EDA

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Read in Data

```
library(tidyverse)
```

```
-- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
v dplyr     1.1.4     v readr     2.1.5
v forcats   1.0.0     v stringr   1.5.1
v ggplot2   3.5.1     v tibble    3.2.1
v lubridate 1.9.3     v tidyr     1.3.1
v purrr     1.0.2
-- Conflicts ------------------------------------------ tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()    masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to becor
```

```
library(here)
```

```
here() starts at C:/Users/10415/Documents/MSc Biostats/CHL8010/version control/CHL8010_Yanyac
```

```
data <- read_csv(here("data", "merged.csv"))
```

```
Rows: 3720 Columns: 21
-- Column specification --------------------------------------------------------
Delimiter: ","
chr  (3): country_name, ISO, region
dbl (18): year, gdp1000, OECD, OECD2023, popdens, urban, agedep, male_edu, t...

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.
```

Quick Look at Data

First look at the top lines.

```
data %>% head()
```

```
# A tibble: 6 x 21
  country_name ISO   region     year gdp1000  OECD OECD2023 popdens urban agedep
  <chr>        <chr> <chr>     <dbl>   <dbl> <dbl>    <dbl>   <dbl> <dbl>  <dbl>
1 Afghanistan  AFG   Southern~  2000  NA         0        0    14.1  16.3   108.
2 Afghanistan  AFG   Southern~  2001  NA         0        0    14.2  16.3   109.
3 Afghanistan  AFG   Southern~  2002   0.184     0        0    14.3  16.4   109.
4 Afghanistan  AFG   Southern~  2003   0.200     0        0    14.4  16.6   109.
5 Afghanistan  AFG   Southern~  2004   0.222     0        0    15.2  16.7   109.
6 Afghanistan  AFG   Southern~  2005   0.255     0        0    15.3  16.9   108.
# i 11 more variables: male_edu <dbl>, temp <dbl>, rainfall1000 <dbl>,
#   death <dbl>, conflict <dbl>, maternalMor <dbl>, infantMor <dbl>,
#   neonatalMor <dbl>, under5Mor <dbl>, drought <dbl>, earthquake <dbl>
```

Then the bottom lines

```
data %>% tail()
```

```
# A tibble: 6 x 21
  country_name ISO   region     year gdp1000  OECD OECD2023 popdens urban agedep
  <chr>        <chr> <chr>     <dbl>   <dbl> <dbl>    <dbl>   <dbl> <dbl>  <dbl>
1 Zimbabwe     ZWE   Sub-Saha~  2014    1.41     0        0    26.5  24.4   85.9
2 Zimbabwe     ZWE   Sub-Saha~  2015    1.41     0        0    26.5  24.8   85.1
3 Zimbabwe     ZWE   Sub-Saha~  2016    1.42     0        0    26.5  25.0   84.1
4 Zimbabwe     ZWE   Sub-Saha~  2017    1.19     0        0    26.5  25.3   83.1
5 Zimbabwe     ZWE   Sub-Saha~  2018    2.27     0        0    26.5  25.5   82.1
6 Zimbabwe     ZWE   Sub-Saha~  2019    1.42     0        0    26.5  25.7   81.2
# i 11 more variables: male_edu <dbl>, temp <dbl>, rainfall1000 <dbl>,
#   death <dbl>, conflict <dbl>, maternalMor <dbl>, infantMor <dbl>,
#   neonatalMor <dbl>, under5Mor <dbl>, drought <dbl>, earthquake <dbl>
```

Now randomly select a few lines

```
data %>% slice_sample(n = 6)
```

```
# A tibble: 6 x 21
  country_name    ISO   region  year gdp1000  OECD OECD2023 popdens urban agedep
  <chr>           <chr> <chr>  <dbl>   <dbl> <dbl>    <dbl>   <dbl> <dbl>  <dbl>
1 Niger           NER   Sub-S~  2008   0.472     0        0    9.46 11.1   105.
2 Guatemala       GTM   Latin~  2008   2.80      0        0   20.7  31.4    79.6
3 Lebanon         LBN   Weste~  2003   4.46      0        0   53.3  48.7    55.1
4 Equatorial Gui~ GNQ   Sub-S~  2000   1.53      0        0    0     6.87   84.7
5 Kenya           KEN   Sub-S~  2008   0.916     0        0   21.9  37.7    84.2
6 Germany         DEU   Weste~  2015  41.1       1        1   36.0  43.0    51.9
# i 11 more variables: male_edu <dbl>, temp <dbl>, rainfall1000 <dbl>,
#   death <dbl>, conflict <dbl>, maternalMor <dbl>, infantMor <dbl>,
#   neonatalMor <dbl>, under5Mor <dbl>, drought <dbl>, earthquake <dbl>
```

