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

#| output: asis  
# 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$gdp1000) <- "GDP per capita"  
label(data\_2000$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 class="Rtable1"><caption>Table of Armed Conflict Demographics</caption>  
  
<thead>  
<tr>  
<th class='rowlabel firstrow lastrow'></th>  
<th class='firstrow lastrow'><span class='stratlabel'>No Conflict in Year 2000<br><span class='stratn'>(N=147)</span></span></th>  
<th class='firstrow lastrow'><span class='stratlabel'>Conflict in Year 2000<br><span class='stratn'>(N=39)</span></span></th>  
</tr>  
</thead>  
<tbody>  
<tr>  
<td class='rowlabel firstrow'>Maternal mortality ratio per 100,000 live births</td>  
<td class='firstrow'></td>  
<td class='firstrow'></td>  
</tr>  
<tr>  
<td class='rowlabel'>Median [Min, Max]</td>  
<td>57.0 [3.00, 1730]</td>  
<td>553 [13.0, 2480]</td>  
</tr>  
<tr>  
<td class='rowlabel lastrow'>Missing</td>  
<td class='lastrow'>3 (2.0%)</td>  
<td class='lastrow'>0 (0%)</td>  
</tr>  
<tr>  
<td class='rowlabel firstrow'>Neonatal mortality rate per 1,000 live births</td>  
<td class='firstrow'></td>  
<td class='firstrow'></td>  
</tr>  
<tr>  
<td class='rowlabel'>Median [Min, Max]</td>  
<td>12.9 [1.60, 56.0]</td>  
<td>36.6 [7.80, 60.9]</td>  
</tr>  
<tr>  
<td class='rowlabel lastrow'>Missing</td>  
<td class='lastrow'>1 (0.7%)</td>  
<td class='lastrow'>0 (0%)</td>  
</tr>  
<tr>  
<td class='rowlabel firstrow'>Infant mortality rate per 1,000 live births</td>  
<td class='firstrow'></td>  
<td class='firstrow'></td>  
</tr>  
<tr>  
<td class='rowlabel'>Median [Min, Max]</td>  
<td>21.0 [3.00, 112]</td>  
<td>66.7 [10.9, 138]</td>  
</tr>  
<tr>  
<td class='rowlabel lastrow'>Missing</td>  
<td class='lastrow'>1 (0.7%)</td>  
<td class='lastrow'>0 (0%)</td>  
</tr>  
<tr>  
<td class='rowlabel firstrow'>Under-5 mortality rate per 1,000 live births</td>  
<td class='firstrow'></td>  
<td class='firstrow'></td>  
</tr>  
<tr>  
<td class='rowlabel'>Median [Min, Max]</td>  
<td>24.8 [3.90, 225]</td>  
<td>98.5 [12.6, 225]</td>  
</tr>  
<tr>  
<td class='rowlabel lastrow'>Missing</td>  
<td class='lastrow'>1 (0.7%)</td>  
<td class='lastrow'>0 (0%)</td>  
</tr>  
<tr>  
<td class='rowlabel firstrow'>GDP per capita</td>  
<td class='firstrow'></td>  
<td class='firstrow'></td>  
</tr>  
<tr>  
<td class='rowlabel'>Median [Min, Max]</td>  
<td>2.19 [0.137, 48.7]</td>  
<td>0.558 [0.123, 4.80]</td>  
</tr>  
<tr>  
<td class='rowlabel lastrow'>Missing</td>  
<td class='lastrow'>3 (2.0%)</td>  
<td class='lastrow'>2 (5.1%)</td>  
</tr>  
<tr>  
<td class='rowlabel firstrow'>OECD member</td>  
<td class='firstrow'></td>  
<td class='firstrow'></td>  
</tr>  
<tr>  
<td class='rowlabel lastrow'>Median [Min, Max]</td>  
<td class='lastrow'>0 [0, 1.00]</td>  
