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Global Implication of Differential Impacts of Covid-19 on Different Countries Using the USA as A Comparism Factor.

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Abstract
Coronavirus disease 2019 (COVID-19) is a contagious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first known case was identified in Wuhan, China, in December 2019. The disease has since spread worldwide, leading to an ongoing pandemic. The aim of this study is to Understand the dynamics of differential impacts of covid-19 on different countries using the USA as a comparism factor. Data from one hundred and fourty nine countries were selected based on their continents, countries and cases of infection. Data were obtained from United Nations Geoscheme and WHO. They were analyzed and compared to that of the United State of America (USA) value.Data analyzed showed that most Africa countries are least to be affected. Data further revealed that many countries have been able to understand and manage the spread and infectivity of the virus compared to the USA compare to earlier days of the disease. Also many countries have been able to improve on managing the infection. The study suggests that Africa, may have better immunity for the virus, there seems to be improvement the management of disease by developed countries.

Keyword: *Africa, USA, COVID-19, countries, continent*

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I. Introduction

Coronaviruses are members of the subfamily Orthocoronavirinae, in the family Coronaviridae, order Nidovirales, and realm Riboviria [1]. They are enveloped viruses with a positivesense single-stranded RNA genome and a nucleocapsid of helical symmetry [2]. Coronaviridae is generally considered to contain two genera, Corona virus and Toro virus, which differ in nucleocapsid morphology, the former being helical and the latter being tubular [3]. Corona viruses are important agents of gastrointestinal disease in humans, poultry, and bovines. In humans, a species known as SARS corona virus (or Severe acute respiratory syndrome corona virus) causes a highly contagious respiratory disease that is characterized by symptoms of fever, cough, and muscle ache, often with progressive difficulty in breathing. The virus emerged in humans in 2002; it likely jumped to humans from an animal reservoir, believed to be horseshoe bats [4,5,6]. All viruses – including SARS-CoV-2, the virus that causes COVID-19 – evolve over time. When a virus replicates or makes copies of itself, it sometimes changes a little bit, which is normal for a virus. These changes are called "mutations". A virus with one or more new mutations is referred to as a "variant" of the original virus [8].

The virus can spread from an infected person's mouth or nose in small liquid particles when they cough, sneeze, speak, sing or breathe. These particles range from larger respiratory droplets to smaller aerosols. It is important to practice respiratory etiquette, for example by coughing into a flexed elbow, and to stay home and self-isolate until you recover if you feel unwell [9].

Viruses constantly change through mutation, and new variants of a virus are expected to occur over time. Sometimes new variants emerge and disappear. Other times, new variants emerge and persist[10]. Multiple variants of the virus that causes COVID-19 have been documented in the United States and globally during this pandemic. In the United Kingdom (UK), a new variant has emerged with an unusually large number of mutations. In South Africa, another variant has emerged independently of the variant detected in the UK. Another variant recently emerged in Nigeria [11,12]. The number of new COVID-19 cases in the months of July and August, 2020, declined rapidly. Delta variant was found to be more infectious and was leading to increased transmissibility when compared with other variants, even in some vaccinated individuals. [13,14]. The second

wave of the disease has been a focus of concern due to change in weather and mutated strain of the virus discovered in some countries. There is the need to understand this surge with the virulent and spreading ability of the newly mutated strain of the virus. The aim of this study is to Understand the dynamics of differential impacts of covid-19 on different countries using the USA as a comparism factor.

II. Material and Method

A total of one hundred and fourty (149) countries from different continent and regions of the world were selected from different continents and based on COVID-19 cases in each country. The list of countries and territories with their continental regional classification is based on the United Nations Geoscheme and WHO. Sources and data used were provided under Latest Updates from WHO/World meter's on September 23, 2021 [15]. Data obtained for each country was analyzed and compared to that of the United State of America (USA). USA was used as a Comparism Factor (CF) because it has one of the best healthcare systems in the world and highest COVID-19 cases in the world. Subsequent examination of associations between the proportion of COVID-19 cases, recovery and deaths of each country to the United State of America was carried out. All data used in these analyses are from publicly available data sets.

