Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 25 November 2022 doi:10.20944/preprints202211.0480.v1

Global COVID-19 Pandemic Outcomes: Dissecting a Failed Strategy

James A. Thorp, MD SSM Health System, St. Louis, MO Department of ObGyn and Division of Maternal Fetal Medicine. Gulf Breeze, Florida
Corresponding author jathorp@bellsouth.net, jathorpMFM@gmail.com,

Margery M. Thorp, JD MACP
Law Firm of Margery Thorp Esq PLLC, Gulf Breeze Florida

Elise M. Thorp, BS, FNTP, Private Independent Researcher, Williamston, Michigan

Ajovi Scott-Emuakpor, MD-PhD, Michigan State University, Lansing, Michigan
Department of Pediatrics, Division of Pediatric Oncology and Genetics

K. E. Thorp, MD Sparrow Hospital Lansing, Michigan
Department of Radiology, Division of Interventional Radiology

Abstract

Objectives to assess COVID-19 mortality rates per country population. To determine what if any independent country-specific variables from 9 different databases were correlated.

Design population based retrospective cohort study.

Setting analysis of global COVID-19 treatment and containment strategies using data from 9 worldwide websites.

Participants 108 countries worldwide.

Interventions none.

Main Outcome Measures were COVID-19 death rates per country population analyzed by univariate and multivariate analysis. The main outcome parameters were to determine if there are any correlations between the percentage of countrywide COVID-19 deaths/population by the countries' percent vaccinated. Secondary outcome measures include the effect of other independent variables on COVID-19 death rates per country population including: health expenditures per capita, annual income per capita, COVID-19 tests per 1000 people, stringency index (a measure of each countries containment strategies), hydroxychloroquine score (a measure of each countries use), ivermectin score (a measure of each countries use), hypertension, obesity, diabetes, and specific countries and geographic locations.

Results

COVID-19 vaccination rates ranged from 0-99% in 108 countries. Univariate analysis demonstrates the following independent variables to correlate with COVID-19 deaths/population (correlation coefficient, p value): countrywide COVID-19 vaccination rates (+0.2936, p=0.002); healthcare costs per capita (+0.3212, p=0.0007), income per capita (+0.3051, p=0.0013), COVID-19 tests per 1000 population (+0.6981 p=0.0307); stringency index (+0.3098, p=0.0011); hydroxychloroquine index (-0.1337, p=0.0678); and ivermectin index (-0.1383, p=0.1535).

Conclusions Increasing rates of COVID-19 vaccination are associated with increase COVID-19 death rates per country population (p=0.002). Other variables associated include healthcare costs per capita (+0.3212, p=0.0007), income per capita (+0.3051, p=0.0013), COVID-19 tests per 1000 population (+0.6981 p=0.0307); and stringency index (+0.3098, p=0.0011).

Key Words COVID-19 death rates, COVID-19 vaccines, hydroxychloroquine, ivermectin, rates of COVID-19 testing, containment measures, social distancing, travel restrictions, COVID-19 testing.

James A Thorp MD is the corresponding author jathorp@bellsouth.net, jathorpMFM@gmail.com,

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 25 November 2022 doi:10.20944/preprints202211.0480.v1

Introduction

With global infection rates declining to the lowest levels in over a year, and many countries having discontinued social containment policies which, in many cases, had been in place since 2020, it would appear as though the pandemic is winding down. Since its beginning nearly every facet of the pandemic has been chronicled and subjected to deep analysis in one way or another. Undoubtedly this will be the most thoroughly documented pandemic in history.

Despite such intense scrutiny, analysis of outcomes will ultimately be hampered by lack of valid historical comparisons, both in terms of the unparalleled modern data gathering capacity as well as the unique nature of SARS-CoV-2 causal agent. Given such limitations how is one to draw meaningful conclusions regarding the effectiveness of the global response? What are the take-home lessons? How will the present COVID-19 response be used to guide future pandemic interventions?

Measures were not by any means applied uniformly across the globe. Broad disparities were observed in how individual countries responded to the pandemic based not only upon availability of resources, per capita wealth, composition of the population, but the ability or inclination of sovereign nations to impose and enforce containment strategies. To further complicate matters there were wide variations from country to country in the percent of individuals that ultimately received the vaccines. Finally, there were confounding variables independent of vaccine status, particularly in less developed, socioeconomically disadvantaged nations such as in Africa: namely, the broad use of prophylactic agents such as hydroxychloroquine and ivermectin.

To address such striking incongruities in the pandemic response we identified a host of variables by which to compare global outcomes on a country-by-country basis and subjected obtained data to statistical analysis.

Materials & Methods

To assess outcome variability, we assembled pandemic related data on a country-by-country basis using population size, number of diagnosed COVID-19 cases, and the number of registered deaths, from which we calculated COVID-19 mortality/population. These, in turn, were compared to the percentage of individuals in the population who had been vaccinated. All data was obtained from the Johns Hopkins University Coronavirus Resource Center.[1] Data was collected between August 21 and September 21, 2022.

To evaluate potential confounding factors, we constructed a list of country-specific parameters that could potentially influence or modify outcomes in a particular locale: hypertension rates; obesity rates; diabetes rates; percent of the population >65 years of age; percent of the population <14 years of age; per capita health expenditures per capita; and net annual per capita income. These were obtained from official sources.[2-10]

To evaluate the effectiveness of social containment measures we developed a stringency index based on a binary (0,1) weighting of 11 parameters: mandates, masking, social distancing, curfews, quarantine, business/school closings, banning or limiting public gatherings, lockdowns, travel ban, contact tracing, and PCR testing. The highest possible stringency score was thus 11 while countries with more lax policies were correspondingly lower. Data were obtained via internet search from the 9 websites.[1-10]

To evaluate the potential influence of background hydroxychloroquine and/or ivermectin use we developed an HCQ score and an IVM score based upon a 5-tiered ranking scale: no use (0); sporadic-to-limited use (1); limited-to-moderate use (2) moderate use (3); moderate-to-widespread use (4); country-wide use (5). Data were obtained via internet search.

Finally, as a means of cross-correlating various outcomes with global testing initiatives, we assayed the number of COVID-19 tests per 1000 people on a country-by-country basis.[9]

Statistical analysis was performed using MedCalc® Statistical Software version 20.115 (MedCalc Software Ltd, Ostend, Belgium; https://www.medcalc.org; 2022). Univariate analytics were performed using correlation coefficients. Shapiro-Wilk test is used for determining normal distributions and log transformation was performed when necessary. A forward regression modeling used p values for entry if < 0.05 and removal if $p > 0.10$.

Results

Table 1 notes the descriptive statistics for the final variables in our model. A total of 108 countries were studied. The specific geographic locations were compared to all others by assigning a binary variable (0,1) with 1 assigned to the specific geographic location of interest (country or country groupings) and 0 to all other locations. None of the variables were uniformly distributed as per Shapiro Wilk test ($p < 0.01$) and logarithmic data transformation and non-parametric analysis were explored. There were missing data in only one variable (5 missing, n=103) in the number of COVID-19 tests per 1000 population as this data was not available for 5 countries.

The range of countrywide COVID-19 vaccination rates ranged from 0 to 99% (n=108) with a mean ± 1 standard deviation [SD] of 52.2 ± 0.3. The COVID-19 deaths per population ranged from 0.00001 to 0.653 (n=108) with a mean (± 1 standard deviation [SD]) of 0.1309 ± 0.1413 and was not uniformly distributed ($p<0.01$). Only one country reports a vaccination rate of zero and that is Burundi and their COVID-19 death rate per population was quite low at 0.07 which is at the 5^{th} %ile of all the other countries. For comparative purposes, the 12 countries having the lowest vaccination rates are depicted in Table 2 and the 12 with the highest rates in Table 3.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 25 November 2022 doi:10.20944/preprints202211.0480.v1

Univariate Analysis

Figure 1 depicts a scatter plot of COVID-19 deaths per population by the country's vaccination rates. As the data was not uniform (p<0.01), a log transformation was performed. The correlation coefficient was +0.2936 (n=108, p=0.0020, 95% confidence interval [CI] 0.1108 to 0.4572). The higher the countrywide COVID-19 vaccination rates, the higher the COVID-19 deaths per country population (p=0.0020).

