Case Study 2 AKSTA Statistical Computing

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Maybe include dataset description here.

Task

a

Load in R the following data sets which you can find in TUWEL. For each data set, ensure that missing values are read in properly, that column names are unambiguous. Each data set should contain at the end only two columns: country and the variable.

rawdata_343.txt which contains the (estimated) median age per country. Pay attention! The delimiter is 2 or more white spaces (one space would not work as it would separate country names which contain a space); you have to skip the first two lines. Hint: you can look into function read.fwf or the readr corresponding function. It might also be useful to use tidyr functions to unite some columns back or separate them.

```r
library(readr)
```

```
## Warning: package 'readr' was built under R version 4.3.2
```

```r
library(tidyr)
```

```
## Warning: package 'tidyr' was built under R version 4.3.2
```

```r
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```r
library(readxl)
```

```
## Warning: package 'readxl' was built under R version 4.3.3
```

```r
library(data.table)
```

```
## Warning: package 'data.table' was built under R version 4.3.2
```

```
##
## Attaching package: 'data.table'
```

```
## The following objects are masked from 'package:dplyr':
##
##     between, first, last
```

```r
require(stringr)
```

```
## Loading required package: stringr
```

```r
median_age_data <- read.fwf("rawdata_343.txt", widths = c(8,66,4,18), skip=2)
names(median_age_data) <- c("Rank", "Country", "Median_Age")
median_age_data <- median_age_data[, c("Country", "Median_Age")]
median_age_data
```

```
##                                                                    Country
## 1    Monaco
## 2    Japan
## 3    Saint Pierre and Miquelon
## 4    Germany
## 5    Italy
## 6    Andorra
## 7    Hong Kong
## 8    Saint Barthelemy
## 9    Greece
## 10   San Marino
## 11   Slovenia
## 12   Isle of Man
## 13   Portugal
## 14   Austria
## 15   Lithuania
## 16   Latvia
## 17   Guernsey
## 18   Croatia
## 19   Spain
## 20   Bulgaria
## 21   Estonia
## 22   Liechtenstein
## 23   Bermuda
## 24   Hungary
## 25   Puerto Rico
```

```
## 26   Serbia
## 27   Bosnia and Herzegovina
## 28   Czechia
## 29   Korea, South
## 30   Saint Helena, Ascension, and Tristan da Cunha
## 31   Finland
## 32   Netherlands
## 33   Switzerland
## 34   Romania
## 35   Malta
## 36   Taiwan
## 37   Cuba
## 38   Denmark
## 39   Poland
## 40   Canada
## 41   Slovakia
## 42   Virgin Islands
## 43   France
## 44   Belgium
## 45   Ukraine
## 46   Sint Maarten
## 47   Sweden
## 48   Belarus
## 49   Macau
## 50   United Kingdom
## 51   Cayman Islands
## 52   Russia
## 53   Aruba
## 54   Montenegro
## 55   Barbados
## 56   Luxembourg
## 57   Norway
## 58   Macedonia
## 59   Thailand
## 60   Georgia
## 61   United States
## 62   China
## 63   United Arab Emirates
## 64   Cook Islands
## 65   Cyprus
## 66   Ireland
## 67   Trinidad and Tobago
## 68   Moldova
## 69   Australia
## 70   Jersey
## 71   British Virgin Islands
## 72   Faroe Islands
## 73   New Zealand
## 74   Iceland
## 75   Saint Lucia
## 76   Seychelles
## 77   Curacao
## 78   Armenia
## 79   Saint Kitts and Nevis
```

```
## 80  Mauritius
## 81  Anguilla
## 82  Singapore
## 83  Chile
## 84  Gibraltar
## 85  Uruguay
## 86  Saint Vincent and the Grenadines
## 87  Dominica
## 88  Montserrat
## 89  Korea, North
## 90  Turks and Caicos Islands
## 91  Albania
## 92  Greenland
## 93  Wallis and Futuna
## 94  Palau
## 95  Lebanon
## 96  Qatar
## 97  Sri Lanka
## 98  French Polynesia
## 99  Grenada
## 100 Saint Martin
## 101 Brazil
## 102 Bahrain
## 103 New Caledonia
## 104 Bahamas, The
## 105 Northern Mariana Islands
## 106 Antigua and Barbuda
## 107 Tunisia
## 108 Azerbaijan
## 109 Costa Rica
## 110 Argentina
## 111 Turkey
## 112 Vietnam
## 113 Iran
## 114 Kazakhstan
## 115 Colombia
## 116 Brunei
## 117 Indonesia
## 118 Suriname
## 119 Saudi Arabia
## 120 Kosovo
## 121 Israel
## 122 Panama
## 123 Uzbekistan
## 124 Venezuela
## 125 Fiji
## 126 Mongolia
## 127 Kuwait
## 128 Paraguay
## 129 Maldives
## 130 Guam
## 131 Jamaica
## 132 Mexico
## 133 Burma
```

```
## 134 Malaysia
## 135 Turkmenistan
## 136 Bhutan
## 137 Morocco
## 138 Peru
## 139 Algeria
## 140 Ecuador
## 141 India
## 142 South Africa
## 143 Bangladesh
## 144 Dominican Republic
## 145 El Salvador
## 146 Guyana
## 147 Kyrgyzstan
## 148 Nicaragua
## 149 American Samoa
## 150 Nauru
## 151 Cabo Verde
## 152 Tuvalu
## 153 Cambodia
## 154 Micronesia, Federated States of
## 155 Oman
## 156 Libya
## 157 Botswana
## 158 Kiribati
## 159 Samoa
## 160 Bolivia
## 161 Nepal
## 162 Tajikistan
## 163 Djibouti
## 164 Lesotho
## 165 Honduras
## 166 Egypt
## 167 Haiti
## 168 Philippines
## 169 Tonga
## 170 Laos
## 171 Papua New Guinea
## 172 Belize
## 173 Marshall Islands
## 174 Eswatini
## 175 Jordan
## 176 Solomon Islands
## 177 Syria
## 178 Guatemala
## 179 Vanuatu
## 180 Pakistan
## 181 West Bank
## 182 Gambia, The
## 183 Namibia
## 184 Ghana
## 185 Iraq
## 186 Gabon
## 187 Mauritania
```

```
## 188 Comoros
## 189 Zimbabwe
## 190 Cote d'Ivoire
## 191 Equatorial Guinea
## 192 Eritrea
## 193 Madagascar
## 194 Central African Republic
## 195 Kenya
## 196 Togo
## 197 Ethiopia
## 198 Yemen
## 199 Rwanda
## 200 Timor-Leste
## 201 Afghanistan
## 202 Congo, Republic of the
## 203 Senegal
## 204 Sao Tome and Principe
## 205 Guinea
## 206 Sierra Leone
## 207 Nigeria
## 208 South Sudan
## 209 Cameroon
## 210 Somalia
## 211 Sudan
## 212 Tanzania
## 213 Gaza Strip
## 214 Guinea-Bissau
## 215 Liberia
## 216 Burkina Faso
## 217 Burundi
## 218 Benin
## 219 Mozambique
## 220 Zambia
## 221 Malawi
## 222 Congo, Democratic Republic of the
## 223 Chad
## 224 Mali
## 225 Angola
## 226 Uganda
## 227 Niger
##     Median_Age
## 1        55.4
## 2        48.6
## 3        48.5
## 4        47.8
## 5        46.5
## 6        46.2
## 7        45.6
## 8        45.6
## 9        45.3
## 10       45.2
## 11       44.9
## 12       44.6
## 13       44.6
```

```
## 14        44.5
## 15        44.5
## 16        44.4
## 17        44.3
## 18        43.9
## 19        43.9
## 20        43.7
## 21        43.7
## 22        43.7
## 23        43.6
## 24        43.6
## 25        43.6
## 26        43.4
## 27        43.3
## 28        43.3
## 29        43.2
## 30        43.2
## 31        42.8
## 32        42.8
## 33        42.7
## 34        42.5
## 35        42.3
## 36        42.3
## 37        42.1
## 38        42.0
## 39        41.9
## 40        41.8
## 41        41.8
## 42        41.8
## 43        41.7
## 44        41.6
## 45        41.2
## 46        41.1
## 47        41.1
## 48        40.9
## 49        40.8
## 50        40.6
## 51        40.5
## 52        40.3
## 53        39.9
## 54        39.6
## 55        39.5
## 56        39.5
## 57        39.5
## 58        39.0
## 59        39.0
## 60        38.6
## 61        38.5
## 62        38.4
## 63        38.4
## 64        38.3
## 65        37.9
## 66        37.8
## 67        37.8
```

```
## 68        37.7
## 69        37.5
## 70        37.5
## 71        37.2
## 72        37.2
## 73        37.2
## 74        37.1
## 75        36.9
## 76        36.8
## 77        36.7
## 78        36.6
## 79        36.5
## 80        36.3
## 81        35.7
## 82        35.6
## 83        35.5
## 84        35.5
## 85        35.5
## 86        35.3
## 87        34.9
## 88        34.8
## 89        34.6
## 90        34.6
## 91        34.3
## 92        34.3
## 93        34.0
## 94        33.9
## 95        33.7
## 96        33.7
## 97        33.7
## 98        33.3
## 99        33.3
## 100       33.3
## 101       33.2
## 102       32.9
## 103       32.9
## 104       32.8
## 105       32.8
## 106       32.7
## 107       32.7
## 108       32.6
## 109       32.6
## 110       32.4
## 111       32.2
## 112       31.9
## 113       31.7
## 114       31.6
## 115       31.2
## 116       31.1
## 117       31.1
## 118       31.0
## 119       30.8
## 120       30.5
## 121       30.4
```

```
## 122        30.1
## 123        30.1
## 124        30.0
## 125        29.9
## 126        29.8
## 127        29.7
## 128        29.7
## 129        29.5
## 130        29.4
## 131        29.4
## 132        29.3
## 133        29.2
## 134        29.2
## 135        29.2
## 136        29.1
## 137        29.1
## 138        29.1
## 139        28.9
## 140        28.8
## 141        28.7
## 142        28.0
## 143        27.9
## 144        27.9
## 145        27.7
## 146        27.5
## 147        27.3
## 148        27.3
## 149        27.2
## 150        27.0
## 151        26.8
## 152        26.6
## 153        26.4
## 154        26.3
## 155        26.2
## 156        25.8
## 157        25.7
## 158        25.7
## 159        25.6
## 160        25.3
## 161        25.3
## 162        25.3
## 163        24.9
## 164        24.7
## 165        24.4
## 166        24.1
## 167        24.1
## 168        24.1
## 169        24.1
## 170        24.0
## 171        24.0
## 172        23.9
## 173        23.8
## 174        23.7
## 175        23.5
```

```
## 176      23.5
## 177      23.5
## 178      23.2
## 179      23.0
## 180      22.0
## 181      21.9
## 182      21.8
## 183      21.8
## 184      21.4
## 185      21.2
## 186      21.0
## 187      21.0
## 188      20.9
## 189      20.5
## 190      20.3
## 191      20.3
## 192      20.3
## 193      20.3
## 194      20.0
## 195      20.0
## 196      20.0
## 197      19.8
## 198      19.8
## 199      19.7
## 200      19.6
## 201      19.5
## 202      19.5
## 203      19.4
## 204      19.3
## 205      19.1
## 206      19.1
## 207      18.6
## 208      18.6
## 209      18.5
## 210      18.5
## 211      18.3
## 212      18.2
## 213      18.0
## 214      18.0
## 215      18.0
## 216      17.9
## 217      17.7
## 218      17.0
## 219      17.0
## 220      16.9
## 221      16.8
## 222      16.7
## 223      16.1
## 224      16.0
## 225      15.9
## 226      15.7
## 227      14.8
```

```
# fwf_widths <- fwf_empty("rawdata_347.txt", skip = 2)
# fwf_widths did not work
migration_data <- read.fwf("rawdata_347.txt", widths = c(8,64,6,18), skip=2)
names(migration_data) <- c("Rank", "Country", "Migration_rate", "Date")
migration_data <- migration_data[, c("Country", "Migration_rate")]
migration_data
```

```
##                                                             Country
## 1    Syria
## 2    British Virgin Islands
## 3    Luxembourg
## 4    Cayman Islands
## 5    Singapore
## 6    Anguilla
## 7    Bahrain
## 8    Turks and Caicos Islands
## 9    Aruba
## 10   Monaco
## 11   Australia
## 12   New Zealand
## 13   Cyprus
## 14   United Arab Emirates
## 15   Spain
## 16   Malta
## 17   San Marino
## 18   Qatar
## 19   Sint Maarten
## 20   Canada
## 21   Isle of Man
## 22   Sweden
## 23   Djibouti
## 24   Liechtenstein
## 25   Belgium
## 26   Saudi Arabia
## 27   Switzerland
## 28   Norway
## 29   Gabon
## 30   Ireland
## 31   New Caledonia
## 32   Austria
## 33   Iceland
## 34   Macau
## 35   Italy
## 36   United States
## 37   Botswana
## 38   Denmark
## 39   Finland
## 40   United Kingdom
## 41   Brunei
## 42   Czechia
## 43   Jersey
## 44   Korea, South
## 45   Ukraine
```

```
## 46   Antigua and Barbuda
## 47   Israel
## 48   Guernsey
## 49   Netherlands
## 50   Hong Kong
## 51   Russia
## 52   Bermuda
## 53   Germany
## 54   Slovenia
## 55   Hungary
## 56   Cote d'Ivoire
## 57   Saint Kitts and Nevis
## 58   France
## 59   Seychelles
## 60   Greece
## 61   Palau
## 62   Costa Rica
## 63   Taiwan
## 64   Belarus
## 65   Suriname
## 66   Kazakhstan
## 67   Macedonia
## 68   Benin
## 69   Chile
## 70   Portugal
## 71   Slovakia
## 72   South Sudan
## 73   Georgia
## 74   Andorra
## 75   Azerbaijan
## 76   Bahamas, The
## 77   Bhutan
## 78   Central African Republic
## 79   Ecuador
## 80   Equatorial Guinea
## 81   Faroe Islands
## 82   Guinea
## 83   Guyana
## 84   India
## 85   Japan
## 86   Korea, North
## 87   Madagascar
## 88   Malawi
## 89   Mauritius
## 90   Montserrat
## 91   Namibia
## 92   Papua New Guinea
## 93   Saint Helena, Ascension, and Tristan da Cunha
## 94   Serbia
## 95   Thailand
## 96   Togo
## 97   Zambia
## 98   Afghanistan
## 99   Argentina
```

```
## 100 Brazil
## 101 Chad
## 102 Panama
## 103 Paraguay
## 104 Angola
## 105 Ethiopia
## 106 Kenya
## 107 Nigeria
## 108 Romania
## 109 South Africa
## 110 Yemen
## 111 Barbados
## 112 Bolivia
## 113 Bulgaria
## 114 Cambodia
## 115 Cameroon
## 116 Egypt
## 117 Iran
## 118 Malaysia
## 119 Poland
## 120 Vietnam
## 121 Bosnia and Herzegovina
## 122 China
## 123 Oman
## 124 Sudan
## 125 Tanzania
## 126 Iraq
## 127 Burkina Faso
## 128 Cabo Verde
## 129 Colombia
## 130 French Polynesia
## 131 Libya
## 132 Niger
## 133 Burundi
## 134 Mauritania
## 135 Mongolia
## 136 Algeria
## 137 Congo, Democratic Republic of the
## 138 Congo, Republic of the
## 139 Pakistan
## 140 Uruguay
## 141 Belize
## 142 Croatia
## 143 Laos
## 144 Indonesia
## 145 Tajikistan
## 146 Sierra Leone
## 147 Curacao
## 148 Senegal
## 149 Sri Lanka
## 150 Vanuatu
## 151 Burma
## 152 Honduras
## 153 Tunisia
```

```
## 154 Gambia, The
## 155 Ghana
## 156 Solomon Islands
## 157 Guatemala
## 158 Mozambique
## 159 Saint Lucia
## 160 Turkmenistan
## 161 Kosovo
## 162 Peru
## 163 Philippines
## 164 Haiti
## 165 Mexico
## 166 Morocco
## 167 Uzbekistan
## 168 Comoros
## 169 Nicaragua
## 170 Grenada
## 171 Dominican Republic
## 172 Kiribati
## 173 Liberia
## 174 Bangladesh
## 175 Saint Barthelemy
## 176 Estonia
## 177 Nepal
## 178 Albania
## 179 Gibraltar
## 180 Kuwait
## 181 Rwanda
## 182 Venezuela
## 183 Uganda
## 184 Cuba
## 185 Guinea-Bissau
## 186 Somalia
## 187 Mali
## 188 Timor-Leste
## 189 West Bank
## 190 Turkey
## 191 Wallis and Futuna
## 192 Marshall Islands
## 193 Gaza Strip
## 194 El Salvador
## 195 Montenegro
## 196 Kyrgyzstan
## 197 Zimbabwe
## 198 Dominica
## 199 Trinidad and Tobago
## 200 Armenia
## 201 Latvia
## 202 Lithuania
## 203 Greenland
## 204 Saint Martin
## 205 Lesotho
## 206 Fiji
## 207 Tuvalu
```

```
## 208 Eswatini
## 209 Saint Vincent and the Grenadines
## 210 Virgin Islands
## 211 Saint Pierre and Miquelon
## 212 Sao Tome and Principe
## 213 Samoa
## 214 Moldova
## 215 Jamaica
## 216 Guam
## 217 Jordan
## 218 Nauru
## 219 Eritrea
## 220 Maldives
## 221 Puerto Rico
## 222 Northern Mariana Islands
## 223 Tonga
## 224 Micronesia, Federated States of
## 225 American Samoa
## 226 Cook Islands
## 227 Lebanon
##     Migration_rate
## 1            27.1
## 2            15.5
## 3            13.3
## 4            13.0
## 5            11.8
## 6            11.1
## 7            10.6
## 8             8.9
## 9             8.4
## 10            8.3
## 11            8.1
## 12            8.0
## 13            7.6
## 14            7.6
## 15            7.0
## 16            6.6
## 17            6.6
## 18            6.5
## 19            6.0
## 20            5.6
## 21            5.2
## 22            5.2
## 23            5.1
## 24            4.9
## 25            4.8
## 26            4.7
## 27            4.6
## 28            4.0
## 29            3.9
## 30            3.9
## 31            3.8
## 32            3.6
## 33            3.3
```

```
## 34            3.3
## 35            3.2
## 36            3.0
## 37            2.9
## 38            2.8
## 39            2.6
## 40            2.5
## 41            2.3
## 42            2.3
## 43            2.3
## 44            2.3
## 45            2.3
## 46            2.1
## 47            2.1
## 48            1.9
## 49            1.9
## 50            1.7
## 51            1.7
## 52            1.6
## 53            1.5
## 54            1.5
## 55            1.3
## 56            1.2
## 57            1.2
## 58            1.1
## 59            1.0
## 60            0.9
## 61            0.9
## 62            0.8
## 63            0.8
## 64            0.7
## 65            0.5
## 66            0.4
## 67            0.4
## 68            0.3
## 69            0.3
## 70            0.3
## 71            0.2
## 72            0.2
## 73            0.1
## 74            0.0
## 75            0.0
## 76            0.0
## 77            0.0
## 78            0.0
## 79            0.0
## 80            0.0
## 81            0.0
## 82            0.0
## 83            0.0
## 84            0.0
## 85            0.0
## 86            0.0
## 87            0.0
```

```
## 88            0.0
## 89            0.0
## 90            0.0
## 91            0.0
## 92            0.0
## 93            0.0
## 94            0.0
## 95            0.0
## 96            0.0
## 97            0.0
## 98           -0.1
## 99           -0.1
## 100          -0.1
## 101          -0.1
## 102          -0.1
## 103          -0.1
## 104          -0.2
## 105          -0.2
## 106          -0.2
## 107          -0.2
## 108          -0.2
## 109          -0.2
## 110          -0.2
## 111          -0.3
## 112          -0.3
## 113          -0.3
## 114          -0.3
## 115          -0.3
## 116          -0.3
## 117          -0.3
## 118          -0.3
## 119          -0.3
## 120          -0.3
## 121          -0.4
## 122          -0.4
## 123          -0.4
## 124          -0.4
## 125          -0.4
## 126          -0.5
## 127          -0.6
## 128          -0.6
## 129          -0.6
## 130          -0.7
## 131          -0.7
## 132          -0.7
## 133          -0.8
## 134          -0.8
## 135          -0.8
## 136          -0.9
## 137          -0.9
## 138          -0.9
## 139          -0.9
## 140          -0.9
## 141          -1.0
```

```
## 142          -1.0
## 143          -1.0
## 144          -1.1
## 145          -1.1
## 146          -1.2
## 147          -1.3
## 148          -1.3
## 149          -1.3
## 150          -1.3
## 151          -1.4
## 152          -1.4
## 153          -1.4
## 154          -1.6
## 155          -1.6
## 156          -1.6
## 157          -1.7
## 158          -1.7
## 159          -1.7
## 160          -1.7
## 161          -1.8
## 162          -1.8
## 163          -1.8
## 164          -1.9
## 165          -1.9
## 166          -1.9
## 167          -1.9
## 168          -2.3
## 169          -2.4
## 170          -2.6
## 171          -2.7
## 172          -2.8
## 173          -2.9
## 174          -3.0
## 175          -3.0
## 176          -3.1
## 177          -3.1
## 178          -3.3
## 179          -3.3
## 180          -3.3
## 181          -3.3
## 182          -3.4
## 183          -3.5
## 184          -3.7
## 185          -3.8
## 186          -3.8
## 187          -3.9
## 188          -3.9
## 189          -4.2
## 190          -4.3
## 191          -4.3
## 192          -4.5
## 193          -4.7
## 194          -4.8
## 195          -4.9
```

```
## 196                -5.0
## 197                -5.0
## 198                -5.3
## 199                -5.4
## 200                -5.5
## 201                -5.9
## 202                -5.9
## 203                -6.0
## 204                -6.0
## 205                -6.1
## 206                -6.2
## 207                -6.5
## 208                -6.8
## 209                -7.2
## 210                -7.5
## 211                -7.7
## 212                -7.9
## 213                -8.1
## 214                -9.0
## 215                -9.4
## 216               -11.0
## 217               -11.3
## 218               -11.3
## 219               -11.6
## 220               -12.7
## 221               -14.1
## 222               -15.4
## 223               -17.9
## 224               -20.9
## 225               -26.1
## 226               -29.9
## 227               -88.7
```

```r
unemployment_data <- read.csv("rawdata_373.csv")
names(unemployment_data) <- c("Country", "Youth_unemployment_rate")
unemployment_data
```

```
##                                                              Country
## 1    French Polynesia
## 2    Kosovo
## 3    South Africa
## 4    Libya
## 5    Eswatini
## 6    Saint Lucia
## 7    Macedonia
## 8    Gaza Strip
## 9    West Bank
## 10   Malawi
## 11   Greece
## 12   Angola
## 13   Algeria
## 14   South Sudan
## 15   New Caledonia
## 16   Namibia
```

```
## 17   Armenia
## 18   Botswana
## 19   Syria
## 20   Gabon
## 21   Jordan
## 22   Tunisia
## 23   Lesotho
## 24   Spain
## 25   Bosnia and Herzegovina
## 26   Italy
## 27   Albania
## 28   Samoa
## 29   Georgia
## 30   Serbia
## 31   Barbados
## 32   Egypt
## 33   Guam
## 34   Montenegro
## 35   Bermuda
## 36   Curacao
## 37   Brunei
## 38   Saudi Arabia
## 39   Brazil
## 40   Cabo Verde
## 41   Iran
## 42   San Marino
## 43   Monaco
## 44   Nauru
## 45   Puerto Rico
## 46   Uruguay
## 47   Bahamas, The
## 48   Iraq
## 49   Ethiopia
## 50   Yemen
## 51   Jamaica
## 52   Zambia
## 53   Mauritius
## 54   Argentina
## 55   Croatia
## 56   India
## 57   Morocco
## 58   Guyana
## 59   Nepal
## 60   Sri Lanka
## 61   France
## 62   Sao Tome and Principe
## 63   Costa Rica
## 64   Rwanda
## 65   Tuvalu
## 66   Portugal
## 67   Cyprus
## 68   Turkey
## 69   Comoros
## 70   Micronesia, Federated States of
```

```
## 71  Colombia
## 72  Laos
## 73  Chile
## 74  Ukraine
## 75  Afghanistan
## 76  Kiribati
## 77  Finland
## 78  Russia
## 79  Mali
## 80  Mongolia
## 81  Sweden
## 82  Indonesia
## 83  Zimbabwe
## 84  Romania
## 85  Maldives
## 86  Belgium
## 87  Fiji
## 88  Kuwait
## 89  Belize
## 90  Mauritania
## 91  Slovakia
## 92  Uganda
## 93  Peru
## 94  Venezuela
## 95  Paraguay
## 96  Kyrgyzstan
## 97  Luxembourg
## 98  Cayman Islands
## 99  Ireland
## 100 Nigeria
## 101 Oman
## 102 Dominican Republic
## 103 Azerbaijan
## 104 Suriname
## 105 Timor-Leste
## 106 Gambia, The
## 107 Bangladesh
## 108 Bulgaria
## 109 Latvia
## 110 Australia
## 111 Estonia
## 112 Poland
## 113 Seychelles
## 114 New Zealand
## 115 United Kingdom
## 116 Canada
## 117 Lithuania
## 118 Marshall Islands
## 119 Bhutan
## 120 Honduras
## 121 Belarus
## 122 Malaysia
## 123 Hungary
## 124 Korea, South
```

```
## 125 Panama
## 126 Isle of Man
## 127 Norway
## 128 El Salvador
## 129 Austria
## 130 Denmark
## 131 Sierra Leone
## 132 Ghana
## 133 Malta
## 134 Singapore
## 135 Slovenia
## 136 Burkina Faso
## 137 Congo, Democratic Republic of the
## 138 Hong Kong
## 139 Trinidad and Tobago
## 140 United States
## 141 Nicaragua
## 142 Senegal
## 143 Ecuador
## 144 Switzerland
## 145 Pakistan
## 146 Kenya
## 147 Moldova
## 148 Mozambique
## 149 Israel
## 150 Netherlands
## 151 Bolivia
## 152 Mexico
## 153 United Arab Emirates
## 154 Vietnam
## 155 Czechia
## 156 Philippines
## 157 Cameroon
## 158 Germany
## 159 Cuba
## 160 Iceland
## 161 Benin
## 162 Palau
## 163 Cote d'Ivoire
## 164 Bahrain
## 165 Macau
## 166 Guatemala
## 167 Tanzania
## 168 Togo
## 169 Kazakhstan
## 170 Thailand
## 171 Japan
## 172 Papua New Guinea
## 173 Burundi
## 174 Liberia
## 175 Burma
## 176 Solomon Islands
## 177 Cambodia
## 178 Guinea
```

```
## 179 Madagascar
## 180 Niger
## 181 Qatar
##       Youth_unemployment_rate
## 1                         56.7
## 2                         55.4
## 3                         53.4
## 4                         48.7
## 5                         47.1
## 6                         46.2
## 7                         45.4
## 8                         42.2
## 9                         42.2
## 10                        40.5
## 11                        39.9
## 12                        39.4
## 13                        39.3
## 14                        38.6
## 15                        38.4
## 16                        38.0
## 17                        36.3
## 18                        36.0
## 19                        35.8
## 20                        35.7
## 21                        35.6
## 22                        35.0
## 23                        34.4
## 24                        34.3
## 25                        33.8
## 26                        32.2
## 27                        31.9
## 28                        31.9
## 29                        29.9
## 30                        29.7
## 31                        29.6
## 32                        29.6
## 33                        29.4
## 34                        29.4
## 35                        29.3
## 36                        29.3
## 37                        28.9
## 38                        28.8
## 39                        28.5
## 40                        27.8
## 41                        27.6
## 42                        27.4
## 43                        26.6
## 44                        26.6
## 45                        26.6
## 46                        25.9
## 47                        25.8
## 48                        25.6
## 49                        25.2
## 50                        24.5
```

```
## 51                    24.2
## 52                    24.0
## 53                    23.9
## 54                    23.7
## 55                    23.7
## 56                    22.5
## 57                    22.2
## 58                    21.5
## 59                    21.4
## 60                    21.0
## 61                    20.8
## 62                    20.8
## 63                    20.6
## 64                    20.6
## 65                    20.6
## 66                    20.3
## 67                    20.2
## 68                    20.2
## 69                    19.5
## 70                    18.9
## 71                    18.5
## 72                    18.2
## 73                    18.1
## 74                    17.9
## 75                    17.6
## 76                    17.1
## 77                    17.0
## 78                    17.0
## 79                    16.9
## 80                    16.8
## 81                    16.8
## 82                    16.5
## 83                    16.5
## 84                    16.2
## 85                    15.9
## 86                    15.8
## 87                    15.4
## 88                    15.4
## 89                    15.3
## 90                    15.2
## 91                    14.9
## 92                    14.8
## 93                    14.7
## 94                    14.6
## 95                    14.5
## 96                    14.2
## 97                    14.2
## 98                    13.8
## 99                    13.8
## 100                   13.8
## 101                   13.7
## 102                   13.5
## 103                   13.4
## 104                   13.4
```

```
## 105                     13.2
## 106                     13.1
## 107                     12.8
## 108                     12.7
## 109                     12.2
## 110                     11.8
## 111                     11.8
## 112                     11.7
## 113                     11.6
## 114                     11.5
## 115                     11.3
## 116                     11.1
## 117                     11.1
## 118                     11.0
## 119                     10.7
## 120                     10.7
## 121                     10.6
## 122                     10.5
## 123                     10.2
## 124                     10.2
## 125                     10.2
## 126                     10.1
## 127                      9.7
## 128                      9.6
## 129                      9.4
## 130                      9.4
## 131                      9.4
## 132                      9.1
## 133                      9.1
## 134                      9.1
## 135                      8.8
## 136                      8.7
## 137                      8.7
## 138                      8.7
## 139                      8.7
## 140                      8.6
## 141                      8.5
## 142                      8.1
## 143                      7.9
## 144                      7.9
## 145                      7.8
## 146                      7.4
## 147                      7.4
## 148                      7.4
## 149                      7.2
## 150                      7.2
## 151                      6.9
## 152                      6.9
## 153                      6.9
## 154                      6.9
## 155                      6.7
## 156                      6.7
## 157                      6.3
## 158                      6.2
```

```
## 159                                   6.1
## 160                                   6.1
## 161                                   5.6
## 162                                   5.6
## 163                                   5.5
## 164                                   5.3
## 165                                   5.3
## 166                                   5.0
## 167                                   3.9
## 168                                   3.9
## 169                                   3.8
## 170                                   3.7
## 171                                   3.6
## 172                                   3.6
## 173                                   2.9
## 174                                   2.3
## 175                                   2.0
## 176                                   1.3
## 177                                   1.1
## 178                                   1.0
## 179                                   1.0
## 180                                   0.7
## 181                                   0.4
```