Statistical analysis

Parameters such as total incidences/cases, total deaths and total recovered of countries were compared against factors obtained for USA. Bivariate analysis was done with Chi-square test to compare proportions for variables. In reporting these results, country-level characteristics are scaled to represent a comparison of two countries similar in all other respects. Thus, rate ratios greater than one means that higher levels of a given characteristic are associated with higher rates of COVID-19 cases or deaths, while rate ratios less than one means that lower levels of a given characteristic are associated with lower rates of COVID-19 cases or deaths.

III. Result

America and Europe have the most infection to population ratio. Result also showed most countries of the world have considerable number of affected citizens. When compared to USA, African countries are the least affected, followed by Asian countries. Americans and Europeans are most affected when compare to the comparism factor of USA in cases and deaths.

Table 1: Infectious, recovery and mortality rate of COVID-19 based on country

#	Country, Other	Total Cases (A)	Total Deaths (B)	Population (D)	% of A to D (E)	% of A to D (F)	E/13.02 (CF1)	F/0.210 (CF2)
1	USA	43,417,209	699,878	333,378,983	**13.02**	**0.210**	**1.00**	**1.00**
2	Afghanistan	154,960	7,198	39,998,750	**0.39**	**0.018**	**0.03**	**0.09**
3	Albania	165,096	2,601	2,873,947	**5.74**	**0.091**	**0.44**	**0.43**
4	Algeria	202,122	5,739	44,818,600	**0.45**	**0.013**	**0.03**	**0.06**
5	Angola	53,387	1,434	34,112,564	**0.16**	**0.004**	**0.01**	**0.02**
6	Argentina	5,245,265	114,684	45,703,280	**11.48**	**0.251**	**0.88**	**1.19**
7	Armenia	255,648	5,200	2,970,027	**8.61**	**0.175**	**0.66**	**0.83**
8	Australia	92,204	1,196	25,861,803	**0.36**	**0.005**	**0.03**	**0.02**
9	Austria	730,403	10,943	9,069,314	**8.05**	**0.121**	**0.62**	**0.57**
10	Azerbaijan	477,587	6,394	10,251,013	**4.66**	**0.062**	**0.36**	**0.30**
11	Bahamas	20,288	512	397,842	**5.10**	**0.129**	**0.39**	**0.61**
12	Bahrain	274,524	1,388	1,773,628	**15.48**	**0.078**	**1.19**	**0.37**
13	Bangladesh	1,548,320	27,337	166,696,957	**0.93**	**0.016**	**0.07**	**0.08**
14	Belgium	1,229,236	25,533	11,651,387	**10.55**	**0.219**	**0.81**	**1.04**
15	Bolivia	497,984	18,681	11,867,733	**4.20**	**0.157**	**0.32**	**0.75**
16	Bosnia and Herzegovina	230,212	10,379	3,255,800	**7.07**	**0.319**	**0.54**	**1.52**
17	Botswana	173,788	2,354	2,409,624	**7.21**	**0.098**	**0.55**	**0.47**
18	Brazil	21,283,567	592,357	214,408,955	**9.93**	**0.276**	**0.76**	**1.32**

