CHL8010: Statistical Programming and Computation in Health Data

2024-10-07

```
head(Final_data,10)
```

```
   country_name ISO        region   gdp1000 OECD OECD2023  popdens    urban
1   Afghanistan AFG Southern Asia        NA    0        0 14.13654 16.25324
2   Afghanistan AFG Southern Asia        NA    0        0 14.23156 16.25661
3   Afghanistan AFG Southern Asia 0.1835328    0        0 14.32270 16.42654
4   Afghanistan AFG Southern Asia 0.2004626    0        0 14.40691 16.60701
5   Afghanistan AFG Southern Asia 0.2216576    0        0 15.21947 16.71367
6   Afghanistan AFG Southern Asia 0.2550551    0        0 15.33619 16.85096
7   Afghanistan AFG Southern Asia 0.2740005    0        0 15.43982 16.98105
8   Afghanistan AFG Southern Asia 0.3750781    0        0 15.65217 17.12259
9   Afghanistan AFG Southern Asia 0.3878492    0        0 15.74447 17.26919
10  Afghanistan AFG Southern Asia 0.4438452    0        0 15.83043 17.43508
     agedep male_edu     temp rainfall1000 Year Totdeath Conflict MatMor NeoMor
1  108.3466 2.762086 12.69959    0.2763704 2000     5065        1   1450   60.9
2  108.9899 2.856936 12.85570    0.2793079 2001     5394        1   1390   59.7
3  109.3472 2.954241 12.71081    0.3805710 2002     5553        1   1300   58.5
4  109.4475 3.054121 12.16592    0.4288939 2003     1157        1   1240   57.2
5  109.2868 3.156706 13.04643    0.3754336 2004      944        1   1180   55.9
6  107.9646 3.262133 12.23141    0.4415680 2005      817        1   1140   54.6
7  106.3262 3.370551 12.96153    0.4437097 2006     1711        1   1120   53.2
8  108.3381 3.482112 12.47451    0.4092555 2007     4982        1   1090   51.7
9  109.2404 3.596977 12.63527    0.3901204 2008     7020        1   1030   50.3
10 106.8458 3.715306 12.61764    0.4808727 2009     5660        1    993   48.9
   InfMor Und5Mor drought earthquake
1    90.5   129.2       1          0
2    87.9   125.2       0          2
3    85.3   121.1       0          3
```

```
4    82.7   116.9       0          1
5    80.0   112.6       0          1
6    77.3   108.4       0          2
7    74.6   104.1       1          1
8    71.9    99.9       0          0
9    69.2    95.7       1          0
10   66.7    91.7       0          1
```

```r
# Restrict countries to 2000 & remove unnecessary columns
data_2000 <- Final_data %>%
  filter(Year == 2000) %>%
  select(-country_name, -region, -ISO, -OECD2023, -Year)

# Make Conflict a factor and label  levels
data_2000$Conflict <- factor(data_2000$Conflict,
                             levels = c(0, 1),
                             labels = c("No Conflict in Year 2000",
                                        "Conflict in Year 2000"))

data_2000$OECD <- factor(data_2000$OECD,
                         levels = c(0,1),
                         labels = c("No", "Yes"))

data_2000$drought <- factor(data_2000$drought,
                            levels = c(0,1),
                            labels = c("No", "Yes"))

data_2000$earthquake <- factor(data_2000$earthquake,
                               levels = c(0,1),