Figure 2 depicts a scatter plot of COVID-19 deaths per country population versus healthcare costs per capita (US dollars). As the data was not uniform (p<0.01), a log transformation was performed. The correlation coefficient was +0.3212 (n=108, p<0.0007, 95% CI 0.1408 to 0.4810). The higher the country's healthcare costs per capita, the higher the COVID-19 deaths per country population (p=0.0007).

Figure 3 depicts a scatter plot of COVID-19 deaths per country population versus annual income per capita (US dollars). As the data was not uniform (p=0.0013), a log transformation was performed. The correlation coefficient was +0.3051 (n=108, p=0.0013, 95% CI 0.1232 to 0.4671). The higher the annual income per capita, the higher the COVID-19 deaths per country population (p=0.0013).

Figure 4 depicts a scatter plot of COVID-19 deaths per country population versus the COVID-19 tests per 1000 population. As the data was not uniform (p<0.01), a log transformation was performed. The correlation coefficient was 0.6981 (n=103, p=0.0307, 95% CI 0.02045 to 0.3906). The higher the countrywide COVID-19 testing, the higher the COVID-19 deaths per country population (p=0.037).

Figure 5 depicts a scatter plot of COVID-19 deaths per population versus stringency index (1-11). As the data was not uniform (p<0.01), a log transformation was performed. The correlation coefficient was +0.1973 (n=108, p=0.047, 95% CI 0.0.008654 to 0.3724). The higher the country's stringency index, the higher the COVID-19 deaths per country population (p=0.047. Stringency index is based upon a binary (0,1) weighting of 11 parameters: mandates, masking, social distancing, curfews, quarantine, business/school closings, banning or limiting public gatherings, lockdowns, travel ban, contact tracing, and PCR testing. The highest possible stringency score was thus 11 while countries with more lax policies were correspondingly lower. Data were obtained via internet search from the 9 websites.[1-10]

Figure 6 depicts a scatter plot of COVID-19 deaths per population versus the hydroxychloroquine (HCQ) index. As the data was not uniform (p<0.01), a log transformation was performed. The correlation coefficient was -0.1337 (n=108, p=0.0678, 95% CI -0.3147 to 0.05672). Higher countrywide HCQ index is associated with lower COVID-19 deaths per country population (p=0.07).

Figure 7 depicts a scatter plot of COVID-19 deaths per population versus the ivermectin (IVM) index. As the data was not uniform (p<0.01), a log transformation was performed. The correlation coefficient was -0.1383 (n=108, p=0.1535, 95% CI -0.3189 to +0.5204).

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 25 November 2022 doi:10.20944/preprints202211.0480.v1

IVM index is trended with lower COVID-19 deaths per country population but was not statistically significant (p=0.1535).

Multivariate Analysis

Table 4 notes the forward regression model used COVID-19 deaths / population as the dependent variable and only two variables were retained (t-value, p value): East Asia (+2.932, 0.041) and Europe (+4.648, <0.0001). The following independent variables were eliminated (enter variable if p<0.05 and remove variable if p>0.1): Africa, Australia, Canada, Japan, Mexico, Middle East, diabetes rate, hypertension rate, obesity rate, Russia, Sweden, USA, Age > 65, Age < 14, India, and Central & South America.

Discussion

The findings of this study demonstrate COVID-19 death rates per population are positively correlated with countrywide COVID-19 vaccination rates (p=0.002); the higher the percentage of a countries' vaccination rate, the higher is the COVID-19 death rate/population. Other positive correlations of secondary measures include healthcare expenditure per capita (p=0.0007), national average income per capita (p=0.0013), rate of COVID-19 testing per 1000 population (p=0.0307), and stringency index (p=0.047).

We undertook this analysis to resolve outstanding questions regarding the efficacy of global pandemic management strategies, namely, social containment measures such as masking and lockdowns, widespread testing measures and the vaccine initiative. We sought to address disparities concerning stated efficacies of these measures in relation to reported global and regional case numbers which, in the end, seem to tell a different story.

One question assumes primacy: how effective was the highly centralized pandemic management strategy and, moreover, is it a viable approach in future pandemics? It should not be overlooked that this is the first pandemic in which widescale orchestrated efforts were implemented. Is the world in better stead because these strategies were employed?

Comparing reported case numbers at three points during the pandemic - early January of 2020 2021, and 2022 - a pattern emerges of unimpeded spread regardless of enacted measures: on January 1, 2020, as the pandemic was emerging (and before data were even available) global case numbers were (perhaps) in the thousands. During the first week of January 2021, after nearly ten months of containment measures, 4,985,723 new cases were reported globally. During the first week of January 2022, after a year of containment measures *and* vaccine initiatives, there were 16,138,104 new cases translating to a 3.2-fold increase. By late-January at the peak of the Omicron surge numbers had skyrocketed even further to 23,205,305 equating to a 4.6X increase (**Figure 8**).[10]

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 25 November 2022 doi:10.20944/preprints202211.0480.v1

Similar trends were seen in the US: in the first week of January 2021 the US tallied 1,667,173 new cases. During the first week of January 2022 these numbers had climbed to 4,682,921, about a 2.8-fold increase. By mid-January the total hit 5,650,958 new cases corresponding to a 3.4-fold increment. Based on such data to even hint of beneficial outcomes related to social containment or mass vaccination is unfounded and in fact may increase the risk of COVID-19 deaths per population. This is corroborated by the findings of this study as evidenced in Figure 5: the higher the countrywide stringency index, the higher were the COVID-19 deaths per country population (p=0.047).

The reasons behind the uncontrolled spread are well established: it is estimated that at least 50% of viral transmission occurs through asymptomatic or pre-symptomatic carriers.[11-18] This is to say that policies intended to curtail viral spread were, from the beginning, doomed to fail. This, in turn, calls into question the value of mass populational testing which, even under optimal circumstances, has a sensitivity of about 80% and, in the real world, no more than 50-60%. These facts argue against testing measures favorably impacting transmission dynamics.[19-22]

A similar case can be made regarding the vaccines. Mass deployment began in early 2021 and by Spring a handful of countries, Israel in particular, were nearing the hypothetical threshold for herd immunity and yet, once the Delta variant emerged, it spread like wildfire independent of a country's vaccine status.[23,24] It was only later recognized that the vaccines don't confer immunity but simply induce short-term protection by stimulating an antibody response. Therefore, booster doses became necessary.[25-33]

Despite an aggressive booster campaign, the same results occurred when the Omicron variant emerged in Fall of 2021. By January 2022 case rates, both globally and in the US, reached the highest levels of the pandemic, far surpassing those at the beginning of 2021 when the vaccines were being rolled out. A large percentage of those infected had received both vaccination and booster jabs. It is difficult to explain these results on any basis other than primary failure of containment and vaccine strategies.[34-36]

The failure to significantly impact pandemic outcomes incriminates top-down centralized management strategies by entities such as WHO and large countries like the US. In March 2020, WHO Director-General Ghebreysus announced “we have a simple message for all countries: test, test, test.” Testing, he claimed, was essential to contain the spread of the virus. But how does a bureaucrat in New York City know what is happening on the ground in Brazil, Indonesia, or Nigeria? The one-size-fits-all pandemic management strategy was an unqualified disaster. The only viable solution is radical decentralization of authority and policymaking.