19	Bulgaria	487,588	20,251	6,884,311	**7.08**	**0.294**	**0.54**	**1.40**
20	Burkina Faso	14,092	178	21,602,473	**0.07**	**0.001**	**0.01**	**0.00**
21	Burundi	16,356	38	12,322,598	**0.13**	**0.000**	**0.01**	**0.00**
22	Cabo Verde	37,240	332	563,375	**6.61**	**0.059**	**0.51**	**0.28**
23	Cambodia	106,619	2,176	17,001,900	**0.63**	**0.013**	**0.05**	**0.06**
24	Cameroon	85,414	1,368	27,352,294	**0.31**	**0.005**	**0.02**	**0.02**
25	Canada	1,589,602	27,537	38,147,124	**4.17**	**0.072**	**0.32**	**0.34**
26	CAR	11,340	100	4,932,387	**0.23**	**0.002**	**0.02**	**0.01**
27	Caribbean Netherlands	1,988	18	26,521	**7.50**	**0.068**	**0.58**	**0.32**
28	Chad	5,030	174	17,000,692	**0.03**	**0.001**	**0.00**	**0.00**
29	Chile	1,649,409	37,410	19,317,020	**8.54**	**0.194**	**0.66**	**0.92**
30	China	95,894	4,636	**1,439,323,776**	**0.01**	**0.000**	**0.00**	**0.00**
31	Colombia	4,945,203	126,006	51,546,410	**9.59**	**0.244**	**0.74**	**1.16**
32	Congo	14,014	191	5,683,854	**0.25**	**0.003**	**0.02**	**0.02**
33	Costa Rica	515,931	6,128	5,151,042	**10.02**	**0.119**	**0.77**	**0.57**
34	Croatia	396,470	8,554	4,074,230	**9.73**	**0.210**	**0.75**	**1.00**
35	Cuba	832,286	7,048	11,318,145	**7.35**	**0.062**	**0.56**	**0.30**
36	Cyprus	117,508	548	1,218,117	**9.65**	**0.045**	**0.74**	**0.21**
37	Czechia	1,687,973	30,448	10,733,317	**15.73**	**0.284**	**1.21**	**1.35**
38	Denmark	355,944	2,638	5,817,182	**6.12**	**0.045**	**0.47**	**0.22**
39	DRC	56,463	1,068	92,881,057	**0.06**	**0.001**	**0.00**	**0.01**
40	Ecuador	507,020	32,666	17,970,578	**2.82**	**0.182**	**0.22**	**0.87**
41	Egypt	298,988	17,043	104,692,511	**0.29**	**0.016**	**0.02**	**0.08**
42	Equatorial Guinea	11,544	140	1,459,156	**0.79**	**0.010**	**0.06**	**0.05**
43	Eritrea	6,680	41	3,606,440	**0.19**	**0.001**	**0.01**	**0.01**
44	Ethiopia	336,762	5,254	118,438,978	**0.28**	**0.004**	**0.02**	**0.02**
45	Fiji	50,447	583	904,396	**5.58**	**0.064**	**0.43**	**0.31**
46	Finland	138,068	1,062	5,551,264	**2.49**	**0.019**	**0.19**	**0.09**
47	France	6,971,493	116,309	65,450,425	**10.65**	**0.178**	**0.82**	**0.85**
48	Gabon	28,726	178	2,289,843	**1.25**	**0.008**	**0.10**	**0.04**
49	Gambia	9,900	334	2,499,477	**0.40**	**0.013**	**0.03**	**0.06**
50	Georgia	602,065	8,711	3,979,784	**15.13**	**0.219**	**1.16**	**1.04**
51	Germany	4,178,841	93,798	84,112,045	**4.97**	**0.112**	**0.38**	**0.53**
52	Ghana	125,830	1,130	31,865,092	**0.39**	**0.004**	**0.03**	**0.02**
53	Greece	638,921	14,575	10,360,645	**6.17**	**0.141**	**0.47**	**0.67**
54	Guinea	30,318	375	13,567,355	**0.22**	**0.003**	**0.02**	**0.01**
55	Guinea-Bissau	6,093	133	2,024,780	**0.30**	**0.007**	**0.02**	**0.03**
56	Haiti	21,453	607	11,572,547	**0.19**	**0.005**	**0.01**	**0.02**
57	Honduras	361,527	9,627	10,097,167	**3.58**	**0.095**	**0.27**	**0.45**
58	Hong Kong	12,170	213	7,571,422	**0.16**	**0.003**	**0.01**	**0.01**
59	Hungary	819,547	30,145	9,630,289	**8.51**	**0.313**	**0.65**	**1.49**
60	Iceland	11,594	33	343,954	**3.37**	**0.010**	**0.26**	**0.05**
61	India	33,592,214	446,373	1,396,605,602	**2.41**	**0.032**	**0.18**	**0.15**
62	Indonesia	4,201,559	141,114	277,062,241	**1.52**	**0.051**	**0.12**	**0.24**