b

Merge the data sets containing raw data using dplyr function on the unique keys. Keep the union of all
observations in the tables. What key are you using for merging? Return the dimension of the merged data
set. I use the column "country" for merging - I encountered an issue where the column for migration rate
was always NaN so I had to trim the whitespaces.

```r
median_age_data$Country <- trimws(median_age_data$Country)
migration_data$Country <- trimws(migration_data$Country)
unemployment_data$Country <- trimws(unemployment_data$Country)

joined <- left_join(median_age_data, unemployment_data, by = join_by(Country))
joined_data <- left_join(joined, migration_data, by = join_by(Country == Country))
head(joined_data)
```

```
##                         Country Median_Age Youth_unemployment_rate Migration_rate
## 1                        Monaco       55.4                    26.6            8.3
## 2                         Japan       48.6                     3.6            0.0
## 3 Saint Pierre and Miquelon       48.5                      NA           -7.7
## 4                       Germany       47.8                     6.2            1.5
## 5                         Italy       46.5                    32.2            3.2
## 6                       Andorra       46.2                      NA            0.0
```

c

You will acquire more country level information such as the classification of the country based on income.
Such an information can be found at https://datahelpdesk.worldbank.org/knowledgebase/articles/906519.
```

From there extract the classification for 2020 into low/lower-middle/upper-middle/high income countries

```
income_data <- read_excel("OGHIST.xlsx", sheet="Country Analytical History", col_names = TRUE)
```

```
## New names:
## * `` -> `...1`
## * `` -> `...3`
## * `` -> `...4`
## * `` -> `...5`
## * `` -> `...6`
## * `` -> `...7`
## * `` -> `...8`
## * `` -> `...9`
## * `` -> `...10`
## * `` -> `...11`
## * `` -> `...12`
## * `` -> `...13`
## * `` -> `...14`
## * `` -> `...15`
## * `` -> `...16`
## * `` -> `...17`
## * `` -> `...18`
## * `` -> `...19`
## * `` -> `...20`
## * `` -> `...21`
## * `` -> `...22`
## * `` -> `...23`
## * `` -> `...24`
## * `` -> `...25`
## * `` -> `...26`
## * `` -> `...27`
## * `` -> `...28`
## * `` -> `...29`
## * `` -> `...30`
## * `` -> `...31`
## * `` -> `...32`
## * `` -> `...33`
## * `` -> `...34`
## * `` -> `...35`
## * `` -> `...36`
## * `` -> `...37`
## * `` -> `...38`
```

```
income_data <- income_data[, c("World Bank Analytical Classifications", "...36")]
income_data <- income_data[11:nrow(income_data), ]
names(income_data) <- c("Country", "Income_class")
income_data
```

```
## # A tibble: 229 x 2
##    Country            Income_class
##    <chr>              <chr>
##  1 Afghanistan        L
##  2 Albania            UM
```

```
## 3 Algeria              LM
## 4 American Samoa        UM
## 5 Andorra               H
## 6 Angola                LM
## 7 Antigua and Barbuda  H
## 8 Argentina             UM
## 9 Armenia               UM
## 10 Aruba                H
## # i 219 more rows
```

d

Merge this information to the data set in b. 1. What are the common variables? Can you merge using them? Why or why not? I can merge the dataframes on the column Country.

```
data <- left_join(joined_data, income_data, by = join_by(Country == Country))
data
```

```
##                                               Country Median_Age
## 1                                              Monaco       55.4
## 2                                               Japan       48.6
## 3                           Saint Pierre and Miquelon       48.5
## 4                                             Germany       47.8
## 5                                               Italy       46.5
## 6                                             Andorra       46.2
## 7                                           Hong Kong       45.6
## 8                                     Saint Barthelemy       45.6
## 9                                              Greece       45.3
## 10                                          San Marino       45.2
## 11                                            Slovenia       44.9
## 12                                          Isle of Man       44.6
## 13                                            Portugal       44.6
## 14                                             Austria       44.5
## 15                                           Lithuania       44.5
## 16                                              Latvia       44.4
## 17                                            Guernsey       44.3
## 18                                             Croatia       43.9
## 19                                               Spain       43.9
## 20                                            Bulgaria       43.7
## 21                                             Estonia       43.7
## 22                                       Liechtenstein       43.7
## 23                                             Bermuda       43.6
## 24                                             Hungary       43.6
## 25                                         Puerto Rico       43.6
## 26                                              Serbia       43.4
## 27                              Bosnia and Herzegovina       43.3
## 28                                             Czechia       43.3
## 29                                         Korea, South       43.2
## 30  Saint Helena, Ascension, and Tristan da Cunha       43.2
## 31                                             Finland       42.8
## 32                                         Netherlands       42.8
## 33                                         Switzerland       42.7
```

```
## 34                              Romania  42.5
## 35                                Malta  42.3
## 36                               Taiwan  42.3
## 37                                 Cuba  42.1
## 38                              Denmark  42.0
## 39                               Poland  41.9
## 40                               Canada  41.8
## 41                             Slovakia  41.8
## 42                        Virgin Islands  41.8
## 43                               France  41.7
## 44                              Belgium  41.6
## 45                              Ukraine  41.2
## 46                         Sint Maarten  41.1
## 47                               Sweden  41.1
## 48                              Belarus  40.9
## 49                                Macau  40.8
## 50                       United Kingdom  40.6
## 51                       Cayman Islands  40.5
## 52                               Russia  40.3
## 53                                Aruba  39.9
## 54                           Montenegro  39.6
## 55                             Barbados  39.5
## 56                           Luxembourg  39.5
## 57                               Norway  39.5
## 58                            Macedonia  39.0
## 59                             Thailand  39.0
## 60                              Georgia  38.6
## 61                        United States  38.5
## 62                                China  38.4
## 63                 United Arab Emirates  38.4
## 64                         Cook Islands  38.3
## 65                               Cyprus  37.9
## 66                              Ireland  37.8
## 67                  Trinidad and Tobago  37.8
## 68                              Moldova  37.7
## 69                            Australia  37.5
## 70                               Jersey  37.5
## 71              British Virgin Islands  37.2
## 72                        Faroe Islands  37.2
## 73                          New Zealand  37.2
## 74                              Iceland  37.1
## 75                          Saint Lucia  36.9
## 76                           Seychelles  36.8
## 77                              Curacao  36.7
## 78                              Armenia  36.6
## 79                 Saint Kitts and Nevis  36.5
## 80                            Mauritius  36.3
## 81                             Anguilla  35.7
## 82                            Singapore  35.6
## 83                                Chile  35.5
## 84                            Gibraltar  35.5
## 85                              Uruguay  35.5
## 86      Saint Vincent and the Grenadines  35.3
## 87                             Dominica  34.9
```

```
## 88                        Montserrat   34.8
## 89                       Korea, North   34.6
## 90          Turks and Caicos Islands   34.6
## 91                            Albania   34.3
## 92                          Greenland   34.3
## 93                  Wallis and Futuna   34.0
## 94                              Palau   33.9
## 95                            Lebanon   33.7
## 96                              Qatar   33.7
## 97                          Sri Lanka   33.7
## 98                   French Polynesia   33.3
## 99                            Grenada   33.3
## 100                      Saint Martin   33.3
## 101                            Brazil   33.2
## 102                           Bahrain   32.9
## 103                     New Caledonia   32.9
## 104                      Bahamas, The   32.8
## 105          Northern Mariana Islands   32.8
## 106               Antigua and Barbuda   32.7
## 107                           Tunisia   32.7
## 108                        Azerbaijan   32.6
## 109                        Costa Rica   32.6
## 110                         Argentina   32.4
## 111                            Turkey   32.2
## 112                           Vietnam   31.9
## 113                              Iran   31.7
## 114                        Kazakhstan   31.6
## 115                          Colombia   31.2
## 116                            Brunei   31.1
## 117                         Indonesia   31.1
## 118                          Suriname   31.0
## 119                      Saudi Arabia   30.8
## 120                            Kosovo   30.5
## 121                            Israel   30.4
## 122                            Panama   30.1
## 123                        Uzbekistan   30.1
## 124                         Venezuela   30.0
## 125                              Fiji   29.9
## 126                          Mongolia   29.8
## 127                            Kuwait   29.7
## 128                          Paraguay   29.7
## 129                          Maldives   29.5
## 130                              Guam   29.4
## 131                           Jamaica   29.4
## 132                            Mexico   29.3
## 133                             Burma   29.2
## 134                          Malaysia   29.2
## 135                      Turkmenistan   29.2
## 136                            Bhutan   29.1
## 137                           Morocco   29.1
## 138                              Peru   29.1
## 139                           Algeria   28.9
## 140                           Ecuador   28.8
## 141                             India   28.7
```