Check the class of all variables

```
data %>% glimpse()
```

```
Rows: 3,720
Columns: 21
$ country_name <chr> "Afghanistan", "Afghanistan", "Afghanistan", "Afghanistan~
$ ISO          <chr> "AFG", "AFG", "AFG", "AFG", "AFG", "AFG", "AFG", "AFG", "~
$ region       <chr> "Southern Asia", "Southern Asia", "Southern Asia", "South~
$ year         <dbl> 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 200~
$ gdp1000      <dbl> NA, NA, 0.1835328, 0.2004626, 0.2216576, 0.2550551, 0.274~
$ OECD         <dbl> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ~
$ OECD2023     <dbl> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ~
$ popdens      <dbl> 14.13654, 14.23156, 14.32270, 14.40691, 15.21947, 15.3361~
$ urban        <dbl> 16.25324, 16.25661, 16.42654, 16.60701, 16.71367, 16.8509~
$ agedep       <dbl> 108.34663, 108.98989, 109.34716, 109.44753, 109.28682, 10~
$ male_edu     <dbl> 2.762086, 2.856936, 2.954241, 3.054121, 3.156706, 3.26213~
$ temp         <dbl> 12.69959, 12.85570, 12.71081, 12.16592, 13.04643, 12.2314~
$ rainfall1000 <dbl> 0.2763704, 0.2793079, 0.3805710, 0.4288939, 0.3754336, 0.~
$ death        <dbl> 5065, 5394, 5553, 1157, 944, 817, 1711, 4982, 7020, 5660,~
$ conflict     <dbl> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, ~
$ maternalMor  <dbl> 1450, 1390, 1300, 1240, 1180, 1140, 1120, 1090, 1030, 993~
$ infantMor    <dbl> 90.5, 87.9, 85.3, 82.7, 80.0, 77.3, 74.6, 71.9, 69.2, 66.~
$ neonatalMor  <dbl> 60.9, 59.7, 58.5, 57.2, 55.9, 54.6, 53.2, 51.7, 50.3, 48.~
$ under5Mor    <dbl> 129.2, 125.2, 121.1, 116.9, 112.6, 108.4, 104.1, 99.9, 95~
$ drought      <dbl> 1, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, ~
$ earthquake   <dbl> 0, 1, 1, 1, 1, 1, 1, 0, 0, 1, 1, 0, 1, 1, 0, 1, 0, 0, 0, ~
```