63	Iran	5,493,591	118,508	85,307,775	**6.44**	**0.139**	**0.49**	**0.66**
64	Iraq	1,987,352	21,993	41,324,516	**4.81**	**0.053**	**0.37**	**0.25**
65	Ireland	379,366	5,209	5,005,261	**7.58**	**0.104**	**0.58**	**0.50**
66	Israel	1,253,724	7,602	**9,326,000**	**13.44**	**0.082**	**1.03**	**0.39**
67	Italy	4,649,906	130,551	60,352,883	**7.70**	**0.216**	**0.59**	**1.03**
68	Ivory Coast	59,408	583	27,175,466	**0.22**	**0.002**	**0.02**	**0.01**
69	Jamaica	80,959	1,803	2,976,994	**2.72**	**0.061**	**0.21**	**0.29**
70	Japan	1,683,965	17,319	126,001,938	**1.34**	**0.014**	**0.10**	**0.07**
71	Jordan	817,487	10,645	10,327,070	**7.92**	**0.103**	**0.61**	**0.49**
72	Kazakhstan	870,059	10,913	19,051,428	**4.57**	**0.057**	**0.35**	**0.27**
73	Kenya	247,358	5,018	55,217,541	**0.45**	**0.009**	**0.03**	**0.04**
74	Kuwait	411,316	2,442	4,347,788	**9.46**	**0.056**	**0.73**	**0.27**
75	Latvia	152,693	2,669	1,860,620	**8.21**	**0.143**	**0.63**	**0.68**
76	Lebanon	619,950	8,253	6,787,979	**9.13**	**0.122**	**0.70**	**0.58**
77	Lesotho	14,395	403	2,163,034	**0.67**	**0.019**	**0.05**	**0.09**
78	Liberia	5,915	283	5,202,793	**0.11**	**0.005**	**0.01**	**0.03**
79	Libya	335,055	4,569	6,985,552	**4.80**	**0.065**	**0.37**	**0.31**
80	Lithuania	321,243	4,866	2,675,688	**12.01**	**0.182**	**0.92**	**0.87**
81	Luxembourg	77,552	835	638,426	**12.15**	**0.131**	**0.93**	**0.62**
82	Madagascar	42,898	958	28,559,671	**0.15**	**0.003**	**0.01**	**0.02**
83	Malawi	61,433	2,268	19,733,126	**0.31**	**0.011**	**0.02**	**0.05**
84	Malaysia	2,142,924	24,565	32,873,164	**6.52**	**0.075**	**0.50**	**0.36**
85	Maldives	84,017	229	552,178	**15.22**	**0.041**	**1.17**	**0.20**
86	Mali	15,103	547	20,962,172	**0.07**	**0.003**	**0.01**	**0.01**
87	Malta	37,048	456	442,983	**8.36**	**0.103**	**0.64**	**0.49**
88	Mauritius	14,863	60	1,274,353	**1.17**	**0.005**	**0.09**	**0.02**
89	Mexico	3,597,168	273,391	130,590,080	**2.75**	**0.209**	**0.21**	**1.00**
90	Morocco	925,507	14,076	37,445,704	**2.47**	**0.038**	**0.19**	**0.18**
91	Mozambique	150,280	1,906	32,323,504	**0.46**	**0.006**	**0.04**	**0.03**
92	Myanmar	453,407	17,343	54,856,313	**0.83**	**0.032**	**0.06**	**0.15**
93	Namibia	127,035	3,478	2,597,131	**4.89**	**0.134**	**0.38**	**0.64**
94	Nepal	788,769	11,072	29,777,166	**2.65**	**0.037**	**0.20**	**0.18**
95	Netherlands	1,991,628	18,144	17,181,311	**11.59**	**0.106**	**0.89**	**0.50**
96	New Zealand	4,135	27	**5,002,100**	**0.08**	**0.001**	**0.01**	**0.00**
97	Nicaragua	13,730	203	6,720,961	**0.20**	**0.003**	**0.02**	**0.01**
98	Niger	5,971	201	25,273,829	**0.02**	**0.001**	**0.00**	**0.00**
99	Nigeria	203,081	2,666	212,375,017	**0.10**	**0.001**	**0.01**	**0.01**
100	North Macedonia	188,113	6,511	2,083,269	**9.03**	**0.313**	**0.69**	**1.49**
101	Oman	303,551	4,093	5,265,111	**5.77**	**0.078**	**0.44**	**0.37**
102	Pakistan	1,232,595	27,432	226,132,029	**0.55**	**0.012**	**0.04**	**0.06**
103	Palestine	390,369	3,968	5,246,184	**7.44**	**0.076**	**0.57**	**0.36**
104	Panama	465,147	7,183	4,397,796	**10.58**	**0.163**	**0.81**	**0.78**
105	Papua New Guinea	19,182	217	9,154,083	**0.21**	**0.002**	**0.02**	**0.01**
106	Paraguay	459,720	16,138	7,239,699	**6.35**	**0.223**	**0.49**	**1.06**

