

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

```
# Define the renamed outcome variables and covariates
outcomes <- c("MatMor" = "Maternal mortality ratio per 100,000 live births",
              "NeoMor" = "Neonatal mortality rate per 1,000 live births",
              "InfMor" = "Infant mortality rate per 1,000 live births",
              "Und5Mor" = "Under-5 mortality rate per 1,000 live births")

covariates <- c("gdp1000" = "GDP per capita",
               "OECD" = "OECD member",
               "popdens" = "Population density",
               "urban" = "Urban residence",
               "agedep" = "Age dependency ratio",
               "male_edu" = "Male education",
               "temp" = "Temperature",
               "rainfall1000" = "Rainfall",
               "earthquake" = "Earthquakes",
               "drought" = "Droughts")

# 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"))

# 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"
```

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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$male_edu) <- "Male education"
label(data_2000$temp) <- "Temperature"
label(data_2000$rainfall1000) <- "Rainfall"
label(data_2000$earthquake) <- "Earthquakes"
label(data_2000$drought) <- "Droughts"

#Create Table
caption <- "Table of Armed Conflict Demographics"
table1_2000 <-table1(~ MatMor + NeoMor + InfMor + Und5Mor + gdp1000 + OECD +
  popdens + urban + agedep + male_edu + temp +
  rainfall1000 + earthquake + drought | Conflict,
  data = data_2000,
  caption = caption,
  overall = FALSE,
  render.continuous = c(.= "Median [Min, Max]"))
# render.continuous = function(x)
#   sprintf("%0.1f (%0.1f - %0.1f)", median(x, na.rm = TRUE),
#   quantile(x, 0.25, na.rm = TRUE),
#   quantile(x, 0.75, na.rm = TRUE)))

print(table1_2000)

```

Table of Armed Conflict Demographics

No Conflict in Year 2000(N=147)

Conflict in Year 2000(N=39)

Maternal mortality ratio per 100,000 live births

Median [Min, Max]

57.0 [3.00, 1730]

553 [13.0, 2480]

Missing

3 (2.0%)

0 (0%)

Neonatal mortality rate per 1,000 live births

Median [Min, Max]

12.9 [1.60, 56.0]

36.6 [7.80, 60.9]

Missing

1 (0.7%)

0 (0%)

Infant mortality rate per 1,000 live births

Median [Min, Max]

21.0 [3.00, 112]

66.7 [10.9, 138]

Missing

1 (0.7%)

0 (0%)

Under-5 mortality rate per 1,000 live births

Median [Min, Max]

24.8 [3.90, 225]

98.5 [12.6, 225]

Missing

1 (0.7%)

0 (0%)

GDP per capita

Median [Min, Max]

2.19 [0.137, 48.7]

0.558 [0.123, 4.80]

Missing

3 (2.0%)

2 (5.1%)

OECD member

Median [Min, Max]

0 [0, 1.00]

0 [0, 1.00]

Population density

Median [Min, Max]

27.3 [0, 99.8]

21.3 [0, 71.7]

Missing

1 (0.7%)

0 (0%)

Urban residence

Median [Min, Max]

28.9 [0.106, 91.6]

24.1 [3.80, 49.3]

Missing

1 (0.7%)

0 (0%)

Age dependency ratio

Median [Min, Max]

60.2 [30.0, 108]

84.4 [44.2, 111]

Male education

Median [Min, Max]

7.91 [1.07, 14.0]

4.94 [1.69, 11.8]

Missing

1 (0.7%)

0 (0%)

Temperature

Median [Min, Max]

21.0 [-1.21, 28.6]

24.0 [5.09, 28.5]

Missing

1 (0.7%)

0 (0%)

Rainfall

Median [Min, Max]

0.998 [0.0480, 4.71]

1.07 [0.191, 3.03]

Missing

1 (0.7%)

0 (0%)

Earthquakes

Median [Min, Max]

0 [0, 5.00]

0 [0, 5.00]

Droughts

Median [Min, Max]

0 [0, 3.00]

0 [0, 1.00]

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

```
Maternal_Mortality_Plot_Data <- Final_data %>%  
  filter(Year == 2000 | Year == 2017) %>% # Filter only 2000 & 2017  
  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: 26 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-e~ 18.0 0 0 17.2 57.5 56.3
2 Brunei BRN South-e~ 28.2 0 0 22.1 58.3 39.1
3 Canada CAN Norther~ 24.3 1 1 66.2 56.1 46.3
4 Canada CAN Norther~ 45.1 1 1 70.4 59.6 49.1
5 Dominican Republic DOM Latin A~ 2.85 0 0 44.7 42.4 66.1
6 Dominican Republic DOM Latin A~ 7.51 0 0 50.0 48.4 53.4
7 Haiti HTI Latin A~ 0.815 0 0 31.3 39.7 78.8
8 Haiti HTI Latin A~ 1.38 0 0 44.0 42.7 60.7
9 Jamaica JAM Latin A~ 3.45 0 0 23.6 38.0 64.7
10 Jamaica JAM Latin A~ 5.27 0 0 23.2 40.8 40.7
# i 16 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>

```

```

#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'

Warning in simpleLoess(y, x, w, span, degree = degree, parametric = parametric,
: pseudoinverse used at 1999.9

```
Warning in simpleLoess(y, x, w, span, degree = degree, parametric = parametric,  
: neighborhood radius 17.085
```

```
Warning in simpleLoess(y, x, w, span, degree = degree, parametric = parametric,  
: reciprocal condition number 0
```

```
Warning in simpleLoess(y, x, w, span, degree = degree, parametric = parametric,  
: There are other near singularities as well. 291.9
```

