamos a revisar nuestro objeto:

```
class(pop)
```

```
[1] "data.frame"
```

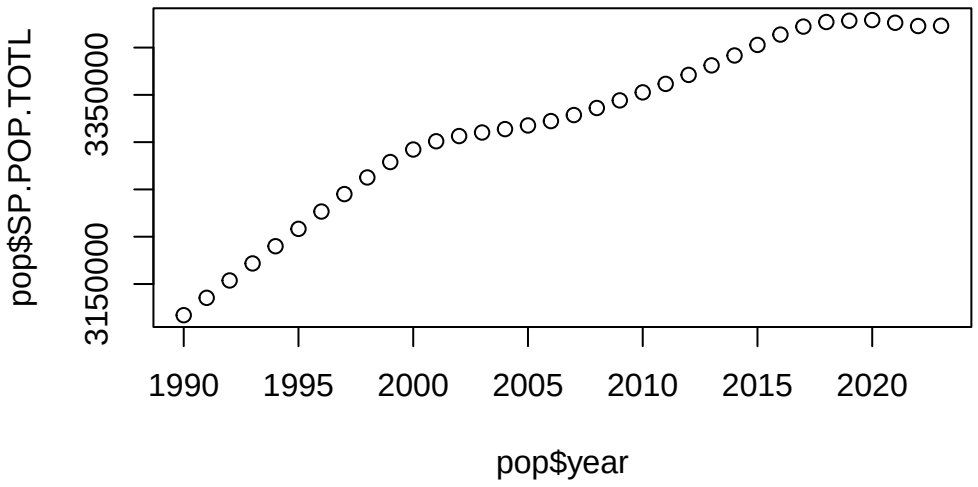
Veamos y conozcamos la función `plot()`

```
plot(pop$SP.POP.TOTL)
```



Este no es el mejor gráfico.

```
plot(pop$year, pop$SP.POP.TOTL)
```



Las matrices por lo general sólo almacenan un tipo de datos mientras que las data frames puede almacenar varios tipos de datos.

1.8 Importación de datos

1.8.1 Desde Excel

El paquete más compatible con RStudio es `{readxl}`. Como su nombre dice "lee" los archivos de excel

```
ejemploxl <- readxl::read_excel("datos/ejemplo_xlsx.xlsx")
```

https://catalogodatos.gub.uy/dataset/mides-indicador-10829/resource/3f5356a2-b6dc-4827-8a8e-e34285ef54ba

Como el nombre de paquete lo indica, sólo lee. Para "escribir" en este formato, recomiendo el paquete `{writexl}`. Lo instalamos anteriormente.

Si quisiéramos exportar un objeto a Excel, se hace de la siguiente forma:

```
writexl::write_xlsx(ejemploxl, path = "Mi_Exportación.xlsx")
```

1.8.2 Desde STATA y SPSS

Si bien también se puede realizar desde el paquete `{foreign}` Pero este no importa algunas características como las etiquetas y tampoco funciona con las versiones más nuevas de STATA. Vamos a instalar otro paquete, compatible con el mundo `{tidyverse}`.

Recuerda que no hay que instalarlo (viene adentro de `{tidyverse}`).

```
encuesta_generacion <- haven::read_dta("datos/GGSII_Wave1_UY_V_1_3.dta")
```

!Importante, a R no le gustan los objetos con nombres que empiezan en números

El paquete haven sí exporta información.

```
haven::write_dta(encuesta_generacion,
                 "datos/mi_exportación.dta",
                 version = 12)
```

Con SSPS es muy parecido. Dentro de `{haven}` hay una función específica para ello.

Checa que en todas las exportaciones en los nombres hay que incluir la extensión del programa. Si quieres guardar en un lugar diferente al directorio del trabajo, hay que escribir toda la ruta dentro de la computadora.

1.8.3 Desde archivos de texto y de una url

Desde el portal https://catalogodatos.gub.uy/ tenemos acceso a directo a varias fuentes de información, al ser datos abiertos, los archivos de texto son muy comunes.

Leeremos parte de esa información, específicamente de la actividad docente

```
docente2019 <- read.csv("https://catalogodatos.gub.uy/dataset/e5b78d49-1707-4f50-9b3b-f2db
names(docente2019)
```

```
[1] "Id.persona"
[2] "Sexo"
[3] "Rol"
[4] "Departamento"
```

```
 [5] "Subsistema"
 [6] "Año.lectivo"
 [7] "Cantidad.de.días.ingreso.a.CREA"
 [8] "Cantidad.de.Comentarios.posteados"
 [9] "Cantidad.de.Acciones.totales"
[10] "Cantidad.de.días.de.ingreso.a.Biblioteca"
[11] "Cantidad.de.préstamos.en.biblioteca"
```

```
docente2019 <- readr::read_csv("https://catalogodatos.gub.uy/dataset/e5b78d49-1707-4f50-9b
```

```
Rows: 51370 Columns: 11
-- Column specification --------------------------------------------------------
Delimiter: ","
chr (4): Sexo, Rol, Departamento, Subsistema
dbl (7): Id persona, Año lectivo, Cantidad de días ingreso a CREA, Cantidad ...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
names(docente2019)
```

```
 [1] "Id persona"
 [2] "Sexo"
 [3] "Rol"
 [4] "Departamento"
 [5] "Subsistema"
 [6] "Año lectivo"
 [7] "Cantidad de días ingreso a CREA"
 [8] "Cantidad de Comentarios posteados"
 [9] "Cantidad de Acciones totales"
[10] "Cantidad de días de ingreso a Biblioteca"
[11] "Cantidad de préstamos en biblioteca"
```