                               labels = c("No", "Yes"))

# Apply labels to outcomes and covariates
label(data_2000$MatMor) <- "Maternal mortality ratio per 100,000 live births"
label(data_2000$NeoMor) <- "Neonatal mortality rate per 1,000 live births"
label(data_2000$InfMor) <- "Infant mortality rate per 1,000 live births"
label(data_2000$Und5Mor) <- "Under-5 mortality rate per 1,000 live births"
label(data_2000$gdp1000) <- "GDP per capita"
label(data_2000$OECD) <- "OECD member"
label(data_2000$popdens) <- "Population density"
label(data_2000$urban) <- "Urban residence"
label(data_2000$agedep) <- "Age dependency ratio"
label(data_2000$male_edu) <- "Male education"
```

```r
label(data_2000$temp) <- "Temperature"
label(data_2000$rainfall1000) <- "Rainfall"
label(data_2000$earthquake) <- "Earthquakes"
label(data_2000$drought) <- "Droughts"
```

```r
#Create Table
caption <- "Table of Armed Conflict Demographics"
table1_2000_latex <- table1(~ MatMor + NeoMor + InfMor + Und5Mor + gdp1000 + OECD +
                              popdens + urban + agedep + male_edu + temp +
                              rainfall1000 + earthquake + drought | Conflict,
                            data = data_2000,
                            caption = caption,
                            overall = c(left = "Total"),
                            render.continuous = c(.= "Median [Min, Max]"))

# Convert to kable for LaTeX compatibility
table_latex <- kable(table1_2000_latex, "latex", booktabs = TRUE, caption = caption) %>%
  kable_styling(latex_options = c("HOLD_position", "scale_down"))
print(table_latex)
```

Table 1: Table of Armed Conflict Demographics

	No Conflict in Year 2000	Conflict in Year 2000	Total
	(N=147)	(N=39)	(N=186)
Maternal mortality ratio per 100,000 live births			
Median [Min, Max]	57.0 [3.00, 1730]	553 [13.0, 2480]	77.0 [3.00, 2480]
Missing	3 (2.0%)	0 (0%)	3 (1.6%)
Neonatal mortality rate per 1,000 live births			
Median [Min, Max]	12.9 [1.60, 56.0]	36.6 [7.80, 60.9]	16.8 [1.60, 60.9]
Missing	1 (0.7%)	0 (0%)	1 (0.5%)
Infant mortality rate per 1,000 live births			
Median [Min, Max]	21.0 [3.00, 112]	66.7 [10.9, 138]	27.4 [3.00, 138]
Missing	1 (0.7%)	0 (0%)	1 (0.5%)
Under-5 mortality rate per 1,000 live births			
Median [Min, Max]	24.8 [3.90, 225]	98.5 [12.6, 225]	31.5 [3.90, 225]
Missing	1 (0.7%)	0 (0%)	1 (0.5%)
GDP per capita			
Median [Min, Max]	2.19 [0.137, 48.7]	0.558 [0.123, 4.80]	1.77 [0.123, 48.7]
Missing	3 (2.0%)	2 (5.1%)	5 (2.7%)
OECD member			
No	118 (80.3%)	38 (97.4%)	156 (83.9%)
Yes	29 (19.7%)	1 (2.6%)	30 (16.1%)
Population density			
Median [Min, Max]	27.3 [0, 99.8]	21.3 [0, 71.7]	25.4 [0, 99.8]
Missing	1 (0.7%)	0 (0%)	1 (0.5%)
Urban residence			
Median [Min, Max]	28.9 [0.106, 91.6]	24.1 [3.80, 49.3]	28.0 [0.106, 91.6]
Missing	1 (0.7%)	0 (0%)	1 (0.5%)
Age dependency ratio			
Median [Min, Max]	60.2 [30.0, 108]	84.4 [44.2, 111]	63.5 [30.0, 111]
Male education			
Median [Min, Max]	7.91 [1.07, 14.0]	4.94 [1.69, 11.8]	7.14 [1.07, 14.0]
Missing	1 (0.7%)	0 (0%)	1 (0.5%)
Temperature			
Median [Min, Max]	21.0 [-1.21, 28.6]	24.0 [5.09, 28.5]	21.4 [-1.21, 28.6]