```
## 142                         South Africa       28.0
## 143                           Bangladesh       27.9
## 144                   Dominican Republic       27.9
## 145                          El Salvador       27.7
## 146                               Guyana       27.5
## 147                           Kyrgyzstan       27.3
## 148                            Nicaragua       27.3
## 149                       American Samoa       27.2
## 150                                Nauru       27.0
## 151                           Cabo Verde       26.8
## 152                               Tuvalu       26.6
## 153                             Cambodia       26.4
## 154     Micronesia, Federated States of       26.3
## 155                                 Oman       26.2
## 156                                Libya       25.8
## 157                             Botswana       25.7
## 158                             Kiribati       25.7
## 159                                Samoa       25.6
## 160                              Bolivia       25.3
## 161                                Nepal       25.3
## 162                           Tajikistan       25.3
## 163                             Djibouti       24.9
## 164                              Lesotho       24.7
## 165                             Honduras       24.4
## 166                                Egypt       24.1
## 167                                Haiti       24.1
## 168                          Philippines       24.1
## 169                                Tonga       24.1
## 170                                 Laos       24.0
## 171                     Papua New Guinea       24.0
## 172                               Belize       23.9
## 173                      Marshall Islands       23.8
## 174                             Eswatini       23.7
## 175                               Jordan       23.5
## 176                      Solomon Islands       23.5
## 177                                Syria       23.5
## 178                            Guatemala       23.2
## 179                              Vanuatu       23.0
## 180                             Pakistan       22.0
## 181                            West Bank       21.9
## 182                          Gambia, The       21.8
## 183                              Namibia       21.8
## 184                                Ghana       21.4
## 185                                 Iraq       21.2
## 186                                Gabon       21.0
## 187                           Mauritania       21.0
## 188                              Comoros       20.9
## 189                             Zimbabwe       20.5
## 190                        Cote d'Ivoire       20.3
## 191                    Equatorial Guinea       20.3
## 192                              Eritrea       20.3
## 193                           Madagascar       20.3
## 194             Central African Republic       20.0
## 195                                Kenya       20.0
```

```
## 196                             Togo         20.0
## 197                          Ethiopia        19.8
## 198                             Yemen        19.8
## 199                            Rwanda        19.7
## 200                       Timor-Leste        19.6
## 201                       Afghanistan        19.5
## 202            Congo, Republic of the        19.5
## 203                           Senegal        19.4
## 204             Sao Tome and Principe        19.3
## 205                            Guinea        19.1
## 206                      Sierra Leone        19.1
## 207                           Nigeria        18.6
## 208                       South Sudan        18.6
## 209                          Cameroon        18.5
## 210                           Somalia        18.5
## 211                             Sudan        18.3
## 212                          Tanzania        18.2
## 213                         Gaza Strip        18.0
## 214                      Guinea-Bissau        18.0
## 215                           Liberia        18.0
## 216                      Burkina Faso        17.9
## 217                           Burundi        17.7
## 218                             Benin        17.0
## 219                        Mozambique        17.0
## 220                            Zambia        16.9
## 221                            Malawi        16.8
## 222   Congo, Democratic Republic of the        16.7
## 223                              Chad        16.1
## 224                              Mali        16.0
## 225                            Angola        15.9
## 226                            Uganda        15.7
## 227                             Niger        14.8
##     Youth_unemployment_rate Migration_rate Income_class
## 1                      26.6            8.3            H
## 2                       3.6            0.0            H
## 3                        NA           -7.7         <NA>
## 4                       6.2            1.5            H
## 5                      32.2            3.2            H
## 6                        NA            0.0            H
## 7                       8.7            1.7         <NA>
## 8                        NA           -3.0         <NA>
## 9                      39.9            0.9            H
## 10                     27.4            6.6            H
## 11                      8.8            1.5            H
## 12                     10.1            5.2            H
## 13                     20.3            0.3            H
## 14                      9.4            3.6            H
## 15                     11.1           -5.9            H
## 16                     12.2           -5.9            H
## 17                       NA            1.9         <NA>
## 18                     23.7           -1.0            H
## 19                     34.3            7.0            H
## 20                     12.7           -0.3           UM
## 21                     11.8           -3.1            H
```

```
## 22           NA      4.9       H
## 23         29.3      1.6       H
## 24         10.2      1.3       H
## 25         26.6    -14.1       H
## 26         29.7      0.0      UM
## 27         33.8     -0.4      UM
## 28          6.7      2.3    <NA>
## 29         10.2      2.3    <NA>
## 30           NA      0.0    <NA>
## 31         17.0      2.6       H
## 32          7.2      1.9       H
## 33          7.9      4.6       H
## 34         16.2     -0.2      UM
## 35          9.1      6.6       H
## 36           NA      0.8    <NA>
## 37          6.1     -3.7      UM
## 38          9.4      2.8       H
## 39         11.7     -0.3       H
## 40         11.1      5.6       H
## 41         14.9      0.2    <NA>
## 42           NA     -7.5    <NA>
## 43         20.8      1.1       H
## 44         15.8      4.8       H
## 45         17.9      2.3      LM
## 46           NA      6.0    <NA>
## 47         16.8      5.2       H
## 48         10.6      0.7      UM
## 49          5.3      3.3    <NA>
## 50         11.3      2.5       H
## 51         13.8     13.0       H
## 52         17.0      1.7    <NA>
## 53           NA      8.4       H
## 54         29.4     -4.9      UM
## 55         29.6     -0.3       H
## 56         14.2     13.3       H
## 57          9.7      4.0       H
## 58         45.4      0.4    <NA>
## 59          3.7      0.0      UM
## 60         29.9      0.1      UM
## 61          8.6      3.0       H
## 62           NA     -0.4      UM
## 63          6.9      7.6       H
## 64           NA    -29.9    <NA>
## 65         20.2      7.6       H
## 66         13.8      3.9       H
## 67          8.7     -5.4       H
## 68          7.4     -9.0      UM
## 69         11.8      8.1       H
## 70           NA      2.3    <NA>
## 71           NA     15.5       H
## 72           NA      0.0    <NA>
## 73         11.5      8.0       H
## 74          6.1      3.3       H
## 75         46.2     -1.7    <NA>
```

```
## 76                11.6           1.0              H
## 77                29.3          -1.3           <NA>
## 78                36.3          -5.5             UM
## 79                  NA           1.2           <NA>
## 80                23.9           0.0             UM
## 81                  NA          11.1           <NA>
## 82                 9.1          11.8              H
## 83                18.1           0.3              H
## 84                  NA          -3.3              H
## 85                25.9          -0.9              H
## 86                  NA          -7.2           <NA>
## 87                  NA          -5.3             UM
## 88                  NA           0.0           <NA>
## 89                  NA           0.0           <NA>
## 90                  NA           8.9              H
## 91                31.9          -3.3             UM
## 92                  NA          -6.0              H
## 93                  NA          -4.3           <NA>
## 94                 5.6           0.9              H
## 95                  NA         -88.7             UM
## 96                 0.4           6.5              H
## 97                21.0          -1.3             LM
## 98                56.7          -0.7              H
## 99                  NA          -2.6             UM
## 100                 NA          -6.0           <NA>
## 101               28.5          -0.1             UM
## 102                5.3          10.6              H
## 103               38.4           3.8              H
## 104               25.8           0.0              H
## 105                 NA         -15.4              H
## 106                 NA           2.1              H
## 107               35.0          -1.4             LM
## 108               13.4           0.0             UM
## 109               20.6           0.8             UM
## 110               23.7          -0.1             UM
## 111               20.2          -4.3           <NA>
## 112                6.9          -0.3             LM
## 113               27.6          -0.3           <NA>
## 114                3.8           0.4             UM
## 115               18.5          -0.6             UM
## 116               28.9           2.3           <NA>
## 117               16.5          -1.1             LM
## 118               13.4           0.5             UM
## 119               28.8           4.7              H
## 120               55.4          -1.8             UM
## 121                7.2           2.1              H
## 122               10.2          -0.1             UM
## 123                 NA          -1.9             LM
## 124               14.6          -3.4           <NA>
## 125               15.4          -6.2             UM
## 126               16.8          -0.8             LM
## 127               15.4          -3.3              H
## 128               14.5          -0.1             UM
## 129               15.9         -12.7             UM
```

```
## 130                29.4          -11.0             H
## 131                24.2           -9.4            UM
## 132                 6.9           -1.9            UM
## 133                 2.0           -1.4          <NA>
## 134                10.5           -0.3            UM
## 135                  NA           -1.7            UM
## 136                10.7            0.0            LM
## 137                22.2           -1.9            LM
## 138                14.7           -1.8            UM
## 139                39.3           -0.9            LM
## 140                 7.9            0.0            UM
## 141                22.5            0.0            LM
## 142                53.4           -0.2            UM
## 143                12.8           -3.0            LM
## 144                13.5           -2.7            UM
## 145                 9.6           -4.8            LM
## 146                21.5            0.0            UM
## 147                14.2           -5.0          <NA>
## 148                 8.5           -2.4            LM
## 149                  NA          -26.1            UM
## 150                26.6          -11.3             H
## 151                27.8           -0.6            LM
## 152                20.6           -6.5            UM
## 153                 1.1           -0.3            LM
## 154                18.9          -20.9          <NA>
## 155                13.7           -0.4             H
## 156                48.7           -0.7            UM
## 157                36.0            2.9            UM
## 158                17.1           -2.8            LM
## 159                31.9           -8.1            LM
## 160                 6.9           -0.3            LM
## 161                21.4           -3.1            LM
## 162                  NA           -1.1            LM
## 163                  NA            5.1            LM
## 164                34.4           -6.1            LM
## 165                10.7           -1.4            LM
## 166                29.6           -0.3          <NA>
## 167                  NA           -1.9            LM
## 168                 6.7           -1.8            LM
## 169                  NA          -17.9            UM
## 170                18.2           -1.0          <NA>
## 171                 3.6            0.0            LM
## 172                15.3           -1.0            LM
## 173                11.0           -4.5            UM
## 174                47.1           -6.8            LM
## 175                35.6          -11.3            UM
## 176                 1.3           -1.6            LM
## 177                35.8           27.1          <NA>
## 178                 5.0           -1.7            UM
## 179                  NA           -1.3            LM
## 180                 7.8           -0.9            LM
## 181                42.2           -4.2          <NA>
## 182                13.1           -1.6             L
## 183                38.0            0.0            UM
```

```
## 184                 9.1             -1.6              LM
## 185                25.6             -0.5              UM
## 186                35.7              3.9              UM
## 187                15.2             -0.8              LM
## 188                19.5             -2.3              LM
## 189                16.5             -5.0              LM
## 190                 5.5              1.2            <NA>
## 191                  NA              0.0              UM
## 192                  NA            -11.6               L
## 193                 1.0              0.0               L
## 194                  NA              0.0               L
## 195                 7.4             -0.2              LM
## 196                 3.9              0.0               L
## 197                25.2             -0.2               L
## 198                24.5             -0.2            <NA>
## 199                20.6             -3.3               L
## 200                13.2             -3.9              LM
## 201                17.6             -0.1               L
## 202                  NA             -0.9            <NA>
## 203                 8.1             -1.3              LM
## 204                20.8             -7.9            <NA>
## 205                 1.0              0.0               L
## 206                 9.4             -1.2               L
## 207                13.8             -0.2              LM
## 208                38.6              0.2               L
## 209                 6.3             -0.3              LM
## 210                  NA             -3.8               L
## 211                  NA             -0.4               L
## 212                 3.9             -0.4              LM
## 213                42.2             -4.7            <NA>
## 214                  NA             -3.8               L
## 215                 2.3             -2.9               L
## 216                 8.7             -0.6               L
## 217                 2.9             -0.8               L
## 218                 5.6              0.3              LM
## 219                 7.4             -1.7               L
## 220                24.0              0.0              LM
## 221                40.5              0.0               L
## 222                 8.7             -0.9            <NA>
## 223                  NA             -0.1               L
## 224                16.9             -3.9               L
## 225                39.4             -0.2              LM
## 226                14.8             -3.5               L
## 227                 0.7             -0.7               L
```

2. A reliable merging for countries are ISO codes as they are standardized across data sources. Download the mapping of ISO codes to countries from https://www.cia.gov/the-world-factbook/references/ country data-codes/ and load it into R.

```
#using read.csv
#country_code <- read.csv("Country Data Codes.csv", sep = ",", quote = "", stringsAsFactors = FALSE, he
#country_code

#using read_csv
```

```r
#country_code <- read_csv("Country Data Codes.csv", col_types = , show_col_types = FALSE,   trim_ws = T
#country_code

#using fread
country_code <- fread("Country Data Codes.csv", sep = ",", header = TRUE, fill=TRUE, stringsAsFactors =
names(country_code)[names(country_code) == 'ISO 3166'] <- 'ISO'
names(country_code)[names(country_code) == 'Name'] <- 'Country'

#new idea - merge columns when col2 contains country name data
country_code <- country_code %>%
  mutate(
    Country = ifelse(
      str_detect(GENC, "[a-z]"),  # check for lowercase letters
      paste(Country, GENC, sep = ", "),  # Concatenate Name and GENC if condition is true
      Country  # Keep NAme
    ),
    GENC = ifelse(
      str_detect(GENC, "[a-z]"),
      NA,  # Clear GENC if merged
      GENC
    )
  )

#happy bc we only need Name and ISO columns so i dont have to shift the others

country_code <- country_code[, c("Country", "ISO")]

country_code <- country_code %>%
  mutate(across(everything(), ~ str_replace_all(., '"', '')))

country_code
```

```
##               Country          ISO
##   1:      Afghanistan AF|AFG|004
##   2:         Akrotiri            -
##   3:           Albania AL|ALB|008
##   4:           Algeria DZ|DZA|012
##   5: American Samoa AS|ASM|016
##   ---
## 274:            World            -
## 275:            Yemen YE|YEM|887
## 276:            Zaire            -
## 277:           Zambia ZM|ZMB|894
## 278:         Zimbabwe ZW|ZWE|716
```

3. Merge the data sets using the ISO codes.

```r
country_code$Country <- trimws(country_code$Country)
country_code$ISO <- trimws(country_code$ISO)

data <- left_join(data, country_code, by = join_by(Country == Country))
names(data)[names(data) == 'ISO.y'] <- 'ISO'
```

```
data$ISO.x <- NULL
data
```

```
##                                             Country Median_Age
## 1                                            Monaco       55.4
## 2                                             Japan       48.6
## 3                          Saint Pierre and Miquelon       48.5
## 4                                           Germany       47.8
## 5                                             Italy       46.5
## 6                                            Andorra       46.2
## 7                                         Hong Kong       45.6
## 8                                  Saint Barthelemy       45.6
## 9                                             Greece       45.3
## 10                                       San Marino       45.2
## 11                                         Slovenia       44.9
## 12                                       Isle of Man       44.6
## 13                                         Portugal       44.6
## 14                                          Austria       44.5
## 15                                        Lithuania       44.5
## 16                                           Latvia       44.4
## 17                                         Guernsey       44.3
## 18                                          Croatia       43.9
## 19                                            Spain       43.9
## 20                                         Bulgaria       43.7
## 21                                          Estonia       43.7
## 22                                    Liechtenstein       43.7
## 23                                          Bermuda       43.6
## 24                                          Hungary       43.6
## 25                                      Puerto Rico       43.6
## 26                                           Serbia       43.4
## 27                           Bosnia and Herzegovina       43.3
## 28                                          Czechia       43.3
## 29                                      Korea, South       43.2
## 30   Saint Helena, Ascension, and Tristan da Cunha       43.2
## 31                                          Finland       42.8
## 32                                      Netherlands       42.8
## 33                                      Switzerland       42.7
## 34                                          Romania       42.5
## 35                                            Malta       42.3
## 36                                           Taiwan       42.3
## 37                                             Cuba       42.1
## 38                                          Denmark       42.0
## 39                                           Poland       41.9
## 40                                           Canada       41.8
## 41                                         Slovakia       41.8
## 42                                    Virgin Islands       41.8
## 43                                           France       41.7
## 44                                          Belgium       41.6
## 45                                          Ukraine       41.2
## 46                                     Sint Maarten       41.1
## 47                                           Sweden       41.1
## 48                                          Belarus       40.9
## 49                                            Macau       40.8
```

```
## 50                         United Kingdom     40.6
## 51                         Cayman Islands     40.5
## 52                                 Russia     40.3
## 53                                  Aruba     39.9
## 54                             Montenegro     39.6
## 55                               Barbados     39.5
## 56                             Luxembourg     39.5
## 57                                 Norway     39.5
## 58                              Macedonia     39.0
## 59                               Thailand     39.0
## 60                                Georgia     38.6
## 61                          United States     38.5
## 62                                  China     38.4
## 63                   United Arab Emirates     38.4
## 64                           Cook Islands     38.3
## 65                                 Cyprus     37.9
## 66                                Ireland     37.8
## 67                     Trinidad and Tobago     37.8
## 68                                Moldova     37.7
## 69                              Australia     37.5
## 70                                 Jersey     37.5
## 71                 British Virgin Islands     37.2
## 72                           Faroe Islands     37.2
## 73                            New Zealand     37.2
## 74                                Iceland     37.1
## 75                            Saint Lucia     36.9
## 76                             Seychelles     36.8
## 77                                Curacao     36.7
## 78                                Armenia     36.6
## 79                  Saint Kitts and Nevis     36.5
## 80                              Mauritius     36.3
## 81                               Anguilla     35.7
## 82                              Singapore     35.6
## 83                                  Chile     35.5
## 84                              Gibraltar     35.5
## 85                                Uruguay     35.5
## 86      Saint Vincent and the Grenadines     35.3
## 87                               Dominica     34.9
## 88                             Montserrat     34.8
## 89                           Korea, North     34.6
## 90             Turks and Caicos Islands     34.6
## 91                                Albania     34.3
## 92                              Greenland     34.3
## 93                      Wallis and Futuna     34.0
## 94                                  Palau     33.9
## 95                                Lebanon     33.7
## 96                                  Qatar     33.7
## 97                              Sri Lanka     33.7
## 98                       French Polynesia     33.3
## 99                                Grenada     33.3
## 100                            Saint Martin     33.3
## 101                                 Brazil     33.2
## 102                                Bahrain     32.9
## 103                          New Caledonia     32.9
```