1.9 Revisión de nuestro conjunto de datos

1.9.1 con base

Vamos a revisar la base, brevemente la base

```r
class(encuesta_generacion) # tipo de objeto
```

```
[1] "tbl_df"     "tbl"        "data.frame"
```

```r
names(encuesta_generacion) # lista las variables
```

```
  [1] "country"          "region"           "respid"
  [4] "intid"            "mode"             "weight"
  [7] "instrument"       "intdatem"         "intdatey"
 [10] "dem01"            "dem02m"           "dem02y"
 [13] "dem03"            "dem04a"           "dem04biso"
 [16] "dem05m"           "dem05y"           "dem06"
 [19] "dem07"            "dem07isced"       "dem08m"
 [22] "dem08y"           "dem09"            "dem10m"
 [25] "dem10y"           "dem11"            "dem12"
 [28] "dem14"            "dem15"            "dem17"
 [31] "dem18"            "dem19"            "dem20"
 [34] "dem21"            "dem22a"           "dem22m"
 [37] "dem22y"           "dem23"            "dem24a"
 [40] "dem24biso"        "dem24em"          "dem24ey"
 [43] "dem25"            "dem25isced"       "dem26"
 [46] "dem27"            "dem28a"           "dem28bm"
 [49] "dem28by"          "dem28c"           "dem30a"
 [52] "dem30bm"          "dem30by"          "dem30c"
 [55] "dem30d"           "dem31m"           "dem31y"
 [58] "dem32a"           "dem32b"           "dem32c"
 [61] "dem32d"           "dem33"            "dem33am"
 [64] "dem33ay"          "dem34m"           "dem34y"
 [67] "dem35"            "dem36a"           "dem36au"
 [70] "dem36b"           "dem36bu"          "dem37"
 [73] "dem38a"           "dem38b"           "dem38c"
 [76] "dem38d"           "dem38e"           "dem38f"
 [79] "dem38g"           "dem39a"           "dem39b"
 [82] "dem39c"           "dem39d"           "dem40"
 [85] "dem41"            "dem42"            "dem43"
 [88] "dem44"            "dem45"            "dem46"
 [91] "lhi01"            "lhi02"            "lhi04_m1"
 [94] "lhi04_m2"         "lhi04_m3"         "lhi04_m4"
 [97] "lhi04_m5"         "lhi04_m6"         "lhi04_m7"
[100] "lhi04_m8"         "lhi04_m9"         "lhi04_m10"
```

```
[103] "lhi04_m11"        "lhi04_m12"        "lhi04_m13"
[106] "lhi04_m14"        "lhi04_m15"        "lhi04_m16"
[109] "lhi04_m17"        "lhi04_m18"        "lhi04_m19"
[112] "lhi04_m20"        "lhi04_y1"         "lhi04_y2"
[115] "lhi04_y3"         "lhi04_y4"         "lhi04_y5"
[118] "lhi04_y6"         "lhi04_y7"         "lhi04_y8"
[121] "lhi04_y9"         "lhi04_y10"        "lhi04_y11"
[124] "lhi04_y12"        "lhi04_y13"        "lhi04_y14"
[127] "lhi04_y15"        "lhi04_y16"        "lhi04_y17"
[130] "lhi04_y18"        "lhi04_y19"        "lhi04_y20"
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[136] "lhi04a_4"         "lhi04a_5"         "lhi04a_6"
[139] "lhi04a_7"         "lhi04a_8"         "lhi04a_9"
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```

```
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[241] "lhi06_y9"         "lhi06_y10"        "lhi06_y11"
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```

```
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[475] "lhi15b_y3"        "lhi15b_y4"        "lhi15b_y5"
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```

