

Exploration and Revelation for COVID-19 Data: An InfoGeographic Atlas and Other Visual Data Insights

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Visual Data Insights™

Strong Smart Systems™

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About the Speaker

LeRoy Bessler PhD is a data artist, the world's longest serving advisor to SAS[®] users on best practices for graphic design and use of color, and author of *Visual Data Insights Using SAS ODS Graphics: A Guide to Communication-Effective Data Visualization*. His principles explained and demonstrated in the book are useful for any graphics software. LeRoy is a data analyst and SAS programmer, who has supported SAS servers, SAS software, SAS analytic data repositories, and hundreds of SAS users. "If you can't do it with SAS software, you probably don't really need to do it." —*LeRB*

At the MWSUG slides upload time this is still a work in progress.

Suggestions as to what might be done differently or additionally are welcome. Near-future requests for data and code are welcome. Email questions will be answered.

Questions DURING presentation are also welcome.

Purpose of this presentation

- ▶ **This project was inspired by an underinforming Tableau dashboard at LinkedIn Data Visualization Group**
- ▶ **It shows what insights can be provided with SAS® & ODS Graphics**
- ▶ **Using PROC SGMAP, PROC SGPLOT, ODS HTML5, ODS LAYOUT, ODS Excel, SAS macro language, and Base SAS software**
- ▶ **Version SAS 9.4M8**

Content

- ▶ **InfoGeographic Maps**
- ▶ **Bar Charts**
- ▶ **5 Column X 3 Row Panels of
Scatters Plots of Rates and Counts
versus fifteen data elements**
- ▶ **Linked-To Web-Page Large-Size
Versions of the Small Plots**
- ▶ **Linked To from Graphs:
Web Tables
Excel WorkSheets**

Data 2000 to 2003 for 236 Countries

Source: owid-covid-data.csv

**<https://covid.ourworldindata.org/>
on 5 January 2024**

Data 2000 to 2003 for 236 Countries

Data includes:

- ▶ Country Name, Continent**
- ▶ ISOALPHA3, ID (geographic keys)**
- ▶ Population**
- ▶ Total Cases & Total Deaths**
- ▶ Case Rate (Cases / Population)**
- ▶ Mortality Rate (Deaths / Cases)**
- ▶ Fifteen other data elements
listed on a later slide**

Country-Level Derived Data Stored

- ▶ **Percent of World Cases**
- ▶ **Percent of World Deaths**

RankInWorld for

- ▶ **Population**
- ▶ **Total Cases**
- ▶ **Total Deaths**
- ▶ **Case Rate**
- ▶ **Mortality Rate**

Country-Level Derived Data

RankInRegion / RankInContinent
For Regional / Continental Maps

- ▶ **Population**
- ▶ **Case Rate**
- ▶ **Mortality Rate**

To Be Added: Analogous Ranks for
Total Cases and Total Deaths

Data Source Includes Fifteen Data Elements By Country

**Do they have any effect
on Case Rate or Mortality Rate?
or Case Count or Mortality Count?**

The Number of Countries with Each Data Element Is:

236 Population

227 Life Expectancy

210 People Per Sq. Km.

202 Diabetes % of Aged 20 to 79

194 Median Age

192 Cardiac Deaths Per 1000

192 GDP (\$K) Per Capita

192 Pop. % Aged 70 or Older

188 Pop. % Aged 65 or Older

187 Human Development Index

170 Hospital Beds Per 1000 People

146 Females % Who Smoke

144 Males % Who Smoke

125 Pop. % in Extreme Poverty

94 Pop. % with On-Premises HandWashing

The COVID-19 Atlas contains:

World Maps

Continent Maps

Regional Maps

Basic Maps

- ▶ **Case Rate & Mortality Rate Maps are interlinked**
- ▶ **Population Map not linked to either of those**
- ▶ **All maps are web-enabled with data tips for all population, case, and mortality information and ranks.**

Basic Maps

► For non-vanishing inspection, each map links to a bar chart of its mapped data and its data tip data

Basic Maps

- ▶ All maps are color-coded to support five categories of the response variable
- ▶ A gradient legend and color-coding would be unsatisfactory—flagrantly underinforming

Map Color-Coding

All maps are distinct-color-coded for five categories of the response variable:

- Top N**
- Above Median**
- Median (two areas for any map with an even number of countries)**
- Below Median**
- Bottom N**

Positive ID for Top & Bottom N Countries

All maps have a footnote for:

- ▶ Top N in a rank-ordered wrapped list
of Rank : Country Name**
- ▶ Bottom N in a reverse-rank-ordered
wrapped list
of Rank : Country Name**

Other Countries

Any map can optionally include a footnote for all of the non-Top non-Bottom countries in a rank-ordered wrapped list of Rank : Country Name

Missing Data

► Any map with missing data for the response variable includes a last footnote with a list of such Countries

Map Usability Obstacle

- ▶ For maps, there can be countries that are too small to see their color-coding
- ▶ For those countries, data tips are inaccessible

Maps Made Usable

- ▶ **Any map can optionally be annotated with Rank Numbers for the Top N and Bottom N Countries**
- ▶ **Annotation is black numbers on white backfill—to assure that map area color coding fill does not impair readability**

Full Annotation Option

- ▶ Any map can optionally have ALL of its countries Rank-Annotated
- ▶ Complete annotation is most useful when the countries are neither too numerous, nor too close—so that the map does not suffer so much annotation overlapping that it impairs map usability

Picking a Value for N

**For Top N and Bottom N,
N is chosen as deemed appropriate.
Usually not greater than 20% of the
Count of Countries**

Making Discovery of Top & Bottom Countries Easy

- ▶ Just TELL Them
- ▶ For Every Map the Top N and Bottom N are listed in footnotes.
- ▶ Hunting by color code is not required

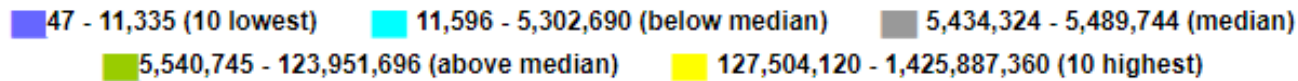
Top 3 CaseRate Countries (highest to lowest): 1:Israel | 2:Bahrain | 3:Lebanon
Bottom 3 CaseRate Countries (lowest to highest): 12:Yemen | 11:Syria | 10:Saudi Arabia

Countries with Missing Data for the Response are listed in a footnote

No CaseRate Data for: North Korea | Taiwan | Turkmenistan | Western Sahara

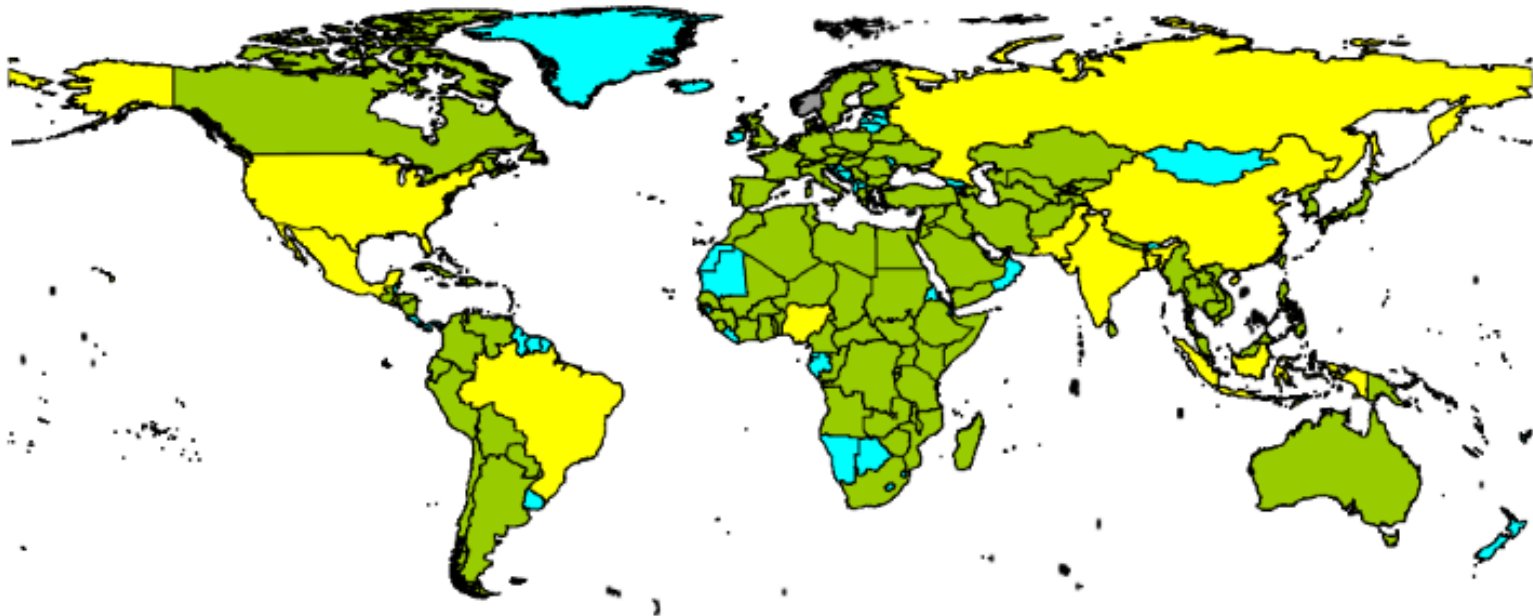
Basic Map

Population for 236 Countries in World



See MouseOver Text for Values and Ranks of 2023 Population and COVID-19 Data 2020 to 2023

[Go To Bar Chart](#)

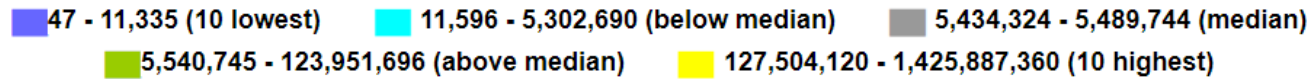


Top 10 Population Countries (highest to lowest): 1:China | 2:India | 3:United States of America | 4:Indonesia | 5:Pakistan | 6:Nigeria | 7:Brazil | 8:Bangladesh | 9:Russia | 10:Mexico

Bottom 10 Population Countries (lowest to highest): 236:Pitcairn | 235:Vatican City State | 234:Tokelau | 233:Niue | 232:Falkland Islands | 231:Montserrat | 230:Saint Helena, Ascension Island, & Tristan da Cunha | 229:Saint Pierre and Miquelon | 228:Saint Barthelemy | 227:Tuvvalu

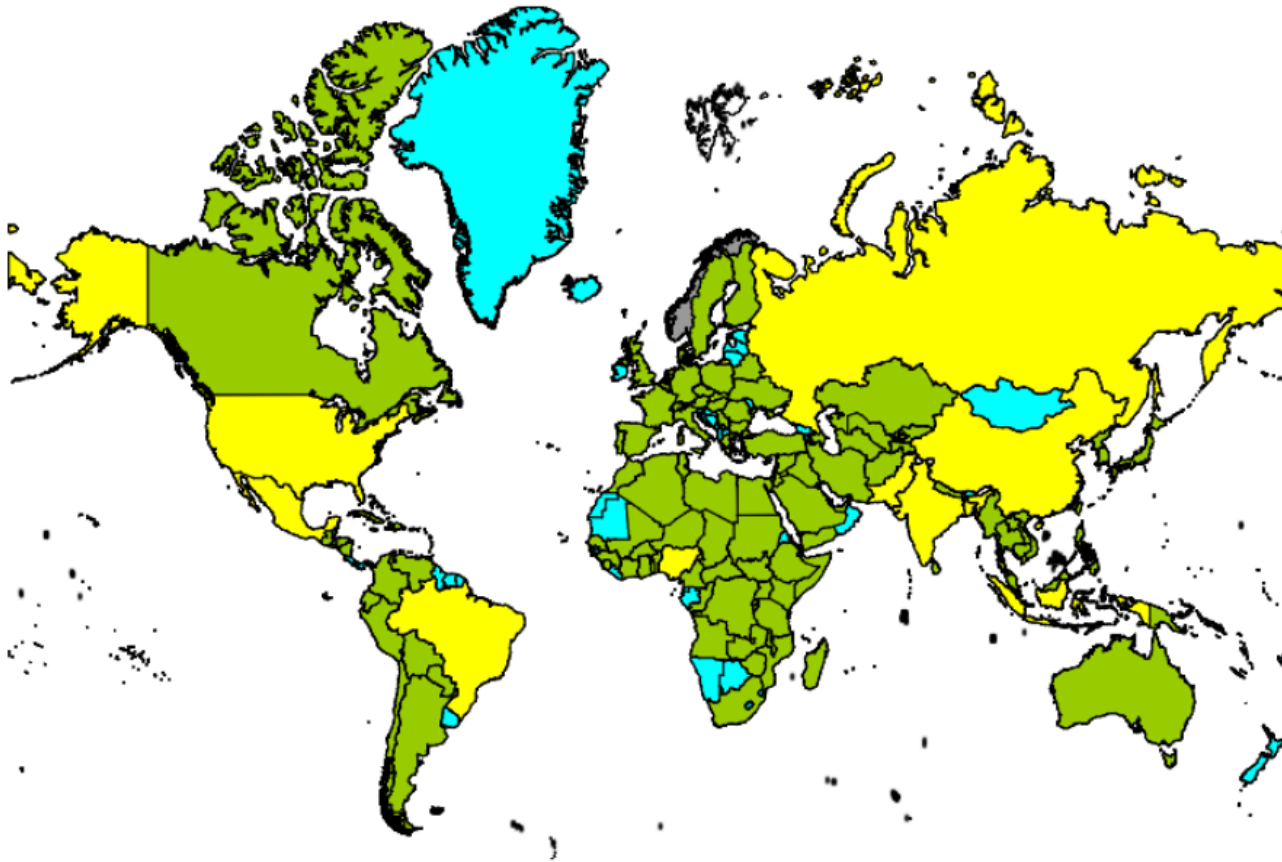
Mercator Projection

Population for 236 Countries in World



See MouseOver Text for Values and Ranks of 2023 Population and COVID-19 Data 2020 to 2023

[Go To Bar Chart](#)



Top 10 Population Countries (highest to lowest): 1:China | 2:India | 3:United States of America | 4:Indonesia | 5:Pakistan | 6:Nigeria | 7:Brazil | 8:Bangladesh | 9:Russia | 10:Mexico

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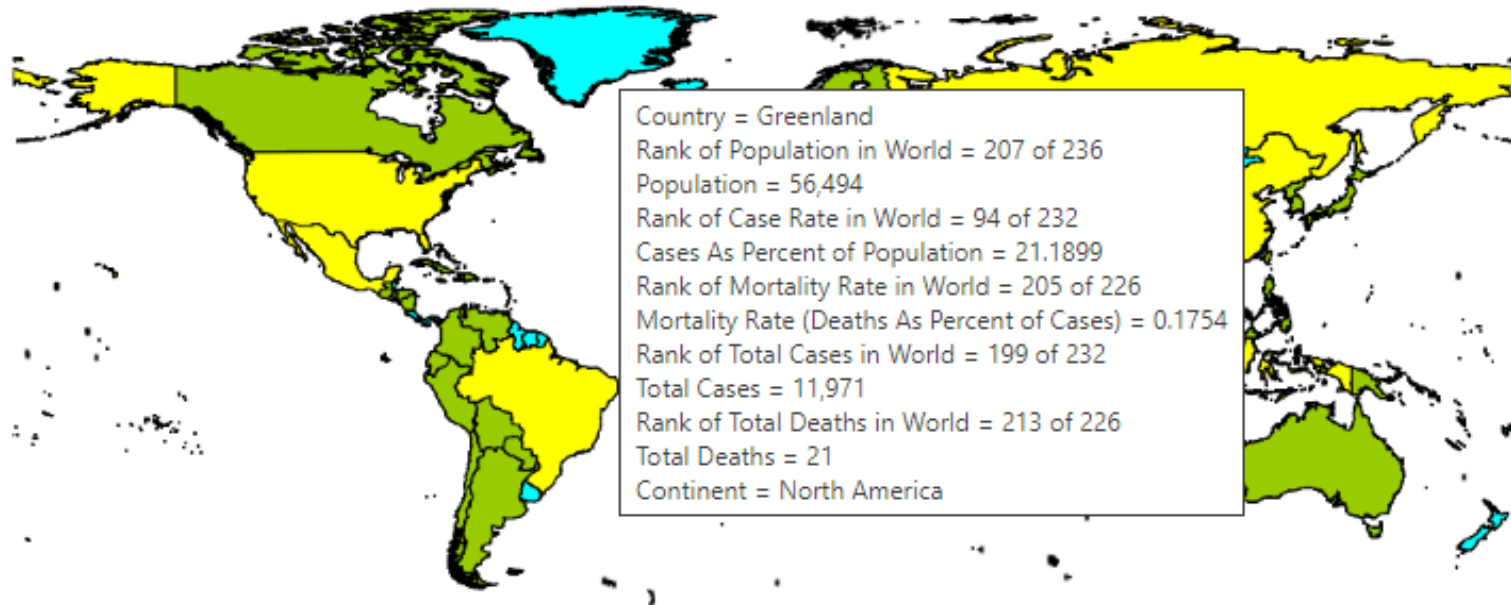
Mouse on Greenland

Population for 236 Countries in World

47 - 11,335 (10 lowest) 11,596 - 5,302,690 (below median) 5,434,324 - 5,489,744 (median)
5,540,745 - 123,951,696 (above median) 127,504,120 - 1,425,887,360 (10 highest)

See MouseOver Text for Values and Ranks of 2023 Population and COVID-19 Data 2020 to 2023

[Go To Bar Chart](#)



Top 10 Population Countries (highest to lowest): 1:China | 2:India | 3:United States of America | 4:Indonesia | 5:Pakistan | 6:Nigeria | 7:Brazil | 8:Bangladesh | 9:Russia | 10:Mexico

Bottom 10 Population Countries (lowest to highest): 236:Pitcairn | 235:Vatican City State | 234:Tokelau | 233:Niue | 232:Falkland Islands | 231:Montserrat | 230:Saint Helena, Ascension Island, & Tristan da Cunha | 229:Saint Pierre and Miquelon | 228:Saint Barthelemy | 227:Tuvatu

Making Top & Bottom 10 Findable

CaseRate for 232 Countries in World With Top and Bottom 10 Annotated

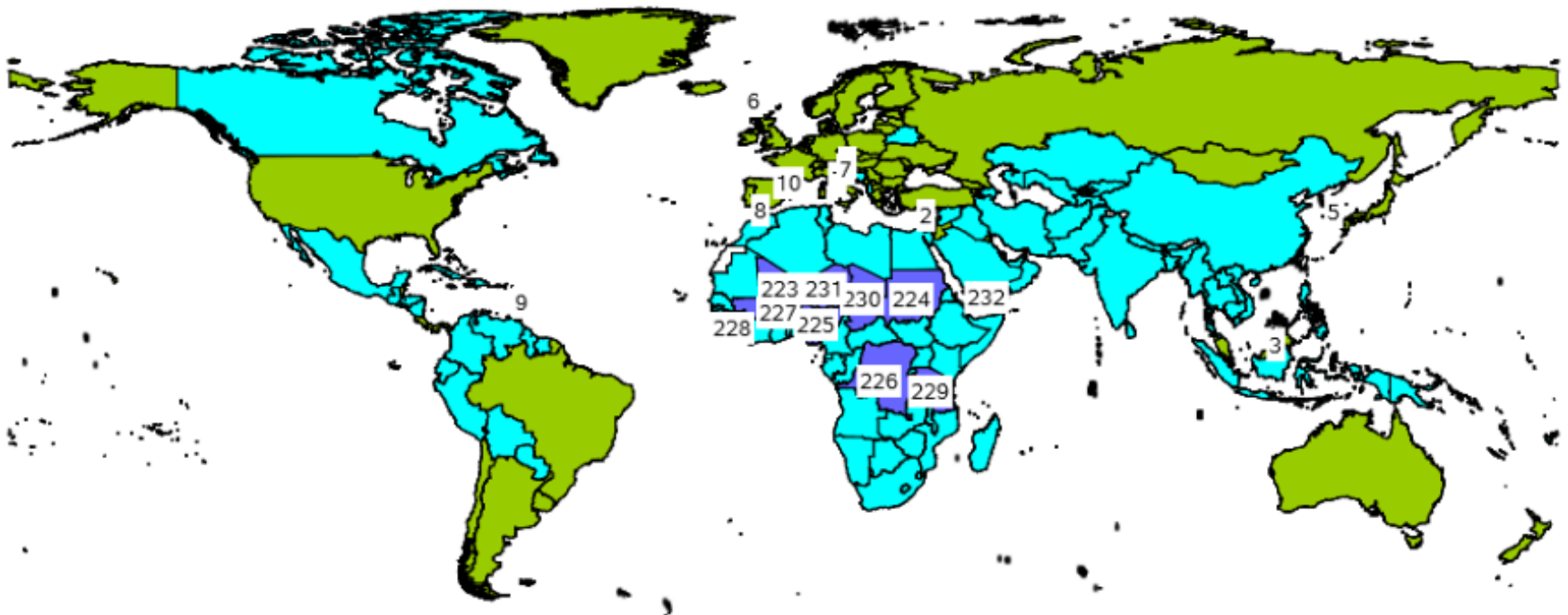
0.0354 - 0.1468 (10 lowest) 0.1526 - 13.3495 (below median) 13.3946 - 13.8567 (median)

13.9049 - 60.0686 (above median) 60.1368 - 75.0727 (10 highest) No Data

[See MouseOver Text for More Information](#)

[Go To Bar Chart](#)

[Go To Map of MortalityRate By Country](#)



Top 10 CaseRate Countries (highest to lowest): 1:San Marino | 2:Cyprus | 3:Brunei | 4:Austria | 5:South Korea | 6:Faroe Islands | 7:Slovenia | 8:Gibraltar | 9:Martinique | 10:Andorra

Bottom 10 CaseRate Countries (lowest to highest): 232:Yemen | 231:Niger | 230:Chad | 229:Tanzania | 228:Sierra Leone | 227:Burkina Faso | 226:Democratic Republic of the Congo | 225:Nigeria | 224:Sudan | 223:Mali