```
## 104                        Bahamas, The       32.8
## 105            Northern Mariana Islands       32.8
## 106                 Antigua and Barbuda       32.7
## 107                             Tunisia       32.7
## 108                          Azerbaijan       32.6
## 109                          Costa Rica       32.6
## 110                           Argentina       32.4
## 111                              Turkey       32.2
## 112                             Vietnam       31.9
## 113                                Iran       31.7
## 114                          Kazakhstan       31.6
## 115                            Colombia       31.2
## 116                              Brunei       31.1
## 117                           Indonesia       31.1
## 118                            Suriname       31.0
## 119                        Saudi Arabia       30.8
## 120                              Kosovo       30.5
## 121                              Israel       30.4
## 122                              Panama       30.1
## 123                          Uzbekistan       30.1
## 124                           Venezuela       30.0
## 125                                Fiji       29.9
## 126                            Mongolia       29.8
## 127                              Kuwait       29.7
## 128                            Paraguay       29.7
## 129                            Maldives       29.5
## 130                                Guam       29.4
## 131                             Jamaica       29.4
## 132                              Mexico       29.3
## 133                               Burma       29.2
## 134                            Malaysia       29.2
## 135                        Turkmenistan       29.2
## 136                              Bhutan       29.1
## 137                             Morocco       29.1
## 138                                Peru       29.1
## 139                             Algeria       28.9
## 140                             Ecuador       28.8
## 141                               India       28.7
## 142                        South Africa       28.0
## 143                          Bangladesh       27.9
## 144                  Dominican Republic       27.9
## 145                         El Salvador       27.7
## 146                              Guyana       27.5
## 147                          Kyrgyzstan       27.3
## 148                           Nicaragua       27.3
## 149                      American Samoa       27.2
## 150                               Nauru       27.0
## 151                          Cabo Verde       26.8
## 152                              Tuvalu       26.6
## 153                            Cambodia       26.4
## 154     Micronesia, Federated States of       26.3
## 155                                Oman       26.2
## 156                               Libya       25.8
## 157                            Botswana       25.7
```

```
## 158                          Kiribati      25.7
## 159                             Samoa      25.6
## 160                           Bolivia      25.3
## 161                             Nepal      25.3
## 162                        Tajikistan      25.3
## 163                          Djibouti      24.9
## 164                           Lesotho      24.7
## 165                          Honduras      24.4
## 166                             Egypt      24.1
## 167                             Haiti      24.1
## 168                       Philippines      24.1
## 169                             Tonga      24.1
## 170                              Laos      24.0
## 171                  Papua New Guinea      24.0
## 172                            Belize      23.9
## 173                   Marshall Islands      23.8
## 174                          Eswatini      23.7
## 175                            Jordan      23.5
## 176                   Solomon Islands      23.5
## 177                             Syria      23.5
## 178                         Guatemala      23.2
## 179                           Vanuatu      23.0
## 180                          Pakistan      22.0
## 181                         West Bank      21.9
## 182                       Gambia, The      21.8
## 183                           Namibia      21.8
## 184                             Ghana      21.4
## 185                              Iraq      21.2
## 186                             Gabon      21.0
## 187                        Mauritania      21.0
## 188                           Comoros      20.9
## 189                          Zimbabwe      20.5
## 190                     Cote d'Ivoire      20.3
## 191                 Equatorial Guinea      20.3
## 192                           Eritrea      20.3
## 193                        Madagascar      20.3
## 194          Central African Republic      20.0
## 195                             Kenya      20.0
## 196                              Togo      20.0
## 197                          Ethiopia      19.8
## 198                             Yemen      19.8
## 199                            Rwanda      19.7
## 200                       Timor-Leste      19.6
## 201                       Afghanistan      19.5
## 202          Congo, Republic of the      19.5
## 203                           Senegal      19.4
## 204           Sao Tome and Principe      19.3
## 205                            Guinea      19.1
## 206                      Sierra Leone      19.1
## 207                           Nigeria      18.6
## 208                       South Sudan      18.6
## 209                          Cameroon      18.5
## 210                           Somalia      18.5
## 211                             Sudan      18.3
```

```
## 212                                    Tanzania       18.2
## 213                                   Gaza Strip      18.0
## 214                               Guinea-Bissau      18.0
## 215                                     Liberia      18.0
## 216                                Burkina Faso      17.9
## 217                                     Burundi      17.7
## 218                                       Benin      17.0
## 219                                  Mozambique      17.0
## 220                                      Zambia      16.9
## 221                                      Malawi      16.8
## 222        Congo, Democratic Republic of the       16.7
## 223                                        Chad      16.1
## 224                                        Mali      16.0
## 225                                      Angola      15.9
## 226                                      Uganda      15.7
## 227                                       Niger      14.8
##     Youth_unemployment_rate Migration_rate Income_class          ISO
## 1                      26.6            8.3            H MC|MCO|492
## 2                       3.6            0.0            H JP|JPN|392
## 3                        NA           -7.7         <NA> PM|SPM|666
## 4                       6.2            1.5            H DE|DEU|276
## 5                      32.2            3.2            H IT|ITA|380
## 6                        NA            0.0            H AD|AND|020
## 7                       8.7            1.7         <NA> HK|HKG|344
## 8                        NA           -3.0         <NA> BL|BLM|652
## 9                      39.9            0.9            H GR|GRC|300
## 10                     27.4            6.6            H SM|SMR|674
## 11                      8.8            1.5            H SI|SVN|705
## 12                     10.1            5.2            H IM|IMN|833
## 13                     20.3            0.3            H PT|PRT|620
## 14                      9.4            3.6            H AT|AUT|040
## 15                     11.1           -5.9            H LT|LTU|440
## 16                     12.2           -5.9            H LV|LVA|428
## 17                       NA            1.9         <NA> GG|GGY|831
## 18                     23.7           -1.0            H HR|HRV|191
## 19                     34.3            7.0            H ES|ESP|724
## 20                     12.7           -0.3           UM BG|BGR|100
## 21                     11.8           -3.1            H EE|EST|233
## 22                       NA            4.9            H LI|LIE|438
## 23                     29.3            1.6            H BM|BMU|060
## 24                     10.2            1.3            H HU|HUN|348
## 25                     26.6          -14.1            H PR|PRI|630
## 26                     29.7            0.0           UM RS|SRB|688
## 27                     33.8           -0.4           UM BA|BIH|070
## 28                      6.7            2.3         <NA> CZ|CZE|203
## 29                     10.2            2.3         <NA>         KOR
## 30                       NA            0.0         <NA>        <NA>
## 31                     17.0            2.6            H FI|FIN|246
## 32                      7.2            1.9            H NL|NLD|528
## 33                      7.9            4.6            H CH|CHE|756
## 34                     16.2           -0.2           UM RO|ROU|642
## 35                      9.1            6.6            H MT|MLT|470
## 36                       NA            0.8         <NA> TW|TWN|158
## 37                      6.1           -3.7           UM CU|CUB|192
```

```
## 38                9.4        2.8        H DK|DNK|208
## 39               11.7       -0.3        H PL|POL|616
## 40               11.1        5.6        H CA|CAN|124
## 41               14.9        0.2     <NA> SK|SVK|703
## 42                 NA       -7.5     <NA> VI|VIR|850
## 43               20.8        1.1        H FR|FRA|250
## 44               15.8        4.8        H BE|BEL|056
## 45               17.9        2.3       LM UA|UKR|804
## 46                 NA        6.0     <NA> SX|SXM|534
## 47               16.8        5.2        H SE|SWE|752
## 48               10.6        0.7       UM BY|BLR|112
## 49                5.3        3.3     <NA> MO|MAC|446
## 50               11.3        2.5        H GB|GBR|826
## 51               13.8       13.0        H KY|CYM|136
## 52               17.0        1.7     <NA> RU|RUS|643
## 53                 NA        8.4        H AW|ABW|533
## 54               29.4       -4.9       UM ME|MNE|499
## 55               29.6       -0.3        H BB|BRB|052
## 56               14.2       13.3        H LU|LUX|442
## 57                9.7        4.0        H NO|NOR|578
## 58               45.4        0.4     <NA>       <NA>
## 59                3.7        0.0       UM TH|THA|764
## 60               29.9        0.1       UM GE|GEO|268
## 61                8.6        3.0        H US|USA|840
## 62                 NA       -0.4       UM CN|CHN|156
## 63                6.9        7.6        H AE|ARE|784
## 64                 NA      -29.9     <NA> CK|COK|184
## 65               20.2        7.6        H CY|CYP|196
## 66               13.8        3.9        H IE|IRL|372
## 67                8.7       -5.4        H TT|TTO|780
## 68                7.4       -9.0       UM MD|MDA|498
## 69               11.8        8.1        H AU|AUS|036
## 70                 NA        2.3     <NA> JE|JEY|832
## 71                 NA       15.5        H VG|VGB|092
## 72                 NA        0.0     <NA> FO|FRO|234
## 73               11.5        8.0        H NZ|NZL|554
## 74                6.1        3.3        H IS|ISL|352
## 75               46.2       -1.7     <NA> LC|LCA|662
## 76               11.6        1.0        H SC|SYC|690
## 77               29.3       -1.3     <NA> CW|CUW|531
## 78               36.3       -5.5       UM AM|ARM|051
## 79                 NA        1.2     <NA> KN|KNA|659
## 80               23.9        0.0       UM MU|MUS|480
## 81                 NA       11.1     <NA> AI|AIA|660
## 82                9.1       11.8        H SG|SGP|702
## 83               18.1        0.3        H CL|CHL|152
## 84                 NA       -3.3        H GI|GIB|292
## 85               25.9       -0.9        H UY|URY|858
## 86                 NA       -7.2     <NA> VC|VCT|670
## 87                 NA       -5.3       UM DM|DMA|212
## 88                 NA        0.0     <NA> MS|MSR|500
## 89                 NA        0.0     <NA>        PRK
## 90                 NA        8.9        H TC|TCA|796
## 91               31.9       -3.3       UM AL|ALB|008
```

```
## 92               NA      -6.0       H GL|GRL|304
## 93               NA      -4.3   <NA> WF|WLF|876
## 94              5.6       0.9       H PW|PLW|585
## 95               NA     -88.7      UM LB|LBN|422
## 96              0.4       6.5       H QA|QAT|634
## 97             21.0      -1.3      LM LK|LKA|144
## 98             56.7      -0.7       H PF|PYF|258
## 99               NA      -2.6      UM GD|GRD|308
## 100              NA      -6.0   <NA> MF|MAF|663
## 101            28.5      -0.1      UM BR|BRA|076
## 102             5.3      10.6       H BH|BHR|048
## 103            38.4       3.8       H NC|NCL|540
## 104            25.8       0.0       H        BHS
## 105              NA     -15.4       H MP|MNP|580
## 106              NA       2.1       H AG|ATG|028
## 107            35.0      -1.4      LM TN|TUN|788
## 108            13.4       0.0      UM AZ|AZE|031
## 109            20.6       0.8      UM CR|CRI|188
## 110            23.7      -0.1      UM AR|ARG|032
## 111            20.2      -4.3   <NA>        <NA>
## 112             6.9      -0.3      LM VN|VNM|704
## 113            27.6      -0.3   <NA> IR|IRN|364
## 114             3.8       0.4      UM KZ|KAZ|398
## 115            18.5      -0.6      UM CO|COL|170
## 116            28.9       2.3   <NA> BN|BRN|096
## 117            16.5      -1.1      LM ID|IDN|360
## 118            13.4       0.5      UM SR|SUR|740
## 119            28.8       4.7       H SA|SAU|682
## 120            55.4      -1.8      UM    XK|XKS|
## 121             7.2       2.1       H IL|ISR|376
## 122            10.2      -0.1      UM PA|PAN|591
## 123              NA      -1.9      LM UZ|UZB|860
## 124            14.6      -3.4   <NA> VE|VEN|862
## 125            15.4      -6.2      UM FJ|FJI|242
## 126            16.8      -0.8      LM MN|MNG|496
## 127            15.4      -3.3       H KW|KWT|414
## 128            14.5      -0.1      UM PY|PRY|600
## 129            15.9     -12.7      UM MV|MDV|462
## 130            29.4     -11.0       H GU|GUM|316
## 131            24.2      -9.4      UM JM|JAM|388
## 132             6.9      -1.9      UM MX|MEX|484
## 133             2.0      -1.4   <NA> MM|MMR|104
## 134            10.5      -0.3      UM MY|MYS|458
## 135              NA      -1.7      UM TM|TKM|795
## 136            10.7       0.0      LM BT|BTN|064
## 137            22.2      -1.9      LM MA|MAR|504
## 138            14.7      -1.8      UM PE|PER|604
## 139            39.3      -0.9      LM DZ|DZA|012
## 140             7.9       0.0      UM EC|ECU|218
## 141            22.5       0.0      LM IN|IND|356
## 142            53.4      -0.2      UM ZA|ZAF|710
## 143            12.8      -3.0      LM BD|BGD|050
## 144            13.5      -2.7      UM DO|DOM|214
## 145             9.6      -4.8      LM SV|SLV|222
```

```
## 146            21.5          0.0     UM GY|GUY|328
## 147            14.2         -5.0   <NA> KG|KGZ|417
## 148             8.5         -2.4     LM NI|NIC|558
## 149              NA        -26.1     UM AS|ASM|016
## 150            26.6        -11.3      H NR|NRU|520
## 151            27.8         -0.6     LM CV|CPV|132
## 152            20.6         -6.5     UM TV|TUV|798
## 153             1.1         -0.3     LM KH|KHM|116
## 154            18.9        -20.9   <NA>        FSM
## 155            13.7         -0.4      H OM|OMN|512
## 156            48.7         -0.7     UM LY|LBY|434
## 157            36.0          2.9     UM BW|BWA|072
## 158            17.1         -2.8     LM KI|KIR|296
## 159            31.9         -8.1     LM WS|WSM|882
## 160             6.9         -0.3     LM BO|BOL|068
## 161            21.4         -3.1     LM NP|NPL|524
## 162              NA         -1.1     LM TJ|TJK|762
## 163              NA          5.1     LM DJ|DJI|262
## 164            34.4         -6.1     LM LS|LSO|426
## 165            10.7         -1.4     LM HN|HND|340
## 166            29.6         -0.3   <NA> EG|EGY|818
## 167              NA         -1.9     LM HT|HTI|332
## 168             6.7         -1.8     LM PH|PHL|608
## 169              NA        -17.9     UM TO|TON|776
## 170            18.2         -1.0   <NA> LA|LAO|418
## 171             3.6          0.0     LM PG|PNG|598
## 172            15.3         -1.0     LM BZ|BLZ|084
## 173            11.0         -4.5     UM MH|MHL|584
## 174            47.1         -6.8     LM SZ|SWZ|748
## 175            35.6        -11.3     UM JO|JOR|400
## 176             1.3         -1.6     LM SB|SLB|090
## 177            35.8         27.1   <NA> SY|SYR|760
## 178             5.0         -1.7     UM GT|GTM|320
## 179              NA         -1.3     LM VU|VUT|548
## 180             7.8         -0.9     LM PK|PAK|586
## 181            42.2         -4.2   <NA> PS|PSE|275
## 182            13.1         -1.6      L        GMB
## 183            38.0          0.0     UM NA|NAM|516
## 184             9.1         -1.6     LM GH|GHA|288
## 185            25.6         -0.5     UM IQ|IRQ|368
## 186            35.7          3.9     UM GA|GAB|266
## 187            15.2         -0.8     LM MR|MRT|478
## 188            19.5         -2.3     LM KM|COM|174
## 189            16.5         -5.0     LM ZW|ZWE|716
## 190             5.5          1.2   <NA> CI|CIV|384
## 191              NA          0.0     UM GQ|GNQ|226
## 192              NA        -11.6      L ER|ERI|232
## 193             1.0          0.0      L MG|MDG|450
## 194              NA          0.0      L CF|CAF|140
## 195             7.4         -0.2     LM KE|KEN|404
## 196             3.9          0.0      L TG|TGO|768
## 197            25.2         -0.2      L ET|ETH|231
## 198            24.5         -0.2   <NA> YE|YEM|887
## 199            20.6         -3.3      L RW|RWA|646
```

```
## 200                        13.2             -3.9              LM TL|TLS|626
## 201                        17.6             -0.1               L AF|AFG|004
## 202                          NA             -0.9            <NA>        COG
## 203                         8.1             -1.3              LM SN|SEN|686
## 204                        20.8             -7.9            <NA> ST|STP|678
## 205                         1.0              0.0               L GN|GIN|324
## 206                         9.4             -1.2               L SL|SLE|694
## 207                        13.8             -0.2              LM NG|NGA|566
## 208                        38.6              0.2               L SS|SSD|728
## 209                         6.3             -0.3              LM CM|CMR|120
## 210                          NA             -3.8               L SO|SOM|706
## 211                          NA             -0.4               L SD|SDN|729
## 212                         3.9             -0.4              LM TZ|TZA|834
## 213                        42.2             -4.7            <NA> PS|PSE|275
## 214                          NA             -3.8               L GW|GNB|624
## 215                         2.3             -2.9               L LR|LBR|430
## 216                         8.7             -0.6               L BF|BFA|854
## 217                         2.9             -0.8               L BI|BDI|108
## 218                         5.6              0.3              LM BJ|BEN|204
## 219                         7.4             -1.7               L MZ|MOZ|508
## 220                        24.0              0.0              LM ZM|ZMB|894
## 221                        40.5              0.0               L MW|MWI|454
## 222                         8.7             -0.9            <NA>        COD
## 223                          NA             -0.1               L TD|TCD|148
## 224                        16.9             -3.9               L ML|MLI|466
## 225                        39.4             -0.2              LM AO|AGO|024
## 226                        14.8             -3.5               L UG|UGA|800
## 227                         0.7             -0.7               L NE|NER|562
```

e

Introduce into the data set information on continent for each country and subcontinent (region). You should find a way to gather this data. You can find an appropriate online resource, download the data and merge the information with the existing data set. Name the merged data set df_vars.

