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  628434 33.6    1354132 72.4         NA  1354132 72.4
Vcells 1176743  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.html"
 [4] "P1.qmd"              "P1.rmarkdown"        "P1_files"
 [7] "README.md"           "_quarto.yml"         "datos"
[10] "docs"                "index.html"          "index.qmd"
[13] "instala.html"        "instala.qmd"         "ipums.R"
[16] "ipumsi_00016.R"      "ipumsi_00016.dat.gz" "ipumsi_00016.xml"
[19] "mi_exportacion.sav"  "r_demo_uy.Rproj"     "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

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
18383                   UIS.CR.3.RUR.Q3.GPIA
18387                   UIS.CR.3.RUR.Q4.GPIA
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18418                   UIS.CR.3.URB.Q5.GPIA
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18536          UIS.ESG.LOWERSEC.NCOG.ENJO.GPI
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18679 UIS.GCS.LOWERSEC.NCOG.GEQU.M
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18690 UIS.GCS.LOWERSEC.NCOG.PEAC.GPI
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18698 UIS.GCS.LOWERSEC.NCOG.SJUS.GPI
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19141 UIS.NART.2.Q5.GPIA
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19204 UIS.NART.3.GPIA
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19252 UIS.NART.3.RUR.Q1.GPIA
19256 UIS.NART.3.RUR.Q2.GPIA
19260 UIS.NART.3.RUR.Q3.GPIA
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19268 UIS.NART.3.RUR.Q5.GPIA
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19283 UIS.NART.3.URB.Q2.GPIA
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19291 UIS.NART.3.URB.Q4.GPIA
19295 UIS.NART.3.URB.Q5.GPIA
19301 UIS.NERA.AGM1.GPIA.CP
19305 UIS.NERT.1.GPI
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19321 UIS.OAEPG.2.GPV.GPIA

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19346            UIS.ONTRACK.THREE.DOMAINS.GPIA
19350                UIS.PER.11T15.BULLIED.GPIA
19363                       UIS.POSTIMUENV.GPIA
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
19495                     UIS.READ.PRIMARY.GPIA
19553                       UIS.ROFST.1.GPIA.CP
19557                     UIS.ROFST.1T2.GPIA.CP
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19725                   UIS.ROFST.H.2.RUR.GPIA
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19845                UIS.ROFST.H.3.RUR.Q5.GPIA
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19925                          UIS.SLE.02.GPI
19929                           UIS.SLE.1.GPI
19936                         UIS.SLE.123.GPI
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19946                           UIS.SLE.4.GPI
19950                          UIS.SLE.56.GPI
19954                         UIS.SR.1.G4.GPI
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19957                       UIS.SR.1.GLAST.GPI
19979                       UIS.TATTRR.02.GPIA
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19986	UIS.TATTRR.2.GPIA
19991	UIS.TATTRR.2T3.GPIA
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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)
```

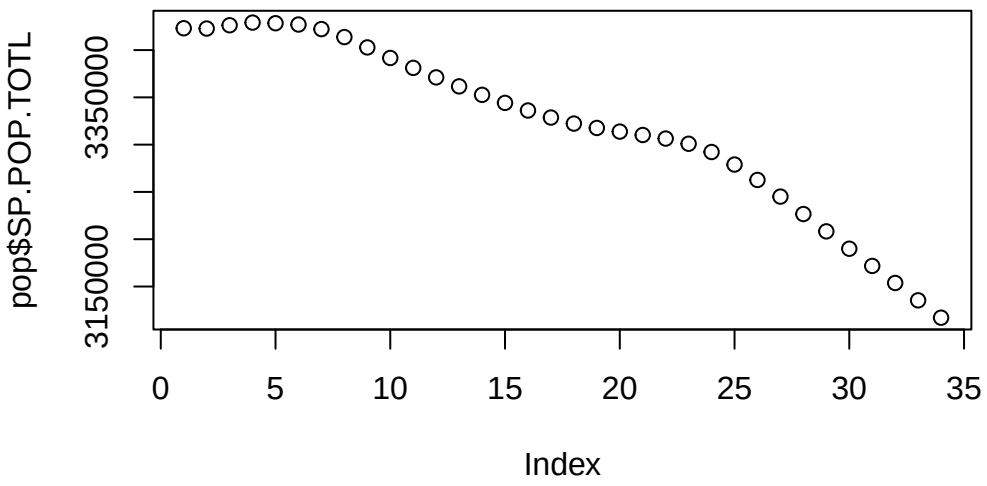
Vamos a revisar nuestro objeto:

```
class(pop)
```

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

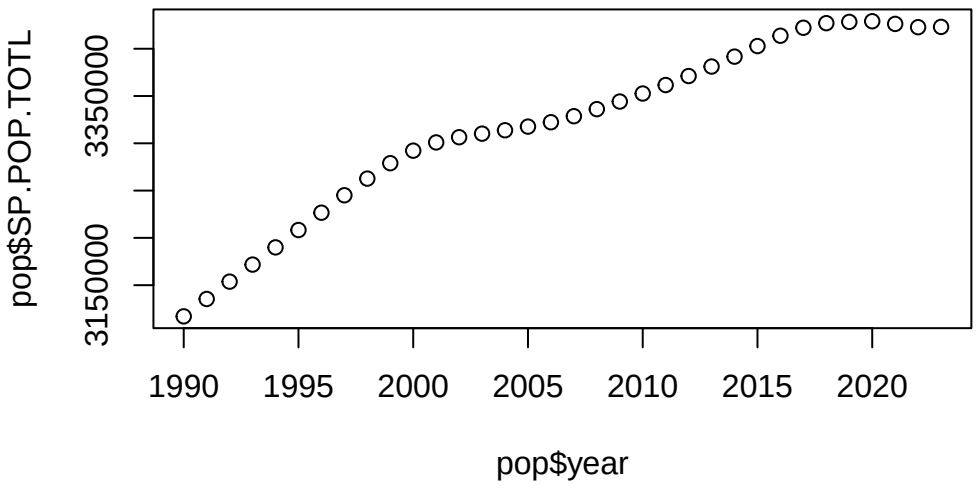
Veamos y conozcamos la función `plot()`

```
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

```
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"
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[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"
[133] "lhi04a_1"          "lhi04a_2"          "lhi04a_3"
[136] "lhi04a_4"          "lhi04a_5"          "lhi04a_6"
[139] "lhi04a_7"          "lhi04a_8"          "lhi04a_9"
[142] "lhi04a_10"         "lhi04a_11"         "lhi04a_12"
[145] "lhi04a_13"         "lhi04a_14"         "lhi04a_15"
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[154] "lhi05a_2"          "lhi05a_3"          "lhi05a_4"
[157] "lhi05a_5"          "lhi05a_6"          "lhi05a_7"
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[178] "lhi05b_m6"         "lhi05b_m7"         "lhi05b_m8"
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[235] "lhi06_y3"          "lhi06_y4"          "lhi06_y5"
[238] "lhi06_y6"          "lhi06_y7"          "lhi06_y8"
[241] "lhi06_y9"          "lhi06_y10"         "lhi06_y11"
[244] "lhi06_y12"         "lhi06_y13"         "lhi06_y14"
[247] "lhi06_y15"         "lhi06_y16"         "lhi06_y17"
```

```
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```

```
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[475] "lhi15b_y3"        "lhi15b_y4"        "lhi15b_y5"
[478] "lhi15b_y6"        "lhi15b_y7"        "lhi15b_y8"
[481] "lhi15b_y9"        "lhi15b_y10"       "lhi15b_y11"
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[505] "lhi16_13"         "lhi16_14"         "lhi16_15"
```

```
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[529] "lhi17_17"         "lhi17_18"         "lhi17_19"
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[562] "lhi26_4"          "lhi26_5"          "lhi26_6"
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[634] "lhi29_m16"        "lhi29_m17"        "lhi29_m18"
```

```
[637] "lhi29_m19"        "lhi29_m20"        "lhi29_y1"
[640] "lhi29_y2"         "lhi29_y3"         "lhi29_y4"
[643] "lhi29_y5"         "lhi29_y6"         "lhi29_y7"
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[691] "lhi30_y13"        "lhi30_y14"        "lhi30_y15"
[694] "lhi30_y16"        "lhi30_y17"        "lhi30_y18"
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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	

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
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>, ...
```

```
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.

```
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"
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[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"
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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"
[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"
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[1870] "inc06"          "inc08_1"        "inc08_2"
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[1891] "inc09_9"        "inc09_10"       "inc09_11"
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[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"
```

```
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"
[133] "lhi04a_1"         "lhi04a_2"         "lhi04a_3"
[136] "lhi04a_4"         "lhi04a_5"         "lhi04a_6"
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[256] "lhi07_4"          "lhi07_5"          "lhi07_6"
```

```
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```
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