```
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```

```
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[1582] "wel11d"            "wel11e"            "wel14a_4001"
[1585] "wel14b_4001"       "wel14c_4001"       "wel14d_4001"
[1588] "wel14e_4001"       "wel14f_4001"       "wel14g_4001"
[1591] "wel16a_4001"       "wel16b_4001"       "wel16c_1_4001"
[1594] "wel16c_2_4001"     "wel16c_3_4001"     "wel16c_4_4001"
[1597] "wel16c_5_4001"     "wel16c_6_4001"     "wel16c_7_4001"
[1600] "wel16c_8_4001"     "wel16c_9_4001"     "wel16c_10_4001"
[1603] "wel16c_11_4001"    "wel16c_12_4001"    "wel16c_13_4001"
[1606] "wel16c_14_4001"    "wel16c_15_4001"    "wel16c_16_4001"
[1609] "wel16c_17_4001"    "wel16c_18_4001"    "wel16c_19_4001"
[1612] "wel16c_20_4001"    "wel16d_m1_4001"    "wel16d_m2_4001"
[1615] "wel16d_m3_4001"    "wel16d_m4_4001"    "wel16d_m5_4001"
[1618] "wel16d_m6_4001"    "wel16d_m7_4001"    "wel16d_m8_4001"
[1621] "wel16d_m9_4001"    "wel16d_m10_4001"   "wel16d_m11_4001"
[1624] "wel16d_m12_4001"   "wel16d_m13_4001"   "wel16d_m14_4001"
[1627] "wel16d_m15_4001"   "wel16d_m16_4001"   "wel16d_m17_4001"
[1630] "wel16d_m18_4001"   "wel16d_m19_4001"   "wel16d_m20_4001"
[1633] "wel16d_y1_4001"    "wel16d_y2_4001"    "wel16d_y3_4001"
[1636] "wel16d_y4_4001"    "wel16d_y5_4001"    "wel16d_y6_4001"
[1639] "wel16d_y7_4001"    "wel16d_y8_4001"    "wel16d_y9_4001"
[1642] "wel16d_y10_4001"   "wel16d_y11_4001"   "wel16d_y12_4001"
[1645] "wel16d_y13_4001"   "wel16d_y14_4001"   "wel16d_y15_4001"
[1648] "wel16d_y16_4001"   "wel16d_y17_4001"   "wel16d_y18_4001"
```

```
[1651] "wel16d_y19_4001"   "wel16d_y20_4001"   "wel16a_1_4002"
[1654] "wel16a_2_4002"     "wel16a_3_4002"     "wel16a_4_4002"
[1657] "wel16a_5_4002"     "wel16a_6_4002"     "wel16a_7_4002"
[1660] "wel16a_8_4002"     "wel16a_9_4002"     "wel16a_10_4002"
[1663] "wel16a_11_4002"    "wel16a_12_4002"    "wel16a_13_4002"
[1666] "wel16a_14_4002"    "wel16a_15_4002"    "wel16a_16_4002"
[1669] "wel16a_17_4002"    "wel16a_18_4002"    "wel16a_19_4002"
[1672] "wel16a_20_4002"    "wel16b_1_4002"     "wel16b_2_4002"
[1675] "wel16b_3_4002"     "wel16b_4_4002"     "wel16b_5_4002"
[1678] "wel16b_6_4002"     "wel16b_7_4002"     "wel16b_8_4002"
[1681] "wel16b_9_4002"     "wel16b_10_4002"    "wel16b_11_4002"
[1684] "wel16b_12_4002"    "wel16b_13_4002"    "wel16b_14_4002"
[1687] "wel16b_15_4002"    "wel16b_16_4002"    "wel16b_17_4002"
[1690] "wel16b_18_4002"    "wel16b_19_4002"    "wel16b_20_4002"
[1693] "wel16c_1_4002"     "wel16c_2_4002"     "wel16c_3_4002"
[1696] "wel16c_4_4002"     "wel16c_5_4002"     "wel16c_6_4002"
[1699] "wel16c_7_4002"     "wel16c_8_4002"     "wel16c_9_4002"
[1702] "wel16c_10_4002"    "wel16c_11_4002"    "wel16c_12_4002"
[1705] "wel16c_13_4002"    "wel16c_14_4002"    "wel16c_15_4002"
[1708] "wel16c_16_4002"    "wel16c_17_4002"    "wel16c_18_4002"
[1711] "wel16c_19_4002"    "wel16c_20_4002"    "wel16d_1_4002"
[1714] "wel16d_2_4002"     "wel16d_3_4002"     "wel16d_4_4002"
[1717] "wel16d_5_4002"     "wel16d_6_4002"     "wel16d_7_4002"
[1720] "wel16d_8_4002"     "wel16d_9_4002"     "wel16d_10_4002"
[1723] "wel16d_11_4002"    "wel16d_12_4002"    "wel16d_13_4002"
[1726] "wel16d_14_4002"    "wel16d_15_4002"    "wel16d_16_4002"
[1729] "wel16d_17_4002"    "wel16d_18_4002"    "wel16d_19_4002"
[1732] "wel16d_20_4002"    "wel16e_1_4002"     "wel16e_2_4002"
[1735] "wel16e_3_4002"     "wel16e_4_4002"     "wel16e_5_4002"
[1738] "wel16e_6_4002"     "wel16e_7_4002"     "wel16e_8_4002"
[1741] "wel16e_9_4002"     "wel16e_10_4002"    "wel16e_11_4002"
[1744] "wel16e_12_4002"    "wel16e_13_4002"    "wel16e_14_4002"
[1747] "wel16e_15_4002"    "wel16e_16_4002"    "wel16e_17_4002"
[1750] "wel16e_18_4002"    "wel16e_19_4002"    "wel16e_20_4002"
[1753] "wel16f_1_4002"     "wel16f_2_4002"     "wel16f_3_4002"
[1756] "wel16f_4_4002"     "wel16f_5_4002"     "wel16f_6_4002"
[1759] "wel16f_7_4002"     "wel16f_8_4002"     "wel16f_9_4002"
[1762] "wel16f_10_4002"    "wel16f_11_4002"    "wel16f_12_4002"
[1765] "wel16f_13_4002"    "wel16f_14_4002"    "wel16f_15_4002"
[1768] "wel16f_16_4002"    "wel16f_17_4002"    "wel16f_18_4002"
[1771] "wel16f_19_4002"    "wel16f_20_4002"    "wel16g_1_4002"
[1774] "wel16g_2_4002"     "wel16g_3_4002"     "wel16g_4_4002"
[1777] "wel16g_5_4002"     "wel16g_6_4002"     "wel16g_7_4002"
```

```
[1780] "wel16g_8_4002"     "wel16g_9_4002"     "wel16g_10_4002"
[1783] "wel16g_11_4002"    "wel16g_12_4002"    "wel16g_13_4002"
[1786] "wel16g_14_4002"    "wel16g_15_4002"    "wel16g_16_4002"
[1789] "wel16g_17_4002"    "wel16g_18_4002"    "wel16g_19_4002"
[1792] "wel16g_20_4002"    "wrk01"             "wrk02"
[1795] "wrk03m"            "wrk03y"            "wrk04"
[1798] "wrk04isco"         "wrk06"             "wrk07"
[1801] "wrk08"             "wrk09"             "wrk10"
[1804] "wrk11"             "wrk12"             "wrk13"
[1807] "wrk14"             "wrk15a"            "wrk15b"