The African experience is a powerful testament to this approach. For decades throughout Africa widespread use of hydroxychloroquine (HCQ) and chloroquine (CQ) has been a staple for the prevention and treatment of malaria. Not only had their

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 25 November 2022 doi:10.20944/preprints202211.0480.v1

efficacy and safety been empirically well-established but they were cheap and widely available. It seemed inevitable these two agents would figure into the African pandemic strategy until the publication of one study. The findings in this study are consistent with this strategy.

In May 2020 the medical journal *Lancet* published a meta-analysis of 96,000 hospitalized COVID-19 patients from 671 hospitals across the globe claiming that HCQ had no benefit and was associated with increased risk of cardiac arrhythmias and death.[37] The article, however, was fraudulent and subsequently retracted by *Lancet.* But the damage was far-reaching. Not only were several ongoing clinical trials discontinued but, in months to follow, oversight agencies such as the European Medicines Agency (EMA), WHO and FDA issued warnings against their use. These recommendations were met with skepticism on the African continent.[37]

Countries such as Egypt, Zambia, Nigeria, Tunisia, and South Africa chose to continue clinical trials under the support of Africa Centers for Disease Control (ACDC). The director of Nigeria's National Agency for Food and Drug Administration and Control (NAFDAC), Dr. Mojisola Adeyeye, affirmed ongoing support of HCQ and claimed that Nigeria would continue clinical trials despite the WHO warning: "The narrative might change later, but for now, we believe in hydroxychloroquine."[38]

Other countries chose to ignore the edicts. The Economic Community of West African States (ECOWAS) approved HCQ and CQ for the treatment of COVID-19 infection. Ghana's health minister, Kweku Agyeman-Manu, also approved HCQ for widespread use and supported its efficacy. Similarly, Uganda continued its use in conjunction with azithromycin and claimed beneficial results. Djibouti continued to treat all COVID-19 infections with CQ/HCQ and azithromycin. Djibouitian health officials claimed that the death rate was only 0.5% and Dr. Maad Nasser Mohammed, top official of the COVID-19 response center, claimed that the treatment regimen was the main reason for the low death rate.

Algeria also used HCQ for COVID-19 despite the cessation of the WHO-sponsored trials. Mohamed Bekkat, a member of the COVID-19 treatment committee, claimed that thousands of cases had been successfully treated with the HCQ + azithromycin combination with very few undesirable reactions. Moroccan Minister of Health Khalid Ait Taleb vigorously defended its use in COVID-19 infections and claimed Morrocco would continue to use CQ despite warnings from the WHO. Meanwhile, however, as more data has emerged from countries across the globe the efficacy of HCQ and CQ in early COVID-19 infection is widely substantiated.

Dr. Peter McCullough most eloquently communicated this important concept in his now famous "Lesson Learned" Testimony to the Texas State Senate on June 28, 2022.[39] As McCullough emphasized the community standard of care should not emanate from a top-down decree but quite the opposite. Community standard of care should be established at the ground level with experienced, local care providers treating their patients with their own wisdom, due diligence, and their own research. Communication of these grassroots experiences among others then establishes a regional standard.

For decades throughout Africa widespread use of hydroxychloroquine (HCQ) and chloroquine (CQ) has been a staple for the prevention and treatment of malaria. Not only had their efficacy and safety been empirically well-established but they were cheap and widely available. It seemed inevitable these two agents would figure into the African pandemic strategy until the publication of one study. The greater availability of HCQ by country, the less the COVID-19 deaths per country population (-0.1337, p=0.0678).

The centralized statistically based management strategies implemented during the COVID-19 pandemic utterly failed to achieve their stated goals. The socioeconomic and individual consequences of the failed containment strategies such as lockdowns, banning of public gatherings, and business closures far outweighed any possible benefit in terms of loss of life or social well-being. Our analysis demonstrates negative associations between containment strategies, widespread populational testing, mass vaccination and disease outcomes, that is these interventions were associated with more COVID-19 deaths per country population. Evidence suggests that future mass infectious outbreaks would be managed more efficiently and effectively on the ground at regional levels where consequences are most directly felt.[39,40]

Limitations of this study are obvious: the conclusions made in this study are only as reliable as the validity of the data abstracted from the 9 sources that we used to assemble our database.[1-10] There is wide variation in case reporting from country to country and global outcomes could be potentially limited by inconsistencies. Multiple regression analytics may be limited by non-uniform data, collinearity and heteroskedasticity.

References

1) Johns Hopkins Coronovirus Research Center (https://coronavirus.jhu.edu/). (accessed 11/14/2022)

2) World Health Rankings. Live Longer Live better. https://www.worldlifeexpectancy.com/cause-of-death/hypertension/by-country/ (accessed 11/14/2022)

3) Obesity Rates by Country. https://worldpopulationreview.com/country-rankings/obesity-rates-by-country (accessed 11/14/2022)

4) Diabetes Prevalence. https://data.worldbank.org/indicator/SH.STA.DIAB.ZS (accessed 11/08/2022)

5) Population ages 65 and above. https://data.worldbank.org/indicator/SP.POP.65UP.TO.ZS (accessed 11/14/2022)

6) Population ages 0 – 14. https://data.worldbank.org/indicator/SP.POP.0014.TO.ZS (accessed 11/14/2022)

7) Current health expenditure per capita. https://data.worldbank.org/indicator/SH.XPD.CHEX.PC.CD (accessed 11/14/2022)

8) Adjusted net national income income per capita in US dollars ($). https://data.worldbank.org/indicator/NY.ADJ.NNTY.PC.CD (accessed 11/14/2021)

9) Our World in Data. Coronovirus COVID-19 testing. https://ourworldindata.org/coronavirus-testing (accessed 10/31/2022)

10) World Health Organization Coronavirus (COVID-19) Dashboard https://covid19.who.int/ (accessed 11.14.2022)

11) Gao W, Lv J, Pang Y, Li L-M. Role of asymptomatic and pre-symptomatic infections in covid-19 Pandemic. BMJ 2021:375:n2342. https://www.bmj.com/content/375/bmj.n2342

12) Ma Q, Liu J, Liu Q, et al. Global Percentage of Asymptomatic SARS-CoV-2 Infections Among the Tested Population and Individuals with Confirmed COVID-19 Diagnosis: A Systematic Review and Meta-analysis. JAMA Netw Open 2021 Dec; 4(12):e2137257. https://pubmed.ncbi.nlm.nih.gov/34905008/

13) Snider B, Patel B, McBean E. Asymptomatic cases, the hidden challenge in predicting COVID-19 caseload increases. Infect Dis Rep 2021 Apr;13(2):340-47. https://pubmed.ncbi.nlm.nih.gov/33918578/

14) Wong J, Jamaludin SA, Alikhan MF, Chaw L. Asymptomatic transmission of SARS-CoV-2 and implications for mass gatherings Influenza Other Resp Viruses 2020 Sep; 14(5):596-98. https://pubmed.ncbi.nlm.nih.gov/32472601/

15) Johansson MA, Quandelacy TM, Kada S, et al. SARS-CoV-2. Transmission from people without COVID-19 symptoms. JAMA Netw Open 2021; 4(1):e2035057. https://pubmed.ncbi.nlm.nih.gov/33410879/

16) Jennifer Henderson. Most COVID transmission is still asymptomatic. Some 60% of virus spread starts with those who have no symptoms. MedPage Today, May 11, 2020. https://abcnews.go.com/Health/covid-transmission-asymptomatic/story?id=84599810 (accessed 11.14.2022)

17) Oran DP, Topol EJ. The Proportion of SARS-CoV-2 Infections that are asymptomatic: A systematic review. Ann Intern Med 2021 May; 174(9):1344-45. https://pubmed.ncbi.nlm.nih.gov/33481642/