```r
# I found a dataset on kaggle: https://www.kaggle.com/datasets/andradaolteanu/country-mapping-iso-conti
continents <- read.csv("continents2.csv")

#despite iso being 'standard' i could not manage to find a dataset that had the same iso column as the
#therefore i will use this dataset and merge alpha.2 alpha.3 and country code.

continents <- continents %>%
  mutate(
    country.code = str_pad(country.code, width = 3, pad = "0"),
        # make 4 to 004, 12 to 012, leave 248
    ISO = paste(alpha.2, alpha.3, country.code, sep = "|")
    )
    #alpha.2 = paste(alpha.2, alpha.3, country.code, sep = "|"))

names(continents)[names(continents) == 'name'] <- 'Country'
continents
```

```
##                                 Country alpha.2 alpha.3 country.code
```

```
## 1                               Afghanistan   AF   AFG   004
## 2                              Åland Islands   AX   ALA   248
## 3                                    Albania   AL   ALB   008
## 4                                    Algeria   DZ   DZA   012
## 5                             American Samoa   AS   ASM   016
## 6                                    Andorra   AD   AND   020
## 7                                     Angola   AO   AGO   024
## 8                                   Anguilla   AI   AIA   660
## 9                                 Antarctica   AQ   ATA   010
## 10                       Antigua and Barbuda   AG   ATG   028
## 11                                 Argentina   AR   ARG   032
## 12                                   Armenia   AM   ARM   051
## 13                                     Aruba   AW   ABW   533
## 14                                 Australia   AU   AUS   036
## 15                                   Austria   AT   AUT   040
## 16                                Azerbaijan   AZ   AZE   031
## 17                                   Bahamas   BS   BHS   044
## 18                                   Bahrain   BH   BHR   048
## 19                                Bangladesh   BD   BGD   050
## 20                                  Barbados   BB   BRB   052
## 21                                   Belarus   BY   BLR   112
## 22                                   Belgium   BE   BEL   056
## 23                                    Belize   BZ   BLZ   084
## 24                                     Benin   BJ   BEN   204
## 25                                   Bermuda   BM   BMU   060
## 26                                    Bhutan   BT   BTN   064
## 27                                   Bolivia   BO   BOL   068
## 28            Bonaire, Sint Eustatius and Saba   BQ   BES   535
## 29                   Bosnia And Herzegovina   BA   BIH   070
## 30                                  Botswana   BW   BWA   072
## 31                             Bouvet Island   BV   BVT   074
## 32                                    Brazil   BR   BRA   076
## 33            British Indian Ocean Territory   IO   IOT   086
## 34                          Brunei Darussalam   BN   BRN   096
## 35                                  Bulgaria   BG   BGR   100
## 36                              Burkina Faso   BF   BFA   854
## 37                                   Burundi   BI   BDI   108
## 38                                Cabo Verde   CV   CPV   132
## 39                                  Cambodia   KH   KHM   116
## 40                                  Cameroon   CM   CMR   120
## 41                                    Canada   CA   CAN   124
## 42                            Cayman Islands   KY   CYM   136
## 43                  Central African Republic   CF   CAF   140
## 44                                      Chad   TD   TCD   148
## 45                                     Chile   CL   CHL   152
## 46                                     China   CN   CHN   156
## 47                           Christmas Island   CX   CXR   162
## 48                   Cocos (Keeling) Islands   CC   CCK   166
## 49                                  Colombia   CO   COL   170
## 50                                   Comoros   KM   COM   174
## 51                                     Congo   CG   COG   178
## 52         Congo (Democratic Republic Of The)   CD   COD   180
## 53                              Cook Islands   CK   COK   184
## 54                                Costa Rica   CR   CRI   188
```

```
## 55                        Côte D'Ivoire   CI   CIV   384
## 56                              Croatia   HR   HRV   191
## 57                                 Cuba   CU   CUB   192
## 58                              Curaçao   CW   CUW   531
## 59                               Cyprus   CY   CYP   196
## 60                       Czech Republic   CZ   CZE   203
## 61                              Denmark   DK   DNK   208
## 62                             Djibouti   DJ   DJI   262
## 63                             Dominica   DM   DMA   212
## 64                   Dominican Republic   DO   DOM   214
## 65                              Ecuador   EC   ECU   218
## 66                                Egypt   EG   EGY   818
## 67                          El Salvador   SV   SLV   222
## 68                    Equatorial Guinea   GQ   GNQ   226
## 69                              Eritrea   ER   ERI   232
## 70                              Estonia   EE   EST   233
## 71                             Eswatini   SZ   SWZ   748
## 72                             Ethiopia   ET   ETH   231
## 73           Falkland Islands (Malvinas)  FK   FLK   238
## 74                        Faroe Islands   FO   FRO   234
## 75                                 Fiji   FJ   FJI   242
## 76                              Finland   FI   FIN   246
## 77                               France   FR   FRA   250
## 78                        French Guiana   GF   GUF   254
## 79                     French Polynesia   PF   PYF   258
## 80          French Southern Territories   TF   ATF   260
## 81                                Gabon   GA   GAB   266
## 82                               Gambia   GM   GMB   270
## 83                              Georgia   GE   GEO   268
## 84                              Germany   DE   DEU   276
## 85                                Ghana   GH   GHA   288
## 86                            Gibraltar   GI   GIB   292
## 87                               Greece   GR   GRC   300
## 88                            Greenland   GL   GRL   304
## 89                              Grenada   GD   GRD   308
## 90                           Guadeloupe   GP   GLP   312
## 91                                 Guam   GU   GUM   316
## 92                            Guatemala   GT   GTM   320
## 93                             Guernsey   GG   GGY   831
## 94                               Guinea   GN   GIN   324
## 95                        Guinea Bissau   GW   GNB   624
## 96                               Guyana   GY   GUY   328
## 97                                Haiti   HT   HTI   332
## 98     Heard Island and McDonald Islands  HM   HMD   334
## 99                             Holy See   VA   VAT   336
## 100                            Honduras   HN   HND   340
## 101                           Hong Kong   HK   HKG   344
## 102                             Hungary   HU   HUN   348
## 103                             Iceland   IS   ISL   352
## 104                               India   IN   IND   356
## 105                           Indonesia   ID   IDN   360
## 106                                Iran   IR   IRN   364
## 107                                Iraq   IQ   IRQ   368
## 108                             Ireland   IE   IRL   372
```

```
## 109                            Isle of Man       IM    IMN    833
## 110                               Israel         IL    ISR    376
## 111                               Italy          IT    ITA    380
## 112                              Jamaica         JM    JAM    388
## 113                               Japan          JP    JPN    392
## 114                              Jersey          JE    JEY    832
## 115                              Jordan          JO    JOR    400
## 116                           Kazakhstan         KZ    KAZ    398
## 117                               Kenya          KE    KEN    404
## 118                             Kiribati         KI    KIR    296
## 119                          South Korea         KP    PRK    408
## 120                    Korea, Republic of        KR    KOR    410
## 121                              Kuwait          KW    KWT    414
## 122                           Kyrgyzstan         KG    KGZ    417
## 123                               Laos          LA    LAO    418
## 124                              Latvia          LV    LVA    428
## 125                             Lebanon          LB    LBN    422
## 126                             Lesotho          LS    LSO    426
## 127                             Liberia          LR    LBR    430
## 128                               Libya          LY    LBY    434
## 129                        Liechtenstein         LI    LIE    438
## 130                           Lithuania          LT    LTU    440
## 131                          Luxembourg          LU    LUX    442
## 132                               Macao          MO    MAC    446
## 133                          Madagascar          MG    MDG    450
## 134                              Malawi          MW    MWI    454
## 135                             Malaysia         MY    MYS    458
## 136                             Maldives         MV    MDV    462
## 137                               Mali          ML    MLI    466
## 138                               Malta          MT    MLT    470
## 139                      Marshall Islands        MH    MHL    584
## 140                           Martinique         MQ    MTQ    474
## 141                           Mauritania         MR    MRT    478
## 142                            Mauritius         MU    MUS    480
## 143                             Mayotte          YT    MYT    175
## 144                               Mexico         MX    MEX    484
## 145       Micronesia (Federated States of)       FM    FSM    583
## 146                             Moldova          MD    MDA    498
## 147                              Monaco          MC    MCO    492
## 148                            Mongolia          MN    MNG    496
## 149                           Montenegro         ME    MNE    499
## 150                           Montserrat         MS    MSR    500
## 151                             Morocco          MA    MAR    504
## 152                          Mozambique          MZ    MOZ    508
## 153                             Myanmar          MM    MMR    104
## 154                             Namibia        <NA>    NAM    516
## 155                               Nauru          NR    NRU    520
## 156                               Nepal          NP    NPL    524
## 157                          Netherlands         NL    NLD    528
## 158                        New Caledonia         NC    NCL    540
## 159                          New Zealand         NZ    NZL    554
## 160                            Nicaragua         NI    NIC    558
## 161                               Niger          NE    NER    562
## 162                             Nigeria          NG    NGA    566
```

```
## 163                                       Niue   NU   NIU   570
## 164                             Norfolk Island   NF   NFK   574
## 165                                  Macedonia   MK   MKD   807
## 166                   Northern Mariana Islands   MP   MNP   580
## 167                                     Norway   NO   NOR   578
## 168                                       Oman   OM   OMN   512
## 169                                   Pakistan   PK   PAK   586
## 170                                      Palau   PW   PLW   585
## 171                          Palestine, State of   PS   PSE   275
## 172                                     Panama   PA   PAN   591
## 173                           Papua New Guinea   PG   PNG   598
## 174                                   Paraguay   PY   PRY   600
## 175                                       Peru   PE   PER   604
## 176                                Philippines   PH   PHL   608
## 177                                   Pitcairn   PN   PCN   612
## 178                                     Poland   PL   POL   616
## 179                                   Portugal   PT   PRT   620
## 180                                Puerto Rico   PR   PRI   630
## 181                                      Qatar   QA   QAT   634
## 182                                    Réunion   RE   REU   638
## 183                                    Romania   RO   ROU   642
## 184                                     Russia   RU   RUS   643
## 185                                     Rwanda   RW   RWA   646
## 186                           Saint Barthélemy   BL   BLM   652
## 187 Saint Helena, Ascension and Tristan da Cunha   SH   SHN   654
## 188                       Saint Kitts and Nevis   KN   KNA   659
## 189                                Saint Lucia   LC   LCA   662
## 190                    Saint Martin (French part)   MF   MAF   663
## 191                  Saint Pierre and Miquelon   PM   SPM   666
## 192             Saint Vincent and the Grenadines   VC   VCT   670
## 193                                      Samoa   WS   WSM   882
## 194                                 San Marino   SM   SMR   674
## 195                      Sao Tome and Principe   ST   STP   678
## 196                               Saudi Arabia   SA   SAU   682
## 197                                    Senegal   SN   SEN   686
## 198                                     Serbia   RS   SRB   688
## 199                                 Seychelles   SC   SYC   690
## 200                               Sierra Leone   SL   SLE   694
## 201                                  Singapore   SG   SGP   702
## 202                     Sint Maarten (Dutch part)   SX   SXM   534
## 203                                   Slovakia   SK   SVK   703
## 204                                   Slovenia   SI   SVN   705
## 205                            Solomon Islands   SB   SLB   090
## 206                                    Somalia   SO   SOM   706
## 207                               South Africa   ZA   ZAF   710
## 208 South Georgia and the South Sandwich Islands   GS   SGS   239
## 209                                South Sudan   SS   SSD   728
## 210                                      Spain   ES   ESP   724
## 211                                  Sri Lanka   LK   LKA   144
## 212                                      Sudan   SD   SDN   729
## 213                                   Suriname   SR   SUR   740
## 214                    Svalbard and Jan Mayen   SJ   SJM   744
## 215                                     Sweden   SE   SWE   752
## 216                                Switzerland   CH   CHE   756
```

```
## 217                                   Syria   SY   SYR         760
## 218                                  Taiwan   TW   TWN         158
## 219                              Tajikistan   TJ   TJK         762
## 220                                Tanzania   TZ   TZA         834
## 221                                Thailand   TH   THA         764
## 222                             Timor-Leste   TL   TLS         626
## 223                                    Togo   TG   TGO         768
## 224                                 Tokelau   TK   TKL         772
## 225                                   Tonga   TO   TON         776
## 226                     Trinidad and Tobago   TT   TTO         780
## 227                                 Tunisia   TN   TUN         788
## 228                                  Turkey   TR   TUR         792
## 229                            Turkmenistan   TM   TKM         795
## 230                Turks and Caicos Islands   TC   TCA         796
## 231                                  Tuvalu   TV   TUV         798
## 232                                  Uganda   UG   UGA         800
## 233                                 Ukraine   UA   UKR         804
## 234                    United Arab Emirates   AE   ARE         784
## 235                          United Kingdom   GB   GBR         826
## 236                           United States   US   USA         840
## 237   United States Minor Outlying Islands   UM   UMI         581
## 238                                 Uruguay   UY   URY         858
## 239                              Uzbekistan   UZ   UZB         860
## 240                                 Vanuatu   VU   VUT         548
## 241                               Venezuela   VE   VEN         862
## 242                                 Vietnam   VN   VNM         704
## 243                 Virgin Islands (British)   VG   VGB         092
## 244                  Virgin Islands (U.S.)   VI   VIR         850
## 245                       Wallis and Futuna   WF   WLF         876
## 246                          Western Sahara   EH   ESH         732
## 247                                   Yemen   YE   YEM         887
## 248                                  Zambia   ZM   ZMB         894
## 249                                Zimbabwe   ZW   ZWE         716
##         iso_3166.2   region                       sub.region intermediate.region
## 1   ISO 3166-2:AF     Asia                     Southern Asia
## 2   ISO 3166-2:AX   Europe                   Northern Europe
## 3   ISO 3166-2:AL   Europe                   Southern Europe
## 4   ISO 3166-2:DZ   Africa                   Northern Africa
## 5   ISO 3166-2:AS  Oceania                         Polynesia
## 6   ISO 3166-2:AD   Europe                   Southern Europe
## 7   ISO 3166-2:AO   Africa                Sub-Saharan Africa      Middle Africa
## 8   ISO 3166-2:AI Americas Latin America and the Caribbean          Caribbean
## 9   ISO 3166-2:AQ
## 10  ISO 3166-2:AG Americas Latin America and the Caribbean          Caribbean
## 11  ISO 3166-2:AR Americas Latin America and the Caribbean      South America
## 12  ISO 3166-2:AM     Asia                      Western Asia
## 13  ISO 3166-2:AW Americas Latin America and the Caribbean          Caribbean
## 14  ISO 3166-2:AU  Oceania       Australia and New Zealand
## 15  ISO 3166-2:AT   Europe                   Western Europe
## 16  ISO 3166-2:AZ     Asia                      Western Asia
## 17  ISO 3166-2:BS Americas Latin America and the Caribbean          Caribbean
## 18  ISO 3166-2:BH     Asia                      Western Asia
## 19  ISO 3166-2:BD     Asia                     Southern Asia
## 20  ISO 3166-2:BB Americas Latin America and the Caribbean          Caribbean
```

```
## 21  ISO 3166-2:BY   Europe                  Eastern Europe
## 22  ISO 3166-2:BE   Europe                  Western Europe
## 23  ISO 3166-2:BZ Americas Latin America and the Caribbean   Central America
## 24  ISO 3166-2:BJ   Africa          Sub-Saharan Africa    Western Africa
## 25  ISO 3166-2:BM Americas            Northern America
## 26  ISO 3166-2:BT   Asia               Southern Asia
## 27  ISO 3166-2:BO Americas Latin America and the Caribbean    South America
## 28  ISO 3166-2:BQ Americas Latin America and the Caribbean        Caribbean
## 29  ISO 3166-2:BA   Europe              Southern Europe
## 30  ISO 3166-2:BW   Africa          Sub-Saharan Africa   Southern Africa
## 31  ISO 3166-2:BV Americas Latin America and the Caribbean    South America
## 32  ISO 3166-2:BR Americas Latin America and the Caribbean    South America
## 33  ISO 3166-2:IO   Africa          Sub-Saharan Africa    Eastern Africa
## 34  ISO 3166-2:BN   Asia           South-eastern Asia
## 35  ISO 3166-2:BG   Europe                  Eastern Europe
## 36  ISO 3166-2:BF   Africa          Sub-Saharan Africa    Western Africa
## 37  ISO 3166-2:BI   Africa          Sub-Saharan Africa    Eastern Africa
## 38  ISO 3166-2:CV   Africa          Sub-Saharan Africa    Western Africa
## 39  ISO 3166-2:KH   Asia           South-eastern Asia
## 40  ISO 3166-2:CM   Africa          Sub-Saharan Africa     Middle Africa
## 41  ISO 3166-2:CA Americas            Northern America
## 42  ISO 3166-2:KY Americas Latin America and the Caribbean        Caribbean
## 43  ISO 3166-2:CF   Africa          Sub-Saharan Africa     Middle Africa
## 44  ISO 3166-2:TD   Africa          Sub-Saharan Africa     Middle Africa
## 45  ISO 3166-2:CL Americas Latin America and the Caribbean    South America
## 46  ISO 3166-2:CN   Asia                Eastern Asia
## 47  ISO 3166-2:CX  Oceania     Australia and New Zealand
## 48  ISO 3166-2:CC  Oceania     Australia and New Zealand
## 49  ISO 3166-2:CO Americas Latin America and the Caribbean    South America
## 50  ISO 3166-2:KM   Africa          Sub-Saharan Africa    Eastern Africa
## 51  ISO 3166-2:CG   Africa          Sub-Saharan Africa     Middle Africa
## 52  ISO 3166-2:CD   Africa          Sub-Saharan Africa     Middle Africa
## 53  ISO 3166-2:CK  Oceania                 Polynesia
## 54  ISO 3166-2:CR Americas Latin America and the Caribbean   Central America
## 55  ISO 3166-2:CI   Africa          Sub-Saharan Africa    Western Africa
## 56  ISO 3166-2:HR   Europe              Southern Europe
## 57  ISO 3166-2:CU Americas Latin America and the Caribbean        Caribbean
## 58  ISO 3166-2:CW Americas Latin America and the Caribbean        Caribbean
## 59  ISO 3166-2:CY   Asia                Western Asia
## 60  ISO 3166-2:CZ   Europe                  Eastern Europe
## 61  ISO 3166-2:DK   Europe                  Northern Europe
## 62  ISO 3166-2:DJ   Africa          Sub-Saharan Africa    Eastern Africa
## 63  ISO 3166-2:DM Americas Latin America and the Caribbean        Caribbean
## 64  ISO 3166-2:DO Americas Latin America and the Caribbean        Caribbean
## 65  ISO 3166-2:EC Americas Latin America and the Caribbean    South America
## 66  ISO 3166-2:EG   Africa             Northern Africa
## 67  ISO 3166-2:SV Americas Latin America and the Caribbean   Central America
## 68  ISO 3166-2:GQ   Africa          Sub-Saharan Africa     Middle Africa
## 69  ISO 3166-2:ER   Africa          Sub-Saharan Africa    Eastern Africa
## 70  ISO 3166-2:EE   Europe                  Northern Europe
## 71  ISO 3166-2:SZ   Africa          Sub-Saharan Africa   Southern Africa
## 72  ISO 3166-2:ET   Africa          Sub-Saharan Africa    Eastern Africa
## 73  ISO 3166-2:FK Americas Latin America and the Caribbean    South America
## 74  ISO 3166-2:FO   Europe                  Northern Europe
```