[1810] "wrk15c"            "wrk15d"            "wrk16a"
[1813] "wrk16b"            "wrk17"             "wrk18"
[1816] "wrk20"             "wrk21"             "wrk22"
[1819] "wrk23"             "wrk24"             "wrk25"
[1822] "wrk26"             "wrk27"             "wrk27isco"
[1825] "wrk28"             "wrk30"             "wrk30am"
[1828] "wrk30ay"           "wrk31"             "wrk32"
[1831] "wrk34"             "wrk34isco"         "wrk35"
[1834] "wrk36"             "wrk37"             "wrk38"
[1837] "wrk39"             "wrk40"             "wrk41"
[1840] "wrk42"             "wrk43"             "wrk44"
[1843] "wrk46"             "wrk47"             "wrk48"
[1846] "wrk49"             "wrk50"             "wrk51_4001"
[1849] "wrk51_4002"        "wrk51_4003"        "wrk51_4004"
[1852] "wrk51a_4005"       "wrk51b_4005"       "wrk51_4006"
[1855] "wrk51a_4007"       "wrk51b_4007"       "wrk51a_4008"
[1858] "wrk51b_4008"       "wrk51_4009"        "wrk51_4010"
[1861] "wrk51a_4011"       "wrk51b_4011"       "wrk51_4012"
[1864] "wrk51_4013"        "wrk51_4014"        "wrk51_4015"
[1867] "inc01"             "inc03"             "inc05"
[1870] "inc06"             "inc08_1"           "inc08_2"
[1873] "inc08_3"           "inc08_4"           "inc08_5"
[1876] "inc08_6"           "inc08_7"           "inc08_8"
[1879] "inc08_9"           "inc08_10"          "inc08_11"
[1882] "inc08_12"          "inc09_1"           "inc09_2"
[1885] "inc09_3"           "inc09_4"           "inc09_5"
[1888] "inc09_6"           "inc09_7"           "inc09_8"
[1891] "inc09_9"           "inc09_10"          "inc09_11"
[1894] "inc11_1"           "inc11_2"           "inc11_3"
[1897] "inc11_4"           "inc11_5"           "inc11_6"
[1900] "inc11_7"           "inc11_8"           "inc11_9"
[1903] "inc11_10"          "inc11_11"          "inc12"
[1906] "inc13"             "inc14_1"           "inc14_2"
```

```
[1909] "inc14_3"           "inc14_4"           "inc14_5"
[1912] "inc14_6"           "inc14_7"           "inc14_8"
[1915] "inc14_9"           "inc14_10"          "inc14_11"
[1918] "inc14_12"          "inc14_13"          "inc14_14"
[1921] "inc14_15"          "inc14_16"          "inc14_17"
[1924] "inc14_18"          "inc14_19"          "inc14_20"
[1927] "inc14_21"          "inc14_22"          "inc15"
[1930] "att01"             "att02"             "att03a"
[1933] "att03b"            "att03d"            "att03e"
[1936] "att03g"            "att03h"            "att03i"
[1939] "att03j"            "att05b"            "att06a"
[1942] "att06b"            "att07a"            "att07b"
[1945] "att07c"            "att07d"            "att07g"
[1948] "att08"             "att09"             "att09u"
[1951] "att10"             "att11b"            "att11d"
[1954] "att13a_4001"       "att13b_4001"       "att13c_4001"
[1957] "att13d_4001"       "att13e_4001"       "att13f_4001"
[1960] "att13g_4001"       "att13h_4001"       "att13_4002"
[1963] "att13_4003"        "att13_4004"        "att13_4005"
[1966] "att13_1_4006"      "att13_2_4006"      "att13_3_4006"
[1969] "att13_4_4006"      "att13_5_4006"      "att13_6_4006"
[1972] "att13_7_4006"      "att13_8_4006"      "att13_9_4006"
[1975] "att13_4007"        "att19a_4001"       "att19b_4001"
[1978] "att19c_4001"       "rep01"             "rep02"
[1981] "rep03_1"           "rep03_2"           "rep03_3"
[1984] "rep03_4"           "rep04"             "rep05"
[1987] "rep06"             "flag1"             "localitysize_4001"
[1990] "department_4001"   "city_4001"
```

```
head(encuesta_generacion) # muestra las primeras 6 líneas
```

```
# A tibble: 6 x 1,991
  country    region     respid intid mode    weight instrument intdatem intdatey
  <dbl+lbl>  <dbl+lbl>  <chr>  <chr> <dbl+l>  <dbl> <chr>      <dbl+lb>    <dbl>
1 40 [Urugu~ 4001 [Mon~ URAA0~ "URU~ 1 [Fac~  1.37  GGP UY     11 [Nov~     2021
2 40 [Urugu~   NA       URAA0~ ""    2 [Web] NA     GGP UY     12 [Dec~     2021
3 40 [Urugu~ 4001 [Mon~ URAA0~ "URU~ 1 [Fac~  0.522 GGP UY     12 [Dec~     2021
4 40 [Urugu~ 4001 [Mon~ URAA0~ ""    2 [Web]  1.17  GGP UY     12 [Dec~     2021
5 40 [Urugu~ 4001 [Mon~ URAA0~ "URU~ 1 [Fac~  0.636 GGP UY      2 [Feb~     2022
6 40 [Urugu~ 4001 [Mon~ URAA0~ "URU~ 1 [Fac~  0.200 GGP UY      2 [Feb~     2022
# i 1,982 more variables: dem01 <dbl+lbl>, dem02m <dbl+lbl>, dem02y <dbl+lbl>,
```

```
#   dem03 <dbl+lbl>, dem04a <dbl+lbl>, dem04biso <dbl+lbl>, dem05m <dbl+lbl>,
#   dem05y <dbl+lbl>, dem06 <dbl+lbl>, dem07 <dbl+lbl>, dem07isced <dbl+lbl>,
#   dem08m <dbl+lbl>, dem08y <dbl+lbl>, dem09 <dbl+lbl>, dem10m <dbl+lbl>,
#   dem10y <dbl+lbl>, dem11 <dbl+lbl>, dem12 <dbl+lbl>, dem14 <dbl+lbl>,
#   dem15 <dbl+lbl>, dem17 <dbl+lbl>, dem18 <dbl+lbl>, dem19 <dbl+lbl>,
#   dem20 <dbl+lbl>, dem21 <dbl+lbl>, dem22a <dbl+lbl>, dem22m <dbl+lbl>, ...
```

```
table(encuesta_generacion$dem01) # un tabulado simple
```

```
   1    2 4001
2608 4575    9
```