No CaseRate Data for: North Korea | Taiwan | Turkmenistan | Western Sahara

Adding the Other Countries List

MortalityRate for 21 Countries in Oceania With Top and Bottom 5 Annotated

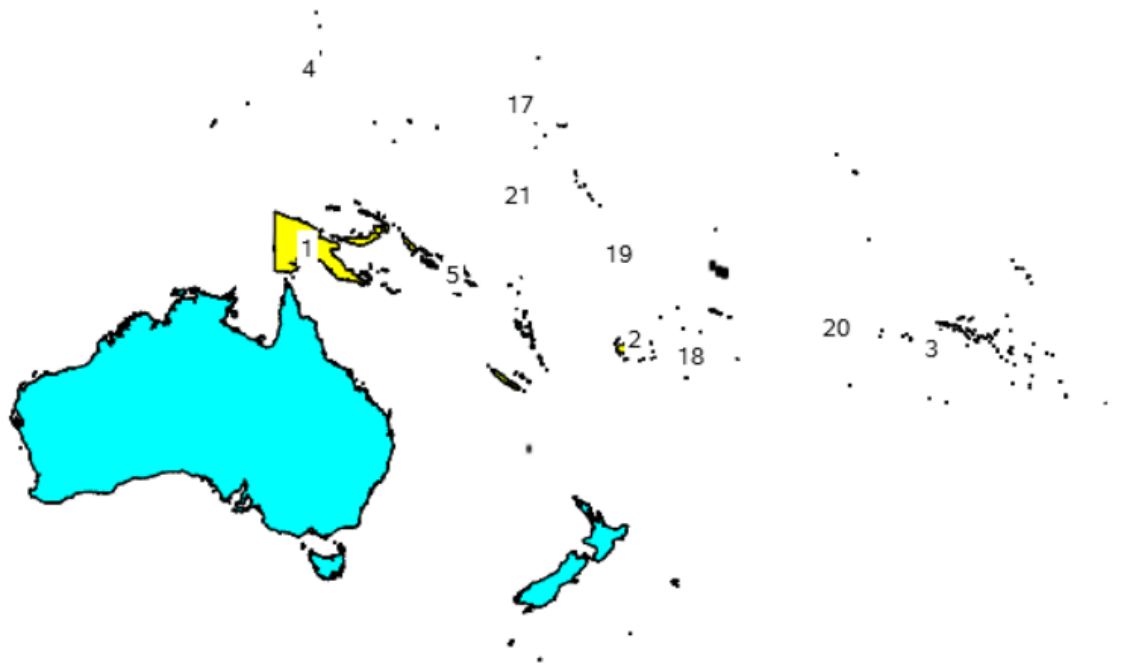
0.0185 - 0.1053 (5 lowest) 0.1165 - 0.2057 (below median) 0.2254 - 0.2254 (median)

0.2448 - 0.4720 (above median) 0.7667 - 1.4297 (5 highest) No Data

[See MouseOver Text for More Information](#)

[Go To Bar Chart](#)

[Go To Map of CaseRate By Country](#)



Top 5 MortalityRate Countries (highest to lowest): 1: Papua New Guinea | 2: Fiji | 3: French Polynesia | 4: Guam | 5: Solomon Islands

Other Countries (highest to lowest Rank): 6: Kiribati | 7: American Samoa | 8: New Caledonia | 9: Northern Mariana Islands | 10: Federated States of Micronesia | 11: Wallis and Futuna | 12: Australia | 13: Samoa | 14: New Zealand | 15: Palau | 16: Vanuatu

Bottom 5 MortalityRate Countries (lowest to highest): 21: Nauru | 20: Cook Islands | 19: Tuvalu | 18: Tonga | 17: Marshall Islands

No MortalityRate Data for: Niue | Pitcairn | Tokelau

See, also, Missing Data Countries

MortalityRate for 21 Countries in Oceania With Top and Bottom 5 Annotated

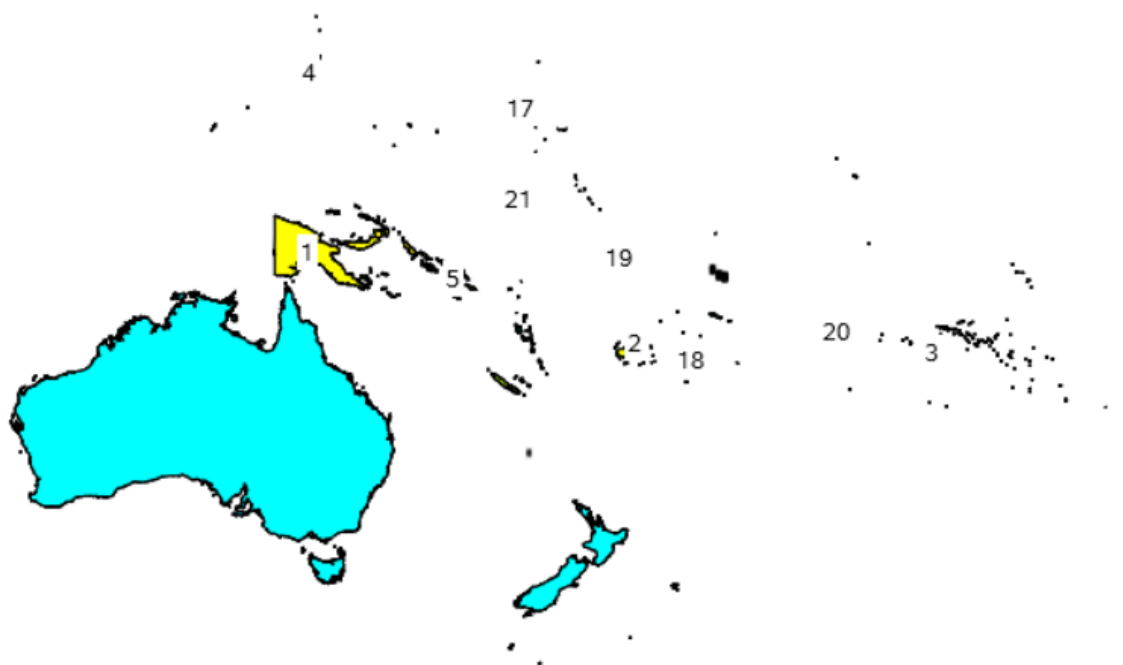
0.0185 - 0.1053 (5 lowest) 0.1165 - 0.2057 (below median) 0.2254 - 0.2254 (median)

0.2448 - 0.4720 (above median) 0.7667 - 1.4297 (5 highest) No Data

[See MouseOver Text for More Information](#)

[Go To Bar Chart](#)

[Go To Map of CaseRate By Country](#)



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Bottom 5 MortalityRate Countries (lowest to highest): 21: Nauru | 20: Cook Islands | 19: Tuvalu | 18: Tonga | 17: Marshall Islands

No MortalityRate Data for: Niue | Pitcairn | Tokelau

Full Annotation Makes All Oceania Identifiable

CaseRate for 24 Countries in Oceania With All Annotated By Rank Of CaseRate

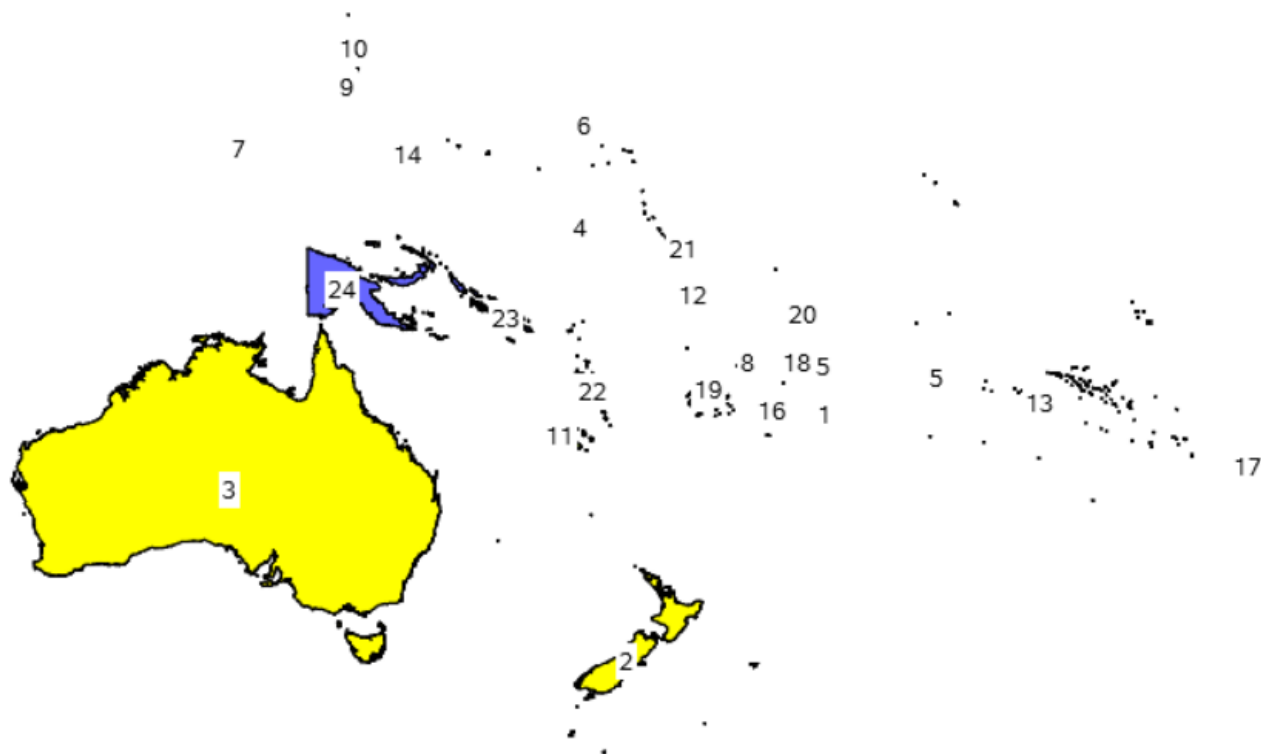
0.4621 - 4.2261 (5 lowest) 7.4263 - 23.2505 (below median) 25.8665 - 25.9638 (median)

27.6122 - 38.7998 (above median) 42.2910 - 48.0020 (5 highest)

[See MouseOver Text for More Information](#)

[Go To Bar Chart](#)

[Go To Map of MortalityRate By Country](#)



Top 5 CaseRate Countries (highest to lowest): 1:Niue | 2:New Zealand | 3:Australia | 4:Nauru | 5:Cook Islands

Other Countries (highest to lowest Rank): 6:Marshall Islands | 7:Palau | 8:Wallis and Futuna | 9:Guam | 10:Northern Mariana Islands | 11:New Caledonia | 12:Tuvalu | 13:French Polynesia | 14:Federated States of Micronesia | 15:American Samoa | 16:Tonga | 17:Pitcairn | 18:Samoa | 19:Fiji

Bottom 5 CaseRate Countries (lowest to highest): 24:Papua New Guinea | 23:Solomon Islands | 22:Vanuatu | 21:Kiribati | 20:Tokelau

Mouse on Least Populous Country

CaseRate for 24 Countries in Oceania With All Annotated By Rank Of CaseRate

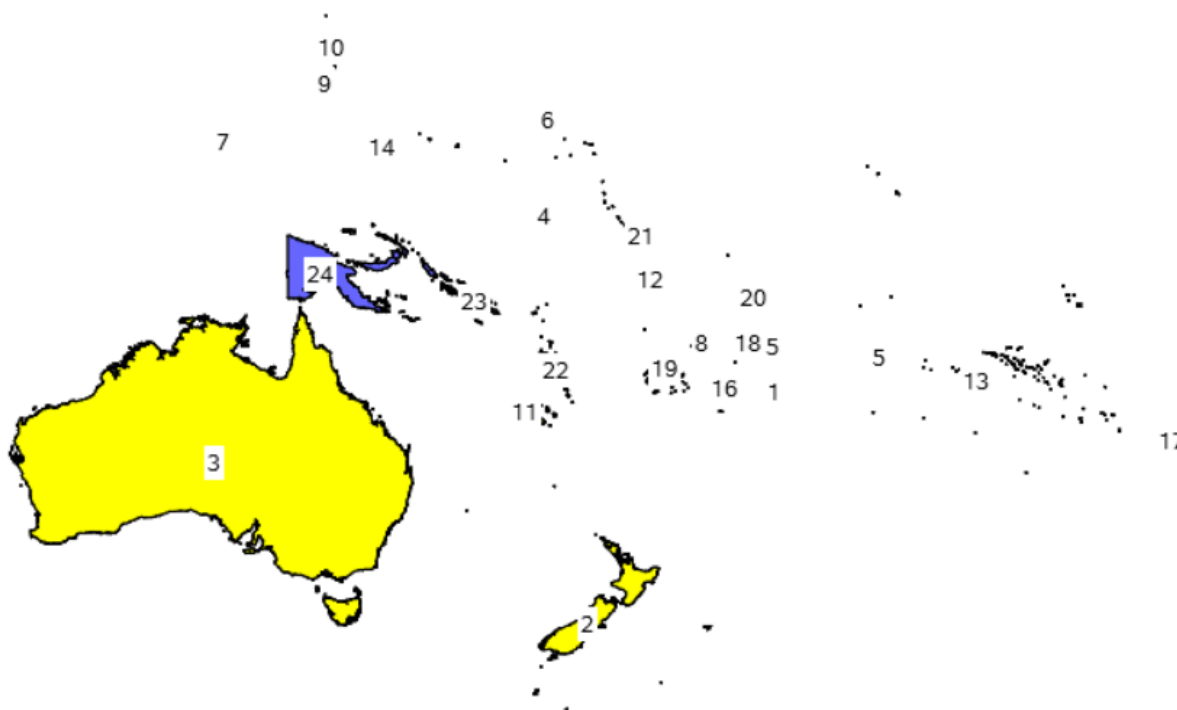
0.4621 - 4.2261 (5 lowest)
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27.6122 - 38.7998 (above median)
42.2910 - 48.0020 (5 highest)

[See MouseOver Text for More Information](#)

[Go To Bar Chart](#)

[Go To Map of MortalityRate By Country](#)



Country = Pitcairn
 Rank of CaseRate in Continent = 17 of 24
 Rank of Population in World = 236 of 236
 Population = 47
 Rank of Case Rate in World = 141 of 232
 Cases As Percent of Population = 8.5106
 Rank of Mortality Rate in World =
 Mortality Rate (Deaths As Percent of Cases) =
 Rank of Total Cases in World = 232 of 232
 Total Cases = 4
 Rank of Total Deaths in World =
 Total Deaths =
 Continent = Oceania

Top 5 CaseRate Countries (highest to lowest): 1:Niue | 2:New Zealand | 3:Australia | 4:Nauru | 5:Cook Islands

Other Countries (highest to lowest Rank): 6:Marshall Islands | 7:Palau | 8:Wallis and Futuna | 9:Guam | 10:Mariana Islands | 11:New Caledonia | 12:Tuvulu | 13:French Polynesia | 14:Federated States of Micronesia

























Samoa | 16:Tonga | 17:Pitcairn | 18:Samoa | 19:Fiji

Bottom 5 CaseRate Countries (lowest to highest): 24: Papua New Guinea | 23: Solomon Islands | 22: Vanuatu | 21: Kiribati | 20: Tokelau

After Clicking on “Go To Bar Chart”

24 Countries in Oceania

[Go Back To The Map](#)

	Rank	Population	Total Cases	Total Deaths	MortalityRate	CaseRate	
Niue	1	1,952	937	.	.	48.0020	
New Zealand	2	5,185,289	2,440,375	3,623	0.1485	47.0634	
Australia	3	26,177,410	11,710,216	24,087	0.2057	44.7341	
Nauru	4	12,691	5,393	1	0.0185	42.4947	
Cook Islands	5	17,032	7,203	2	0.0278	42.2910	
Marshall Islands	6	41,593	16,138	17	0.1053	38.7998	
Palau	7	18,084	6,265	9	0.1437	34.6439	
Wallis and Futuna	8	11,596	3,550	8	0.2254	30.6140	
Guam	9	171,783	52,272	419	0.8016	30.4291	
Northern Mariana Islands	10	49,574	14,337	41	0.2860	28.9204	
New Caledonia	11	289,959	80,064	314	0.3922	27.6122	
Tuvalu	12	11,335	2,943	1	0.0340	25.9638	
French Polynesia	13	306,292	79,227	649	0.8192	25.8665	
Federated States of Micronesia	14	114,178	26,547	65	0.2448	23.2505	
American Samoa	15	44,295	8,359	34	0.4067	18.8712	
Tonga	16	106,867	16,888	12	0.0711	15.8028	
Pitcairn	17	47	4	.	.	8.5106	
Samoa	18	222,390	16,780	31	0.1847	7.5453	
Fiji	19	929,769	69,047	885	1.2817	7.4263	
Tokelau	20	1,893	80	.	.	4.2261	
Kiribati	21	131,237	5,085	24	0.4720	3.8747	
Vanuatu	22	326,744	12,019	14	0.1165	3.6784	
Solomon Islands	23	724,272	25,954	199	0.7667	3.5835	
Papua New Guinea	24	10,142,625	46,864	670	1.4297	0.4621	

Touring Case Rate Around the World

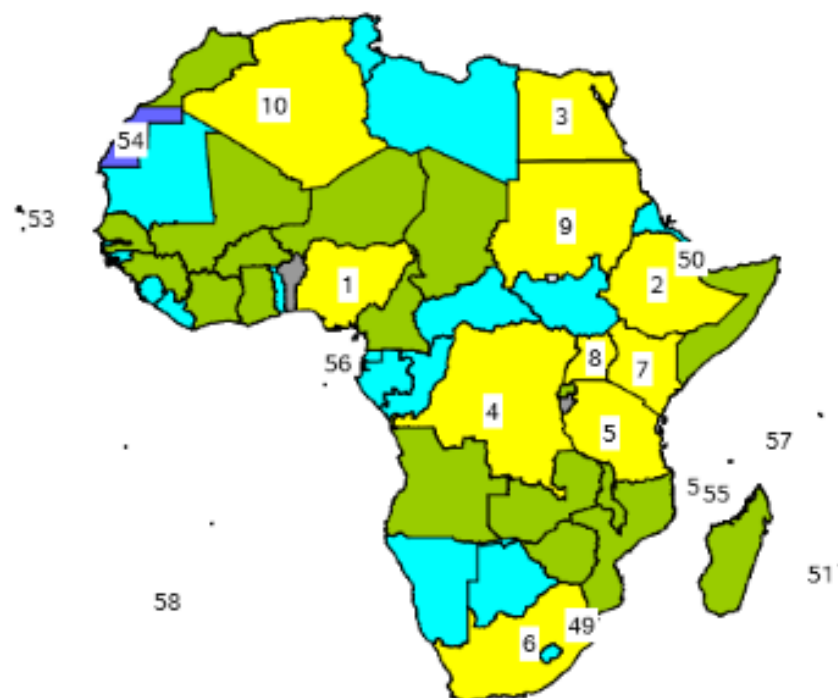
**All Countries in Map Are Annotated
If Label Collisions Are Few Enough**

Population for 58 Countries in Africa With Top and Bottom 10 Annotated

5,401 - 1,201,680 (10 lowest)
1,299,478 - 12,356,116 (below median)
12,889,583 - 13,352,864 (median)
13,776,702 - 37,457,976 (above median)
44,903,228 - 218,541,216 (10 highest)

See MouseOver Text for Values and Ranks of 2023 Population and COVID-19 Data 2020 to 2023

[Go To Bar Chart](#)



Top 10 Population Countries (highest to lowest): 1:Nigeria | 2:Ethiopia | 3:Egypt | 4:Democratic Republic of the Congo | 5:Tanzania | 6:South Africa | 7:Kenya | 8:Uganda | 9:Sudan | 10:Algeria

Other Countries (highest to lowest Rank): 11:Morocco | 12:Angola | 13:Ghana | 14:Mozambique | 15:Madagascar | 16:Cote d'Ivoire | 17:Cameroon | 18:Niger | 19:Burkina Faso | 20:Mali | 21:Malawi | 22:Zambia | 23:Chad | 24:Somalia | 25:Senegal | 26:Zimbabwe | 27:Guinea | 28:Rwanda | 29:Benin | 30:Burundi | 31:Tunisia | 32:South Sudan | 33:Togo | 34:Sierra Leone | 35:Libya | 36:Congo | 37:Central African Republic | 38:Liberia | 39:Mauritania | 40:Eritrea | 41:Gambia | 42:Botswana | 43:Namibia | 44:Gabon | 45:Lesotho | 46:Guinea-Bissau | 47:Equatorial Guinea | 48:Mauritius

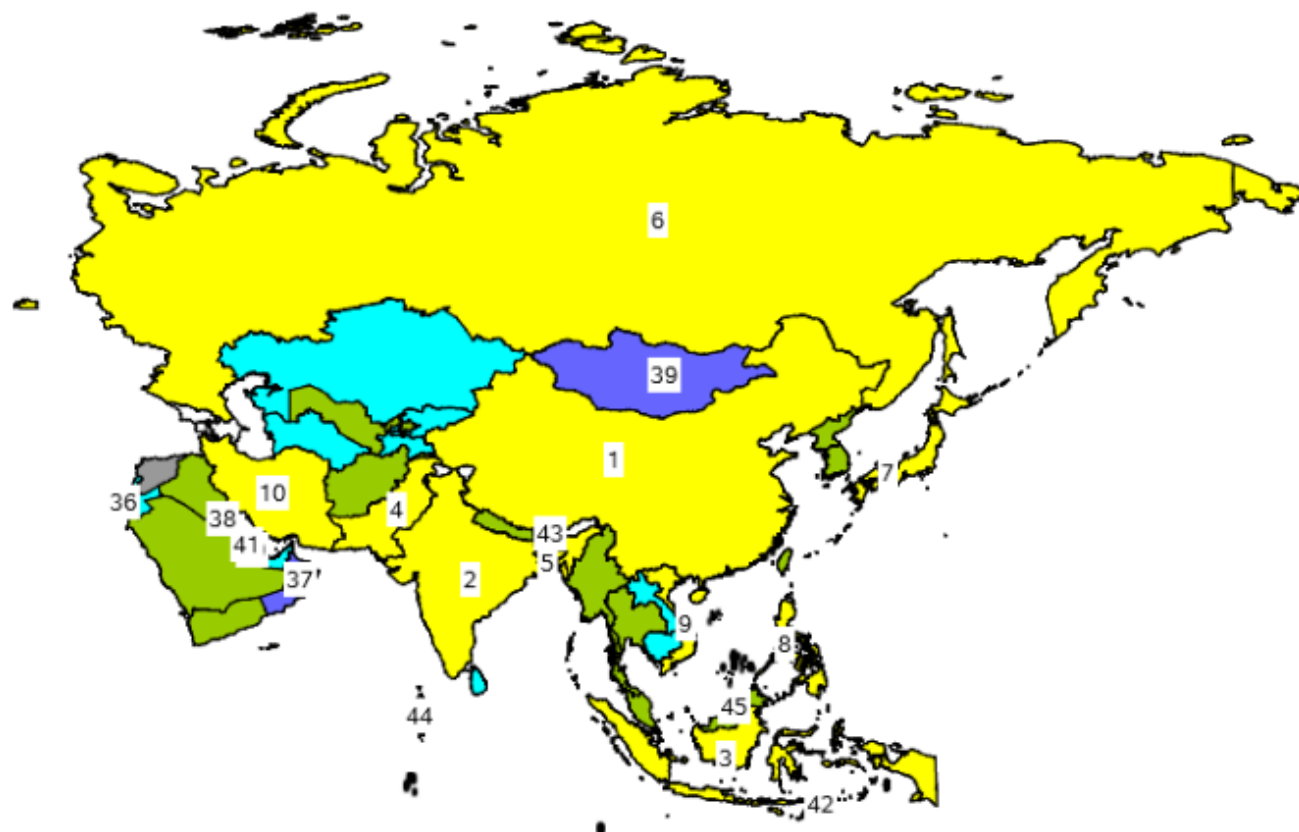
Bottom 10 Population Countries (lowest to highest): 58:Saint Helena, Ascension Island, & Tristan da Cunha | 57:Seychelles | 56:Sao Tome and Principe | 55:Mayotte | 54:Western Sahara | 53:Cape Verde | 52:Comoros | 51:Reunion | 50:Djibouti | 49:Eswatini