```
## 75  ISO 3166-2:FJ  Oceania                      Melanesia
## 76  ISO 3166-2:FI  Europe                 Northern Europe
## 77  ISO 3166-2:FR  Europe                  Western Europe
## 78  ISO 3166-2:GF Americas Latin America and the Caribbean        South America
## 79  ISO 3166-2:PF  Oceania                      Polynesia
## 80  ISO 3166-2:TF   Africa         Sub-Saharan Africa       Eastern Africa
## 81  ISO 3166-2:GA   Africa         Sub-Saharan Africa        Middle Africa
## 82  ISO 3166-2:GM   Africa         Sub-Saharan Africa       Western Africa
## 83  ISO 3166-2:GE    Asia                   Western Asia
## 84  ISO 3166-2:DE  Europe                  Western Europe
## 85  ISO 3166-2:GH   Africa         Sub-Saharan Africa       Western Africa
## 86  ISO 3166-2:GI  Europe                 Southern Europe
## 87  ISO 3166-2:GR  Europe                 Southern Europe
## 88  ISO 3166-2:GL Americas              Northern America
## 89  ISO 3166-2:GD Americas Latin America and the Caribbean           Caribbean
## 90  ISO 3166-2:GP Americas Latin America and the Caribbean           Caribbean
## 91  ISO 3166-2:GU  Oceania                     Micronesia
## 92  ISO 3166-2:GT Americas Latin America and the Caribbean     Central America
## 93  ISO 3166-2:GG  Europe                 Northern Europe     Channel Islands
## 94  ISO 3166-2:GN   Africa         Sub-Saharan Africa       Western Africa
## 95  ISO 3166-2:GW   Africa         Sub-Saharan Africa       Western Africa
## 96  ISO 3166-2:GY Americas Latin America and the Caribbean        South America
## 97  ISO 3166-2:HT Americas Latin America and the Caribbean           Caribbean
## 98  ISO 3166-2:HM  Oceania      Australia and New Zealand
## 99  ISO 3166-2:VA  Europe                 Southern Europe
## 100 ISO 3166-2:HN Americas Latin America and the Caribbean     Central America
## 101 ISO 3166-2:HK    Asia                   Eastern Asia
## 102 ISO 3166-2:HU  Europe                  Eastern Europe
## 103 ISO 3166-2:IS  Europe                 Northern Europe
## 104 ISO 3166-2:IN    Asia                  Southern Asia
## 105 ISO 3166-2:ID    Asia              South-eastern Asia
## 106 ISO 3166-2:IR    Asia                  Southern Asia
## 107 ISO 3166-2:IQ    Asia                   Western Asia
## 108 ISO 3166-2:IE  Europe                 Northern Europe
## 109 ISO 3166-2:IM  Europe                 Northern Europe
## 110 ISO 3166-2:IL    Asia                   Western Asia
## 111 ISO 3166-2:IT  Europe                 Southern Europe
## 112 ISO 3166-2:JM Americas Latin America and the Caribbean           Caribbean
## 113 ISO 3166-2:JP    Asia                   Eastern Asia
## 114 ISO 3166-2:JE  Europe                 Northern Europe     Channel Islands
## 115 ISO 3166-2:JO    Asia                   Western Asia
## 116 ISO 3166-2:KZ    Asia                   Central Asia
## 117 ISO 3166-2:KE   Africa         Sub-Saharan Africa       Eastern Africa
## 118 ISO 3166-2:KI  Oceania                     Micronesia
## 119 ISO 3166-2:KP    Asia                   Eastern Asia
## 120 ISO 3166-2:KR    Asia                   Eastern Asia
## 121 ISO 3166-2:KW    Asia                   Western Asia
## 122 ISO 3166-2:KG    Asia                   Central Asia
## 123 ISO 3166-2:LA    Asia              South-eastern Asia
## 124 ISO 3166-2:LV  Europe                 Northern Europe
## 125 ISO 3166-2:LB    Asia                   Western Asia
## 126 ISO 3166-2:LS   Africa         Sub-Saharan Africa      Southern Africa
## 127 ISO 3166-2:LR   Africa         Sub-Saharan Africa       Western Africa
## 128 ISO 3166-2:LY   Africa               Northern Africa
```

```
## 129 ISO 3166-2:LI    Europe                Western Europe
## 130 ISO 3166-2:LT    Europe                Northern Europe
## 131 ISO 3166-2:LU    Europe                Western Europe
## 132 ISO 3166-2:MO     Asia                  Eastern Asia
## 133 ISO 3166-2:MG    Africa          Sub-Saharan Africa     Eastern Africa
## 134 ISO 3166-2:MW    Africa          Sub-Saharan Africa     Eastern Africa
## 135 ISO 3166-2:MY     Asia            South-eastern Asia
## 136 ISO 3166-2:MV     Asia              Southern Asia
## 137 ISO 3166-2:ML    Africa          Sub-Saharan Africa     Western Africa
## 138 ISO 3166-2:MT    Europe                Southern Europe
## 139 ISO 3166-2:MH   Oceania                 Micronesia
## 140 ISO 3166-2:MQ Americas Latin America and the Caribbean        Caribbean
## 141 ISO 3166-2:MR    Africa          Sub-Saharan Africa     Western Africa
## 142 ISO 3166-2:MU    Africa          Sub-Saharan Africa     Eastern Africa
## 143 ISO 3166-2:YT    Africa          Sub-Saharan Africa     Eastern Africa
## 144 ISO 3166-2:MX Americas Latin America and the Caribbean   Central America
## 145 ISO 3166-2:FM   Oceania                 Micronesia
## 146 ISO 3166-2:MD    Europe                Eastern Europe
## 147 ISO 3166-2:MC    Europe                Western Europe
## 148 ISO 3166-2:MN     Asia                  Eastern Asia
## 149 ISO 3166-2:ME    Europe                Southern Europe
## 150 ISO 3166-2:MS Americas Latin America and the Caribbean        Caribbean
## 151 ISO 3166-2:MA    Africa              Northern Africa
## 152 ISO 3166-2:MZ    Africa          Sub-Saharan Africa     Eastern Africa
## 153 ISO 3166-2:MM     Asia            South-eastern Asia
## 154 ISO 3166-2:NA    Africa          Sub-Saharan Africa    Southern Africa
## 155 ISO 3166-2:NR   Oceania                 Micronesia
## 156 ISO 3166-2:NP     Asia              Southern Asia
## 157 ISO 3166-2:NL    Europe                Western Europe
## 158 ISO 3166-2:NC   Oceania                 Melanesia
## 159 ISO 3166-2:NZ   Oceania      Australia and New Zealand
## 160 ISO 3166-2:NI Americas Latin America and the Caribbean   Central America
## 161 ISO 3166-2:NE    Africa          Sub-Saharan Africa     Western Africa
## 162 ISO 3166-2:NG    Africa          Sub-Saharan Africa     Western Africa
## 163 ISO 3166-2:NU   Oceania                 Polynesia
## 164 ISO 3166-2:NF   Oceania      Australia and New Zealand
## 165 ISO 3166-2:MK    Europe                Southern Europe
## 166 ISO 3166-2:MP   Oceania                 Micronesia
## 167 ISO 3166-2:NO    Europe                Northern Europe
## 168 ISO 3166-2:OM     Asia              Western Asia
## 169 ISO 3166-2:PK     Asia              Southern Asia
## 170 ISO 3166-2:PW   Oceania                 Micronesia
## 171 ISO 3166-2:PS     Asia              Western Asia
## 172 ISO 3166-2:PA Americas Latin America and the Caribbean   Central America
## 173 ISO 3166-2:PG   Oceania                 Melanesia
## 174 ISO 3166-2:PY Americas Latin America and the Caribbean    South America
## 175 ISO 3166-2:PE Americas Latin America and the Caribbean    South America
## 176 ISO 3166-2:PH     Asia            South-eastern Asia
## 177 ISO 3166-2:PN   Oceania                 Polynesia
## 178 ISO 3166-2:PL    Europe                Eastern Europe
## 179 ISO 3166-2:PT    Europe                Southern Europe
## 180 ISO 3166-2:PR Americas Latin America and the Caribbean        Caribbean
## 181 ISO 3166-2:QA     Asia              Western Asia
## 182 ISO 3166-2:RE    Africa          Sub-Saharan Africa     Eastern Africa
```

```
## 183 ISO 3166-2:RO   Europe                 Eastern Europe
## 184 ISO 3166-2:RU   Europe                 Eastern Europe
## 185 ISO 3166-2:RW   Africa                 Sub-Saharan Africa    Eastern Africa
## 186 ISO 3166-2:BL Americas Latin America and the Caribbean         Caribbean
## 187 ISO 3166-2:SH   Africa                 Sub-Saharan Africa    Western Africa
## 188 ISO 3166-2:KN Americas Latin America and the Caribbean         Caribbean
## 189 ISO 3166-2:LC Americas Latin America and the Caribbean         Caribbean
## 190 ISO 3166-2:MF Americas Latin America and the Caribbean         Caribbean
## 191 ISO 3166-2:PM Americas               Northern America
## 192 ISO 3166-2:VC Americas Latin America and the Caribbean         Caribbean
## 193 ISO 3166-2:WS   Oceania                    Polynesia
## 194 ISO 3166-2:SM   Europe                 Southern Europe
## 195 ISO 3166-2:ST   Africa                 Sub-Saharan Africa     Middle Africa
## 196 ISO 3166-2:SA    Asia                  Western Asia
## 197 ISO 3166-2:SN   Africa                 Sub-Saharan Africa    Western Africa
## 198 ISO 3166-2:RS   Europe                 Southern Europe
## 199 ISO 3166-2:SC   Africa                 Sub-Saharan Africa    Eastern Africa
## 200 ISO 3166-2:SL   Africa                 Sub-Saharan Africa    Western Africa
## 201 ISO 3166-2:SG    Asia                 South-eastern Asia
## 202 ISO 3166-2:SX Americas Latin America and the Caribbean         Caribbean
## 203 ISO 3166-2:SK   Europe                 Eastern Europe
## 204 ISO 3166-2:SI   Europe                 Southern Europe
## 205 ISO 3166-2:SB   Oceania                    Melanesia
## 206 ISO 3166-2:SO   Africa                 Sub-Saharan Africa    Eastern Africa
## 207 ISO 3166-2:ZA   Africa                 Sub-Saharan Africa   Southern Africa
## 208 ISO 3166-2:GS Americas Latin America and the Caribbean       South America
## 209 ISO 3166-2:SS   Africa                 Sub-Saharan Africa    Eastern Africa
## 210 ISO 3166-2:ES   Europe                 Southern Europe
## 211 ISO 3166-2:LK    Asia                  Southern Asia
## 212 ISO 3166-2:SD   Africa                 Northern Africa
## 213 ISO 3166-2:SR Americas Latin America and the Caribbean       South America
## 214 ISO 3166-2:SJ   Europe                 Northern Europe
## 215 ISO 3166-2:SE   Europe                 Northern Europe
## 216 ISO 3166-2:CH   Europe                 Western Europe
## 217 ISO 3166-2:SY    Asia                  Western Asia
## 218 ISO 3166-2:TW    Asia                  Eastern Asia
## 219 ISO 3166-2:TJ    Asia                  Central Asia
## 220 ISO 3166-2:TZ   Africa                 Sub-Saharan Africa    Eastern Africa
## 221 ISO 3166-2:TH    Asia                 South-eastern Asia
## 222 ISO 3166-2:TL    Asia                 South-eastern Asia
## 223 ISO 3166-2:TG   Africa                 Sub-Saharan Africa    Western Africa
## 224 ISO 3166-2:TK   Oceania                    Polynesia
## 225 ISO 3166-2:TO   Oceania                    Polynesia
## 226 ISO 3166-2:TT Americas Latin America and the Caribbean         Caribbean
## 227 ISO 3166-2:TN   Africa                 Northern Africa
## 228 ISO 3166-2:TR    Asia                  Western Asia
## 229 ISO 3166-2:TM    Asia                  Central Asia
## 230 ISO 3166-2:TC Americas Latin America and the Caribbean         Caribbean
## 231 ISO 3166-2:TV   Oceania                    Polynesia
## 232 ISO 3166-2:UG   Africa                 Sub-Saharan Africa    Eastern Africa
## 233 ISO 3166-2:UA   Europe                 Eastern Europe
## 234 ISO 3166-2:AE    Asia                  Western Asia
## 235 ISO 3166-2:GB   Europe                 Northern Europe
## 236 ISO 3166-2:US Americas               Northern America
```

```
## 237 ISO 3166-2:UM  Oceania                        Micronesia
## 238 ISO 3166-2:UY Americas Latin America and the Caribbean      South America
## 239 ISO 3166-2:UZ     Asia                     Central Asia
## 240 ISO 3166-2:VU  Oceania                        Melanesia
## 241 ISO 3166-2:VE Americas Latin America and the Caribbean      South America
## 242 ISO 3166-2:VN     Asia           South-eastern Asia
## 243 ISO 3166-2:VG Americas Latin America and the Caribbean         Caribbean
## 244 ISO 3166-2:VI Americas Latin America and the Caribbean         Caribbean
## 245 ISO 3166-2:WF  Oceania                        Polynesia
## 246 ISO 3166-2:EH   Africa              Northern Africa
## 247 ISO 3166-2:YE     Asia              Western Asia
## 248 ISO 3166-2:ZM   Africa          Sub-Saharan Africa     Eastern Africa
## 249 ISO 3166-2:ZW   Africa          Sub-Saharan Africa     Eastern Africa
##     region.code sub.region.code intermediate.region.code      ISO
## 1          142              34                       NA AF|AFG|004
## 2          150             154                       NA AX|ALA|248
## 3          150              39                       NA AL|ALB|008
## 4            2              15                       NA DZ|DZA|012
## 5            9              61                       NA AS|ASM|016
## 6          150              39                       NA AD|AND|020
## 7            2             202                       17 AO|AGO|024
## 8           19             419                       29 AI|AIA|660
## 9           NA              NA                       NA AQ|ATA|010
## 10          19             419                       29 AG|ATG|028
## 11          19             419                        5 AR|ARG|032
## 12         142             145                       NA AM|ARM|051
## 13          19             419                       29 AW|ABW|533
## 14           9              53                       NA AU|AUS|036
## 15         150             155                       NA AT|AUT|040
## 16         142             145                       NA AZ|AZE|031
## 17          19             419                       29 BS|BHS|044
## 18         142             145                       NA BH|BHR|048
## 19         142              34                       NA BD|BGD|050
## 20          19             419                       29 BB|BRB|052
## 21         150             151                       NA BY|BLR|112
## 22         150             155                       NA BE|BEL|056
## 23          19             419                       13 BZ|BLZ|084
## 24           2             202                       11 BJ|BEN|204
## 25          19              21                       NA BM|BMU|060
## 26         142              34                       NA BT|BTN|064
## 27          19             419                        5 BO|BOL|068
## 28          19             419                       29 BQ|BES|535
## 29         150              39                       NA BA|BIH|070
## 30           2             202                       18 BW|BWA|072
## 31          19             419                        5 BV|BVT|074
## 32          19             419                        5 BR|BRA|076
## 33           2             202                       14 IO|IOT|086
## 34         142              35                       NA BN|BRN|096
## 35         150             151                       NA BG|BGR|100
## 36           2             202                       11 BF|BFA|854
## 37           2             202                       14 BI|BDI|108
## 38           2             202                       11 CV|CPV|132
## 39         142              35                       NA KH|KHM|116
## 40           2             202                       17 CM|CMR|120
```

```
## 41      19       21      NA CA|CAN|124
## 42      19      419      29 KY|CYM|136
## 43       2      202      17 CF|CAF|140
## 44       2      202      17 TD|TCD|148
## 45      19      419       5 CL|CHL|152
## 46     142       30      NA CN|CHN|156
## 47       9       53      NA CX|CXR|162
## 48       9       53      NA CC|CCK|166
## 49      19      419       5 CO|COL|170
## 50       2      202      14 KM|COM|174
## 51       2      202      17 CG|COG|178
## 52       2      202      17 CD|COD|180
## 53       9       61      NA CK|COK|184
## 54      19      419      13 CR|CRI|188
## 55       2      202      11 CI|CIV|384
## 56     150       39      NA HR|HRV|191
## 57      19      419      29 CU|CUB|192
## 58      19      419      29 CW|CUW|531
## 59     142      145      NA CY|CYP|196
## 60     150      151      NA CZ|CZE|203
## 61     150      154      NA DK|DNK|208
## 62       2      202      14 DJ|DJI|262
## 63      19      419      29 DM|DMA|212
## 64      19      419      29 DO|DOM|214
## 65      19      419       5 EC|ECU|218
## 66       2       15      NA EG|EGY|818
## 67      19      419      13 SV|SLV|222
## 68       2      202      17 GQ|GNQ|226
## 69       2      202      14 ER|ERI|232
## 70     150      154      NA EE|EST|233
## 71       2      202      18 SZ|SWZ|748
## 72       2      202      14 ET|ETH|231
## 73      19      419       5 FK|FLK|238
## 74     150      154      NA FO|FRO|234
## 75       9       54      NA FJ|FJI|242
## 76     150      154      NA FI|FIN|246
## 77     150      155      NA FR|FRA|250
## 78      19      419       5 GF|GUF|254
## 79       9       61      NA PF|PYF|258
## 80       2      202      14 TF|ATF|260
## 81       2      202      17 GA|GAB|266
## 82       2      202      11 GM|GMB|270
## 83     142      145      NA GE|GEO|268
## 84     150      155      NA DE|DEU|276
## 85       2      202      11 GH|GHA|288
## 86     150       39      NA GI|GIB|292
## 87     150       39      NA GR|GRC|300
## 88      19       21      NA GL|GRL|304
## 89      19      419      29 GD|GRD|308
## 90      19      419      29 GP|GLP|312
## 91       9       57      NA GU|GUM|316
## 92      19      419      13 GT|GTM|320
## 93     150      154     830 GG|GGY|831
## 94       2      202      11 GN|GIN|324
```

```
## 95           2      202    11 GW|GNB|624
## 96          19      419     5 GY|GUY|328
## 97          19      419    29 HT|HTI|332
## 98           9       53    NA HM|HMD|334
## 99         150       39    NA VA|VAT|336
## 100         19      419    13 HN|HND|340
## 101        142       30    NA HK|HKG|344
## 102        150      151    NA HU|HUN|348
## 103        150      154    NA IS|ISL|352
## 104        142       34    NA IN|IND|356
## 105        142       35    NA ID|IDN|360
## 106        142       34    NA IR|IRN|364
## 107        142      145    NA IQ|IRQ|368
## 108        150      154    NA IE|IRL|372
## 109        150      154    NA IM|IMN|833
## 110        142      145    NA IL|ISR|376
## 111        150       39    NA IT|ITA|380
## 112         19      419    29 JM|JAM|388
## 113        142       30    NA JP|JPN|392
## 114        150      154   830 JE|JEY|832
## 115        142      145    NA JO|JOR|400
## 116        142      143    NA KZ|KAZ|398
## 117          2      202    14 KE|KEN|404
## 118          9       57    NA KI|KIR|296
## 119        142       30    NA KP|PRK|408
## 120        142       30    NA KR|KOR|410
## 121        142      145    NA KW|KWT|414
## 122        142      143    NA KG|KGZ|417
## 123        142       35    NA LA|LAO|418
## 124        150      154    NA LV|LVA|428
## 125        142      145    NA LB|LBN|422
## 126          2      202    18 LS|LSO|426
## 127          2      202    11 LR|LBR|430
## 128          2       15    NA LY|LBY|434
## 129        150      155    NA LI|LIE|438
## 130        150      154    NA LT|LTU|440
## 131        150      155    NA LU|LUX|442
## 132        142       30    NA MO|MAC|446
## 133          2      202    14 MG|MDG|450
## 134          2      202    14 MW|MWI|454
## 135        142       35    NA MY|MYS|458
## 136        142       34    NA MV|MDV|462
## 137          2      202    11 ML|MLI|466
## 138        150       39    NA MT|MLT|470
## 139          9       57    NA MH|MHL|584
## 140         19      419    29 MQ|MTQ|474
## 141          2      202    11 MR|MRT|478
## 142          2      202    14 MU|MUS|480
## 143          2      202    14 YT|MYT|175
## 144         19      419    13 MX|MEX|484
## 145          9       57    NA FM|FSM|583
## 146        150      151    NA MD|MDA|498
## 147        150      155    NA MC|MCO|492
## 148        142       30    NA MN|MNG|496
```