<td class='lastrow'>0 [0, 1.00]</td>  
</tr>  
<tr>  
<td class='rowlabel firstrow'>Population density</td>  
<td class='firstrow'></td>  
<td class='firstrow'></td>  
</tr>  
<tr>  
<td class='rowlabel'>Median [Min, Max]</td>  
<td>27.3 [0, 99.8]</td>  
<td>21.3 [0, 71.7]</td>  
</tr>  
<tr>  
<td class='rowlabel lastrow'>Missing</td>  
<td class='lastrow'>1 (0.7%)</td>  
<td class='lastrow'>0 (0%)</td>  
</tr>  
<tr>  
<td class='rowlabel firstrow'>Urban residence</td>  
<td class='firstrow'></td>  
<td class='firstrow'></td>  
</tr>  
<tr>  
<td class='rowlabel'>Median [Min, Max]</td>  
<td>28.9 [0.106, 91.6]</td>  
<td>24.1 [3.80, 49.3]</td>  
</tr>  
<tr>  
<td class='rowlabel lastrow'>Missing</td>  
<td class='lastrow'>1 (0.7%)</td>  
<td class='lastrow'>0 (0%)</td>  
</tr>  
<tr>  
<td class='rowlabel firstrow'>Age dependency ratio</td>  
<td class='firstrow'></td>  
<td class='firstrow'></td>  
</tr>  
<tr>  
<td class='rowlabel lastrow'>Median [Min, Max]</td>  
<td class='lastrow'>60.2 [30.0, 108]</td>  
<td class='lastrow'>84.4 [44.2, 111]</td>  
</tr>  
<tr>  
<td class='rowlabel firstrow'>Male education</td>  
<td class='firstrow'></td>  
<td class='firstrow'></td>  
</tr>  
<tr>  
<td class='rowlabel'>Median [Min, Max]</td>  
<td>7.91 [1.07, 14.0]</td>  
<td>4.94 [1.69, 11.8]</td>  
</tr>  
<tr>  
<td class='rowlabel lastrow'>Missing</td>  
<td class='lastrow'>1 (0.7%)</td>  
<td class='lastrow'>0 (0%)</td>  
</tr>  
<tr>  
<td class='rowlabel firstrow'>Temperature</td>  
<td class='firstrow'></td>  
<td class='firstrow'></td>  
</tr>  
<tr>  
<td class='rowlabel'>Median [Min, Max]</td>  
<td>21.0 [-1.21, 28.6]</td>  
<td>24.0 [5.09, 28.5]</td>  
</tr>  
<tr>  
<td class='rowlabel lastrow'>Missing</td>  
<td class='lastrow'>1 (0.7%)</td>  
<td class='lastrow'>0 (0%)</td>  
</tr>  
<tr>  
<td class='rowlabel firstrow'>Rainfall</td>  
<td class='firstrow'></td>  
<td class='firstrow'></td>  
</tr>  
<tr>  
<td class='rowlabel'>Median [Min, Max]</td>  
<td>0.998 [0.0480, 4.71]</td>  
<td>1.07 [0.191, 3.03]</td>  
</tr>  
<tr>  
<td class='rowlabel lastrow'>Missing</td>  
<td class='lastrow'>1 (0.7%)</td>  
<td class='lastrow'>0 (0%)</td>  
</tr>  
<tr>  
<td class='rowlabel firstrow'>Earthquakes</td>  
<td class='firstrow'></td>  
<td class='firstrow'></td>  
</tr>  
<tr>  
<td class='rowlabel lastrow'>Median [Min, Max]</td>  
<td class='lastrow'>0 [0, 5.00]</td>  
<td class='lastrow'>0 [0, 5.00]</td>  
</tr>  
<tr>  
<td class='rowlabel firstrow'>Droughts</td>  
<td class='firstrow'></td>  
<td class='firstrow'></td>  
</tr>  
<tr>  
<td class='rowlabel lastrow'>Median [Min, Max]</td>  
<td class='lastrow'>0 [0, 3.00]</td>  
<td class='lastrow'>0 [0, 1.00]</td>  
</tr>  
</tbody>  
</table>

#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 × 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