Population for 45 Countries in Asia With Top and Bottom 10 Annotated

449,002 - 5,250,076 (10 lowest)
5,489,744 - 21,832,150 (below median)
22,125,242 - 22,125,242 (median)
23,893,396 - 71,697,024 (above median)
88,550,568 - 1,425,887,360 (10 highest)

See MouseOver Text for Values and Ranks of 2023 Population and COVID-19 Data 2020 to 2023

[Go To Bar Chart](#)



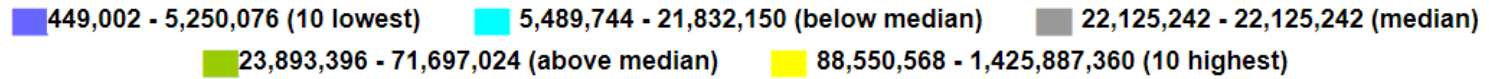
Top 10 Population Countries (highest to lowest): 1:China | 2:India | 3:Indonesia | 4:Pakistan | 5:Bangladesh | 6:Russia | 7:Japan | 8:Philippines | 9:Viet Nam | 10:Iran

Other Countries (highest to lowest Rank): 11:Thailand | 12:Myanmar | 13:South Korea | 14:Iraq | 15:Afghanistan | 16:Saudi Arabia | 17:Uzbekistan | 18:Malaysia | 19:Yemen | 20:Nepal | 21:North Korea | 22:Taiwan | 23:Syria | 24:Sri Lanka | 25:Kazakhstan | 26:Cambodia | 27:Jordan | 28:Tajikistan | 29:Israel | 30:United Arab Emirates | 31:Laos | 32:Kyrgyzstan | 33:Turkmenistan | 34:Singapore | 35:Lebanon

Bottom 10 Population Countries (lowest to highest): 45:Brunei | 44:Maldives | 43:Bhutan | 42:Timor-Leste | 41:Bahrain | 40:Qatar | 39:Mongolia | 38:Kuwait | 37:Oman | 36:Palestine

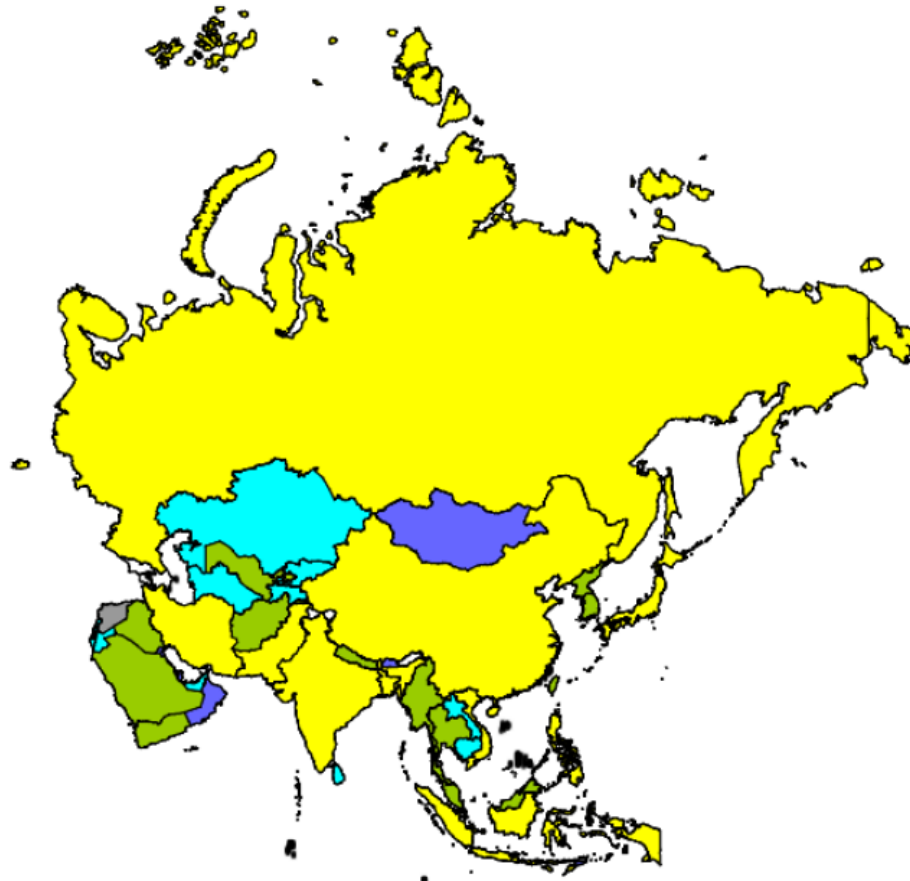
Asia Using Mercator Projection – No Annotation

Population for 45 Countries in Asia



See MouseOver Text for Values and Ranks of 2023 Population and COVID-19 Data 2020 to 2023

[Go To Bar Chart](#)



Top 10 Population Countries (highest to lowest): 1:China | 2:India | 3:Indonesia | 4:Pakistan | 5:Bangladesh | 6:Russia | 7:Japan | 8:Philippines | 9:Viet Nam | 10:Iran

Bottom 10 Population Countries (lowest to highest): 45:Brunei | 44:Maldives | 43:Bhutan | 42:Timor-Leste | 41:Bahrain | 40:Qatar | 39:Mongolia | 38:Kuwait | 37:Oman | 36:Palestine

CaseRate for 27 Countries in Caribbean Islands But Bermuda Omitted With All Annotated By

Rank Of CaseRate

0.2979 - 9.3056 (5 lowest)

9.7108 - 22.0429 (below median)

23.5925 - 23.5925 (median)

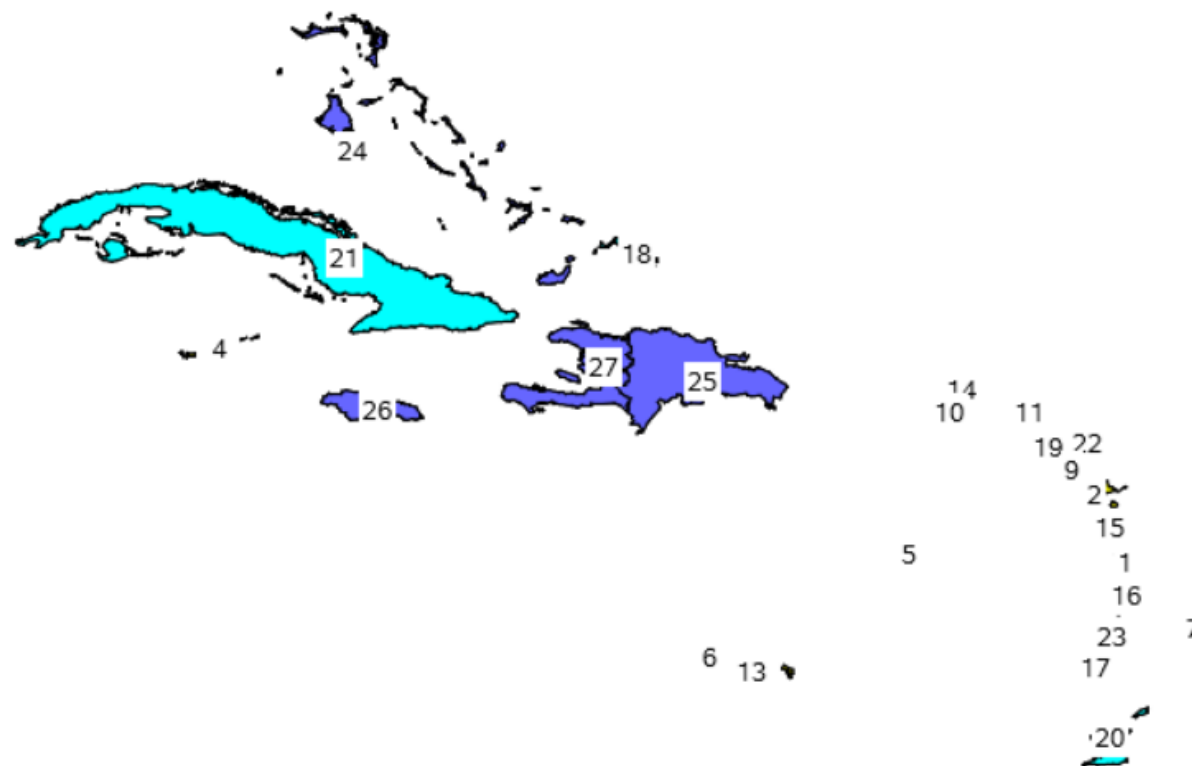
24.0008 - 41.5409 (above median)

44.0707 - 62.6793 (5 highest)

[See MouseOver Text for More Information](#)

[Go To Bar Chart](#)

[Go To Map of MortalityRate By Country](#)



Top 5 CaseRate Countries (highest to lowest): 1:Martinique | 2:Guadeloupe | 3:Saint Barthelemy | 4:Cayman Islands | 5:Bonaire, Sint Eustatius, and Saba

Other Countries (highest to lowest Rank): 6:Aruba | 7:Barbados | 8:Saint Martin | 9:Montserrat | 10:United States Virgin Islands | 11:Sint Maarten | 12:Anguilla | 13:Curacao | 14:British Virgin Islands | 15:Dominica | 16:Saint Lucia | 17:Grenada | 18:Turks and Caicos Islands | 19:Saint Kitts and Nevis | 20:Trinidad and Tobago | 21:Cuba | 22:Antigua and Barbuda

Bottom 5 CaseRate Countries (lowest to highest): 27:Haiti | 26:Jamaica | 25:Dominican Republic | 24:Bahamas | 23:Saint Vincent and the Grenadines

CaseRate for 6 Countries in Central Asia With All Annotated By Rank Of CaseRate

0.1787 - 0.1787 (1 lowest)

0.5056 - 0.5056 (below median)

0.5599 - 1.3413 (median)

7.7475 - 7.7475 (above median)

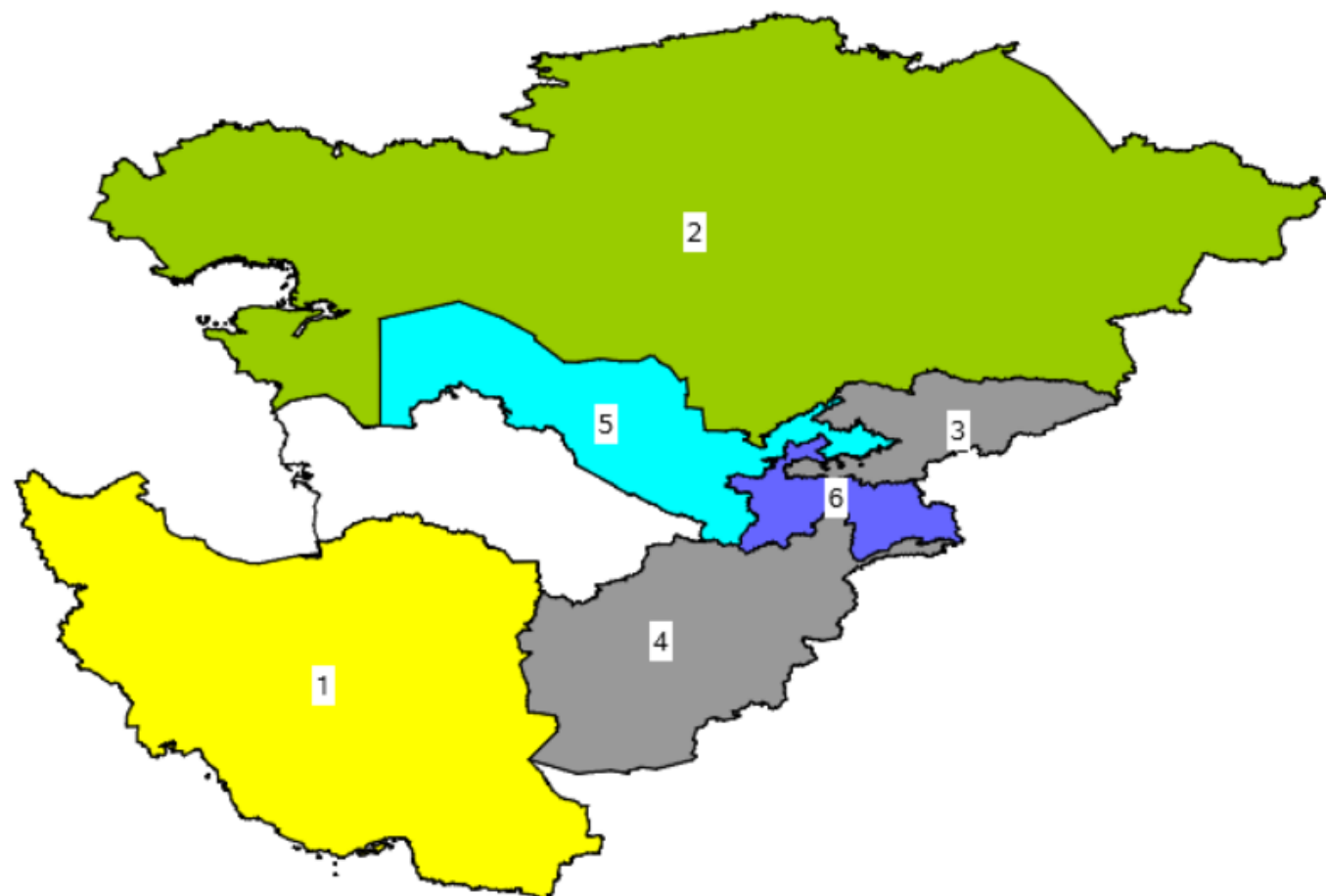
8.6114 - 8.6114 (1 highest)

No Data

[See MouseOver Text for More Information](#)

[Go To Bar Chart](#)

[Go To Map of MortalityRate By Country.](#)



Top 1 CaseRate Countries (highest to lowest): 1:Iran

Other Countries (highest to lowest Rank): 2:Kazakhstan | 3:Kyrgyzstan | 4:Afghanistan | 5:Uzbekistan

Bottom 1 CaseRate Countries (lowest to highest): 6:Tajikistan

No CaseRate Data for: Turkmenistan

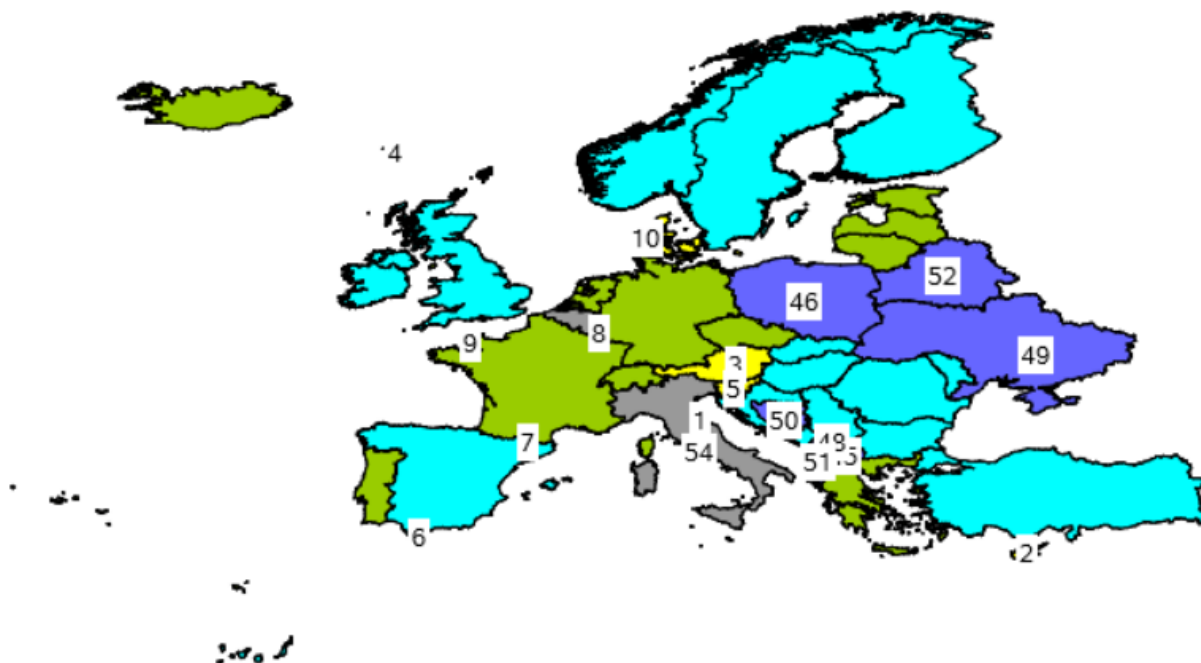
CaseRate for 54 Countries in Europe Omitting Svalbard And Van Mayen With Top and Bottom 10 Annotated

3.2178 - 16.7270 (10 lowest)
 17.8412 - 40.0713 (below median)
 41.5405 - 44.9167 (median)
 44.9618 - 57.5074 (above median)
 58.2498 - 75.0727 (10 highest)

[See MouseOver Text for More Information](#)

[Go To Bar Chart](#)

[Go To Map of MortalityRate By Country](#)



Top 10 CaseRate Countries (highest to lowest): 1:San Marino | 2:Cyprus | 3:Austria | 4:Faroe Islands | 5:Slovenia | 6:Gibraltar | 7:Andorra | 8:Luxembourg | 9:Jersey | 10:Denmark

Other Countries (highest to lowest Rank): 11:France | 12:Iceland | 13:Guernsey | 14:Portugal | 15:Liechtenstein | 16:Greece | 17:Latvia | 18:Switzerland | 19:Georgia | 20:Lithuania | 21:Netherlands | 22:Monaco | 23:Germany | 24:Estonia | 25:Czechia | 26:Isle of Man | 27:Italy | 28:Belgium | 29:Montenegro | 30:Serbia | 31:United Kingdom | 32:Ireland | 33:Slovakia | 34:Croatia | 35:Spain | 36:Norway | 37:Finland | 38:Sweden | 39:Malta | 40:Hungary | 41:Turkey | 42:Bulgaria | 43:Moldova | 44:Romania

Bottom 10 CaseRate Countries (lowest to highest): 54:Vatican City State | 53:Azerbaijan | 52:Belarus | 51:Albania | 50:Bosnia and Herzegovina | 49:Ukraine | 48:Kosovo | 47:Armenia | 46:Poland | 45:North Macedonia

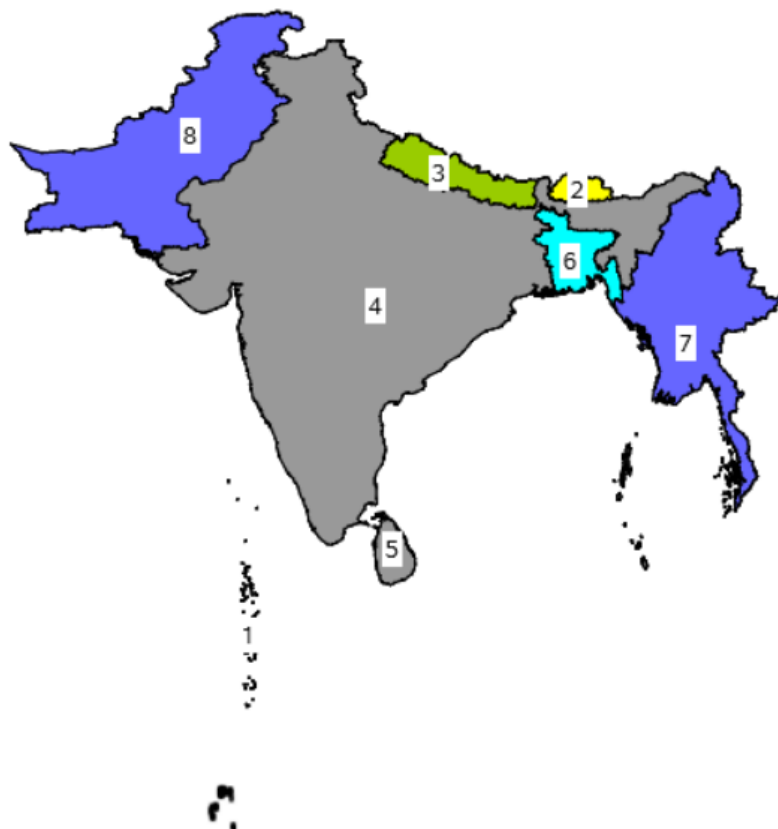
CaseRate for 8 Countries in Indian SubContinent of Asia With All Annotated By Rank Of CaseRate