```
## 149      150        39       NA ME|MNE|499
## 150       19       419       29 MS|MSR|500
## 151        2        15       NA MA|MAR|504
## 152        2       202       14 MZ|MOZ|508
## 153      142        35       NA MM|MMR|104
## 154        2       202       18 NA|NAM|516
## 155        9        57       NA NR|NRU|520
## 156      142        34       NA NP|NPL|524
## 157      150       155       NA NL|NLD|528
## 158        9        54       NA NC|NCL|540
## 159        9        53       NA NZ|NZL|554
## 160       19       419       13 NI|NIC|558
## 161        2       202       11 NE|NER|562
## 162        2       202       11 NG|NGA|566
## 163        9        61       NA NU|NIU|570
## 164        9        53       NA NF|NFK|574
## 165      150        39       NA MK|MKD|807
## 166        9        57       NA MP|MNP|580
## 167      150       154       NA NO|NOR|578
## 168      142       145       NA OM|OMN|512
## 169      142        34       NA PK|PAK|586
## 170        9        57       NA PW|PLW|585
## 171      142       145       NA PS|PSE|275
## 172       19       419       13 PA|PAN|591
## 173        9        54       NA PG|PNG|598
## 174       19       419        5 PY|PRY|600
## 175       19       419        5 PE|PER|604
## 176      142        35       NA PH|PHL|608
## 177        9        61       NA PN|PCN|612
## 178      150       151       NA PL|POL|616
## 179      150        39       NA PT|PRT|620
## 180       19       419       29 PR|PRI|630
## 181      142       145       NA QA|QAT|634
## 182        2       202       14 RE|REU|638
## 183      150       151       NA RO|ROU|642
## 184      150       151       NA RU|RUS|643
## 185        2       202       14 RW|RWA|646
## 186       19       419       29 BL|BLM|652
## 187        2       202       11 SH|SHN|654
## 188       19       419       29 KN|KNA|659
## 189       19       419       29 LC|LCA|662
## 190       19       419       29 MF|MAF|663
## 191       19        21       NA PM|SPM|666
## 192       19       419       29 VC|VCT|670
## 193        9        61       NA WS|WSM|882
## 194      150        39       NA SM|SMR|674
## 195        2       202       17 ST|STP|678
## 196      142       145       NA SA|SAU|682
## 197        2       202       11 SN|SEN|686
## 198      150        39       NA RS|SRB|688
## 199        2       202       14 SC|SYC|690
## 200        2       202       11 SL|SLE|694
## 201      142        35       NA SG|SGP|702
## 202       19       419       29 SX|SXM|534
```

```
## 203              150              151              NA SK|SVK|703
## 204              150               39              NA SI|SVN|705
## 205                9               54              NA SB|SLB|090
## 206                2              202              14 SO|SOM|706
## 207                2              202              18 ZA|ZAF|710
## 208               19              419               5 GS|SGS|239
## 209                2              202              14 SS|SSD|728
## 210              150               39              NA ES|ESP|724
## 211              142               34              NA LK|LKA|144
## 212                2               15              NA SD|SDN|729
## 213               19              419               5 SR|SUR|740
## 214              150              154              NA SJ|SJM|744
## 215              150              154              NA SE|SWE|752
## 216              150              155              NA CH|CHE|756
## 217              142              145              NA SY|SYR|760
## 218              142               30              NA TW|TWN|158
## 219              142              143              NA TJ|TJK|762
## 220                2              202              14 TZ|TZA|834
## 221              142               35              NA TH|THA|764
## 222              142               35              NA TL|TLS|626
## 223                2              202              11 TG|TGO|768
## 224                9               61              NA TK|TKL|772
## 225                9               61              NA TO|TON|776
## 226               19              419              29 TT|TTO|780
## 227                2               15              NA TN|TUN|788
## 228              142              145              NA TR|TUR|792
## 229              142              143              NA TM|TKM|795
## 230               19              419              29 TC|TCA|796
## 231                9               61              NA TV|TUV|798
## 232                2              202              14 UG|UGA|800
## 233              150              151              NA UA|UKR|804
## 234              142              145              NA AE|ARE|784
## 235              150              154              NA GB|GBR|826
## 236               19               21              NA US|USA|840
## 237                9               57              NA UM|UMI|581
## 238               19              419               5 UY|URY|858
## 239              142              143              NA UZ|UZB|860
## 240                9               54              NA VU|VUT|548
## 241               19              419               5 VE|VEN|862
## 242              142               35              NA VN|VNM|704
## 243               19              419              29 VG|VGB|092
## 244               19              419              29 VI|VIR|850
## 245                9               61              NA WF|WLF|876
## 246                2               15              NA EH|ESH|732
## 247              142              145              NA YE|YEM|887
## 248                2              202              14 ZM|ZMB|894
## 249                2              202              14 ZW|ZWE|716
```

```r
continents <- continents[, c("Country", "region", "sub.region", "ISO")]
continents
```

```
##                                Country    region
## 1                          Afghanistan      Asia
## 2                        Åland Islands    Europe
```

```
## 3                          Albania   Europe
## 4                          Algeria   Africa
## 5                   American Samoa  Oceania
## 6                          Andorra   Europe
## 7                           Angola   Africa
## 8                         Anguilla Americas
## 9                       Antarctica
## 10            Antigua and Barbuda Americas
## 11                       Argentina Americas
## 12                         Armenia     Asia
## 13                           Aruba Americas
## 14                       Australia  Oceania
## 15                         Austria   Europe
## 16                      Azerbaijan     Asia
## 17                         Bahamas Americas
## 18                         Bahrain     Asia
## 19                      Bangladesh     Asia
## 20                        Barbados Americas
## 21                         Belarus   Europe
## 22                         Belgium   Europe
## 23                          Belize Americas
## 24                           Benin   Africa
## 25                         Bermuda Americas
## 26                          Bhutan     Asia
## 27                         Bolivia Americas
## 28    Bonaire, Sint Eustatius and Saba Americas
## 29           Bosnia And Herzegovina   Europe
## 30                        Botswana   Africa
## 31                   Bouvet Island Americas
## 32                          Brazil Americas
## 33    British Indian Ocean Territory   Africa
## 34               Brunei Darussalam     Asia
## 35                        Bulgaria   Europe
## 36                    Burkina Faso   Africa
## 37                         Burundi   Africa
## 38                      Cabo Verde   Africa
## 39                        Cambodia     Asia
## 40                        Cameroon   Africa
## 41                          Canada Americas
## 42                  Cayman Islands Americas
## 43        Central African Republic   Africa
## 44                            Chad   Africa
## 45                           Chile Americas
## 46                           China     Asia
## 47                 Christmas Island  Oceania
## 48          Cocos (Keeling) Islands  Oceania
## 49                        Colombia Americas
## 50                         Comoros   Africa
## 51                           Congo   Africa
## 52    Congo (Democratic Republic Of The)   Africa
## 53                    Cook Islands  Oceania
## 54                      Costa Rica Americas
## 55                    Côte D'Ivoire   Africa
## 56                         Croatia   Europe
```

```
## 57                                 Cuba Americas
## 58                              Curaçao Americas
## 59                               Cyprus     Asia
## 60                       Czech Republic   Europe
## 61                             Denmark   Europe
## 62                            Djibouti   Africa
## 63                            Dominica Americas
## 64                  Dominican Republic Americas
## 65                             Ecuador Americas
## 66                               Egypt   Africa
## 67                         El Salvador Americas
## 68                   Equatorial Guinea   Africa
## 69                             Eritrea   Africa
## 70                             Estonia   Europe
## 71                            Eswatini   Africa
## 72                            Ethiopia   Africa
## 73         Falkland Islands (Malvinas) Americas
## 74                       Faroe Islands   Europe
## 75                                Fiji  Oceania
## 76                             Finland   Europe
## 77                              France   Europe
## 78                       French Guiana Americas
## 79                    French Polynesia  Oceania
## 80          French Southern Territories   Africa
## 81                               Gabon   Africa
## 82                              Gambia   Africa
## 83                             Georgia     Asia
## 84                             Germany   Europe
## 85                               Ghana   Africa
## 86                           Gibraltar   Europe
## 87                              Greece   Europe
## 88                           Greenland Americas
## 89                             Grenada Americas
## 90                          Guadeloupe Americas
## 91                                Guam  Oceania
## 92                           Guatemala Americas
## 93                            Guernsey   Europe
## 94                              Guinea   Africa
## 95                       Guinea Bissau   Africa
## 96                              Guyana Americas
## 97                               Haiti Americas
## 98  Heard Island and McDonald Islands  Oceania
## 99                            Holy See   Europe
## 100                           Honduras Americas
## 101                          Hong Kong     Asia
## 102                            Hungary   Europe
## 103                            Iceland   Europe
## 104                              India     Asia
## 105                          Indonesia     Asia
## 106                               Iran     Asia
## 107                               Iraq     Asia
## 108                            Ireland   Europe
## 109                        Isle of Man   Europe
## 110                             Israel     Asia
```

```
## 111                                    Italy    Europe
## 112                                  Jamaica  Americas
## 113                                    Japan      Asia
## 114                                   Jersey    Europe
## 115                                   Jordan      Asia
## 116                               Kazakhstan      Asia
## 117                                    Kenya    Africa
## 118                                 Kiribati   Oceania
## 119                              South Korea      Asia
## 120                        Korea, Republic of      Asia
## 121                                   Kuwait      Asia
## 122                               Kyrgyzstan      Asia
## 123                                     Laos      Asia
## 124                                   Latvia    Europe
## 125                                  Lebanon      Asia
## 126                                  Lesotho    Africa
## 127                                  Liberia    Africa
## 128                                    Libya    Africa
## 129                            Liechtenstein    Europe
## 130                                Lithuania    Europe
## 131                               Luxembourg    Europe
## 132                                    Macao      Asia
## 133                               Madagascar    Africa
## 134                                   Malawi    Africa
## 135                                 Malaysia      Asia
## 136                                 Maldives      Asia
## 137                                     Mali    Africa
## 138                                    Malta    Europe
## 139                          Marshall Islands   Oceania
## 140                               Martinique  Americas
## 141                               Mauritania    Africa
## 142                                Mauritius    Africa
## 143                                  Mayotte    Africa
## 144                                   Mexico  Americas
## 145           Micronesia (Federated States of)   Oceania
## 146                                  Moldova    Europe
## 147                                   Monaco    Europe
## 148                                 Mongolia      Asia
## 149                               Montenegro    Europe
## 150                               Montserrat  Americas
## 151                                  Morocco    Africa
## 152                               Mozambique    Africa
## 153                                  Myanmar      Asia
## 154                                  Namibia    Africa
## 155                                    Nauru   Oceania
## 156                                    Nepal      Asia
## 157                              Netherlands    Europe
## 158                            New Caledonia   Oceania
## 159                              New Zealand   Oceania
## 160                                Nicaragua  Americas
## 161                                    Niger    Africa
## 162                                  Nigeria    Africa
## 163                                     Niue   Oceania
## 164                           Norfolk Island   Oceania
```

```
## 165                                  Macedonia    Europe
## 166                   Northern Mariana Islands   Oceania
## 167                                     Norway    Europe
## 168                                       Oman      Asia
## 169                                   Pakistan      Asia
## 170                                      Palau   Oceania
## 171                         Palestine, State of      Asia
## 172                                     Panama  Americas
## 173                          Papua New Guinea    Oceania
## 174                                   Paraguay  Americas
## 175                                       Peru  Americas
## 176                                Philippines      Asia
## 177                                   Pitcairn   Oceania
## 178                                     Poland    Europe
## 179                                   Portugal    Europe
## 180                                Puerto Rico  Americas
## 181                                      Qatar      Asia
## 182                                    Réunion    Africa
## 183                                    Romania    Europe
## 184                                     Russia    Europe
## 185                                     Rwanda    Africa
## 186                          Saint Barthélemy  Americas
## 187 Saint Helena, Ascension and Tristan da Cunha    Africa
## 188                      Saint Kitts and Nevis  Americas
## 189                                Saint Lucia  Americas
## 190                  Saint Martin (French part) Americas
## 191                  Saint Pierre and Miquelon  Americas
## 192           Saint Vincent and the Grenadines  Americas
## 193                                      Samoa   Oceania
## 194                                 San Marino    Europe
## 195                      Sao Tome and Principe    Africa
## 196                               Saudi Arabia      Asia
## 197                                    Senegal    Africa
## 198                                     Serbia    Europe
## 199                                 Seychelles    Africa
## 200                               Sierra Leone    Africa
## 201                                  Singapore      Asia
## 202                  Sint Maarten (Dutch part) Americas
## 203                                   Slovakia    Europe
## 204                                   Slovenia    Europe
## 205                            Solomon Islands   Oceania
## 206                                    Somalia    Africa
## 207                               South Africa    Africa
## 208 South Georgia and the South Sandwich Islands Americas
## 209                                South Sudan    Africa
## 210                                      Spain    Europe
## 211                                  Sri Lanka      Asia
## 212                                      Sudan    Africa
## 213                                   Suriname  Americas
## 214                     Svalbard and Jan Mayen    Europe
## 215                                     Sweden    Europe
## 216                                Switzerland    Europe
## 217                                      Syria      Asia
## 218                                     Taiwan      Asia
```

```
## 219                              Tajikistan     Asia
## 220                               Tanzania   Africa
## 221                               Thailand     Asia
## 222                            Timor-Leste     Asia
## 223                                   Togo   Africa
## 224                                Tokelau  Oceania
## 225                                  Tonga  Oceania
## 226                    Trinidad and Tobago Americas
## 227                                Tunisia   Africa
## 228                                 Turkey     Asia
## 229                           Turkmenistan     Asia
## 230               Turks and Caicos Islands Americas
## 231                                 Tuvalu  Oceania
## 232                                 Uganda   Africa
## 233                                Ukraine   Europe
## 234                   United Arab Emirates     Asia
## 235                         United Kingdom   Europe
## 236                          United States Americas
## 237    United States Minor Outlying Islands  Oceania
## 238                                Uruguay Americas
## 239                             Uzbekistan     Asia
## 240                                Vanuatu  Oceania
## 241                              Venezuela Americas
## 242                                Vietnam     Asia
## 243                Virgin Islands (British) Americas
## 244                   Virgin Islands (U.S.) Americas
## 245                       Wallis and Futuna  Oceania
## 246                         Western Sahara   Africa
## 247                                  Yemen     Asia
## 248                                 Zambia   Africa
## 249                               Zimbabwe   Africa
##                           sub.region        ISO
## 1                      Southern Asia AF|AFG|004
## 2                    Northern Europe AX|ALA|248
## 3                    Southern Europe AL|ALB|008
## 4                    Northern Africa DZ|DZA|012
## 5                          Polynesia AS|ASM|016
## 6                    Southern Europe AD|AND|020
## 7                 Sub-Saharan Africa AO|AGO|024
## 8   Latin America and the Caribbean AI|AIA|660
## 9                                    AQ|ATA|010
## 10  Latin America and the Caribbean AG|ATG|028
## 11  Latin America and the Caribbean AR|ARG|032
## 12                      Western Asia AM|ARM|051
## 13  Latin America and the Caribbean AW|ABW|533
## 14          Australia and New Zealand AU|AUS|036
## 15                    Western Europe AT|AUT|040
## 16                      Western Asia AZ|AZE|031
## 17  Latin America and the Caribbean BS|BHS|044
## 18                      Western Asia BH|BHR|048
## 19                     Southern Asia BD|BGD|050
## 20  Latin America and the Caribbean BB|BRB|052
## 21                    Eastern Europe BY|BLR|112
## 22                    Western Europe BE|BEL|056
```

```
## 23    Latin America and the Caribbean BZ|BLZ|084
## 24                 Sub-Saharan Africa BJ|BEN|204
## 25                  Northern America BM|BMU|060
## 26                     Southern Asia BT|BTN|064
## 27    Latin America and the Caribbean BO|BOL|068
## 28    Latin America and the Caribbean BQ|BES|535
## 29                   Southern Europe BA|BIH|070
## 30                 Sub-Saharan Africa BW|BWA|072
## 31    Latin America and the Caribbean BV|BVT|074
## 32    Latin America and the Caribbean BR|BRA|076
## 33                 Sub-Saharan Africa IO|IOT|086
## 34                 South-eastern Asia BN|BRN|096
## 35                    Eastern Europe BG|BGR|100
## 36                 Sub-Saharan Africa BF|BFA|854
## 37                 Sub-Saharan Africa BI|BDI|108
## 38                 Sub-Saharan Africa CV|CPV|132
## 39                 South-eastern Asia KH|KHM|116
## 40                 Sub-Saharan Africa CM|CMR|120
## 41                  Northern America CA|CAN|124
## 42    Latin America and the Caribbean KY|CYM|136
## 43                 Sub-Saharan Africa CF|CAF|140
## 44                 Sub-Saharan Africa TD|TCD|148
## 45    Latin America and the Caribbean CL|CHL|152
## 46                      Eastern Asia CN|CHN|156
## 47         Australia and New Zealand CX|CXR|162
## 48         Australia and New Zealand CC|CCK|166
## 49    Latin America and the Caribbean CO|COL|170
## 50                 Sub-Saharan Africa KM|COM|174
## 51                 Sub-Saharan Africa CG|COG|178
## 52                 Sub-Saharan Africa CD|COD|180
## 53                         Polynesia CK|COK|184
## 54    Latin America and the Caribbean CR|CRI|188
## 55                 Sub-Saharan Africa CI|CIV|384
## 56                   Southern Europe HR|HRV|191
## 57    Latin America and the Caribbean CU|CUB|192
## 58    Latin America and the Caribbean CW|CUW|531
## 59                      Western Asia CY|CYP|196
## 60                    Eastern Europe CZ|CZE|203
## 61                   Northern Europe DK|DNK|208
## 62                 Sub-Saharan Africa DJ|DJI|262
## 63    Latin America and the Caribbean DM|DMA|212
## 64    Latin America and the Caribbean DO|DOM|214
## 65    Latin America and the Caribbean EC|ECU|218
## 66                   Northern Africa EG|EGY|818
## 67    Latin America and the Caribbean SV|SLV|222
## 68                 Sub-Saharan Africa GQ|GNQ|226
## 69                 Sub-Saharan Africa ER|ERI|232
## 70                   Northern Europe EE|EST|233
## 71                 Sub-Saharan Africa SZ|SWZ|748
## 72                 Sub-Saharan Africa ET|ETH|231
## 73    Latin America and the Caribbean FK|FLK|238
## 74                   Northern Europe FO|FRO|234
## 75                         Melanesia FJ|FJI|242
## 76                   Northern Europe FI|FIN|246
```