Missing	1 (0.7%)	0 (0%)	1 (0.5%)
Rainfall			
Median [Min, Max]	0.998 [0.0480, 4.71]	1.07 [0.191, 3.03]	1.00 [0.0480, 4.71]
Missing	1 (0.7%)	0 (0%)	1 (0.5%)
Earthquakes			
No	134 (91.2%)	34 (87.2%)	168 (90.3%)
Yes	9 (6.1%)	3 (7.7%)	12 (6.5%)
Missing	4 (2.7%)	2 (5.1%)	6 (3.2%)
Droughts			
No	128 (87.1%)	36 (92.3%)	164 (88.2%)
Yes	17 (11.6%)	3 (7.7%)	20 (10.8%)
Missing	2 (1.4%)	0 (0%)	2 (1.1%)

```
#Maternal Mortality Trends between 2000 - 2017
```

```r
Maternal_Mortality_Plot_Data <- Final_data %>%
  filter(Year >= 2000 & Year <= 2017) %>%  # Filter between 2000 and 2017, inclusive
  group_by(ISO) %>%                        # Group by ISO
  mutate(
    MatMor_2000 = ifelse(Year == 2000, MatMor, NA),
    MatMor_2017 = ifelse(Year == 2017, MatMor, NA)
  ) %>%
  fill(MatMor_2000, .direction = "downup") %>%  # Fill in the 2000 value
  fill(MatMor_2017, .direction = "downup") %>%  # Fill in the 2017 value
  filter(MatMor_2017 > MatMor_2000) %>%         # Only keep ISO if 2017 > 2000
  ungroup()                                     # Ungroup

print(Maternal_Mortality_Plot_Data)
```

```
# A tibble: 234 x 23
   country_name ISO   region          gdp1000  OECD OECD2023 popdens urban agedep
   <chr>        <chr> <chr>             <dbl> <int>    <int>   <dbl> <dbl>  <dbl>
 1 Brunei       BRN   South-eastern~    18.0      0        0    17.2  57.5   56.3
 2 Brunei       BRN   South-eastern~    16.4      0        0    17.5  57.6   54.5
 3 Brunei       BRN   South-eastern~    16.8      0        0    17.8  57.7   52.6
 4 Brunei       BRN   South-eastern~    18.5      0        0    18.4  57.9   50.9
 5 Brunei       BRN   South-eastern~    21.8      0        0    18.7  58.0   49.2
 6 Brunei       BRN   South-eastern~    26.0      0        0    19.0  58.1   47.7
 7 Brunei       BRN   South-eastern~    30.8      0        0    19.3  58.2   46.3
 8 Brunei       BRN   South-eastern~    32.3      0        0    19.8  58.2   45.1
 9 Brunei       BRN   South-eastern~    37.4      0        0    19.8  58.2   43.9
10 Brunei       BRN   South-eastern~    27.5      0        0    20.6  58.2   42.7
# i 224 more rows
# i 14 more variables: male_edu <dbl>, temp <dbl>, rainfall1000 <dbl>,
#   Year <int>, Totdeath <int>, Conflict <int>, MatMor <int>, NeoMor <dbl>,
#   InfMor <dbl>, Und5Mor <dbl>, drought <int>, earthquake <int>,
#   MatMor_2000 <int>, MatMor_2017 <int>
```

```r
#Q2 Plotting Maternal Mortality Increasing Trends between 2000-2017
ggplot(Maternal_Mortality_Plot_Data, aes(Year, MatMor)) +
  geom_line(aes(group = ISO), alpha = 2/5) +
  labs(title = "Maternal Mortality Trends by ISO Code
       (Only Included Countries that Increased)", x = "Year",
       y = "Maternal Mortality") +
  scale_y_log10() +
  geom_smooth(se = FALSE) +
```

```
  theme(plot.title = element_text(hjust = 0.5)) +
  geom_text(data = Maternal_Mortality_Plot_Data %>% filter(Year == 2017),
            aes(label = ISO),
            hjust = -0.1,
            vjust = 0.5,
            size = 2)
```

```
`geom_smooth()` using method = 'loess' and formula = 'y ~ x'
```