And let's see some basic statistics of the variables

```
data %>% summary()
```

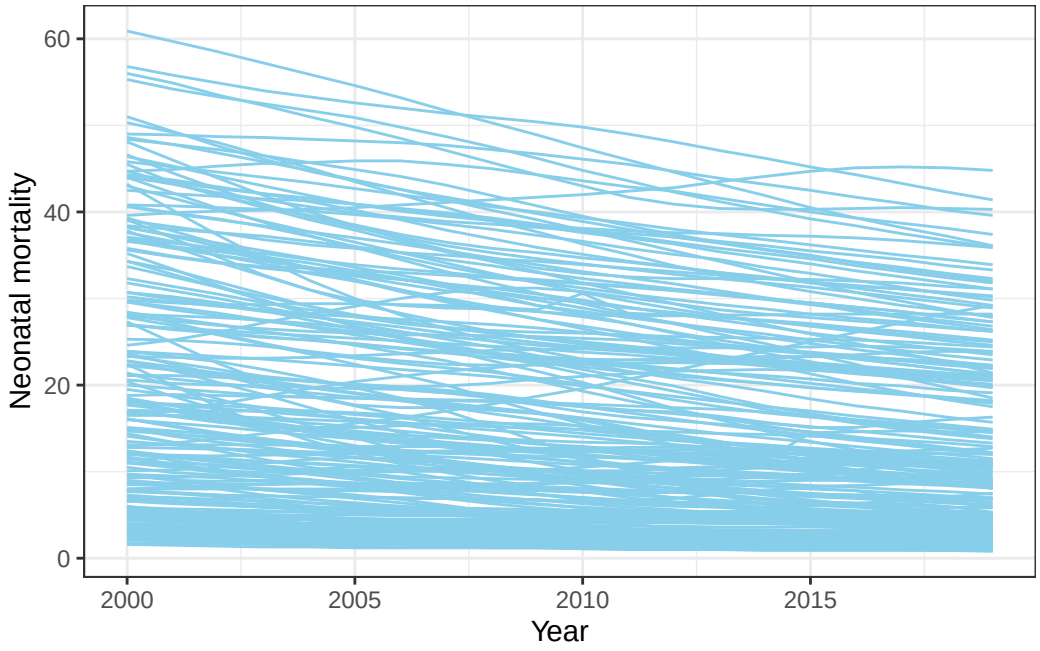
```
 country_name           ISO                region               year
 Length:3720        Length:3720        Length:3720        Min.   :2000
 Class :character   Class :character   Class :character   1st Qu.:2005
 Mode  :character   Mode  :character   Mode  :character   Median :2010
                                                          Mean   :2010
                                                          3rd Qu.:2014
                                                          Max.   :2019

    gdp1000              OECD          OECD2023         popdens
 Min.   :  0.1105   Min.   :0.000   Min.   :0.0000   Min.   : 0.00
 1st Qu.:  1.2383   1st Qu.:0.000   1st Qu.:0.0000   1st Qu.:14.79
 Median :  4.0719   Median :0.000   Median :0.0000   Median :27.52
 Mean   : 11.4917   Mean   :0.171   Mean   :0.1882   Mean   :30.57
 3rd Qu.: 13.1531   3rd Qu.:0.000   3rd Qu.:0.0000   3rd Qu.:40.72
 Max.   :123.6787   Max.   :1.000   Max.   :1.0000   Max.   :99.86
 NA's   :62                                          NA's   :20
     urban             agedep          male_edu          temp
 Min.   : 0.1025   Min.   : 16.17   Min.   : 1.067   Min.   :-2.405
 1st Qu.:17.2872   1st Qu.: 47.94   1st Qu.: 5.904   1st Qu.:12.928
 Median :30.2535   Median : 55.51   Median : 8.368   Median :21.958
 Mean   :30.6948   Mean   : 61.94   Mean   : 8.258   Mean   :19.625
 3rd Qu.:41.6558   3rd Qu.: 77.11   3rd Qu.:10.849   3rd Qu.:25.869
 Max.   :93.4135   Max.   :111.48   Max.   :14.441   Max.   :29.676
 NA's   :20                         NA's   :20       NA's   :20
  rainfall1000         death            conflict       maternalMor
 Min.   :0.01993   Min.   :    0.0   Min.   :0.0000   Min.   :   2.0
 1st Qu.:0.59146   1st Qu.:    0.0   1st Qu.:0.0000   1st Qu.:  17.0
 Median :1.01288   Median :    0.0   Median :0.0000   Median :  66.0
 Mean   :1.20216   Mean   :  361.1   Mean   :0.1892   Mean   : 210.6
 3rd Qu.:1.68706   3rd Qu.:    2.0   3rd Qu.:0.0000   3rd Qu.: 299.8
 Max.   :4.71081   Max.   :78644.0   Max.   :1.0000   Max.   :2480.0
 NA's   :20                                          NA's   :426
   infantMor       neonatalMor      under5Mor         drought
 Min.   :  1.60   Min.   : 0.80   Min.   :  2.00   Min.   :0.00000
 1st Qu.:  7.60   1st Qu.: 4.90   1st Qu.:  9.00   1st Qu.:0.00000
 Median : 18.90   Median :12.10   Median : 22.20   Median :0.00000
 Mean   : 28.90   Mean   :16.18   Mean   : 40.50   Mean   :0.08737
 3rd Qu.: 44.52   3rd Qu.:25.32   3rd Qu.: 61.33   3rd Qu.:0.00000
 Max.   :138.10   Max.   :60.90   Max.   :224.90   Max.   :1.00000
 NA's   :20       NA's   :20      NA's   :20
```

```
   earthquake
 Min.   :0.00000
 1st Qu.:0.00000
 Median :0.00000
 Mean   :0.08333
 3rd Qu.:0.00000
 Max.   :1.00000
```

Mortality Trend

```
data |>
  ggplot(aes(x = year, y = neonatalMor, group = ISO)) +
  geom_line(color = "skyblue") +
  xlim(c(2000,2019)) +
  labs(y = "Neonatal mortality", x = "Year") +
  theme_bw()
```



Mortality Trend by OECD

```
data |>
  ggplot(aes(x = year, y = maternalMor, group = ISO)) +
  geom_line(aes(color = as.factor(conflict)), alpha = 0.5) +
  xlim(c(2000,2019)) +
  scale_y_continuous(trans='log10') +
  labs(y = "Maternal mortality", x = "Year", color = "Armed conflict") +
  theme_bw()
```