0.6703 - 1.1839 (2 lowest) 1.1953 - 1.1953 (below median) 3.0812 - 3.1761 (median)
3.2849 - 3.2849 (above median) 8.0128 - 35.6424 (2 highest)

[See MouseOver Text for More Information](#)

[Go To Bar Chart](#)

[Go To Map of MortalityRate By Country](#)



Top 2 CaseRate Countries (highest to lowest): 1:Maldives | 2:Bhutan

Other Countries (highest to lowest Rank): 3:Nepal | 4:India | 5:Sri Lanka | 6:Bangladesh

Bottom 2 CaseRate Countries (lowest to highest): 8:Pakistan | 7:Myanmar

CaseRate for 7 Countries in Mainland Central America But Mexico Omitted With All Annotated By Rank Of CaseRate

0.2315 - 3.1853 (2 lowest) 4.5313 - 4.5313 (below median) 7.0069 - 7.0069 (median)
17.6106 - 17.6106 (above median) 23.6340 - 23.7539 (2 highest)

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Top 2 CaseRate Countries (highest to lowest): 1:Costa Rica | 2:Panama

Other Countries (highest to lowest Rank): 3:Belize | 4:Guatemala | 5:Honduras

Bottom 2 CaseRate Countries (lowest to highest): 7:Nicaragua | 6:El Salvador

CaseRate for 12 Countries in Middle East With All Annotated By Rank Of CaseRate

0.0354 - 2.3112 (3 lowest)

5.5410 - 8.7286 (below median)

11.3019 - 15.4795 (median)

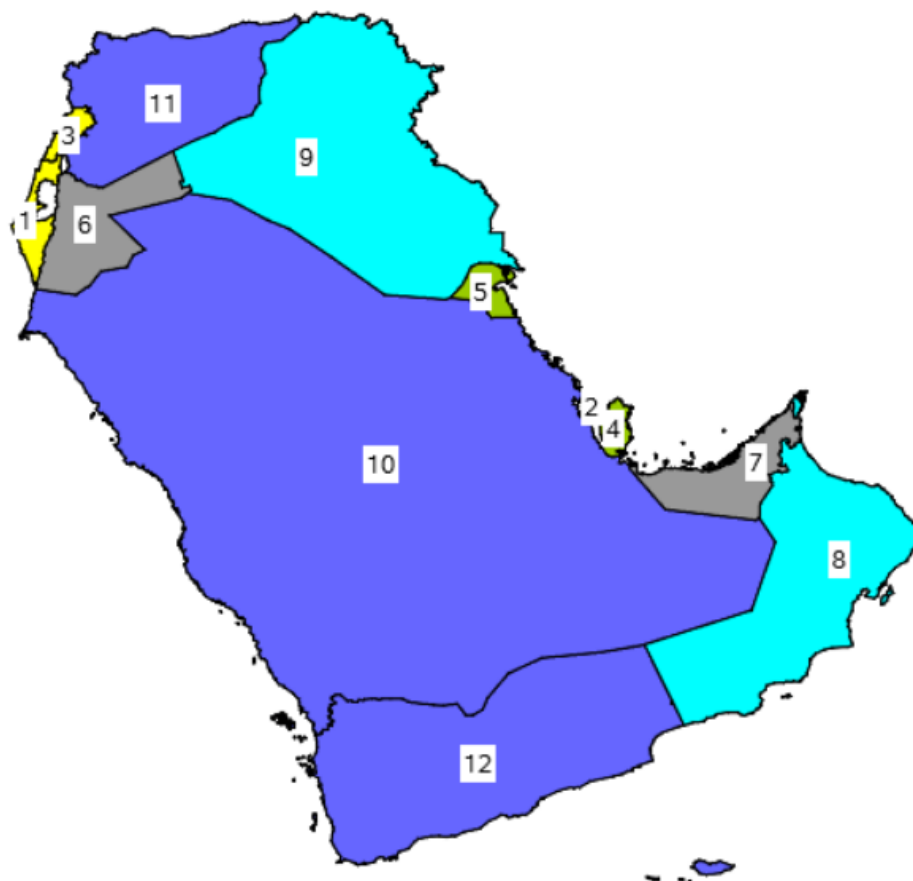
15.6150 - 19.0909 (above median)

22.5858 - 51.2388 (3 highest)

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Top 3 CaseRate Countries (highest to lowest): 1:Israel | 2:Bahrain | 3:Lebanon

Other Countries (highest to lowest Rank): 4:Qatar | 5:Kuwait | 6:Jordan | 7:United Arab Emirates | 8:Oman | 9:Iraq

Bottom 3 CaseRate Countries (lowest to highest): 12:Yemen | 11:Syria | 10:Saudi Arabia

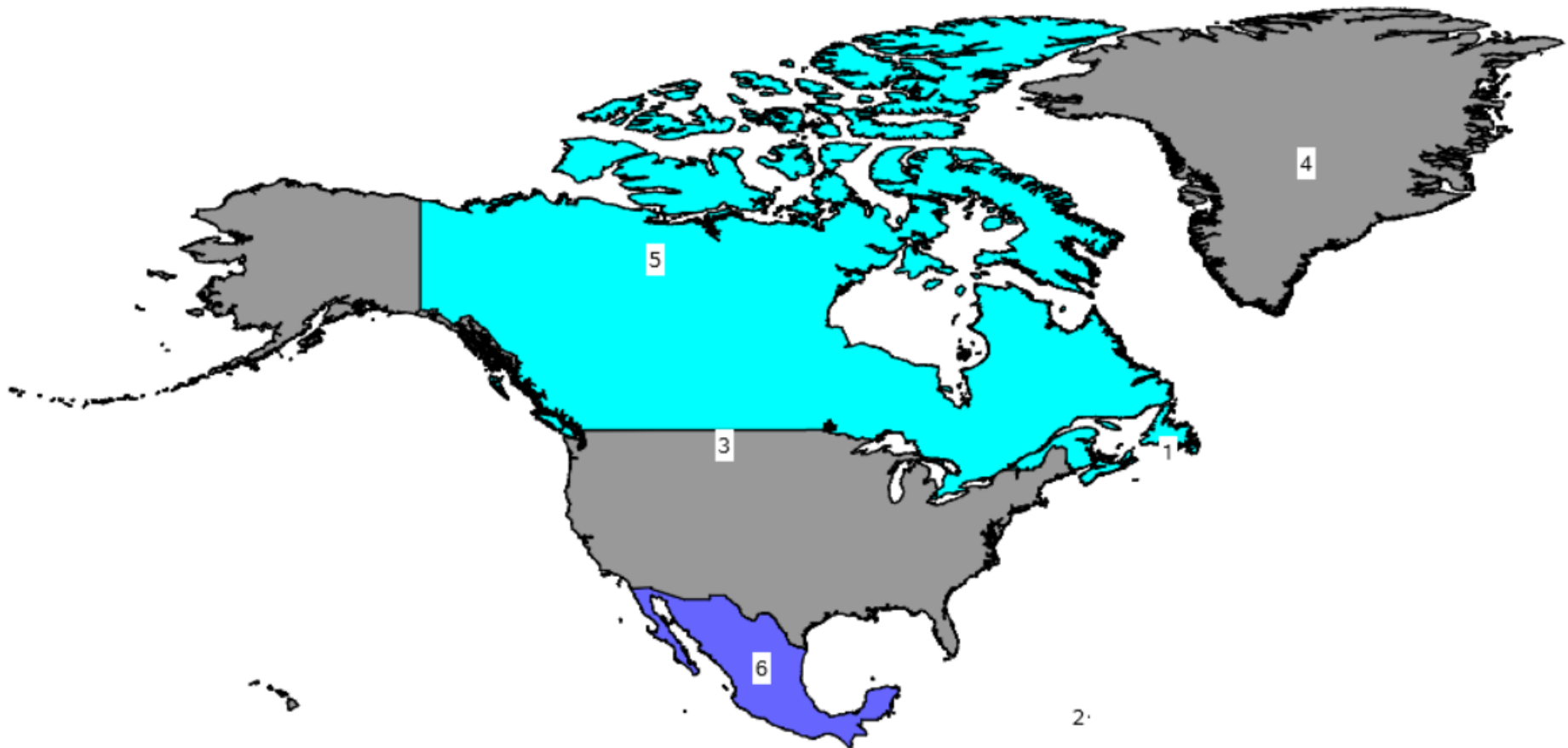
CaseRate for 6 Countries in NorthAmerica With All Annotated By Rank Of CaseRate

6.0412 - 6.0412 (1 lowest) 12.3543 - 12.3543 (below median) 21.1899 - 30.5764 (median)
38.5164 - 38.5164 (above median) 58.2158 - 58.2158 (1 highest)

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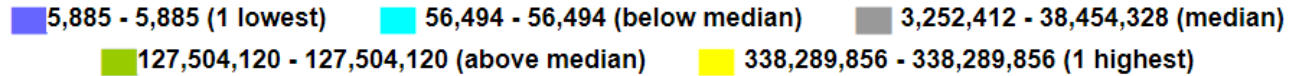
Top 1 CaseRate Countries (highest to lowest): 1:Saint Pierre and Miquelon

Other Countries (highest to lowest Rank): 2:Puerto Rico | 3:United States of America | 4:Greenland | 5:Canada

Bottom 1 CaseRate Countries (lowest to highest): 6:Mexico

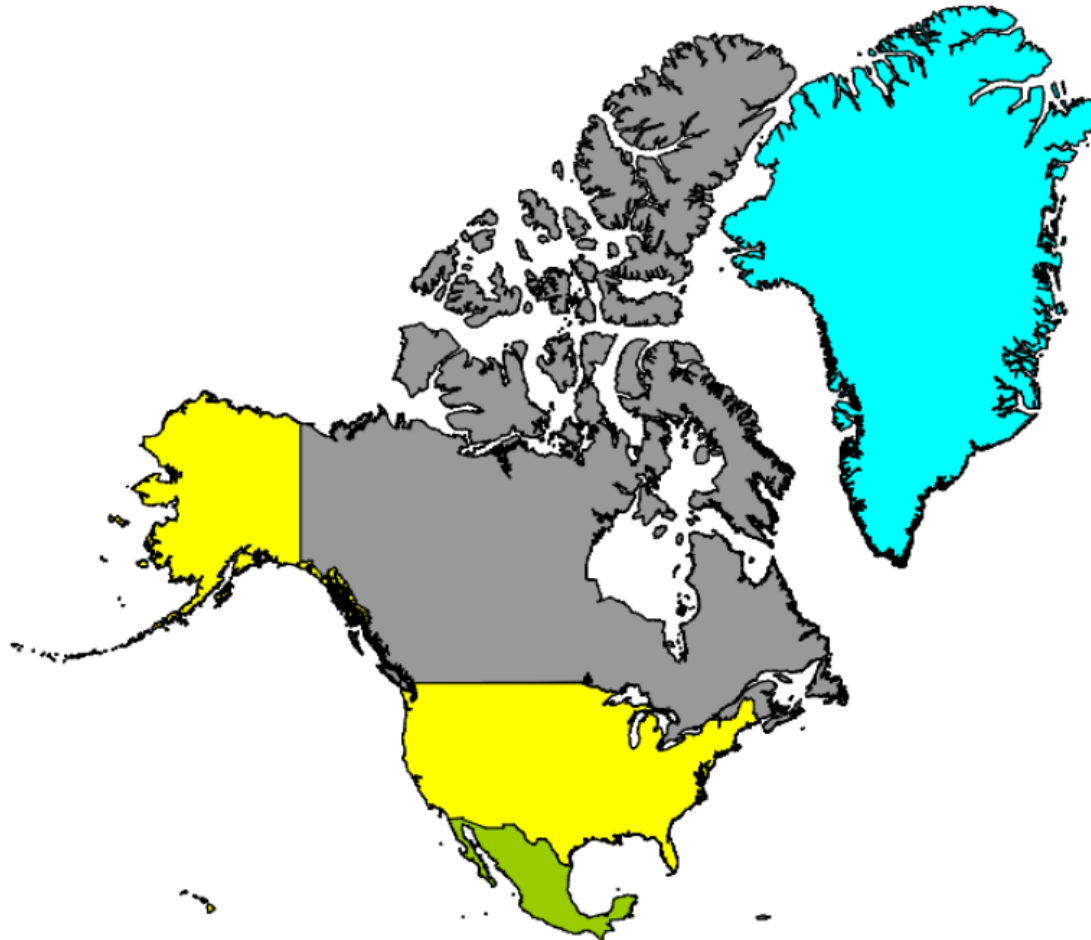
Mercator Projection – Population, No Annotation

Population for 6 Countries in NorthAmerica



See MouseOver Text for Values and Ranks of 2023 Population and COVID-19 Data 2020 to 2023

[Go To Bar Chart](#)



Top 1 Population Countries (highest to lowest): 1:United States of America
Bottom 1 Population Countries (lowest to highest): 6:Saint Pierre and Miquelon

CaseRate for 5 Countries in NorthAsiaAndEastAsia With All Annotated By Rank Of CaseRate

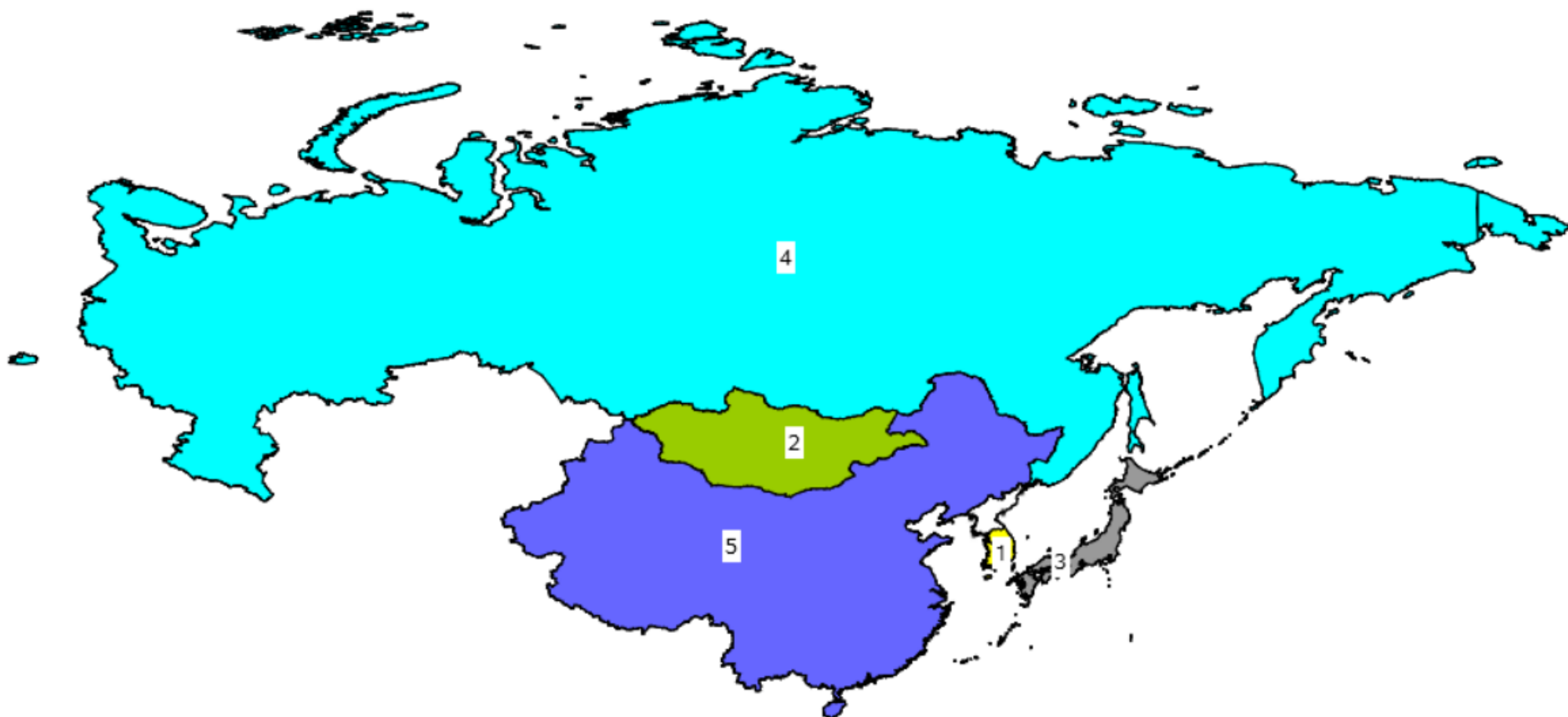
6.9657 - 6.9657 (1 lowest) 16.3141 - 16.3141 (below median) 27.2716 - 27.2716 (median)

29.7619 - 29.7619 (above median) 66.7207 - 66.7207 (1 highest) No Data

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Top 1 CaseRate Countries (highest to lowest): 1:South Korea

Other Countries (highest to lowest Rank): 2:Mongolia | 3:Japan | 4:Russia

Bottom 1 CaseRate Countries (lowest to highest): 5:China

No CaseRate Data for: North Korea

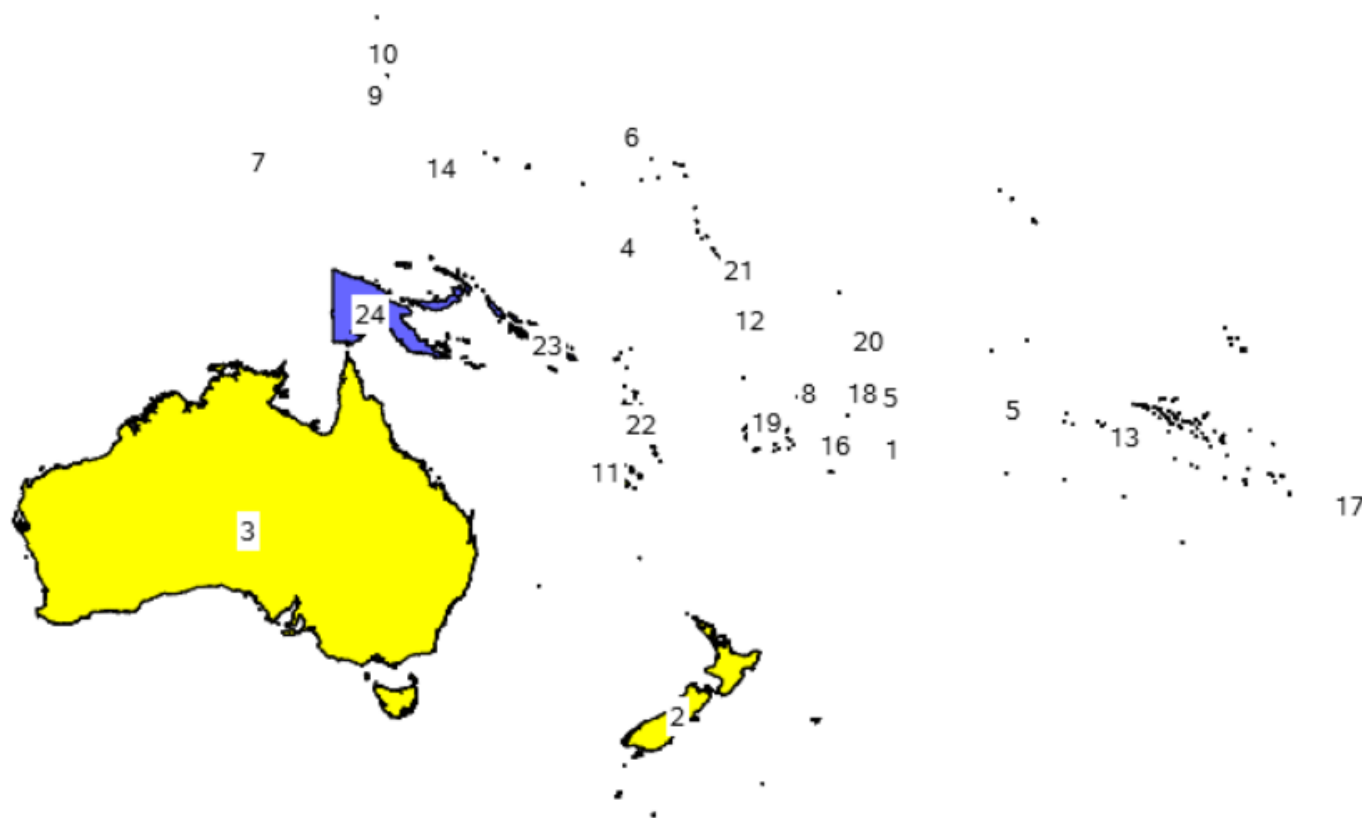
CaseRate for 24 Countries in Oceania With All Annotated By Rank Of CaseRate

0.4621 - 4.2261 (5 lowest) 7.4263 - 23.2505 (below median) 25.8665 - 25.9638 (median)
27.6122 - 38.7998 (above median) 42.2910 - 48.0020 (5 highest)

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Top 5 CaseRate Countries (highest to lowest): 1:Niue | 2:New Zealand | 3:Australia | 4:Nauru | 5:Cook Islands

Other Countries (highest to lowest Rank): 6:Marshall Islands | 7:Palau | 8:Wallis and Futuna | 9:Guam | 10:Northern Mariana Islands | 11:New Caledonia | 12:Tuvalu | 13:French Polynesia | 14:Federated States of Micronesia | 15:American Samoa | 16:Tonga | 17:Pitcairn | 18:Samoa | 19:Fiji

Bottom 5 CaseRate Countries (lowest to highest): 24:Papua New Guinea | 23:Solomon Islands | 22:Vanuatu | 21:Kiribati | 20:Tokelau

CaseRate for 14 Countries in South America With All Annotated By Rank Of CaseRate

1.9529 - 9.1107 (3 lowest)

9.9125 - 12.3097 (below median)

13.3239 - 13.3495 (median)

17.4257 - 27.1841 (above median)

30.4170 - 50.5919 (3 highest)

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Top 3 CaseRate Countries (highest to lowest): 1:Falkland Islands | 2:French Guiana | 3:Uruguay

Other Countries (highest to lowest Rank): 4:Chile | 5:Argentina | 6:Brazil | 7:Suriname | 8:Peru | 9:Colombia | 10:Paraguay | 11:Bolivia

Bottom 3 CaseRate Countries (lowest to highest): 14:Venezuela | 13:Ecuador | 12:Guyana

CaseRate for 11 Countries in SouthEast Asia With All Annotated By Rank Of CaseRate