18) Mitch Anderson. Asymptomatic coronavirus infections contribute to over 50% of spread, according to U Chicago study. U Chicago Medicine. https://www.uchicagomedicine.org/forefront/coronavirus-disease-covid-19/asymptomatic-coronavirus-infections-contribute-to-over-50-percent-of-spread (accessed 11.14.2022)

19) Kortela E. Kirjavainen V, Ahava MJ, et al. Real-life clinical sensitivity of SARS-CoV-2 RT-PCR test in symptomatic patients. PLoS One 2021 May;16(5):e0251661. https://pubmed.ncbi.nlm.nih.gov/34019562/

20) Arevalo-Rodriguez I, Buitrago-Garcia D, Simancas-Racines D, et al. False-negative results of initial RT-PCR assays for COVID-19: a systematic review. PLoS One 2020;15(12):e0242958 https://pubmed.ncbi.nlm.nih.gov/33301459/

21) Pecoraro V, Negro A, Pirotti T, Trenti T. Estimate false-negative RT-PCR rates for SARS-CoV-2: a systematic review and meta-analysis. Eur J Ckin Invest 2022 Feb;52(2):e13706. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8646643/

22) Kanji JN, Zelyas N, MacDonald C et al. False-negative rate of COVID-19 PCR testing: a discordant testing analysis. Virol J 2021 Jan;18(1):13. https://www.semanticscholar.org/paper/False-negative-rate-of-COVID-19-PCR-testing%3A-a-Kanji-Zelyas/42a3a7127f5f6532307172900aef456d001c49f3

23) Internal CDC document on breakthrough infections. July 29,2021. https://www.washingtonpost.com/context/cdc-breakthrough-infections/94390e3a-5e45-44a5-ac40-2744e4e25f2e/ (accessed 11.14.2022)

24) Subramanian SV, Kumar A. Increases in COVID-19 are unrelated to levels of vaccination across 68 countries and 2947 counties in the United States. Eur J Epidemiol 2021;36(12):1237-1240. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8481107/

25) Stephanie Nolan. Most of the World's Vaccines Likely Won't Prevent Infection from Omicron. They do seem to offer significant protection against severe illness, but the consequences of rapidly spreading infection worry many public health experts. The New York Times December 19, 2021. https://www.nytimes.com/2021/12/19/health/omicron-vaccines-efficacy.html?auth=login-google1tap&login=google1tap (accessed 11.14.2022).

26) Florentino PTV, Millington T, Cerqueira-Silva T, et al. Vaccine effectiveness of two-dose BNT162b2 against symptomatic and severe COVID-19 adolescents in Brazil and Scotland over time: a test-negative case-control study. Lancet Infect Dis 2022 August; S1473-3099(22)00451-0. https://pubmed.ncbi.nlm.nih.gov/35952702/

27) Ferdinands JM, Rao S, Dixon BE, et al. Waning of vaccine effectiveness against moderate and severe covid-19 among adults in the US from the VISION network: test negative, case-control study. BMJ 2022 Oct;379. https://www.bmj.com/content/379/bmj-2022-072141

28) Patalon T, Saciuk Y, Peretz A, et al. Waning effectiveness of the third dose of the BNT162b2 mRNA COVID-19 vaccine. Nature Communications 2022 Jun; 13:3203 https://www.nature.com/articles/s41467-022-30884-6

29) Mary Van Beusek. Study: Pfizer COVID vaccine efficacy wanes 27 days after dose 2 in teens orn CIDRAP Center for Infectious Disease Research and Policy August 9, 2022 https://www.cidrap.umn.edu/news-perspective/2022/08/study-pfizer-covid-vaccine-efficacy-wanes-27-days-after-dose-2-teens

30) Andrews N, Stowe J, Kirsebom F, et al. COVID-19 vaccine effectiveness against the Omicron (B.1.1.529) variant. NEJM 2022 Apr;386(16):1532-46. https://pubmed.ncbi.nlm.nih.gov/35249272/

31) UK Health Security Agency. COVID-19 vaccine surveillance report. Week 1 January 6, 2022. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1045329/Vaccine_surveillance_report_week_1_2022.pdf

32) Amanatidou E, Gkiouliava A, Pella E, et al. Breakthrough infections after COVID-19 vaccination: Insights, perspectives and challenges. Metabol Open 2022 Mar; 14:100180 https://pubmed.ncbi.nlm.nih.gov/35313532/

33) Wilhelm A, Widera M, Grikscheit K, et al. Reduced Neutralization of SARS-CoV-2 Omicron Variant by Vaccine Sera and monoclonal antibodies. MedRxiv December 8, 2021. https://www.medrxiv.org/content/10.1101/2021.12.07.21267432v2.full.pdf

34) Thorp KE, Thorp JA, Thorp EM. COVID-19 and the Unraveling of Experimental Medicine - Part I. G Med Sci. 2022; 3(1): 015-045.
https://www.doi.org/10.46766/thegms.pubheal.22012306

35) Thorp KE, Thorp JA, Thorp EM. COVID-19 and the Unraveling of Experimental Medicine - Part II. G Med Sci. 2022; 3(1):074-106
https://www.doi.org/10.46766/thegms.pubheal.22022804

36) Thorp KE, Thorp JA, Thorp EM. COVID-19 and the Unraveling of Experimental Medicine - Part III. G Med Sci. 2022; 3(1):118-158.
https://www.doi.org/10.46766/thegms.pubheal.22042302

37) Mehra MR, Desai SS, Ruschitzka F, Patel AN. RETRACTED: Hydroxychloroquine or chloroquine with or without a macrolide for treatment of COVID-19: a multinational registry analysis. Lancet. 2020 May 22:S0140-6736(20)31180-6. doi: 10.1016/S0140-6736(20)31180-6. Epub ahead of print. Retraction in: Lancet. 2020 Jun 5;:null. Erratum in: Lancet. 2020 May 30;: Erratum in: Lancet. 2020 Jul 18;396(10245):e2-e3. PMID: 32450107; PMCID: PMC7255293. https://pubmed.ncbi.nlm.nih.gov/32450107/

38) Belayneh A. Off-Label Use of Chloroquine and Hydroxychloroquine for COVID-19 Treatment in Africa Against WHO Recommendation. Res Rep Trop Med 2020;11:61-72.
https://pubmed.ncbi.nlm.nih.gov/32982538/

39) Dr. Peter McCullough testifies in the Texas State Senate on Health & Human Services: Lessons Learned on Community Standard of Care.
https://zeeemedia.com/interview/dr-peter-mccullough-md-mph-testifies-at-the-texas-senate- (accessed 11.14.2022)

40) Thorp KE, Thorp MM, Thorp EM, Thorp JA. COVID-19 & Disaster Capitalism – Part I. G Med Sci. 2022; 3(1):159-178
https://www.doi.org/10.46766/thegms.medethics.22071901

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 25 November 2022 doi:10.20944/preprints202211.0480.v1

Table 1 Descriptive Statistics for 108 countries.