```
## 77                     Western Europe FR|FRA|250
## 78  Latin America and the Caribbean GF|GUF|254
## 79                          Polynesia PF|PYF|258
## 80                 Sub-Saharan Africa TF|ATF|260
## 81                 Sub-Saharan Africa GA|GAB|266
## 82                 Sub-Saharan Africa GM|GMB|270
## 83                       Western Asia GE|GEO|268
## 84                     Western Europe DE|DEU|276
## 85                 Sub-Saharan Africa GH|GHA|288
## 86                    Southern Europe GI|GIB|292
## 87                    Southern Europe GR|GRC|300
## 88                    Northern America GL|GRL|304
## 89  Latin America and the Caribbean GD|GRD|308
## 90  Latin America and the Caribbean GP|GLP|312
## 91                         Micronesia GU|GUM|316
## 92  Latin America and the Caribbean GT|GTM|320
## 93                    Northern Europe GG|GGY|831
## 94                 Sub-Saharan Africa GN|GIN|324
## 95                 Sub-Saharan Africa GW|GNB|624
## 96  Latin America and the Caribbean GY|GUY|328
## 97  Latin America and the Caribbean HT|HTI|332
## 98         Australia and New Zealand HM|HMD|334
## 99                    Southern Europe VA|VAT|336
## 100 Latin America and the Caribbean HN|HND|340
## 101                       Eastern Asia HK|HKG|344
## 102                     Eastern Europe HU|HUN|348
## 103                    Northern Europe IS|ISL|352
## 104                      Southern Asia IN|IND|356
## 105                 South-eastern Asia ID|IDN|360
## 106                      Southern Asia IR|IRN|364
## 107                       Western Asia IQ|IRQ|368
## 108                    Northern Europe IE|IRL|372
## 109                    Northern Europe IM|IMN|833
## 110                       Western Asia IL|ISR|376
## 111                    Southern Europe IT|ITA|380
## 112 Latin America and the Caribbean JM|JAM|388
## 113                       Eastern Asia JP|JPN|392
## 114                    Northern Europe JE|JEY|832
## 115                       Western Asia JO|JOR|400
## 116                       Central Asia KZ|KAZ|398
## 117                 Sub-Saharan Africa KE|KEN|404
## 118                         Micronesia KI|KIR|296
## 119                       Eastern Asia KP|PRK|408
## 120                       Eastern Asia KR|KOR|410
## 121                       Western Asia KW|KWT|414
## 122                       Central Asia KG|KGZ|417
## 123                 South-eastern Asia LA|LAO|418
## 124                    Northern Europe LV|LVA|428
## 125                       Western Asia LB|LBN|422
## 126                 Sub-Saharan Africa LS|LSO|426
## 127                 Sub-Saharan Africa LR|LBR|430
## 128                    Northern Africa LY|LBY|434
## 129                     Western Europe LI|LIE|438
## 130                    Northern Europe LT|LTU|440
```

```
## 131                     Western Europe LU|LUX|442
## 132                       Eastern Asia MO|MAC|446
## 133                 Sub-Saharan Africa MG|MDG|450
## 134                 Sub-Saharan Africa MW|MWI|454
## 135                South-eastern Asia MY|MYS|458
## 136                     Southern Asia MV|MDV|462
## 137                 Sub-Saharan Africa ML|MLI|466
## 138                   Southern Europe MT|MLT|470
## 139                         Micronesia MH|MHL|584
## 140 Latin America and the Caribbean MQ|MTQ|474
## 141                 Sub-Saharan Africa MR|MRT|478
## 142                 Sub-Saharan Africa MU|MUS|480
## 143                 Sub-Saharan Africa YT|MYT|175
## 144 Latin America and the Caribbean MX|MEX|484
## 145                         Micronesia FM|FSM|583
## 146                     Eastern Europe MD|MDA|498
## 147                     Western Europe MC|MCO|492
## 148                       Eastern Asia MN|MNG|496
## 149                   Southern Europe ME|MNE|499
## 150 Latin America and the Caribbean MS|MSR|500
## 151                   Northern Africa MA|MAR|504
## 152                 Sub-Saharan Africa MZ|MOZ|508
## 153                South-eastern Asia MM|MMR|104
## 154                 Sub-Saharan Africa NA|NAM|516
## 155                         Micronesia NR|NRU|520
## 156                     Southern Asia NP|NPL|524
## 157                     Western Europe NL|NLD|528
## 158                         Melanesia NC|NCL|540
## 159         Australia and New Zealand NZ|NZL|554
## 160 Latin America and the Caribbean NI|NIC|558
## 161                 Sub-Saharan Africa NE|NER|562
## 162                 Sub-Saharan Africa NG|NGA|566
## 163                         Polynesia NU|NIU|570
## 164         Australia and New Zealand NF|NFK|574
## 165                   Southern Europe MK|MKD|807
## 166                         Micronesia MP|MNP|580
## 167                   Northern Europe NO|NOR|578
## 168                       Western Asia OM|OMN|512
## 169                     Southern Asia PK|PAK|586
## 170                         Micronesia PW|PLW|585
## 171                       Western Asia PS|PSE|275
## 172 Latin America and the Caribbean PA|PAN|591
## 173                         Melanesia PG|PNG|598
## 174 Latin America and the Caribbean PY|PRY|600
## 175 Latin America and the Caribbean PE|PER|604
## 176                South-eastern Asia PH|PHL|608
## 177                         Polynesia PN|PCN|612
## 178                     Eastern Europe PL|POL|616
## 179                   Southern Europe PT|PRT|620
## 180 Latin America and the Caribbean PR|PRI|630
## 181                       Western Asia QA|QAT|634
## 182                 Sub-Saharan Africa RE|REU|638
## 183                     Eastern Europe RO|ROU|642
## 184                     Eastern Europe RU|RUS|643
```

```
## 185                   Sub-Saharan Africa RW|RWA|646
## 186 Latin America and the Caribbean BL|BLM|652
## 187                   Sub-Saharan Africa SH|SHN|654
## 188 Latin America and the Caribbean KN|KNA|659
## 189 Latin America and the Caribbean LC|LCA|662
## 190 Latin America and the Caribbean MF|MAF|663
## 191                   Northern America PM|SPM|666
## 192 Latin America and the Caribbean VC|VCT|670
## 193                         Polynesia WS|WSM|882
## 194                   Southern Europe SM|SMR|674
## 195                   Sub-Saharan Africa ST|STP|678
## 196                       Western Asia SA|SAU|682
## 197                   Sub-Saharan Africa SN|SEN|686
## 198                   Southern Europe RS|SRB|688
## 199                   Sub-Saharan Africa SC|SYC|690
## 200                   Sub-Saharan Africa SL|SLE|694
## 201                   South-eastern Asia SG|SGP|702
## 202 Latin America and the Caribbean SX|SXM|534
## 203                    Eastern Europe SK|SVK|703
## 204                   Southern Europe SI|SVN|705
## 205                         Melanesia SB|SLB|090
## 206                   Sub-Saharan Africa SO|SOM|706
## 207                   Sub-Saharan Africa ZA|ZAF|710
## 208 Latin America and the Caribbean GS|SGS|239
## 209                   Sub-Saharan Africa SS|SSD|728
## 210                   Southern Europe ES|ESP|724
## 211                     Southern Asia LK|LKA|144
## 212                   Northern Africa SD|SDN|729
## 213 Latin America and the Caribbean SR|SUR|740
## 214                   Northern Europe SJ|SJM|744
## 215                   Northern Europe SE|SWE|752
## 216                   Western Europe CH|CHE|756
## 217                      Western Asia SY|SYR|760
## 218                       Eastern Asia TW|TWN|158
## 219                       Central Asia TJ|TJK|762
## 220                   Sub-Saharan Africa TZ|TZA|834
## 221                   South-eastern Asia TH|THA|764
## 222                   South-eastern Asia TL|TLS|626
## 223                   Sub-Saharan Africa TG|TGO|768
## 224                         Polynesia TK|TKL|772
## 225                         Polynesia TO|TON|776
## 226 Latin America and the Caribbean TT|TTO|780
## 227                   Northern Africa TN|TUN|788
## 228                      Western Asia TR|TUR|792
## 229                      Central Asia TM|TKM|795
## 230 Latin America and the Caribbean TC|TCA|796
## 231                         Polynesia TV|TUV|798
## 232                   Sub-Saharan Africa UG|UGA|800
## 233                    Eastern Europe UA|UKR|804
## 234                      Western Asia AE|ARE|784
## 235                   Northern Europe GB|GBR|826
## 236                   Northern America US|USA|840
## 237                        Micronesia UM|UMI|581
## 238 Latin America and the Caribbean UY|URY|858
```

```
## 239                   Central Asia UZ|UZB|860
## 240                     Melanesia VU|VUT|548
## 241 Latin America and the Caribbean VE|VEN|862
## 242               South-eastern Asia VN|VNM|704
## 243 Latin America and the Caribbean VG|VGB|092
## 244 Latin America and the Caribbean VI|VIR|850
## 245                     Polynesia WF|WLF|876
## 246               Northern Africa EH|ESH|732
## 247                   Western Asia YE|YEM|887
## 248             Sub-Saharan Africa ZM|ZMB|894
## 249             Sub-Saharan Africa ZW|ZWE|716
```

```r
#i will now merge all data that we have
df_vars <- left_join(data, continents, by = join_by(Country == Country))
names(df_vars)[names(df_vars) == 'ISO.x'] <- 'ISO'
df_vars$ISO.y <- NULL
dim(df_vars) # 227 × 8
```

```
## [1] 227   8
```

```r
head(df_vars)
```

```
##                    Country Median_Age Youth_unemployment_rate Migration_rate
## 1                   Monaco       55.4                    26.6            8.3
## 2                    Japan       48.6                     3.6            0.0
## 3 Saint Pierre and Miquelon     48.5                      NA           -7.7
## 4                  Germany       47.8                     6.2            1.5
## 5                    Italy       46.5                    32.2            3.2
## 6                   Andorra       46.2                      NA            0.0
##   Income_class       ISO   region        sub.region
## 1            H MC|MCO|492   Europe   Western Europe
## 2            H JP|JPN|392     Asia      Eastern Asia
## 3         <NA> PM|SPM|666 Americas Northern America
## 4            H DE|DEU|276   Europe   Western Europe
## 5            H IT|ITA|380   Europe  Southern Europe
## 6            H AD|AND|020   Europe  Southern Europe
```

```r
#just for the sake of checking things, i get the same output when joining on iso
#df_vars2 <- left_join(data, continents, by = join_by(ISO == ISO))
#dim(df_vars2) # 227 × 9 - double column of country still
#df_vars2
```

f

Discuss on the tidyness of the data set df_vars. What are the observational units, what are the variables? What can be considered fixed vs measured variables? Tidy the data if needed.

The obtained data set df_vars is almost tidy, while it almost fully satisfies the requirements to the data to be considered tidy: our data set is the collection of quantitative and qualitative values and they are organized in a way, that each value belongs to an observation and a variable. Our data is organized in a way that each row represents an observational unit (a country) and each column is a variable. All our variables have the same unit and measure the same attribute.

In our case the fixed variables are Country (char), region (char), sub.region (char), ISO (char), Income_class (char). The left variables Median_Age (double), Migration_rate (double) and Youth_unemployment_rate (double) are measured variables in our case. Typically, the fixed variables are put in the beginning of the data set, while measured are put after them. So we will perform this small change to have our data perfectly tidy.

Also, since in the following tasks the region will be pointed to as "continent", we decided to rename the name of this variable.

```r
df_vars <- df_vars %>%
  select(ISO, Country, region, sub.region, Income_class, Median_Age, Youth_unemployment_rate, Migration_

names(df_vars)[names(df_vars) == "region"] <- "continent"

head(df_vars)
```

```
##          ISO                   Country continent        sub.region Income_class
## 1 MC|MCO|492                     Monaco    Europe    Western Europe            H
## 2 JP|JPN|392                      Japan      Asia      Eastern Asia            H
## 3 PM|SPM|666 Saint Pierre and Miquelon   Americas Northern America         <NA>
## 4 DE|DEU|276                    Germany    Europe    Western Europe            H
## 5 IT|ITA|380                      Italy    Europe   Southern Europe            H
## 6 AD|AND|020                    Andorra    Europe   Southern Europe            H
##   Median_Age Youth_unemployment_rate Migration_rate
## 1       55.4                    26.6            8.3
## 2       48.6                     3.6            0.0
## 3       48.5                      NA           -7.7
## 4       47.8                     6.2            1.5
## 5       46.5                    32.2            3.2
## 6       46.2                      NA            0.0
```

g

Make a frequency table for the status variable in the merged data set. Briefly comment on the results.

```r
income_status_frequency <- df_vars %>%
  count(Income_class, name = "frequency") %>%
  mutate(
    percentage = 100 * (frequency / sum(frequency))
  )

print(income_status_frequency)
```

```
##   Income_class frequency percentage
## 1            H        66   29.07489
## 2            L        23   10.13216
## 3           LM        45   19.82379
## 4           UM        50   22.02643
## 5         <NA>        43   18.94273
```

From the generated table we can conclude that the high income countries are represented at most, while low income countries at least. The representation of lower-middle and upper-middle income countries are on the

same level. Also, a lot of observations (about 19%) are missing the value for the variable Income_class in our data set.

h

What is the distribution of income status in the different continents? Compute the absolute frequencies as well as the relative frequency of status within each continent. Briefly comment on the results.

```
income_distribution_within_continent <- df_vars %>%
  group_by(continent, Income_class) %>%
  summarise(frequency = n(), .groups = 'drop')

income_distribution_within_continent <- income_distribution_within_continent %>%
  group_by(continent) %>%
  mutate(relative_frequency = frequency / sum(frequency))

print(income_distribution_within_continent)
```

```
## # A tibble: 26 x 4
## # Groups:   continent [6]
##    continent Income_class frequency relative_frequency
##    <chr>     <chr>            <int>              <dbl>
##  1 Africa    H                    1             0.0204
##  2 Africa    L                   20             0.408
##  3 Africa    LM                  19             0.388
##  4 Africa    UM                   7             0.143
##  5 Africa    <NA>                 2             0.0408
##  6 Americas  H                   13             0.302
##  7 Americas  LM                   6             0.140
##  8 Americas  UM                  17             0.395
##  9 Americas  <NA>                 7             0.163
## 10 Asia      H                   10             0.222
## # i 16 more rows
```

We can conclude that the low and lower-income classes are prevailing in Africa, while the biggest group in Europe and Oceania is high income class. In Asia the lower-middle income class is the biggest one followed by the upper-middle income class. In Americas the prevailing income class is upper-middle and in our data set there is no low income class countries represented. Also, it should be noted that each continent has some countries with no income class specification available (Africa ≈ 4%, Americas ≈ 16%, Asia ≈ 18%, Europe ≈ 13% and Oceania 10%). In addition, some countries have values for variable Income_class, while no for continent.

i

From h. identify the countries which are the only ones in their respective group. Explain in few words the output.

```
unique_countries_in__their_group <- df_vars %>%
  group_by(continent, Income_class) %>%
  filter(n() == 1) %>%
```

```
  ungroup()

print(unique_countries_in__their_group)
```

```
## # A tibble: 3 x 8
##   ISO        Country     continent sub.region        Income_class Median_Age
##   <chr>      <chr>       <chr>     <chr>             <chr>              <dbl>
## 1 UA|UKR|804 Ukraine     Europe    Eastern Europe    LM                  41.2
## 2 SC|SYC|690 Seychelles  Africa    Sub-Saharan Africa H                   36.8
## 3 AF|AFG|004 Afghanistan Asia      Southern Asia     L                   19.5
## # i 2 more variables: Youth_unemployment_rate <dbl>, Migration_rate <dbl>
```

We can see that Ukraine is the only lower-middle income country in Europe, while the only high income country in Africa is Seychelles and the only low income country is Asia is Afghanistan.

j

For each continent count the number of sub-regions in the data set. How granular are the subcontinents that you employ in the analysis?

```
sub_region_counts_for_continents <- df_vars %>%
  group_by(continent) %>%
  summarise(number_of_sub_regions = n_distinct(sub.region), .groups = 'drop')

print(sub_region_counts_for_continents)
```

```
## # A tibble: 6 x 2
##   continent number_of_sub_regions
##   <chr>                     <int>
## 1 Africa                        2
## 2 Americas                      2
## 3 Asia                          5
## 4 Europe                        4
## 5 Oceania                       4
## 6 <NA>                          1
```

It is seen that the Asia has the highest granularity, followed by Europe and Oceania, while Africa and Americas are represented only by two sub-regions in our data set.

k

Look at the frequency distribution of income status in the subregions of North- and South-Americas. Comment on the results.

```
income_distribution_americas <- df_vars %>%
  filter(continent %in% "Americas") %>%
  group_by(sub.region, Income_class) %>%
  summarise(frequency = n(), .groups = 'drop') %>%
```

```
  group_by(sub.region) %>%
  mutate(relative_frequency = frequency / sum(frequency))

print(income_distribution_americas)
```

```
## # A tibble: 6 x 4
## # Groups:   sub.region [2]
##   sub.region                      Income_class frequency relative_frequency
##   <chr>                           <chr>            <int>              <dbl>
## 1 Latin America and the Caribbean H                    9              0.237
## 2 Latin America and the Caribbean LM                   6              0.158
## 3 Latin America and the Caribbean UM                  17              0.447
## 4 Latin America and the Caribbean <NA>                 6              0.158
## 5 Northern America                H                    4              0.8
## 6 Northern America                <NA>                 1              0.2
```

We obtained that in the Northern America all countries are high income and also we have one country with
no specified income status. In the Southern America prevailing number of countries are upper-middle class
income countries, around 24% of countries are high income.

l.

Dig deeper into the low-middle income countries of the Americas. Which ones are they? Are they primarily
small island states in the Caribbean? Comment.

```
low_middle_income_americas <- df_vars %>%
  filter(continent %in% "Americas" &
         Income_class == "LM")

print(low_middle_income_americas)
```

```
##           ISO    Country continent                     sub.region Income_class
## 1 SV|SLV|222 El Salvador  Americas Latin America and the Caribbean           LM
## 2 NI|NIC|558   Nicaragua  Americas Latin America and the Caribbean           LM
## 3 BO|BOL|068     Bolivia  Americas Latin America and the Caribbean           LM
## 4 HN|HND|340    Honduras  Americas Latin America and the Caribbean           LM
## 5 HT|HTI|332       Haiti  Americas Latin America and the Caribbean           LM
## 6 BZ|BLZ|084      Belize  Americas Latin America and the Caribbean           LM
##   Median_Age Youth_unemployment_rate Migration_rate
## 1       27.7                     9.6           -4.8
## 2       27.3                     8.5           -2.4
## 3       25.3                     6.9           -0.3
## 4       24.4                    10.7           -1.4
## 5       24.1                      NA           -1.9
## 6       23.9                    15.3           -1.0
```

No, these countries are not island states (except Haiti), however they all except Bolivia have the coastal line.
Also, they all are quite differ in terms of the size.

m

Create a table of average values for median age, youth unemployment rate and net migration rate separated into income status. Make sure that in the output, the ordering of the income classes is proper (i.e., L, LM, UM, H or the other way around). Briefly comment the results.

We will calculate it by ignoring the NA values. Also, we will exclude from the final data frame the values for the observations with no income class specified

```r
table_of_average_values <- df_vars %>%
  filter(!is.na(Income_class)) %>%
  mutate(Income_class = factor(Income_class, levels = c("L", "LM", "UM", "H"))) %>%
  group_by(Income_class) %>%
  summarise(
    Avg_Median_Age = mean(Median_Age, na.rm = TRUE),
    Avg_Youth_Unemployment_Rate = mean(Youth_unemployment_rate, na.rm = TRUE),
    Avg_Migration_Rate = mean(Migration_rate, na.rm = TRUE),
    .groups = 'drop'
  )

print(table_of_average_values)
```

```
## # A tibble: 4 x 4
##   Income_class Avg_Median_Age Avg_Youth_Unemployment_Rate Avg_Migration_Rate
##   <fct>                 <dbl>                       <dbl>              <dbl>
## 1 L                      18.4                        13.2              -1.74
## 2 LM                     24.9                        16.4              -1.50
## 3 UM                     31.5                        21.8              -4.48
## 4 H                      39.3                        16.7               2.18
```

We can trace the growth of the average median age of the population with the drop of the status of country's income. In addition, we observe that the highest average unemployment youth rate is experienced by the upper-middle status income countries. The high and lower-middle income countries have the same almost the same average unemployment youth and the indicator for low income status countries is the smallest. Average migration rate in countries of all statuses except high income status is negative, being the most negative in countries with upper-middle income status.