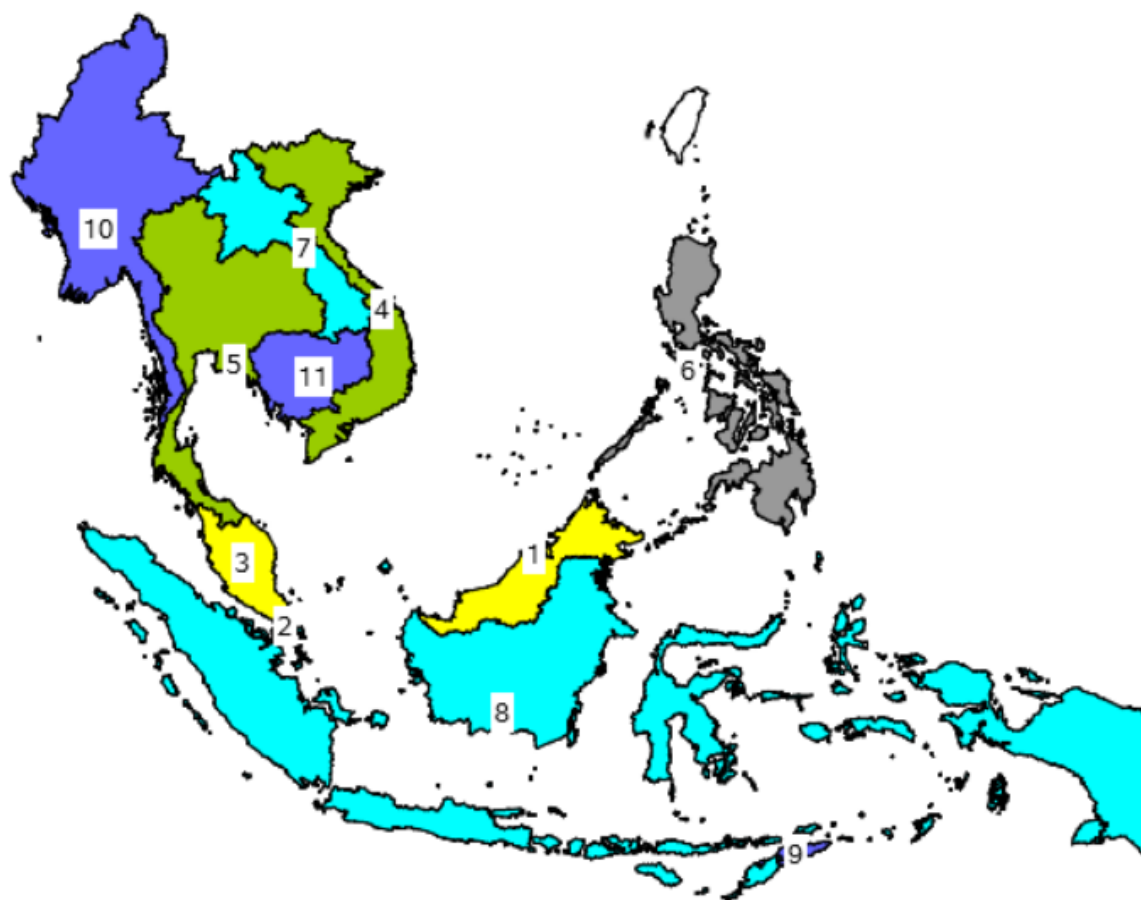
0.8291 - 1.7491 (3 lowest) 2.4758 - 2.9073 (below median) 3.6117 - 3.6117 (median)

6.6415 - 11.8387 (above median) 15.3418 - 73.6692 (3 highest) No Data

[See MouseOver Text for More Information](#)

[Go To Bar Chart](#)

[Go To Map of MortalityRate By Country](#)



Top 3 CaseRate Countries (highest to lowest): 1:Brunei | 2:Singapore | 3:Malaysia

Other Countries (highest to lowest Rank): 4:Viet Nam | 5:Thailand | 6:Philippines | 7:Laos | 8:Indonesia

Bottom 3 CaseRate Countries (lowest to highest): 11:Cambodia | 10:Myanmar | 9:Timor-Leste

No CaseRate Data for: Taiwan

CaseRate for 232 Countries in World With Top and Bottom 10 Annotated

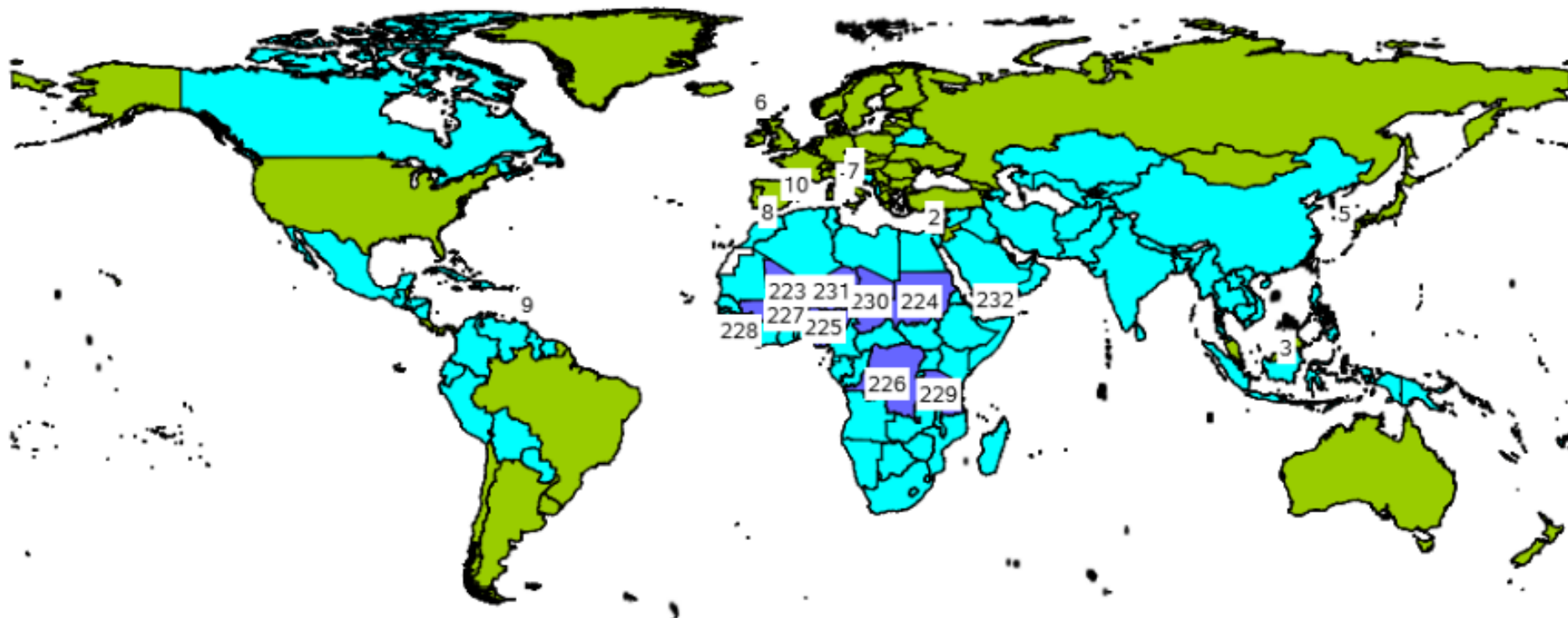
0.0354 - 0.1468 (10 lowest) 0.1526 - 13.3495 (below median) 13.3946 - 13.8567 (median)

13.9049 - 60.0686 (above median) 60.1368 - 75.0727 (10 highest) No Data

[See MouseOver Text for More Information](#)

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Top 10 CaseRate Countries (highest to lowest): 1:San Marino | 2:Cyprus | 3:Brunei | 4:Austria | 5:South Korea | 6:Faroe Islands | 7:Slovenia | 8:Gibraltar | 9:Martinique | 10:Andorra

Bottom 10 CaseRate Countries (lowest to highest): 232:Yemen | 231:Niger | 230:Chad | 229:Tanzania | 228:Sierra Leone | 227:Burkina Faso | 226:Democratic Republic of the Congo | 225:Nigeria | 224:Sudan | 223:Mali

No CaseRate Data for: North Korea | Taiwan | Turkmenistan | Western Sahara

MortalityRate for 226 Countries in World With Top and Bottom 10 Annotated

0.0185 - 0.0808 (10 lowest)

0.0887 - 0.8508 (below median)

0.8658 - 0.8716 (median)

0.8749 - 3.3792 (above median)

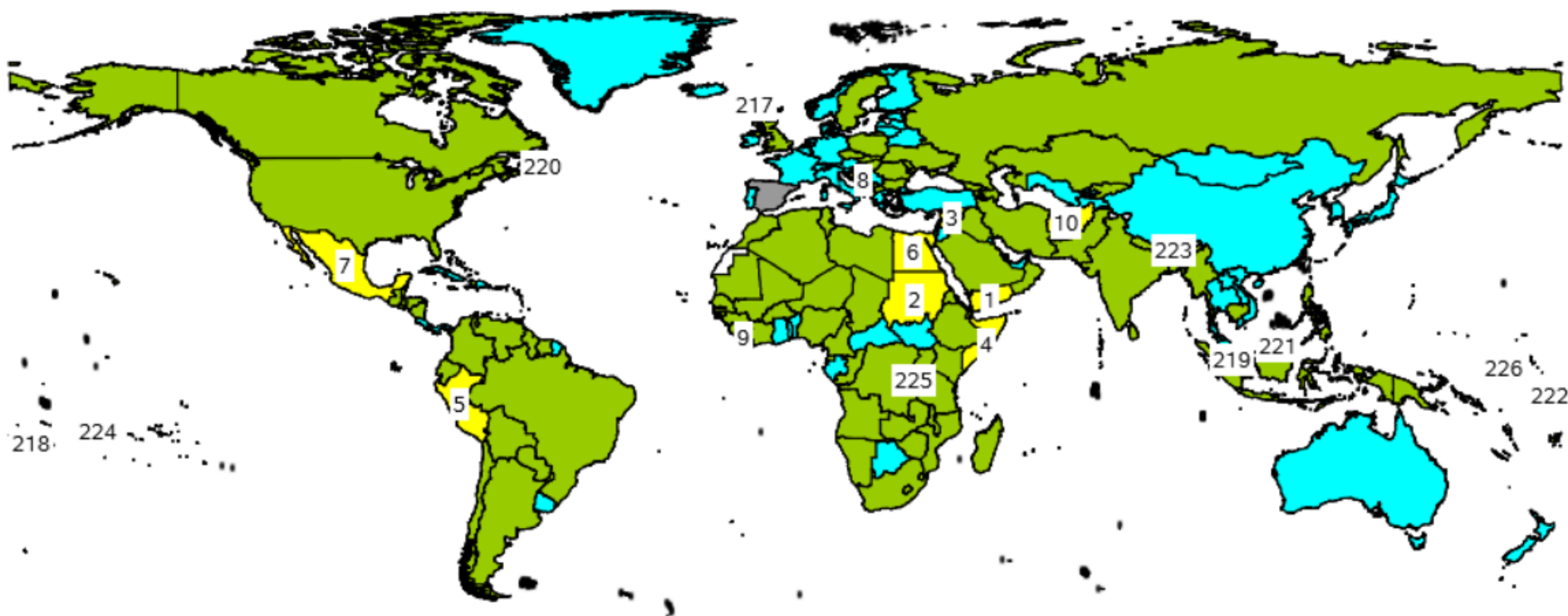
3.4622 - 18.0745 (10 highest)

No Data

[See MouseOver Text for More Information](#)

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Top 10 MortalityRate Countries (highest to lowest): 1:Yemen | 2:Sudan | 3:Syria | 4:Somalia | 5:Peru | 6:Egypt | 7:Mexico | 8:Bosnia and Herzegovina | 9:Liberia | 10:Afghanistan
































Bottom 10 MortalityRate Countries (lowest to highest): 226:Nauru | 225:Burundi | 224:Cook Islands | 223:Bhutan | 222:Tuvulu | 221:Brunei | 220:Saint Pierre and Miquelon | 219:Singapore | 218:Tonga | 217:Faroe Islands

No MortalityRate Data for: Falkland Islands | Niue | North Korea | Pitcairn | Saint Helena, Ascension Island, & Tristan da Cunha | Taiwan | Tokelau | Turkmenistan | Vatican City State | Western Sahara

Top of Its Bar Chart

226 Countries in World

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	Rank	Population	Total Cases	Total Deaths	CaseRate	MortalityRate	
Yemen	1	33,696,612	11,945	2,159	0.0354	18.0745	
Sudan	2	46,874,200	63,993	5,046	0.1365	7.8852	
Syria	3	22,125,242	57,423	3,163	0.2595	5.5082	
Somalia	4	17,597,508	27,334	1,361	0.1553	4.9791	
Peru	5	34,049,588	4,536,733	221,583	13.3239	4.8842	
Egypt	6	110,990,096	516,023	24,830	0.4649	4.8118	
Mexico	7	127,504,120	7,702,809	334,958	6.0412	4.3485	
Bosnia and Herzegovina	8	3,233,530	403,468	16,378	12.4776	4.0593	
Liberia	9	5,302,690	8,090	294	0.1526	3.6341	
Afghanistan	10	41,128,772	230,290	7,973	0.5599	3.4622	
Ecuador	11	18,001,002	1,066,409	36,036	5.9242	3.3792	
Niger	12	26,207,982	9,515	315	0.0363	3.3106	
Myanmar	13	54,179,312	641,422	19,494	1.1839	3.0392	
Malawi	14	20,405,318	89,168	2,686	0.4370	3.0123	
Gambia	15	2,705,995	12,626	372	0.4666	2.9463	
Bulgaria	16	6,781,955	1,321,120	38,613	19.4799	2.9227	
North Macedonia	17	2,093,606	350,197	9,963	16.7270	2.8450	
Paraguay	18	6,780,745	736,182	19,945	10.8569	2.7092	
Tunisia	19	12,356,116	1,153,361	29,423	9.3343	2.5511	
Algeria	20	44,903,228	272,010	6,881	0.6058	2.5297	
Chad	21	17,723,312	7,698	194	0.0434	2.5201	
South Africa	22	59,893,884	4,072,636	102,595	6.7998	2.5191	
Sri Lanka	23	21,832,150	672,685	16,888	3.0812	2.5105	
Haiti	24	11,585,003	34,509	860	0.2979	2.4921	
Namibia	25	2,567,024	172,239	4,103	6.7097	2.3822	
Indonesia	26	275,501,344	6,820,926	161,965	2.4758	2.3745	
Honduras	27	10,432,858	472,743	11,114	4.5313	2.3510	
Jamaica	28	2,827,382	156,584	3,590	5.5381	2.2927	
Trinidad and Tobago	29	1,531,043	191,496	4,390	12.5076	2.2925	
Mali	30	22,593,598	33,164	743	0.1468	2.2404	
Colombia	31	51,874,028	6,385,539	142,727	12.3097	2.2352	

**Not shown above are
the same full package of maps for
Mortality Rate
Case Count
Mortality Count**

Show Them What's Important with Horizontal Bar Charts

Show Them What's Important

- ▶ Ranking . . . Always
- ▶ Subsetting . . . Sometimes—
Incompleteness Can Be Beneficial:
Enough!

The CounterPoint of Information
Overload

Highly Informative Ranked and Subsetted Horizontal Bar Charts

Left of the bars are columns of

- ▶ Rank**
- ▶ Country**
- ▶ Response Value**
- ▶ Percent of Grand Total Cases or Mortalities for the Subset**
(subset of Case / Mortality Rates OR subset of Case / Mortality Counts)

Highly Informative Ranked and Subsetted Horizontal Bar Charts

Subsetted Charts are

- ▶ Top 30**
- ▶ Bottom 30**

Subsetted Charts for

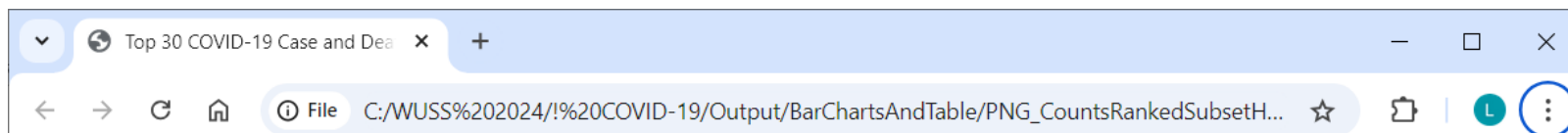
- ▶ Ranked Case / Mortality Rates**
- ▶ Ranked Case / Mortality Counts**

Highly Informative Ranked and Subsetted Horizontal Bar Charts

All Subsetted Chart Titles include

- ▶ Grand Total Response for Counts**

Top 30 Countries By Total Cases AND By Total Deaths



[Go To Alphabetic Order by Country Table of All COVID-19 Information WorldWide](#)

Top 30 Countries Ranked by COVID-19 Total Cases - 2020 to 2023
 This SubTotal of 657,229,080 Cases Is 85.0% of the World Total
 All 232 Countries had a Total of 773,490,126 Cases

	Rank	Cases	% of World Cases	Case Rate
United States of America	1	103,436,829	13.3727	30.5764
China	2	99,322,525	12.8408	6.9657
India	3	45,010,891	5.8192	3.1761
France	4	38,997,490	5.0418	57.5074
Germany	5	38,437,756	4.9694	46.1051
Brazil	6	37,519,960	4.8507	17.4257
South Korea	7	34,571,873	4.4696	66.7207
Japan	8	33,803,572	4.3703	27.2716
Italy	9	26,517,706	3.4283	44.9167
United Kingdom	10	24,843,591	3.2119	36.8004
Russia	11	23,608,723	3.0522	16.3141
Turkey	12	17,004,677	2.1984	19.9255
Spain	13	13,980,340	1.8074	29.3960
Australia	14	11,710,216	1.5139	44.7341
Viet Nam	15	11,624,000	1.5028	11.8387
Argentina	16	10,075,242	1.3026	22.1384
Netherlands	17	8,627,693	1.1154	49.1214
Mexico	18	7,702,809	0.9959	6.0412
Iran	19	7,625,463	0.9859	8.6114
Indonesia	20	6,820,926	0.8818	2.4758
Poland	21	6,609,092	0.8545	16.5820
Colombia	22	6,385,539	0.8255	12.3097
Austria	23	6,081,287	0.7862	68.0263
Portugal	24	5,637,114	0.7288	54.8846
Greece	25	5,533,964	0.7155	53.2882
Ukraine	26	5,520,483	0.7137	13.9049
Chile	27	5,329,103	0.6890	27.1841
Malaysia	28	5,206,724	0.6731	15.3418
Belgium	29	4,841,934	0.6260	41.5405
Israel	30	4,841,558	0.6259	51.2388

Top 30 Countries Ranked by COVID-19 Total Deaths - 2020 to 2023
 This SubTotal of 5,906,988 Mortalities Is 84.5% of the World Total
 All 226 Countries had a Total of 6,994,144 Deaths

	Rank	Deaths	% of World Deaths	Mortality Rate
United States of America	1	1,144,877	16.3691	1.1068
Brazil	2	702,116	10.0386	1.8713
India	3	533,346	7.6256	1.1849
Russia	4	400,967	5.7329	1.6984
Mexico	5	334,958	4.7891	0.3485
United Kingdom	6	232,112	3.3187	0.9343
Peru	7	221,583	3.1681	4.8842
Italy	8	193,886	2.7721	0.7312
Germany	9	174,979	2.5018	0.4552
France	10	167,985	2.4018	0.4308
Indonesia	11	161,965	2.3157	2.3745
Iran	12	146,757	2.0983	1.9246
Colombia	13	142,727	2.0407	2.2352
Argentina	14	130,687	1.8685	1.2971
China	15	121,889	1.7427	0.1227
Spain	16	121,852	1.7422	0.8716
Poland	17	120,018	1.7160	1.8160
Ukraine	18	109,918	1.5716	1.9911
South Africa	19	102,595	1.4669	2.5191
Turkey	20	101,419	1.4501	0.5964
Japan	21	74,694	1.0680	0.2210
Romania	22	68,601	0.9808	1.9559
Philippines	23	66,795	0.9550	1.6004
Chile	24	64,482	0.9219	1.2100
Canada	25	53,595	0.7663	1.1281
Hungary	26	48,917	0.6994	2.1997
Czechia	27	43,225	0.6180	0.9139
Viet Nam	28	43,206	0.6177	0.3717
Bulgaria	29	38,613	0.5521	2.9227
Greece	30	38,224	0.5465	0.6907

Title Lines for Top 30 Total Cases AND Top 30 Total Deaths

**Top 30 Countries Ranked by COVID-19 Total Cases - 2020 to 2023
This SubTotal of 657,229,080 Cases Is 85.0% of the World Total
All 232 Countries had a Total of 773,490,126 Cases**

**Top 30 Countries Ranked by COVID-19 Total Deaths - 2020 to 2023
This SubTotal of 5,906,988 Mortalities Is 84.5% of the World Total
All 226 Countries had a Total of 6,994,144 Deaths**

**30 countries in the two Top 30 charts
account for 85% of total cases & deaths.**

**Subsetted Ranking Reports
can suffice to deliver
the most important information.**

Top 30 Countries By Case Rate & By Mortality Rate

[Go To Alphabetic Order by Country Table of All COVID-19 Information WorldWide](#)

Top 30 Countries Ranked by COVID-19 Case Rate - 2020 to 2023
Case Rate Is Country's Case Count As Percent of Population
This SubTotal of 114,784,207 Cases Is 14.8% of the World Total
All 232 Countries had a Total of 773,490,126 Cases

	Rank	Case Rate	Cases	% of World Cases
San Marino	1	75.0727	25,292	0.0033
Cyprus	2	73.9907	662,962	0.0857
Brunei	3	73.6692	330,776	0.0428
Austria	4	68.0263	6,081,287	0.7862
South Korea	5	66.7207	34,571,873	4.4696
Faroe Islands	6	65.2484	34,658	0.0045
Slovenia	7	63.8156	1,352,790	0.1749
Gibraltar	8	62.8883	20,550	0.0027
Martinique	9	62.6793	230,354	0.0298
Andorra	10	60.1368	48,015	0.0062
Luxembourg	11	60.0686	389,005	0.0503
Jersey	12	59.9218	66,391	0.0086
Denmark	13	58.2498	3,426,405	0.4430
Saint Pierre and Miquelon	14	58.2158	3,426	0.0004
France	15	57.5074	38,997,490	5.0418
Iceland	16	56.2211	209,650	0.0271
Guernsey	17	55.7817	35,326	0.0046
Portugal	18	54.8846	5,637,114	0.7288
Liechtenstein	19	54.7783	21,558	0.0028
Greece	20	53.2882	5,533,964	0.7155
Latvia	21	52.8300	977,701	0.1264
Singapore	22	51.8805	2,924,515	0.3781
Guadeloupe	23	51.3528	203,235	0.0263
Israel	24	51.2388	4,841,558	0.6259
Switzerland	25	50.8184	4,441,768	0.5743
Reunion	26	50.7765	494,595	0.0639
Falkland Islands	27	50.5919	1,923	0.0002
Saint Barthelemy	28	50.0910	5,507	0.0007
Georgia	29	49.5486	1,855,289	0.2399
Lithuania	30	49.4255	1,359,230	0.1757