Variable	Range	Mean ± SD
Africa (0,1)		
Australia (0,1)		
Canada (0,1)		
Central & South America (%)		
East Asia (0,1)		
Europe (0,1)		
India (0,1)		
Japan (0,1)		
Mexico (0,1)		
Middle East (0,1)		
Russia (0,1))		
USA (0,1)		
Population	586634 – 1.412B	50.85M ±144.1M
COVID-19 tests per 1000 population	5 – 21272	1710 ± 3214
COVID-19 Vaccinated (%)	0 - 99	52.2 ± 0.3
COVID-19 cases	7571 – 93.75M	5.280M±11.92M
COVID-19 deaths	38 – 1.04M	55257±139,091
Pop > 65 years (%)	1 - 29	10.1 ± 7.3
Pop < 14 years (%)	12 - 46	26.9 ± 0.1
Net Annual Income per Capita ($)	174 – 64,140	4272 ±15,763
Health Expense per Capita ($)	20 – 10,921	337 ± 2143
Diabetes (%)	1 - 31	8 ± 4.5
Hypertension (%)	1 - 75	16 ± 17
Obesity (%)	2 – 37	19 ± 9
Hydroxychloroquine Score (0 – 5)	0 - 5	2.2 ± 1.9
Ivermectin Score (0 – 5)	0 - 5	1.6 ± 1.9
Stringency Index (0 – 11)	1 - 11	8.9 ± 2.2
COVID-19 deaths / Population (%)	0.007 –0.47	0.07551 ± 0.128
COVID-19 deaths / COVID-19 cases	0.000763 – 0.0784	0.01484 ± 0.01281

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 25 November 2022 doi:10.20944/preprints202211.0480.v1

Table 2 Depicts the 12 HIGHEST COVID-19 vaccination rates by country and includes the COVID-19 death rate per population, COVID-19 testing rate per 1000 population and Healthcare Expenses per annum per capita.

Country	COVID-19 Vaccine Rate	COVID-19 Death Rate per Population	COVID-19 Testing Rate per 1000 Population	Healthcare Expenses per Annum per Capita
United Arab Emirates	99%	0.02	17884	$1843
Qatar	96%	0.023	2818	$1807
Chile	92%	0.315	2040	$1376
New Zealand	91%	0.035	1416	$4211
Portugal	87%	0.24	4160	$2221
Spain	87%	0.24	1962	$2721
Singapore	86%	0.27	1800	$2632
South Korea	86%	0.05	1935	$2625
Australia	85%	0.052	2831	$5427
Peru	85%	0.653	859	$370
Argentina	84%	0.273	810	$946
Vietnam	84%	0.014	881	$181

Table 3 Depicts the 12 LOWEST COVID-19 vaccination rates by country and includes the COVID-19 death rate per population, COVID-19 testing rate per 1000 population and Healthcare Expenses per annum per capita.

Country	COVID-19 Vaccine Rate	COVID-19 Death Rate per Population	COVID-19 Testing Rate per 1000 Population	Healthcare Expenses per Annum per Capita
Burundi	0	0.0700	128	$21
Haiti	2%	0.0300	18	$57
Papua New Guinea	3%	0.0100	25	$65
Madagascar	5%	0.0200	16	$20
Cameroon	5%	0.0200	100	$54
Senegal	7%	0.0200	66	$59
Sudan	10%	0.086	12	$23
Gabon	12%	0.0800	12	$215
Malawi	12%	0.0100	683	$30
Somalia	13%	0.0300	30	$22
Nigeria	14%	0.0500	29	$71
South Sudan	14%	0.0100	25	$23

 doi:10.20944/preprints202211.0480.v1

Table 4 Forward regression model used COVID-19 deaths / population as the dependent variable. The following independent variables were eliminated from this model with enter variable if $p<0.05$ and remove variable if $p>0.1$: Africa, Australia, Canada, Japan, Mexico, Middle East, diabetes rate, hypertension rate, obesity rate, Russia, Sweden, USA, Age > 65, Age < 14, India, and Central & South America.

Independent Variables	Coefficient	Standard Error	t-value	p value
Constant	0.03807			
East Asia (0,1)	0.1569	0.05352	2.932	.0041
Europe (0,1)	0.1207	0.02597	4.648	<0.0001

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 25 November 2022 doi:10.20944/preprints202211.0480.v1

Figure 1 depicts a scatter plot of COVID-19 deaths per population by the country's vaccination rates. As the data was not uniform (p<0.01), a log transformation was performed. The correlation coefficient was +0.2936 (n=108, p=0.0020, 95% confidence interval [CI] 0.1108 to 0.4572). The higher the countrywide COVID-19 vaccination rates, the higher the COVID-19 deaths per country population (p=0.002).

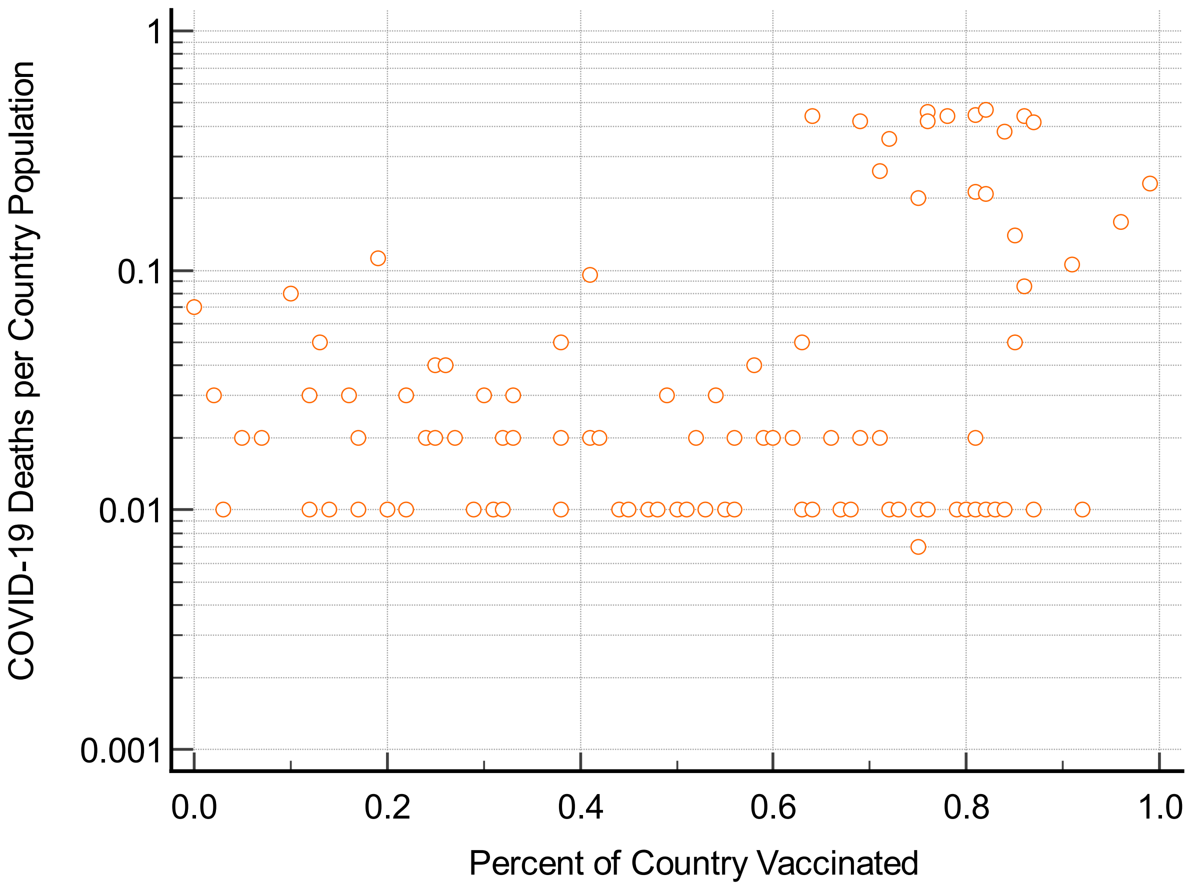
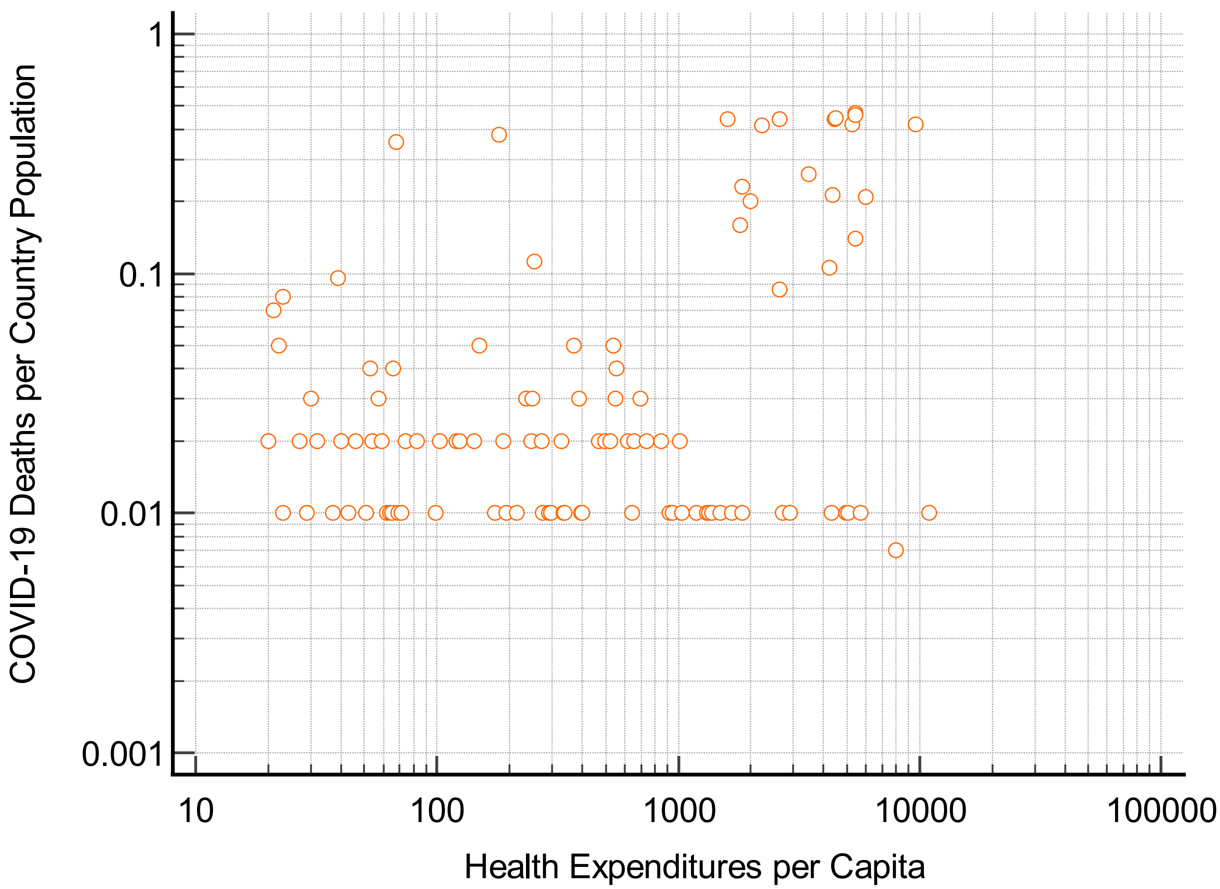