1.9.2 Revisión con {skimr}

Esto se puede tardar un poquito

```
skimr::skim(encuesta_generacion[, 1:20])
```

Table 1.1: Data summary

Name	encuesta_generacion[, 1:2…
Number of rows	7192
Number of columns	20
_____	
Column type frequency:	
character	3
numeric	17
_____	
Group variables	None

Variable type: character

skim_variable	n_missing	complete_rate	min	max	empty	n_unique	whitespace
respid	0	1	9	9	0	7192	0
intid	0	1	0	9	981	593	0
instrument	0	1	6	6	0	1	0

Variable type: numeric

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
country	0	1.00	40.00	0.00	40.0	40.00	40.00	40.00	40	
region	99	0.99	4002.37	2.04	4001.0	4001.00	4001.00	4003.00	4007	
mode	0	1.00	1.14	0.34	1.0	1.00	1.00	1.00	2	
weight	174	0.98	1.00	0.80	0.2	0.45	0.79	1.27	5	
intdatem	0	1.00	8.15	2.94	1.0	6.00	8.00	11.00	12	
intdatey	0	1.00	2021.80	0.40	2021.0	2022.00	2022.00	2022.00	2022	
dem01	0	1.00	6.64	141.40	1.0	1.00	2.00	2.00	4001	
dem02m	21	1.00	6.57	3.39	1.0	4.00	7.00	9.00	12	
dem02y	0	1.00	1972.60	16.83	1942.0	1958.00	1972.00	1987.00	2004	
dem03	0	1.00	1.03	0.18	1.0	1.00	1.00	1.00	2	
dem04a	245	0.97	4009.81	4.08	4001.0	4009.00	4010.00	4011.00	4019	
dem04biso	6953	0.03	289.11	323.40	32.0	32.00	76.00	600.00	862	
dem05m	7006	0.03	6.03	3.69	1.0	3.00	6.00	9.00	12	
dem05y	6956	0.03	1994.95	23.30	1921.0	1980.75	1998.50	2017.00	2022	
dem06	10	1.00	4.04	2.47	1.0	2.00	3.00	6.00	12	
dem07	24	1.00	2.90	1.77	0.0	2.00	3.00	4.00	8	
dem07isced	24	1.00	2.90	1.77	0.0	2.00	3.00	4.00	8	

1.10 Un poquito de {dplyr} y limpieza

1.10.1 Primero, los pipes

R utiliza dos pipes el nativo |> y el pipe que está en {dplyr} %>%. Algunas de las diferencias las puedes checar acá https://eliocamp.github.io/codigo-r/2021/05/r-pipa-nativa/

Aquí hay un *tuit*, o *post de x.com* que lo explica bien.