Top 30 Countries Ranked by COVID-19 Mortality Rate - 2020 to 2023
Mortality Rate Is Country's Deaths Count As Percent of Case Count
This SubTotal of 1,087,915 Mortalities Is 15.6% of the World Total
All 226 Countries had a Total of 6,994,144 Deaths

	Rank	Mortality Rate	Deaths	% of World Deaths
Yemen	1	18.0745	2,159	0.0309
Sudan	2	7.8852	5,046	0.0721
Syria	3	5.5082	3,163	0.0452
Somalia	4	4.9791	1,361	0.0195
Peru	5	4.8842	221,583	3.1681
Egypt	6	4.8118	24,830	0.3550
Mexico	7	4.3485	334,958	4.7891
Bosnia and Herzegovina	8	4.0593	16,378	0.2342
Liberia	9	3.6341	294	0.0042
Afghanistan	10	3.4622	7,973	0.1140
Ecuador	11	3.3792	36,036	0.5152
Niger	12	3.3106	315	0.0045
Myanmar	13	3.0392	19,494	0.2787
Malawi	14	3.0123	2,686	0.0384
Gambia	15	2.9463	372	0.0053
Bulgaria	16	2.9227	38,613	0.5521
North Macedonia	17	2.8450	9,963	0.1424
Paraguay	18	2.7092	19,945	0.2852
Tunisia	19	2.5511	29,423	0.4207
Algeria	20	2.5297	6,881	0.0984
Chad	21	2.5201	194	0.0028
South Africa	22	2.5191	102,595	1.4669
Sri Lanka	23	2.5105	16,888	0.2415
Haiti	24	2.4921	860	0.0123
Namibia	25	2.3822	4,103	0.0587
Indonesia	26	2.3745	161,965	2.3157
Honduras	27	2.3510	11,114	0.1589
Jamaica	28	2.2927	3,590	0.0513
Trinidad and Tobago	29	2.2925	4,390	0.0628
Mali	30	2.2404	743	0.0106

Excerpt of Top of the Top 30 Subsetted Horizontal Bar Chart

Top 30 Countries Ranked by COVID-19 Case Rate - 2020 to 2023
Case Rate Is Country's Case Count As Percent of Population
This SubTotal of 114,784,207 Cases Is 14.8% of the World Total
All 232 Countries had a Total of 773,490,126 Cases

	Rank	Case Rate		Cases	% of World Cases
San Marino	1	75.0727	<div></div>	25,292	0.0033
Cyprus	2	73.9907	<div></div>	662,962	0.0857
Brunei	3	73.6692	<div></div>	330,776	0.0428
Austria	4	68.0263	<div></div>	6,081,287	0.7862
South Korea	5	66.7207	<div></div>	34,571,873	4.4696
Faroe Islands	6	65.2484	<div></div>	34,658	0.0045
Slovenia	7	63.8156	<div></div>	1,352,790	0.1749
Gibraltar	8	62.8883	<div></div>	20,550	0.0027
Martinique	9	62.6793	<div></div>	230,354	0.0298
Andorra	10	60.1368	<div></div>	48,015	0.0062

Maximally Informative:

Everything You Need To Know At The Category Level For This Data

	Rank	Case Rate		Cases	% of World Cases
San Marino	1	75.0727	<div></div>	25,292	0.0033
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Maximally Informative:

Everything You Need To Know

About The Context

Top 30 Countries Ranked by COVID-19 Case Rate - 2020 to 2023
Case Rate Is Country's Case Count As Percent of Population
This SubTotal of 114,784,207 Cases Is 14.8% of the World Total
All 232 Countries had a Total of 773,490,126 Cases

Some People Will Want To
ALSO See ALL OF IT

For them,
provide an Alphabetic Order Table*
for quick easy lookup,
but still include the Rank

***table can include extra data**

Table Options

- ▶ **Linked Web Page**
- ▶ **Linked Excel Worksheet**
- ▶ **Both Chart and Table in Excel**

All Data in Alphabetic Order By Country (left end of sheet)

SAS Output

File C:/WUSS%202024/!%20COVID-19/Output/BarChartsAndTable/AlphabeticOrderTableOfAllID... New Chrome available






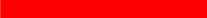
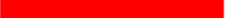
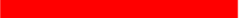
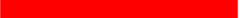
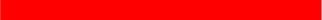
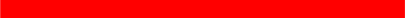
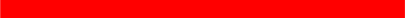
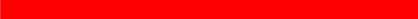
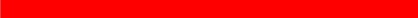
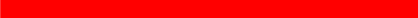
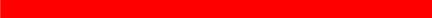
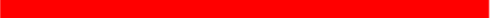
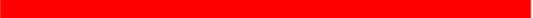
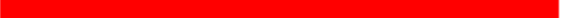

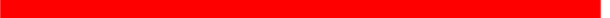
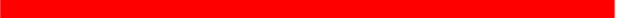








COVID-19 2020 to 2023 Counts and Rates for Cases and Mortality in Alphabetic Order By Country
[Go To Bar Charts of Bottom 30 Case Rates and Bottom 30 Mortality Rates By Country](#)

Country	Continent	RankPopulationInWorld	Population	RankCaseRateInWorld	CaseRate	TotalCases	PctOfWorldCases	RankMortalityRateInWorld	MortalityRate
Afghanistan	Asia	36 of 236	41,128,772	194 of 232	0.5599	230,290	0.0298	10 of 226	3.4622
Albania	Europe	137 of 236	2,842,318	127 of 232	11.7705	334,555	0.0433	98 of 226	1.0773
Algeria	Africa	34 of 236	44,903,228	193 of 232	0.6058	272,010	0.0352	20 of 226	2.5297
American Samoa	Oceania	212 of 236	44,295	99 of 232	18.8712	8,359	0.0011	171 of 226	0.4067
Andorra	Europe	202 of 236	79,843	10 of 232	60.1368	48,015	0.0062	182 of 226	0.3311
Angola	Africa	42 of 236	35,588,996	210 of 232	0.2999	106,720	0.0138	53 of 226	1.8150
Anguilla	CentralAmerica	224 of 236	15,877	83 of 232	24.5890	3,904	0.0005	185 of 226	0.3074
Antigua and Barbuda	CentralAmerica	200 of 236	93,772	134 of 232	9.7108	9,106	0.0012	62 of 226	1.6033
Argentina	SouthAmerica	33 of 236	45,510,324	92 of 232	22.1384	10,075,242	1.3026	74 of 226	1.2971
Armenia	Europe	139 of 236	2,780,472	107 of 232	16.2330	451,353	0.0584	44 of 226	1.9433
Aruba	CentralAmerica	197 of 236	106,459	47 of 232	41.5409	44,224	0.0057	146 of 226	0.6603
Australia	Oceania	55 of 236	26,177,410	43 of 232	44.7341	11,710,216	1.5139	200 of 226	0.2057
Austria	Europe	99 of 236	8,939,617	4 of 232	68.0263	6,081,287	0.7862	179 of 226	0.3705
Azerbaijan	Europe	91 of 236	10,358,078	142 of 232	8.0535	834,183	0.1078	80 of 226	1.2411
Bahamas	CentralAmerica	175 of 236	409,989	137 of 232	9.2890	38,084	0.0049	32 of 226	2.2162
Bahrain	Asia	154 of 236	1,472,237	34 of 232	47.3167	696,614	0.0901	198 of 226	0.2205
Bangladesh	Asia	8 of 236	171,186,368	184 of 232	1.1953	2,046,256	0.2645	70 of 226	1.4405
Barbados	CentralAmerica	185 of 236	281,646	51 of 232	39.1104	110,153	0.0142	157 of 226	0.5383
Belarus	Europe	96 of 236	9,534,956	131 of 232	10.4252	994,037	0.1285	137 of 226	0.7161
Belgium	Europe	81 of 236	11,655,923	48 of 232	41.5405	4,841,934	0.6260	139 of 226	0.7092
Belize	CentralAmerica	176 of 236	405,285	101 of 232	17.6106	71,373	0.0092	104 of 226	0.9639
Benin	Africa	77 of 236	13,352,864	218 of 232	0.2100	28,036	0.0036	152 of 226	0.5814
Bermuda	CentralAmerica	205 of 236	64,207	70 of 232	29.3737	18,860	0.0024	112 of 226	0.8749
Bhutan	Asia	165 of 236	782,457	143 of 232	8.0128	62,697	0.0081	223 of 226	0.0335
Bolivia	SouthAmerica	80 of 236	12,224,114	133 of 232	9.9125	1,211,716	0.1567	50 of 226	1.8474
Bonaire, Sint Eustatius, and Saba	CentralAmerica	221 of 236	27,052	44 of 232	44.0707	11,922	0.0015	180 of 226	0.3439
Bosnia and Herzegovina	Europe	136 of 236	3,233,530	123 of 232	12.4776	403,468	0.0522	8 of 226	4.0593











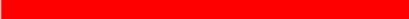
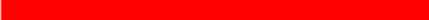

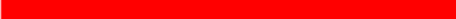
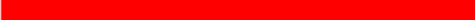
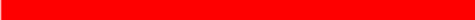
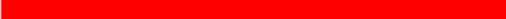
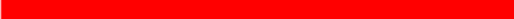
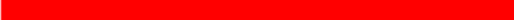

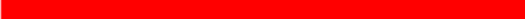
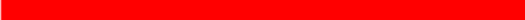








Here are four other ways to look at the rates and counts data

Joint Rank, which is the sum of any pair of the four ranks, is the easiest way I could think of to identify countries with multiple high rankings.













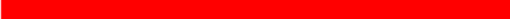













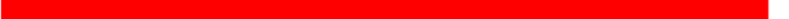



Top 30 Countries Ranked by Joint COVID-19 Sum of Rank of Total Cases and Rank of Total Deaths - 2020 to 2023

Rank		Total Cases Rank	Total Deaths Rank	Total Cases	Total Deaths	Joint Rank	
1	United States of America	1	1	103,436,829	1,144,877	2	
2	India	3	3	45,010,891	533,346	6	
3	Brazil	6	2	37,519,960	702,116	8	
4	France	4	10	38,997,490	167,985	14	
5	Germany	5	9	38,437,756	174,979	14	
6	Russia	11	4	23,608,723	400,967	15	
7	United Kingdom	10	6	24,843,591	232,112	16	
8	China	2	15	99,322,525	121,889	17	
9	Italy	9	8	26,517,706	193,886	17	
10	Mexico	18	5	7,702,809	334,958	23	
11	Japan	8	21	33,803,572	74,694	29	
12	Spain	13	16	13,980,340	121,852	29	
13	Argentina	16	14	10,075,242	130,687	30	
14	Indonesia	20	11	6,820,926	161,965	31	
15	Iran	19	12	7,625,463	146,757	31	
16	Turkey	12	20	17,004,677	101,419	32	
17	Colombia	22	13	6,385,539	142,727	35	
18	Poland	21	17	6,609,092	120,018	38	
19	South Korea	7	33	34,571,873	35,934	40	
20	Peru	34	7	4,536,733	221,583	41	
21	Viet Nam	15	28	11,624,000	43,206	43	
22	Ukraine	26	18	5,520,483	109,918	44	
23	Chile	27	24	5,329,103	64,482	51	
24	Greece	25	30	5,533,964	38,224	55	
25	South Africa	37	19	4,072,636	102,595	56	
26	Australia	14	43	11,710,216	24,087	57	
27	Canada	32	25	4,750,768	53,595	57	
28	Malaysia	28	31	5,206,724	37,268	59	
29	Philippines	36	23	4,173,631	66,795	59	
30	Czechia	33	27	4,729,800	43,225	60	











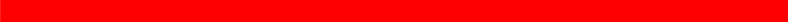
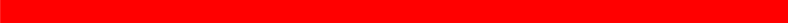


















Top 30 Countries Ranked by Joint COVID-19 Sum of Rank of Case Rate and Rank of Total Cases - 2020 to 2023

Rank		Case Rate Rank	Total Cases Rank	Case Rate	Cases	Joint Rank	
1	South Korea	5	7	66.7207	34,571,873	12	
2	France	15	4	57.5074	38,997,490	19	
3	Austria	4	23	68.0263	6,081,287	27	
4	Germany	37	5	46.1051	38,437,756	42	
5	Portugal	18	24	54.8846	5,637,114	42	
6	Greece	20	25	53.2882	5,533,964	45	
7	Netherlands	31	17	49.1214	8,627,693	48	
8	Italy	42	9	44.9167	26,517,706	51	
9	Denmark	13	39	58.2498	3,426,405	52	
10	Israel	24	30	51.2388	4,841,558	54	
11	Australia	43	14	44.7341	11,710,216	57	
12	Switzerland	25	35	50.8184	4,441,768	60	
13	Singapore	22	40	51.8805	2,924,515	62	
14	Slovenia	7	56	63.8156	1,352,790	63	
15	United Kingdom	56	10	36.8004	24,843,591	66	
16	United States of America	65	1	30.5764	103,436,829	66	
17	Czechia	40	33	45.0715	4,729,800	73	
18	Belgium	48	29	41.5405	4,841,934	77	
19	Georgia	29	48	49.5486	1,855,289	77	
20	New Zealand	36	44	47.0634	2,440,375	80	
21	Japan	74	8	27.2716	33,803,572	82	
22	Spain	69	13	29.3960	13,980,340	82	
23	Cyprus	2	82	73.9907	662,962	84	
24	Lithuania	30	55	49.4255	1,359,230	85	
25	Latvia	21	74	52.8300	977,701	95	
26	Serbia	55	42	37.5966	2,583,470	97	
27	Chile	75	27	27.1841	5,329,103	102	
28	Brunei	3	102	73.6692	330,776	105	
29	Slovakia	60	47	33.1948	1,873,332	107	
30	Turkey	95	12	19.9255	17,004,677	107	

Top 30 Countries Ranked by Joint COVID-19 Sum of Rank of Case Rate and Rank of Total Deaths - 2020 to 2023

Rank		Mortality Rate Rank	Total Deaths Rank	Case Rate	Cases	Joint Rank	
1	Mexico	7	5	4.3485	334,958	12	
2	Peru	5	7	4.8842	221,583	12	
3	Indonesia	26	11	2.3745	161,965	37	
4	South Africa	22	19	2.5191	102,595	41	
5	Ecuador	11	32	3.3792	36,036	43	
6	Colombia	31	13	2.2352	142,727	44	
7	Bulgaria	16	29	2.9227	38,613	45	
8	Egypt	6	42	4.8118	24,830	48	
9	Brazil	49	2	1.8713	702,116	51	
10	Tunisia	19	38	2.5511	29,423	57	
11	Ukraine	40	18	1.9911	109,918	58	
12	Iran	47	12	1.9246	146,757	59	
13	Hungary	34	26	2.1997	48,917	60	
14	Russia	58	4	1.6984	400,967	62	
15	Myanmar	13	50	3.0392	19,494	63	
16	Bosnia and Herzegovina	8	56	4.0593	16,378	64	
17	Romania	43	22	1.9559	68,601	65	
18	Paraguay	18	49	2.7092	19,945	67	
19	Poland	52	17	1.8160	120,018	69	
20	Sri Lanka	23	55	2.5105	16,888	78	
21	Pakistan	45	36	1.9395	30,656	81	
22	North Macedonia	17	67	2.8450	9,963	84	
23	Philippines	63	23	1.6004	66,795	86	
24	Afghanistan	10	77	3.4622	7,973	87	
25	Argentina	74	14	1.2971	130,687	88	
26	India	87	3	1.1849	533,346	90	
27	Honduras	27	64	2.3510	11,114	91	
28	Sudan	2	90	7.8852	5,046	92	
29	Bolivia	50	46	1.8474	22,385	96	
30	United States of America	96	1	1.1068	1,144,877	97	

Top 30 Countries Ranked by Joint COVID-19 Sum of Rank of Case Rate and Rank of Mortality Rate - 2020 to 2023

Rank		Case Rate Rank	Mortality Rate Rank	Case Rate	Mortality Rate	Joint Rank	
1	Bulgaria	96	16	19.4799	2.9227	112	
2	North Macedonia	104	17	16.7270	2.8450	121	
3	Peru	119	5	13.3239	4.8842	124	
4	Hungary	91	34	22.3113	2.1997	125	
5	Bosnia and Herzegovina	123	8	12.4776	4.0593	131	
6	Croatia	62	71	31.8944	1.4382	133	
7	Georgia	29	109	49.5486	0.9234	138	
8	Moldova	97	46	19.2332	1.9328	143	
9	Romania	100	43	17.8412	1.9559	143	
10	Slovenia	7	136	63.8156	0.7181	143	
11	Latvia	21	126	52.8300	0.7635	147	
12	Paraguay	130	18	10.8569	2.7092	148	
13	Czechia	40	110	45.0715	0.9139	150	
14	Armenia	107	44	16.2330	1.9433	151	
15	Brazil	102	49	17.4257	1.8713	151	
16	Montenegro	50	101	40.0713	1.0562	151	
17	Trinidad and Tobago	122	29	12.5076	2.2925	151	
18	Slovakia	60	94	33.1948	1.1309	154	
19	Tunisia	135	19	9.3343	2.5511	154	
20	Ukraine	115	40	13.9049	1.9911	155	
21	Colombia	125	31	12.3097	2.2352	156	
22	Chile	75	82	27.1841	1.2100	157	
23	Poland	105	52	16.5820	1.8160	157	
24	Mexico	154	7	6.0412	4.3485	161	
25	San Marino	1	160	75.0727	0.4982	161	
26	United States of America	65	96	30.5764	1.1068	161	
27	Gibraltar	8	155	62.8883	0.5499	163	
28	Greece	20	143	53.2882	0.6907	163	
29	Russia	106	58	16.3141	1.6984	164	
30	United Kingdom	56	108	36.8004	0.9343	164	

Scatter Plots of Case Rate / Mortality Rate versus other data

Scatter Plots

- ▶ **Available Y variables: Case Rate, Mortality Rate, Total Cases, Total Mortalities**
- ▶ **X variables—each of the fifteen data elements (see list)**

Scatter Plots

Delivered two ways

- ▶ **Stand-alone full web page**
- ▶ **3 Row BY 5 Column Panel of scatter plot miniatures—links to each stand-alone version**

See links in third TITLE line

(Panel Cells are NOT linkable)

Scatter Plot Enhancements

- ▶ **All include**
Pearson's Correlation Coefficient
- ▶ **Three Options**
 - ▶ **Highlighting the plot points**
for Top 10 and Bottom 10
response values
 - ▶ **Linear Fit**
 - ▶ **Highlighting AND Fit**
- ▶ **Highlighting always has value**

Scatter Plot Option

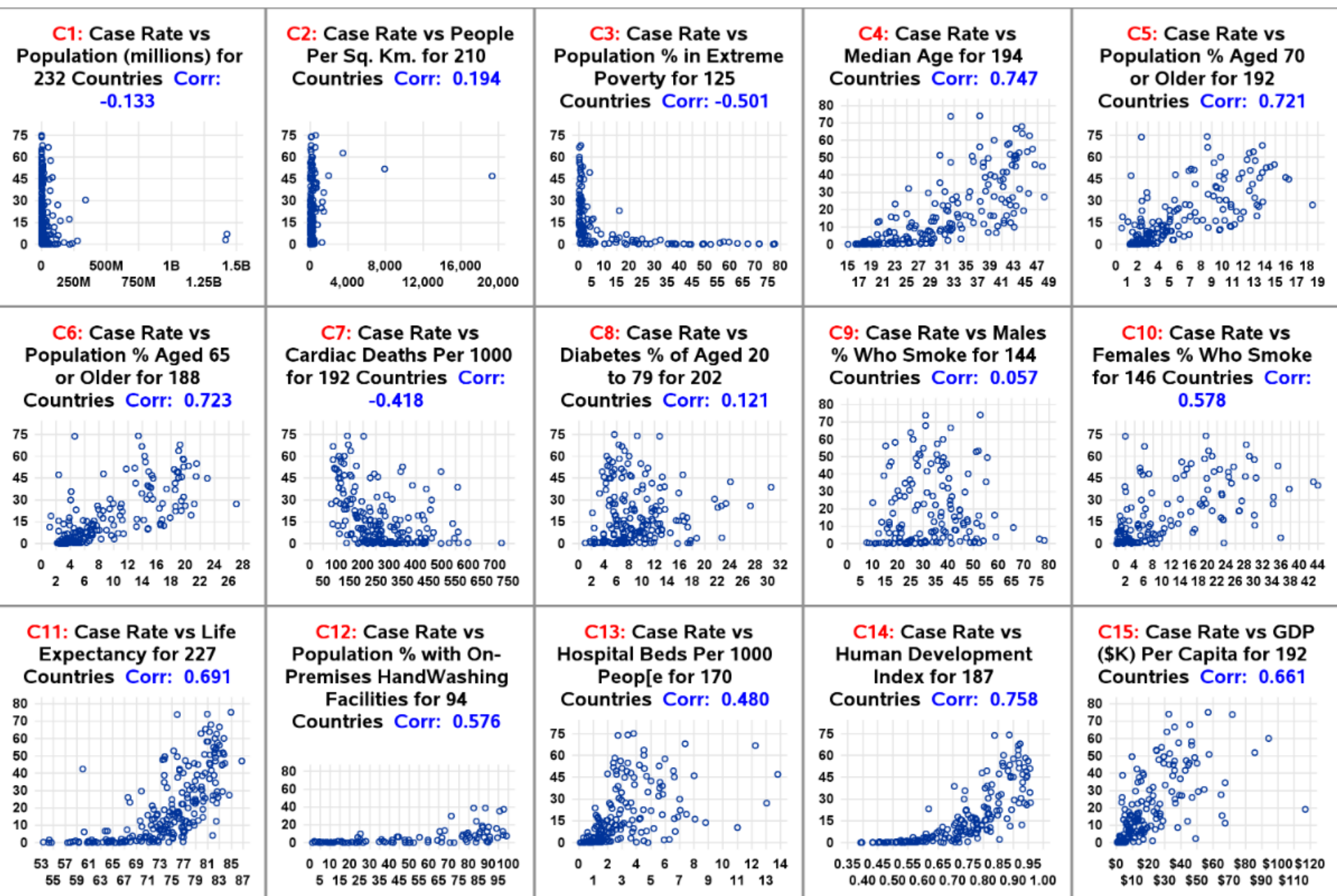
- ▶ **Omit outliers**
- ▶ **Any outliers are identified in the plot subtitles**