Figure 2 depicts a scatter plot of COVID-19 deaths per country population versus healthcare costs per capita (US dollars). As the data was not uniform ($p<0.01$), a log transformation was performed. The correlation coefficient was +0.3212 (n=108, p=0.0007, 95% CI 0.1408 to 0.4810). The higher the country's healthcare costs per capita, the higher the COVID-19 deaths per country population (p=0.0007).



Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 25 November 2022 doi:10.20944/preprints202211.0480.v1

Figure 3 depicts a scatter plot of COVID-19 deaths per country population versus annual income per capita (US dollars). As the data was not uniform (p=0.0013), a log transformation was performed. The correlation coefficient was +0.3051 (n=108, p=0.0013, 95% CI 0.1232 to 0.4671). The higher the annual income per capita, the higher the COVID-19 deaths per country population (p=0.0013).

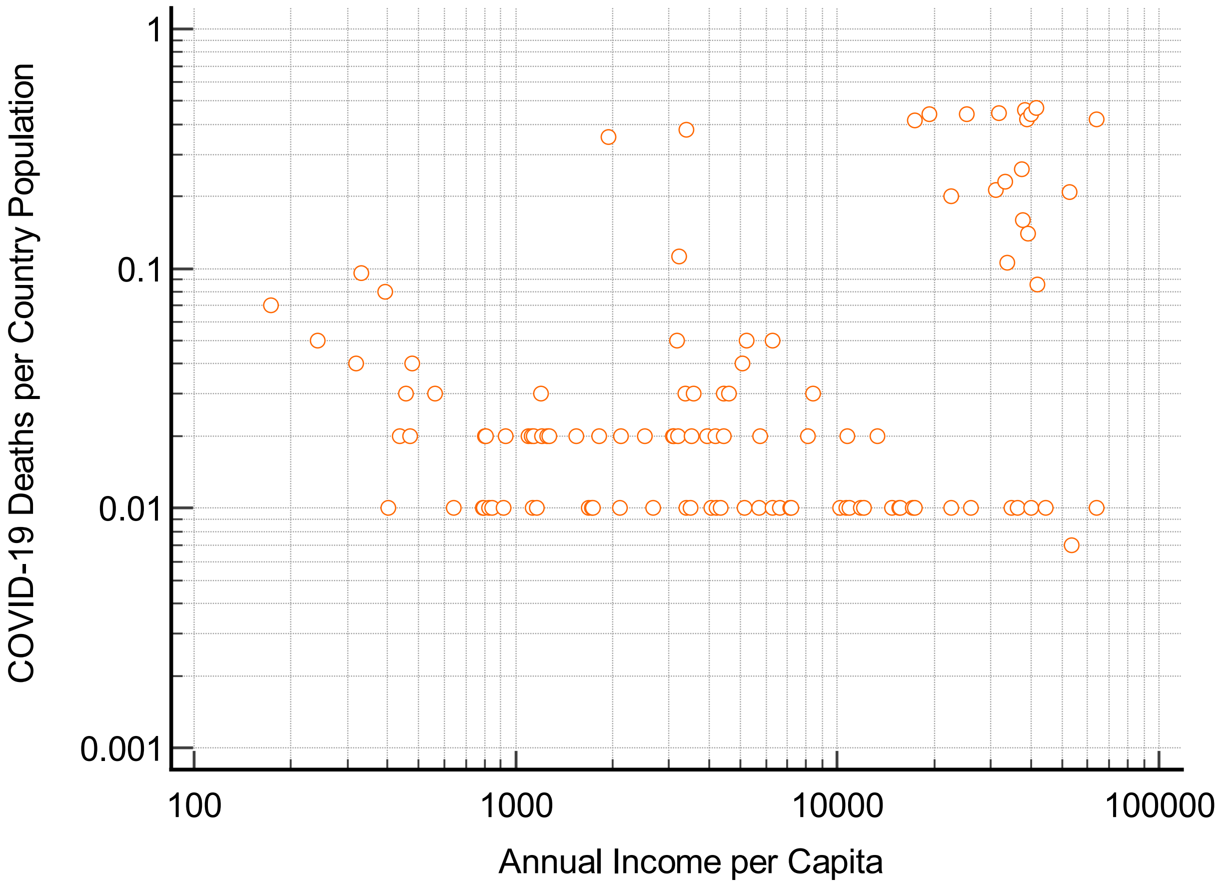


Figure 4 depicts a scatter plot of COVID-19 deaths per country population versus the COVID-19 tests per 1000 population. As the data was not uniform (p<0.01), a log transformation was performed. The correlation coefficient was +0.6981 (n=103, p=0.0307, 95% CI 0.02045 to 0.3906). The higher the countrywide COVID-19 testing, the higher the COVID-19 deaths per country population (p=0.037).