https://x.com/ArthurWelle/status/1535429654760284161

En estas prácticas utilizaremos el segundo, son muy parecidos y así esta instructora pueda reciclar algunos de sus códigos viejos. Pero funcionan igual:

```
encuesta_generacion|> #pipe nativo, no necesita instalación
  head()
```

```
# A tibble: 6 x 1,991
  country    region     respid intid mode    weight instrument intdatem intdatey
  <dbl+lbl>  <dbl+lbl>  <chr>  <chr> <dbl+l>  <dbl> <chr>      <dbl+lb>    <dbl>
```

```
1 40 [Urugu~ 4001 [Mon~ URAA0~ "URU~ 1 [Fac~  1.37  GGP UY     11 [Nov~     2021
2 40 [Urugu~   NA       URAA0~ ""    2 [Web] NA     GGP UY     12 [Dec~     2021
3 40 [Urugu~ 4001 [Mon~ URAA0~ "URU~ 1 [Fac~  0.522 GGP UY     12 [Dec~     2021
4 40 [Urugu~ 4001 [Mon~ URAA0~ ""    2 [Web]  1.17  GGP UY     12 [Dec~     2021
5 40 [Urugu~ 4001 [Mon~ URAA0~ "URU~ 1 [Fac~  0.636 GGP UY      2 [Feb~     2022
6 40 [Urugu~ 4001 [Mon~ URAA0~ "URU~ 1 [Fac~  0.200 GGP UY      2 [Feb~     2022
# i 1,982 more variables: dem01 <dbl+lbl>, dem02m <dbl+lbl>, dem02y <dbl+lbl>,
#   dem03 <dbl+lbl>, dem04a <dbl+lbl>, dem04biso <dbl+lbl>, dem05m <dbl+lbl>,
#   dem05y <dbl+lbl>, dem06 <dbl+lbl>, dem07 <dbl+lbl>, dem07isced <dbl+lbl>,
#   dem08m <dbl+lbl>, dem08y <dbl+lbl>, dem09 <dbl+lbl>, dem10m <dbl+lbl>,
#   dem10y <dbl+lbl>, dem11 <dbl+lbl>, dem12 <dbl+lbl>, dem14 <dbl+lbl>,
#   dem15 <dbl+lbl>, dem17 <dbl+lbl>, dem18 <dbl+lbl>, dem19 <dbl+lbl>,
#   dem20 <dbl+lbl>, dem21 <dbl+lbl>, dem22a <dbl+lbl>, dem22m <dbl+lbl>, ...
```

```r
encuesta_generacion %>%  #pipe de dplyr, necesita instalación de dplyr en tidyverse
  head()
```

```
# A tibble: 6 x 1,991
  country    region     respid intid mode    weight instrument intdatem intdatey
  <dbl+lbl>  <dbl+lbl>  <chr>  <chr> <dbl+l>  <dbl> <chr>      <dbl+lb>    <dbl>
1 40 [Urugu~ 4001 [Mon~ URAA0~ "URU~ 1 [Fac~  1.37  GGP UY     11 [Nov~     2021
2 40 [Urugu~   NA       URAA0~ ""    2 [Web] NA     GGP UY     12 [Dec~     2021
3 40 [Urugu~ 4001 [Mon~ URAA0~ "URU~ 1 [Fac~  0.522 GGP UY     12 [Dec~     2021
4 40 [Urugu~ 4001 [Mon~ URAA0~ ""    2 [Web]  1.17  GGP UY     12 [Dec~     2021
5 40 [Urugu~ 4001 [Mon~ URAA0~ "URU~ 1 [Fac~  0.636 GGP UY      2 [Feb~     2022
6 40 [Urugu~ 4001 [Mon~ URAA0~ "URU~ 1 [Fac~  0.200 GGP UY      2 [Feb~     2022
# i 1,982 more variables: dem01 <dbl+lbl>, dem02m <dbl+lbl>, dem02y <dbl+lbl>,
#   dem03 <dbl+lbl>, dem04a <dbl+lbl>, dem04biso <dbl+lbl>, dem05m <dbl+lbl>,
#   dem05y <dbl+lbl>, dem06 <dbl+lbl>, dem07 <dbl+lbl>, dem07isced <dbl+lbl>,
#   dem08m <dbl+lbl>, dem08y <dbl+lbl>, dem09 <dbl+lbl>, dem10m <dbl+lbl>,
#   dem10y <dbl+lbl>, dem11 <dbl+lbl>, dem12 <dbl+lbl>, dem14 <dbl+lbl>,
#   dem15 <dbl+lbl>, dem17 <dbl+lbl>, dem18 <dbl+lbl>, dem19 <dbl+lbl>,
#   dem20 <dbl+lbl>, dem21 <dbl+lbl>, dem22a <dbl+lbl>, dem22m <dbl+lbl>, ...
```

1.10.2 Limpieza de nombres con {janitor}

Este paso también nos permitirá enseñar otro *pipe* que está en el paquete {magrittr}.