**NEXT is a 5 by 3 array display of
Case Rate vs 15 data items (with
Pearson correlation coefficients)**

AFTER THAT, Mortality Rate

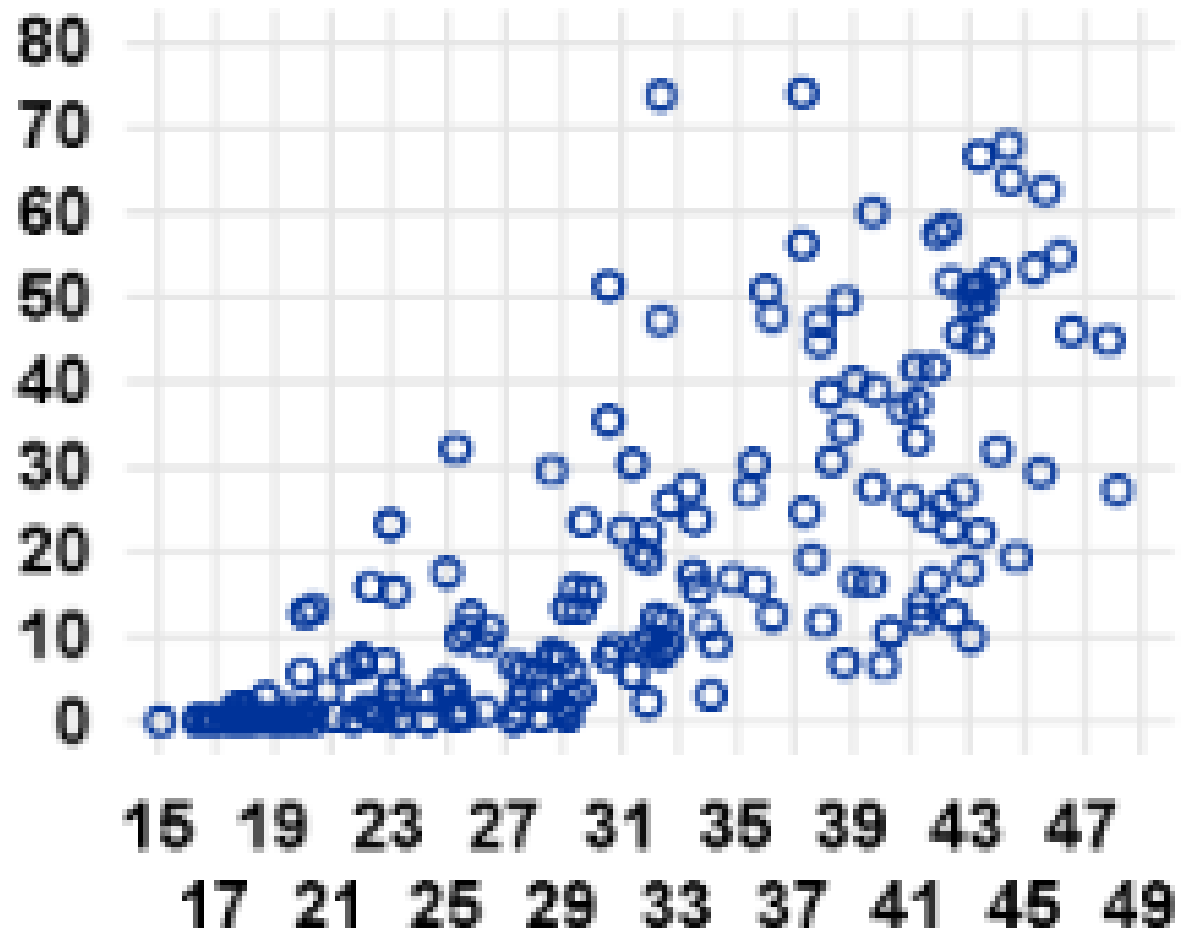
For any plot, its full-size equivalent with mouseover data tips is at the link corresponding to its red plot number title prefix:

[C1](#) [C2](#) [C3](#) [C4](#) [C5](#) [C6](#) [C7](#) [C8](#) [C9](#) [C10](#) [C11](#) [C12](#) [C13](#) [C14](#) [C15](#)



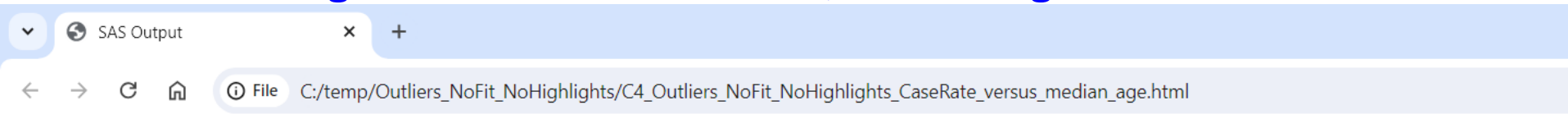
Magnified
Excerpt of
Cell C4
from
Screen
Capture of
Full Panel
Web Page

**C4: Case Rate vs
Median Age for 194
Countries** **Corr: 0.747**



**After we get to the full web page for
C4: Case Rate vs Median Age
let's use the mouse to explore one of
the countries**

After Clicking C4 in Subtitle of Panel, and using mouse at destination

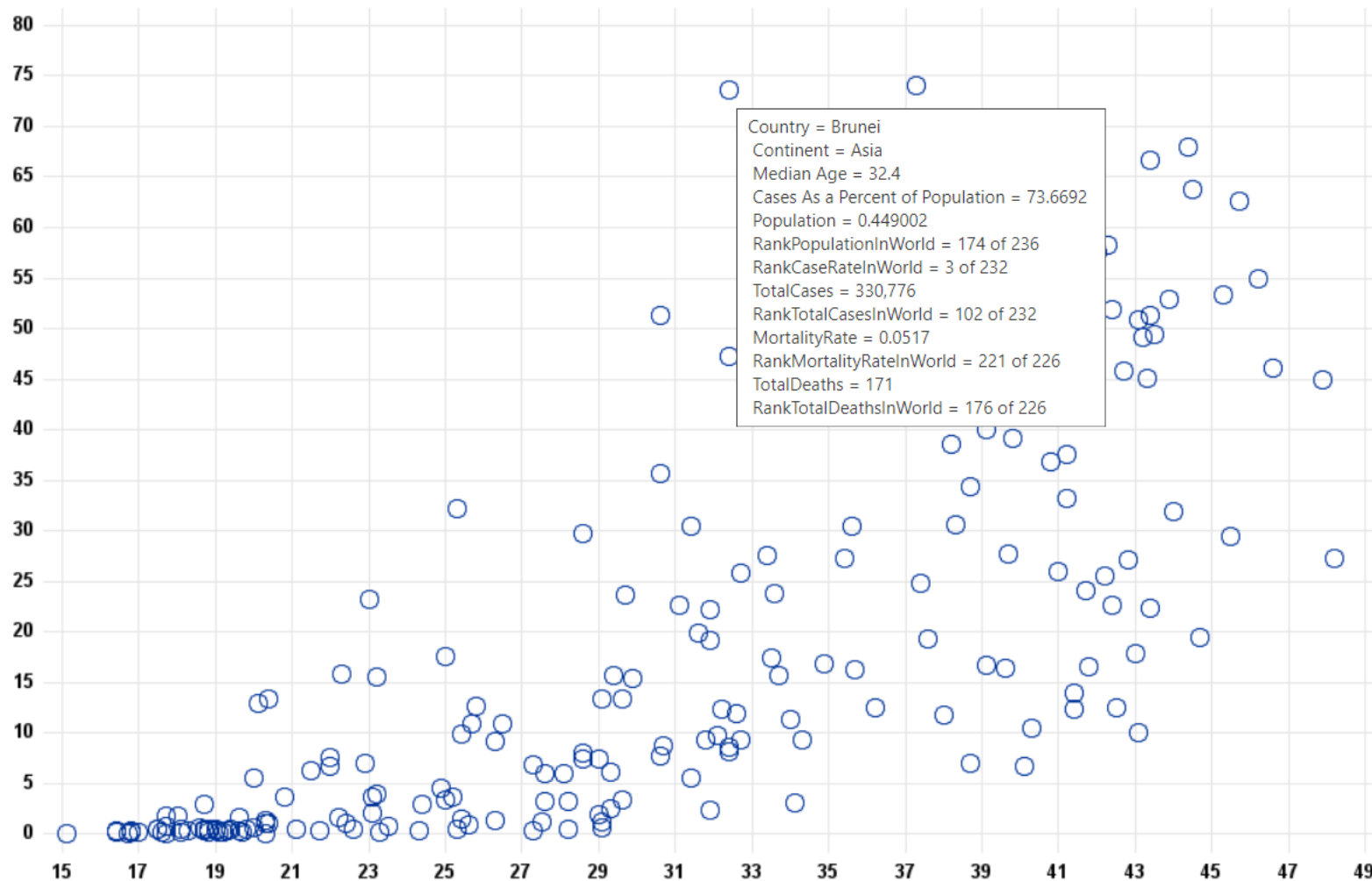


C4: Cases As a Percent of Population versus Median Age for 194 Countries Corr: 0.747

[Mortality Rate versus Median Age](#)

[Panel of Plots of Case Rate versus each of fifteen X Variables](#)

[Panel of Plots of Mortality Rate versus each of fifteen X Variables](#)



Using mouse at full web page for C4: Case Rate vs Median Age

Country = Brunei

Continent = Asia

Median Age = 32.4

Cases As a Percent of Population = 73.6692

Population = 0.449002

RankPopulationInWorld = 174 of 236

RankCaseRateInWorld = 3 of 232

TotalCases = 330,776

RankTotalCasesInWorld = 102 of 232

MortalityRate = 0.0517

RankMortalityRateInWorld = 221 of 226

TotalDeaths = 171

RankTotalDeathsInWorld = 176 of 226

Highlight Top & Bottom 10 Countries

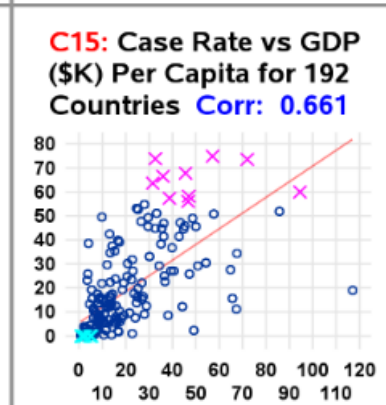
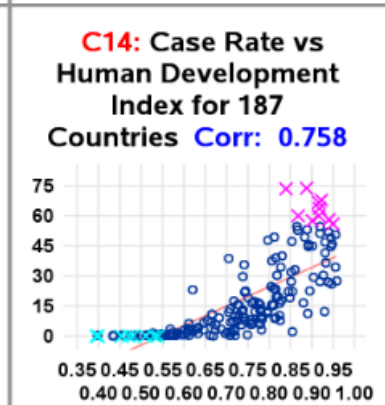
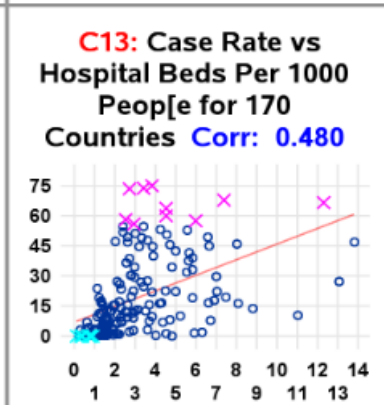
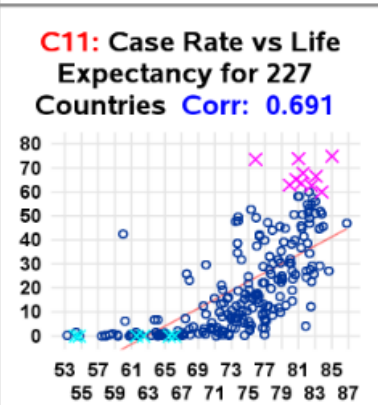
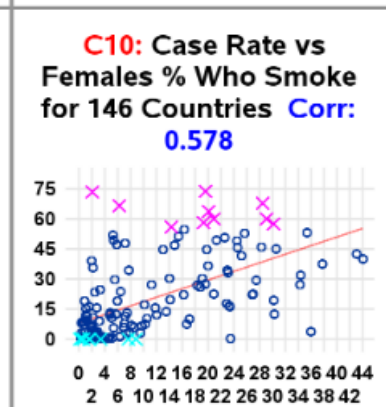
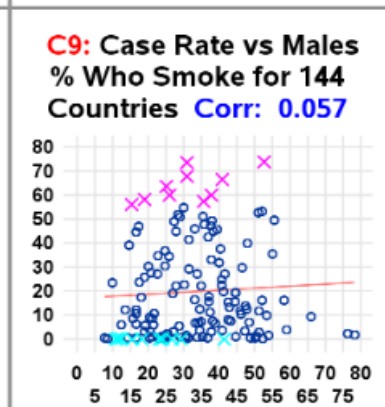
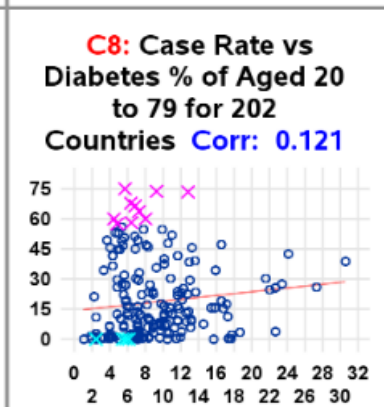
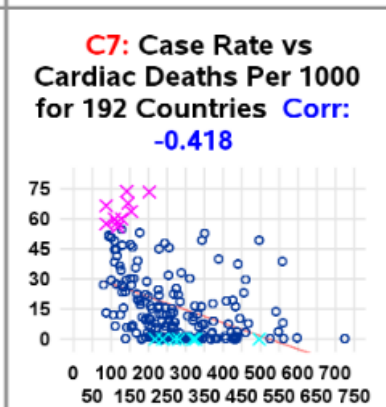
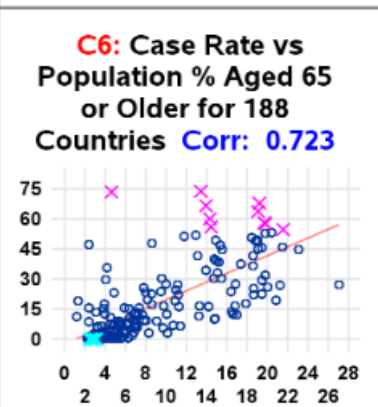
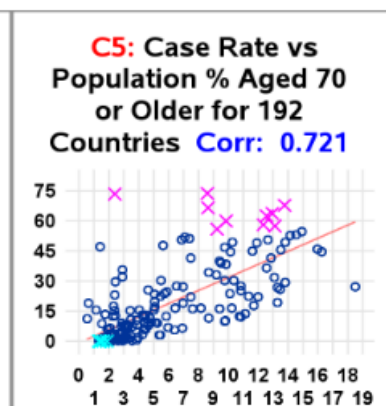
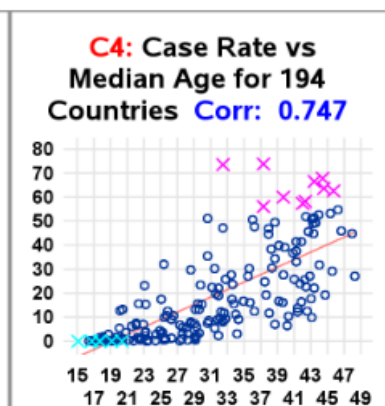
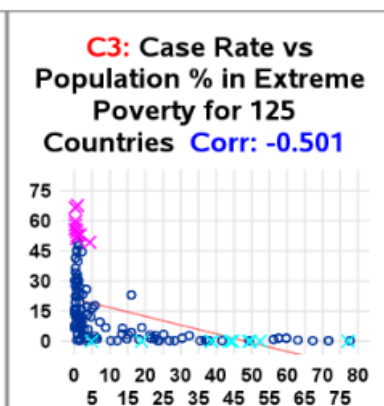
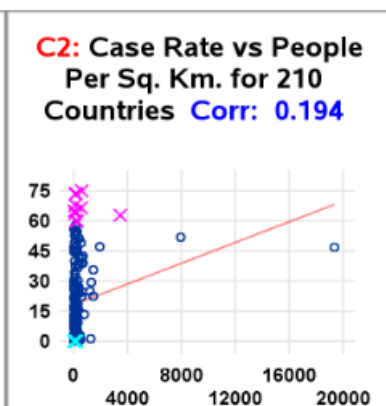
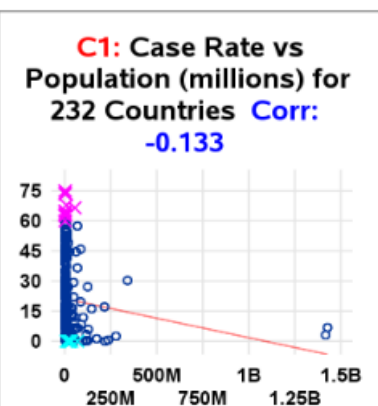
**Show Them What's Important
among the numerous* Countries
in the plot**

***Depending on which X variable it is,
94 to 236 countries may appear.**

Case Rate with [Correlation Coefficients](#) & Linear Fit & Highlights: [X](#) = Top 10 Case Rate [X](#) = Bottom 10 Case Rate [Go to Plots of Mortality Rate vs](#)

For any plot, its full-size equivalent with mouseover data tips is at the link corresponding to its red plot number title prefix:

[C1](#) [C2](#) [C3](#) [C4](#) [C5](#) [C6](#) [C7](#) [C8](#) [C9](#) [C10](#) [C11](#) [C12](#) [C13](#) [C14](#) [C15](#)



From TITLE1 of the web page

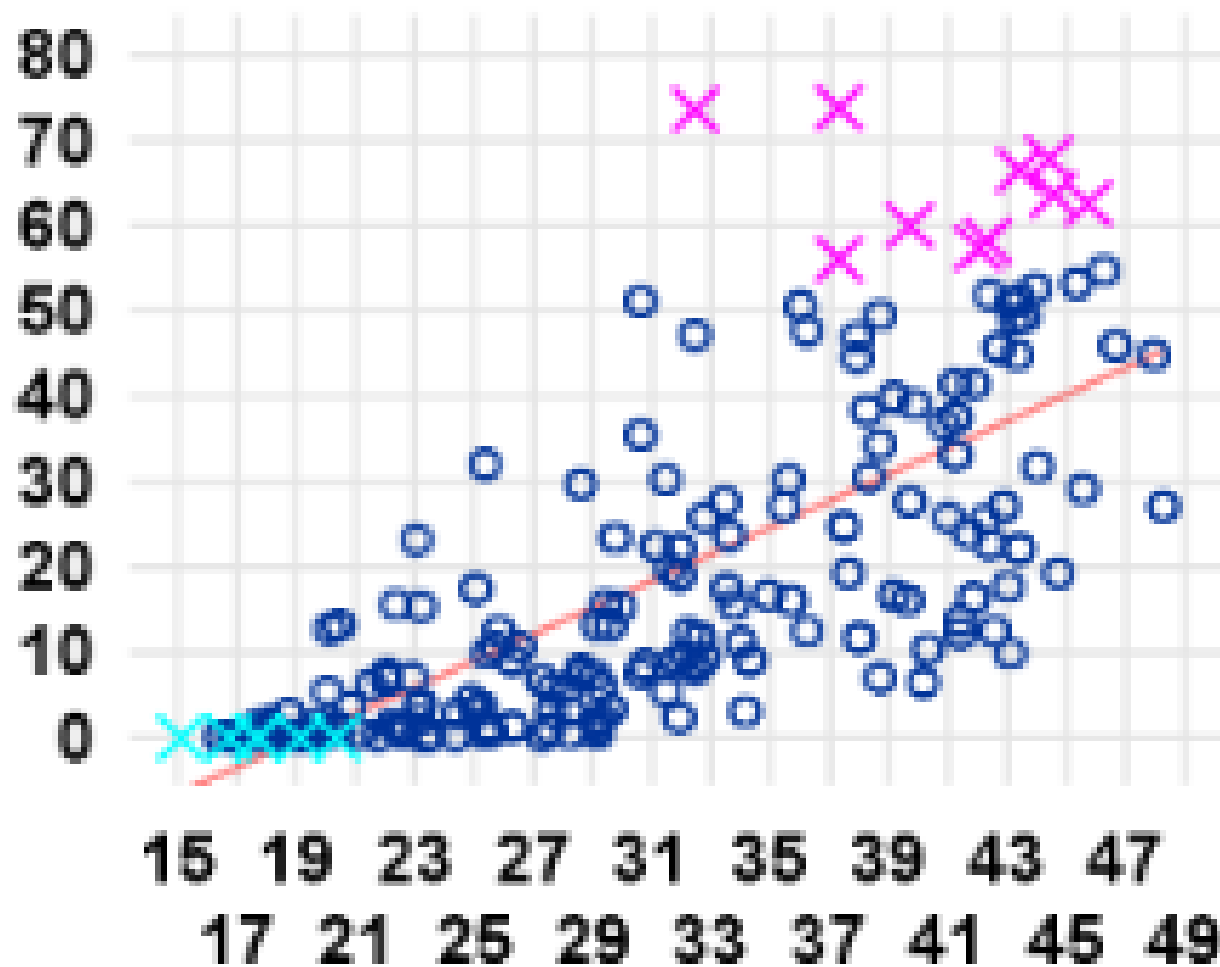
Highlights: **X** = Top 10 Case Rate **X** = Bottom 10 Case Rate