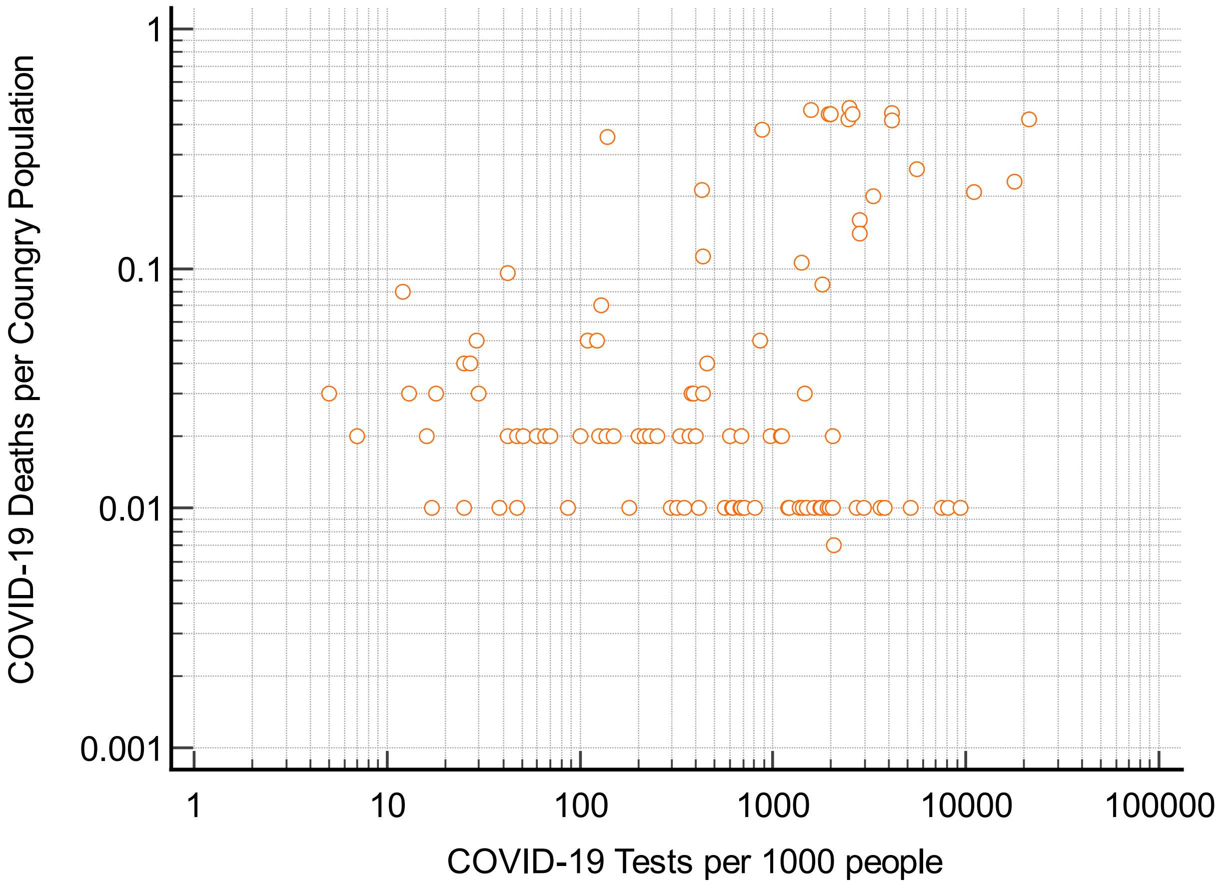
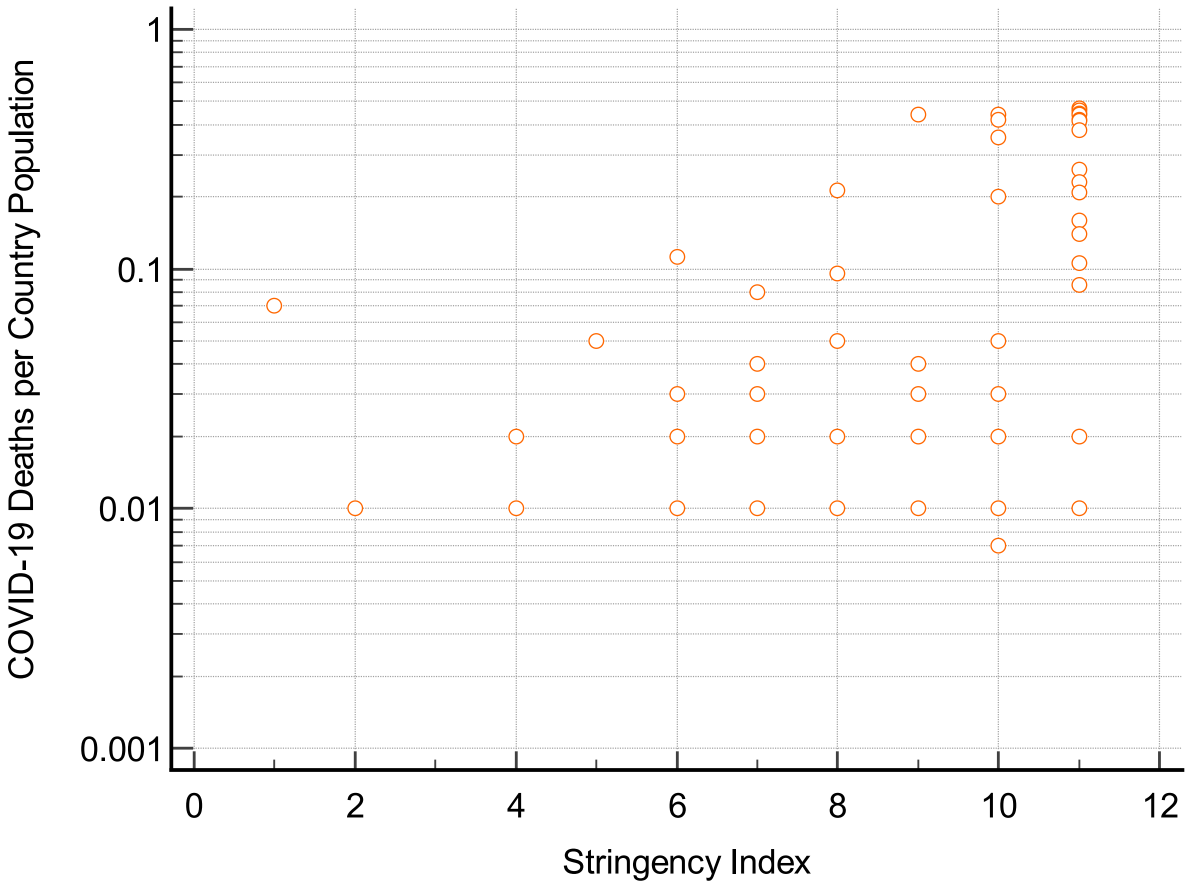
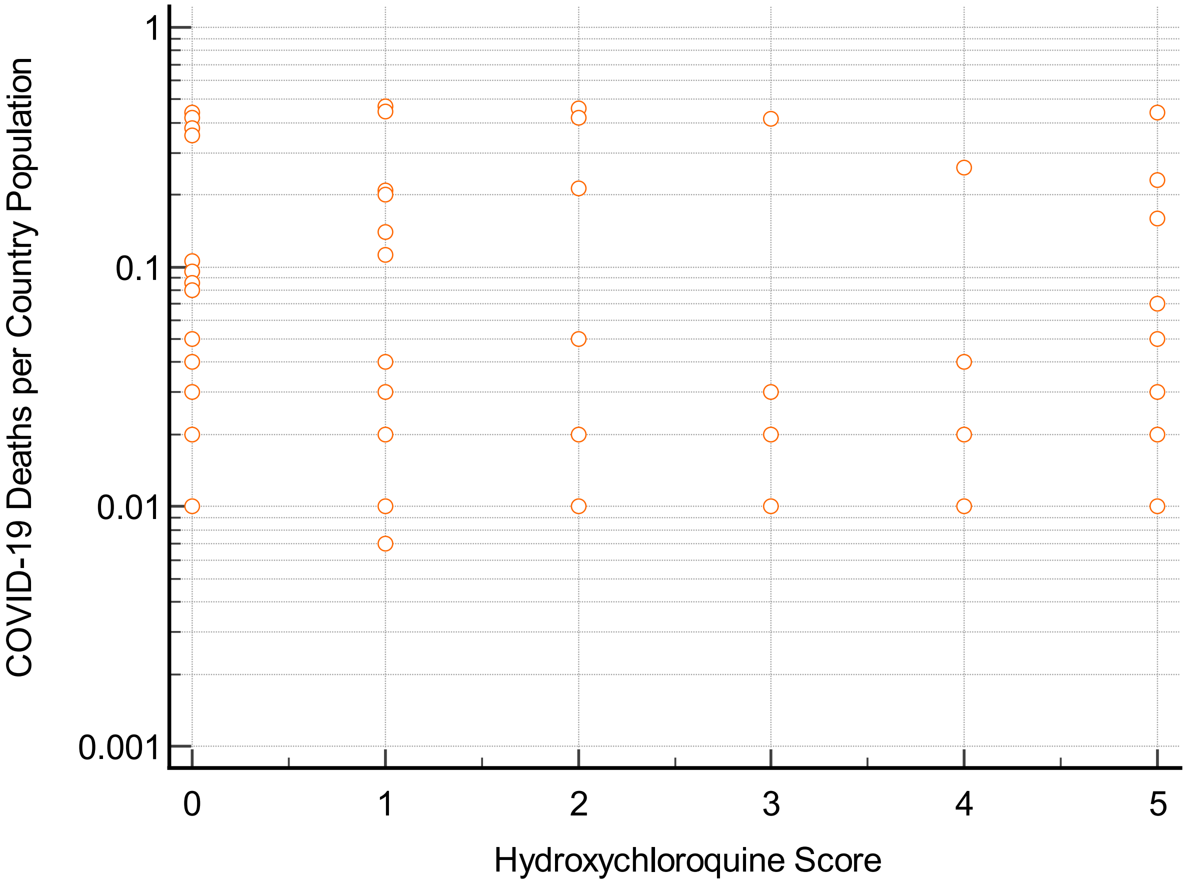