Los nombres de una base de datos son los nombres de las columnas.

```r
names(encuesta_generacion)
```

```
  [1] "country"          "region"           "respid"
  [4] "intid"            "mode"             "weight"
  [7] "instrument"       "intdatem"         "intdatey"
 [10] "dem01"            "dem02m"           "dem02y"
 [13] "dem03"            "dem04a"           "dem04biso"
 [16] "dem05m"           "dem05y"           "dem06"
 [19] "dem07"            "dem07isced"       "dem08m"
 [22] "dem08y"           "dem09"            "dem10m"
 [25] "dem10y"           "dem11"            "dem12"
 [28] "dem14"            "dem15"            "dem17"
 [31] "dem18"            "dem19"            "dem20"
 [34] "dem21"            "dem22a"           "dem22m"
 [37] "dem22y"           "dem23"            "dem24a"
 [40] "dem24biso"        "dem24em"          "dem24ey"
 [43] "dem25"            "dem25isced"       "dem26"
 [46] "dem27"            "dem28a"           "dem28bm"
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[1702] "wel16c_10_4002"   "wel16c_11_4002"   "wel16c_12_4002"
[1705] "wel16c_13_4002"   "wel16c_14_4002"   "wel16c_15_4002"
[1708] "wel16c_16_4002"   "wel16c_17_4002"   "wel16c_18_4002"
[1711] "wel16c_19_4002"   "wel16c_20_4002"   "wel16d_1_4002"
[1714] "wel16d_2_4002"    "wel16d_3_4002"    "wel16d_4_4002"
[1717] "wel16d_5_4002"    "wel16d_6_4002"    "wel16d_7_4002"
[1720] "wel16d_8_4002"    "wel16d_9_4002"    "wel16d_10_4002"
[1723] "wel16d_11_4002"   "wel16d_12_4002"   "wel16d_13_4002"
[1726] "wel16d_14_4002"   "wel16d_15_4002"   "wel16d_16_4002"
[1729] "wel16d_17_4002"   "wel16d_18_4002"   "wel16d_19_4002"
[1732] "wel16d_20_4002"   "wel16e_1_4002"    "wel16e_2_4002"
[1735] "wel16e_3_4002"    "wel16e_4_4002"    "wel16e_5_4002"
[1738] "wel16e_6_4002"    "wel16e_7_4002"    "wel16e_8_4002"
[1741] "wel16e_9_4002"    "wel16e_10_4002"   "wel16e_11_4002"
[1744] "wel16e_12_4002"   "wel16e_13_4002"   "wel16e_14_4002"
[1747] "wel16e_15_4002"   "wel16e_16_4002"   "wel16e_17_4002"
[1750] "wel16e_18_4002"   "wel16e_19_4002"   "wel16e_20_4002"
[1753] "wel16f_1_4002"    "wel16f_2_4002"    "wel16f_3_4002"
[1756] "wel16f_4_4002"    "wel16f_5_4002"    "wel16f_6_4002"
[1759] "wel16f_7_4002"    "wel16f_8_4002"    "wel16f_9_4002"
[1762] "wel16f_10_4002"   "wel16f_11_4002"   "wel16f_12_4002"
[1765] "wel16f_13_4002"   "wel16f_14_4002"   "wel16f_15_4002"
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[1771] "wel16f_19_4002"   "wel16f_20_4002"   "wel16g_1_4002"
[1774] "wel16g_2_4002"    "wel16g_3_4002"    "wel16g_4_4002"
[1777] "wel16g_5_4002"    "wel16g_6_4002"    "wel16g_7_4002"
[1780] "wel16g_8_4002"    "wel16g_9_4002"    "wel16g_10_4002"
[1783] "wel16g_11_4002"   "wel16g_12_4002"   "wel16g_13_4002"
[1786] "wel16g_14_4002"   "wel16g_15_4002"   "wel16g_16_4002"
[1789] "wel16g_17_4002"   "wel16g_18_4002"   "wel16g_19_4002"
[1792] "wel16g_20_4002"   "wrk01"            "wrk02"
[1795] "wrk03m"           "wrk03y"           "wrk04"
[1798] "wrk04isco"        "wrk06"            "wrk07"
[1801] "wrk08"            "wrk09"            "wrk10"
[1804] "wrk11"            "wrk12"            "wrk13"
```

```
[1807] "wrk14"           "wrk15a"           "wrk15b"
[1810] "wrk15c"          "wrk15d"           "wrk16a"
[1813] "wrk16b"          "wrk17"            "wrk18"
[1816] "wrk20"           "wrk21"            "wrk22"
[1819] "wrk23"           "wrk24"            "wrk25"
[1822] "wrk26"           "wrk27"            "wrk27isco"
[1825] "wrk28"           "wrk30"            "wrk30am"
[1828] "wrk30ay"         "wrk31"            "wrk32"
[1831] "wrk34"           "wrk34isco"        "wrk35"
[1834] "wrk36"           "wrk37"            "wrk38"
[1837] "wrk39"           "wrk40"            "wrk41"
[1840] "wrk42"           "wrk43"            "wrk44"
[1843] "wrk46"           "wrk47"            "wrk48"
[1846] "wrk49"           "wrk50"            "wrk51_4001"
[1849] "wrk51_4002"      "wrk51_4003"       "wrk51_4004"
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[1858] "wrk51b_4008"     "wrk51_4009"       "wrk51_4010"
[1861] "wrk51a_4011"     "wrk51b_4011"      "wrk51_4012"
[1864] "wrk51_4013"      "wrk51_4014"       "wrk51_4015"
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[1870] "inc06"           "inc08_1"          "inc08_2"
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[1900] "inc11_7"         "inc11_8"          "inc11_9"
[1903] "inc11_10"        "inc11_11"         "inc12"
[1906] "inc13"           "inc14_1"          "inc14_2"
[1909] "inc14_3"         "inc14_4"          "inc14_5"
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[1921] "inc14_15"        "inc14_16"         "inc14_17"
[1924] "inc14_18"        "inc14_19"         "inc14_20"
[1927] "inc14_21"        "inc14_22"         "inc15"
[1930] "att01"           "att02"            "att03a"
[1933] "att03b"          "att03d"           "att03e"
```

```
[1936] "att03g"            "att03h"            "att03i"
[1939] "att03j"            "att05b"            "att06a"
[1942] "att06b"            "att07a"            "att07b"
[1945] "att07c"            "att07d"            "att07g"
[1948] "att08"             "att09"             "att09u"
[1951] "att10"             "att11b"            "att11d"
[1954] "att13a_4001"       "att13b_4001"       "att13c_4001"
[1957] "att13d_4001"       "att13e_4001"       "att13f_4001"
[1960] "att13g_4001"       "att13h_4001"       "att13_4002"
[1963] "att13_4003"        "att13_4004"        "att13_4005"
[1966] "att13_1_4006"      "att13_2_4006"      "att13_3_4006"
[1969] "att13_4_4006"      "att13_5_4006"      "att13_6_4006"
[1972] "att13_7_4006"      "att13_8_4006"      "att13_9_4006"
[1975] "att13_4007"        "att19a_4001"       "att19b_4001"
[1978] "att19c_4001"       "rep01"             "rep02"
[1981] "rep03_1"           "rep03_2"           "rep03_3"
[1984] "rep03_4"           "rep04"             "rep05"
[1987] "rep06"             "flag1"             "localitysize_4001"
[1990] "department_4001"   "city_4001"
```

```
names(ejemploxl)
```

```
[1] "Causa" "año"   "valor"
```