Magnified
Excerpt of
Cell C4 from
Screen

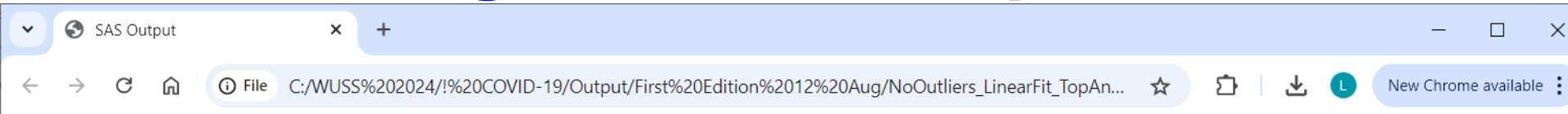
Capture of
Full Panel
Web Page

Linear Fit &
Highlight
Top 10 &
Bottom 10
Countries

C4: Case Rate vs
Median Age for 194
Countries **Corr: 0.747**

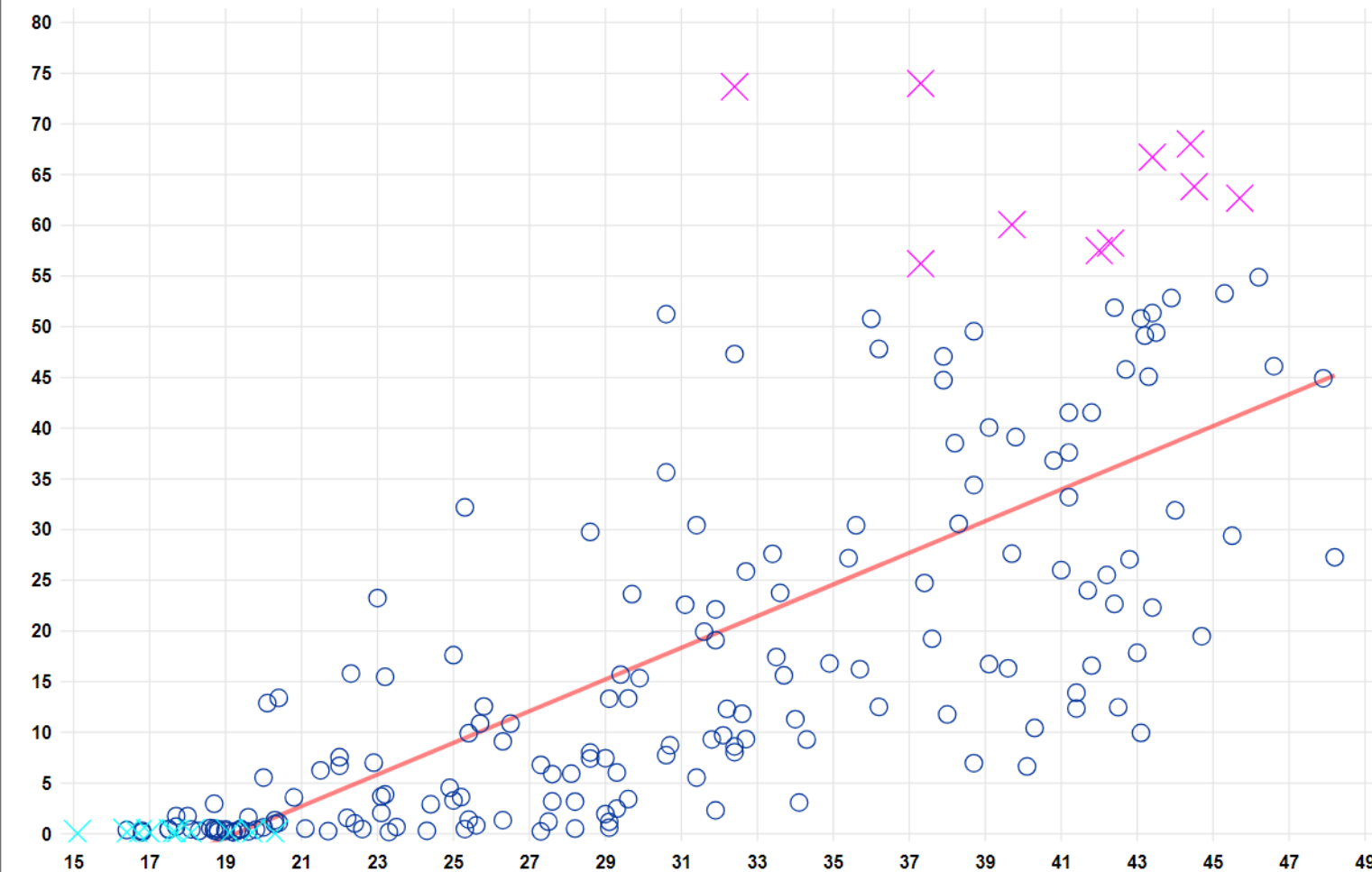


After clicking on C4 in the panel subtitle



C4: Cases As a Percent of Population versus Median Age for 194 Countries Corr: 0.747 X = Top 10 Cases As a Percent of Population X = Bottom 10 Cases As a Percent of Population
Omitting outliers: Population China & India (both > 1.4B), Pop. Density Monaco (19,346), Singapore (7,916), Gibraltar (3,457)

[Mortality Rate versus Median Age](#) [Panel of Plots of Case Rate versus each of fifteen X Variables](#) [Panel of Plots of Mortality Rate versus each of fifteen X Variables](#)

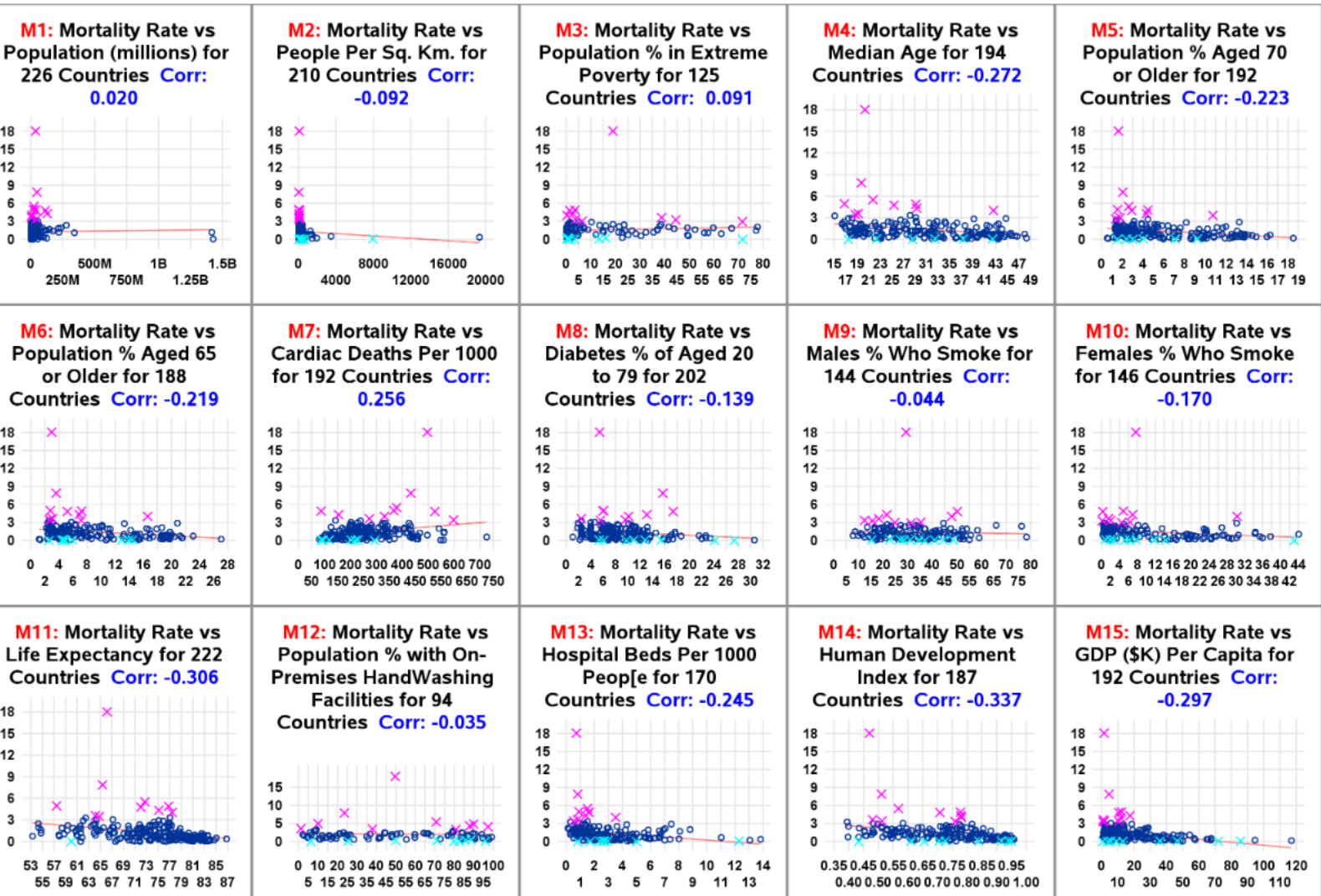


Mortality Rate versus the Fifteen Variables

Mortality Rate with Correlation Coefficients & Linear Fit & Highlights: X = Top 10 Mortality Rate X = Bottom 10 Mortality Rate [Go to Plots of Case Rate versus the Fifteen X Variables](#)

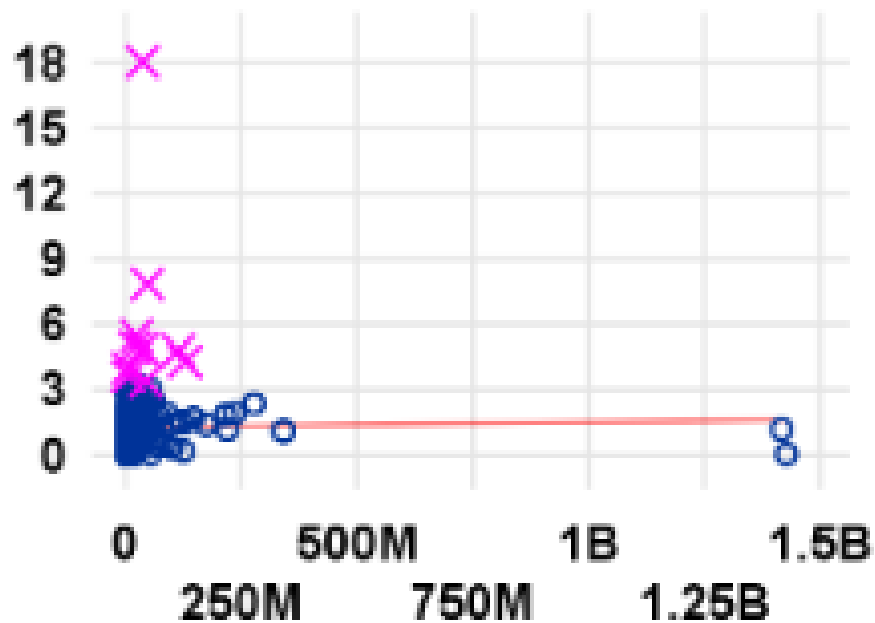
For any plot, its full-size equivalent with mouseover data tips is at the link corresponding to its red plot number title prefix:

M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14 M15

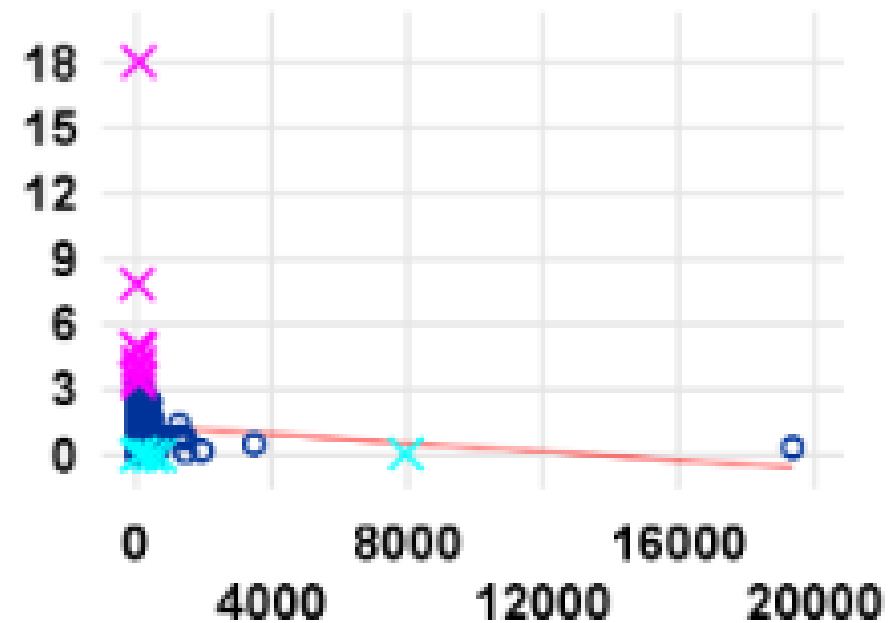


Obvious Outliers for Population and Population Density

M1: Mortality Rate vs Population (millions) for 226 Countries **Corr: 0.020**



M2: Mortality Rate vs People Per Sq. Km. for 210 Countries **Corr: -0.092**



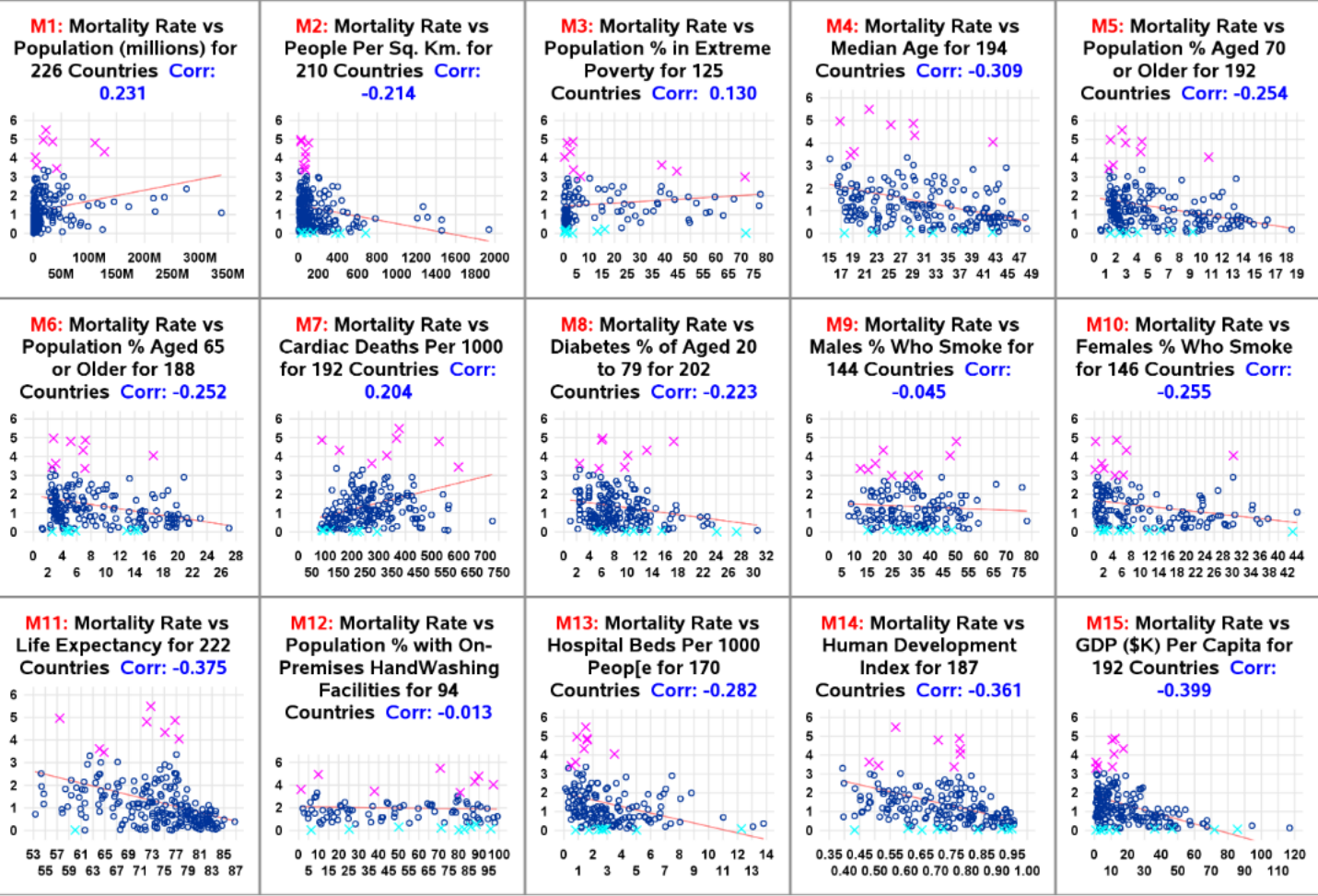
Mortality Rate with Outliers Omitted

Mortality Rate with [Correlation Coefficients](#) & Linear Fit & Highlights: X = Top 10 Mortality Rate X = Bottom 10 Mortality Rate [Go to Plots of Case Rate versus the Fifteen X Variables](#) [Go To Table](#)

Omitting Outliers: Population China & India (both > 1.4B), Pop. Density Monaco (19,346), Singapore (7,916), Gibraltar (3,457) Omitting Mortality Rate Outliers Yemen (18.07) & Sudan (7.88)

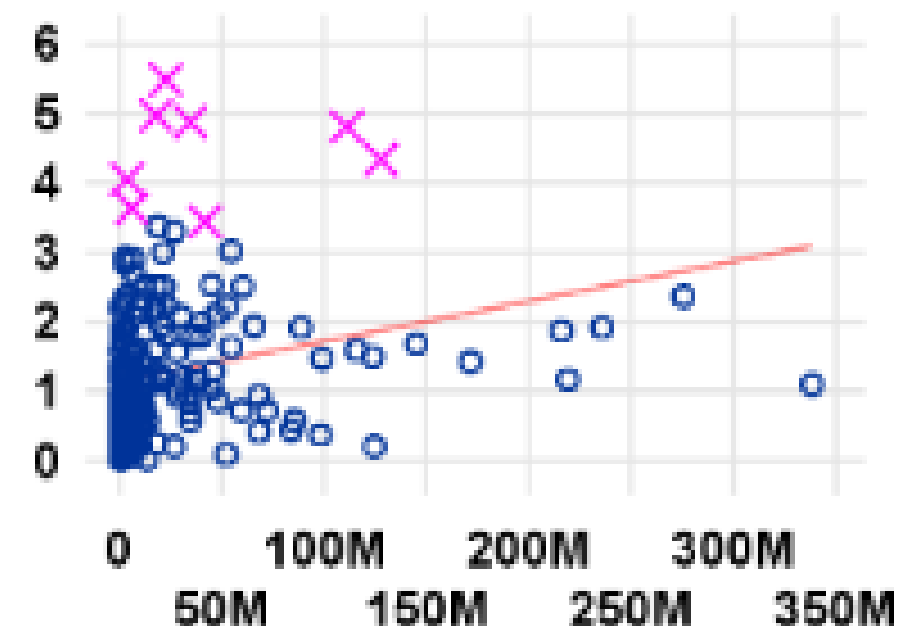
For any plot, its full-size equivalent with mouseover data tips is at the link corresponding to its red plot number title prefix:

[M1](#) [M2](#) [M3](#) [M4](#) [M5](#) [M6](#) [M7](#) [M8](#) [M9](#) [M10](#) [M11](#) [M12](#) [M13](#) [M14](#) [M15](#)

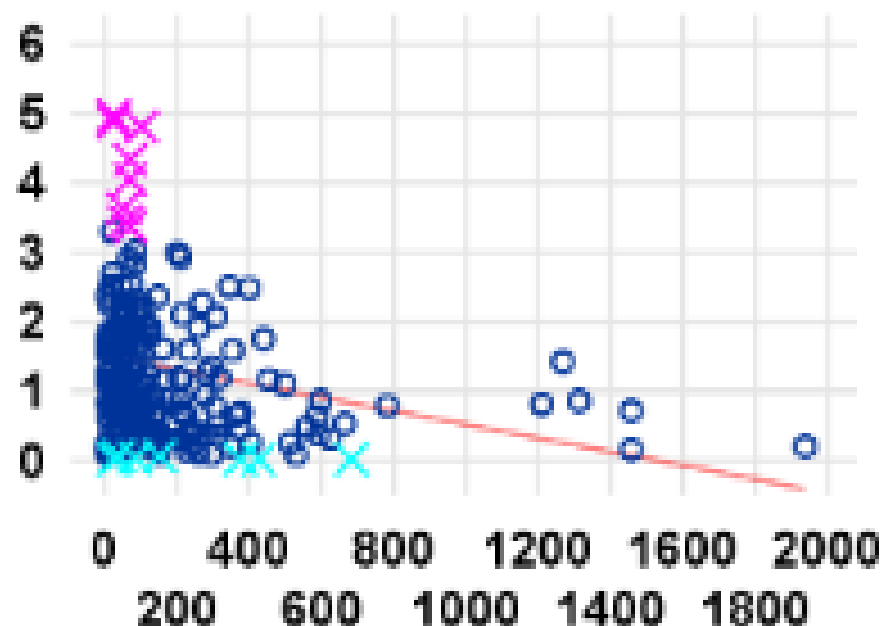


Mortality Rate with Outliers Omitted

M1: Mortality Rate vs
Population (millions) for
226 Countries **Corr:**
0.231



M2: Mortality Rate vs
People Per Sq. Km. for
210 Countries **Corr:**
-0.214



Not shown is the same package of plots as above, but for Total Cases and Total Deaths versus the fifteen other data elements.

There are also other things to do.

Rescale some of the plots, using log-log, log-linear, and linear-log, and to look for non-linear relationships—between rates or counts and the other data.

Use Kendall's tau to prioritize plots for review, to avoid missing non-linear relationships.

COVID-19 Atlas Map Projections

Now:

Default Projection for All

Mercator option for World, North America, Asia, Europe. For other maps, Mercator differs very little from the default.

Next Step: Try to get a projection that is less stretched across the top than the default, but less squashed than Mercator can sometimes be.

Questions, Comments, Suggestions,
and Near-Future Requests
for Data and/or Code Are Welcome

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Strong Smart Systems™
Valparaiso, Indiana, USA

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