Figure 5 depicts a scatter plot of COVID-19 deaths per population versus stringency index (1-11). As the data was not uniform (p<0.01), a log transformation was performed. The correlation coefficient was +0.1973 (n=108, p=0.047, 95% CI 0.0.008654 to 0.3724). The higher the country's stringency index, the higher the COVID-19 deaths per country population (p=0.047). Stringency index is based upon a binary (0,1) weighting of 11 parameters: mandates, masking, social distancing, curfews, quarantine, business/school closings, banning or limiting public gatherings, lockdowns, travel ban, contact tracing, and PCR testing. The highest possible stringency score was thus 11 while countries with more lax policies were correspondingly lower. Data were obtained via internet search from the 9 websites.[1-10]



Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 25 November 2022 doi:10.20944/preprints202211.0480.v1

Figure 6 depicts a scatter plot of COVID-19 deaths per population versus the hydroxychloroquine (HCQ) index. As the data was not uniform (p<0.01), a log transformation was performed. The correlation coefficient was -0.1337 (n=108, p=0.0678, 95% CI -0.3147 to 0.05672). Higher countrywide HCQ index is associated with lower COVID-19 deaths per country population (p=0.0678).



 doi:10.20944/preprints202211.0480.v1

Figure 7 depicts a scatter plot of COVID-19 deaths per population versus the ivermectin (IVM) index. As the data was not uniform (p<0.01), a log transformation was performed. The correlation coefficient was -0.1383 (n=108, p=0.1535, 95% CI -0.3189 to +0.5204). IVM index is trended with lower COVID-19 deaths per country population but was not statistically significant (p=0.1535).

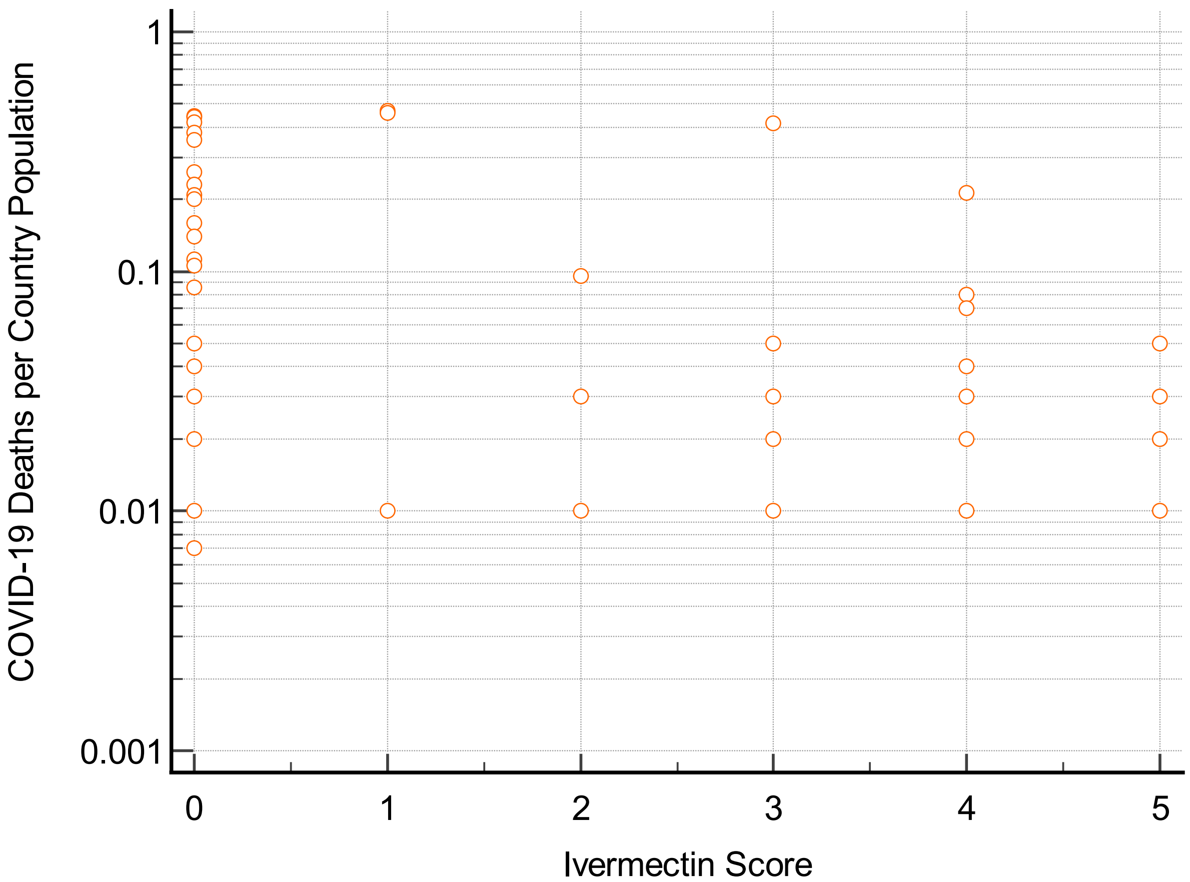


Figure 8 depicts global monthly global cases of COVID-19 and the monthly COVID-19 deaths from the World Health Organization.