Como vemos en las bases hay mayúsculas, caracteres especiales y demás. Esto lo podemos cambiar

```
ejemploxl<-ejemploxl %>%
  janitor::clean_names()

names(ejemploxl)
```

```
[1] "causa" "ano"   "valor"
```

Si quisiéramos que la acción quedará en una sola operación, podemos usar un pipe diferente:

```
pacman::p_load(magrittr)

encuesta_generacion %<>% # este es otro pipe
```

```
  janitor::clean_names()

names(encuesta_generacion)
```

```
  [1] "country"          "region"           "respid"
  [4] "intid"            "mode"             "weight"
  [7] "instrument"       "intdatem"         "intdatey"
 [10] "dem01"            "dem02m"           "dem02y"
 [13] "dem03"            "dem04a"           "dem04biso"
 [16] "dem05m"           "dem05y"           "dem06"
 [19] "dem07"            "dem07isced"       "dem08m"
 [22] "dem08y"           "dem09"            "dem10m"
 [25] "dem10y"           "dem11"            "dem12"
 [28] "dem14"            "dem15"            "dem17"
 [31] "dem18"            "dem19"            "dem20"
 [34] "dem21"            "dem22a"           "dem22m"
 [37] "dem22y"           "dem23"            "dem24a"
 [40] "dem24biso"        "dem24em"          "dem24ey"
 [43] "dem25"            "dem25isced"       "dem26"
 [46] "dem27"            "dem28a"           "dem28bm"
 [49] "dem28by"          "dem28c"           "dem30a"
 [52] "dem30bm"          "dem30by"          "dem30c"
 [55] "dem30d"           "dem31m"           "dem31y"
 [58] "dem32a"           "dem32b"           "dem32c"
 [61] "dem32d"           "dem33"            "dem33am"
 [64] "dem33ay"          "dem34m"           "dem34y"
 [67] "dem35"            "dem36a"           "dem36au"
 [70] "dem36b"           "dem36bu"          "dem37"
 [73] "dem38a"           "dem38b"           "dem38c"
 [76] "dem38d"           "dem38e"           "dem38f"
 [79] "dem38g"           "dem39a"           "dem39b"
 [82] "dem39c"           "dem39d"           "dem40"
 [85] "dem41"            "dem42"            "dem43"
 [88] "dem44"            "dem45"            "dem46"
 [91] "lhi01"            "lhi02"            "lhi04_m1"
 [94] "lhi04_m2"         "lhi04_m3"         "lhi04_m4"
 [97] "lhi04_m5"         "lhi04_m6"         "lhi04_m7"
[100] "lhi04_m8"         "lhi04_m9"         "lhi04_m10"
[103] "lhi04_m11"        "lhi04_m12"        "lhi04_m13"
[106] "lhi04_m14"        "lhi04_m15"        "lhi04_m16"
[109] "lhi04_m17"        "lhi04_m18"        "lhi04_m19"
[112] "lhi04_m20"        "lhi04_y1"         "lhi04_y2"
```

```
[115] "lhi04_y3"          "lhi04_y4"          "lhi04_y5"
[118] "lhi04_y6"          "lhi04_y7"          "lhi04_y8"
[121] "lhi04_y9"          "lhi04_y10"         "lhi04_y11"
[124] "lhi04_y12"         "lhi04_y13"         "lhi04_y14"
[127] "lhi04_y15"         "lhi04_y16"         "lhi04_y17"
[130] "lhi04_y18"         "lhi04_y19"         "lhi04_y20"
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[238] "lhi06_y6"          "lhi06_y7"          "lhi06_y8"
[241] "lhi06_y9"          "lhi06_y10"         "lhi06_y11"
```

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[247] "lhi06_y15"        "lhi06_y16"        "lhi06_y17"
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[499] "lhi16_7"          "lhi16_8"          "lhi16_9"
```

```
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