107	Peru	2,169,427	199,108	33,533,482	**6.47**	**0.594**	**0.50**	**2.83**
108	Philippines	2,434,753	37,405	111,364,692	**2.19**	**0.034**	**0.17**	**0.16**
109	Poland	2,900,862	75,537	37,795,820	**7.68**	**0.200**	**0.59**	**0.95**
110	Portugal	1,064,876	17,938	10,160,271	**10.48**	**0.177**	**0.80**	**0.84**
111	Qatar	235,907	604	**2,807,805**	**8.40**	**0.022**	**0.64**	**0.10**
112	Romania	1,172,981	35,964	19,080,351	**6.15**	**0.188**	**0.47**	**0.90**
113	Russia	7,354,995	201,445	146,011,125	**5.04**	**0.138**	**0.39**	**0.66**
114	Rwanda	96,023	1,226	13,344,061	**0.72**	**0.009**	**0.06**	**0.04**
115	S. Korea	292,699	2,427	51,323,238	**0.57**	**0.005**	**0.04**	**0.02**
116	Sao Tome and Principe	3,192	46	224,131	**1.42**	**0.021**	**0.11**	**0.10**
117	Saudi Arabia	546,792	8,684	35,476,650	**1.54**	**0.024**	**0.12**	**0.12**
118	Senegal	73,706	1,853	17,282,277	**0.43**	**0.011**	**0.03**	**0.05**
119	Serbia	893,023	7,926	8,694,233	**10.27**	**0.091**	**0.79**	**0.43**
120	Sierra Leone	6,393	121	8,175,119	**0.08**	**0.001**	**0.01**	**0.01**
121	Singapore	81,356	68	5,906,657	**1.38**	**0.001**	**0.11**	**0.01**
122	Slovakia	405,931	12,592	5,462,882	**7.43**	**0.231**	**0.57**	**1.10**
123	Slovenia	287,278	4,521	2,079,288	**13.82**	**0.217**	**1.06**	**1.04**
124	Solomon Islands	20		707,442	**0.00**	**0.000**	**0.00**	**0.00**
125	Somalia	19,235	1,079	16,434,065	**0.12**	**0.007**	**0.01**	**0.03**
126	South Africa	2,889,298	86,500	60,223,249	**4.80**	**0.144**	**0.37**	**0.68**
127	South Sudan	11,861	121	11,354,257	**0.10**	**0.001**	**0.01**	**0.01**
128	Spain	4,943,855	86,185	46,776,965	**10.57**	**0.184**	**0.81**	**0.88**
129	Sudan	38,077	2,881	45,099,076	**0.08**	**0.006**	**0.01**	**0.03**
130	Sweden	1,148,641	14,772	10,176,359	**11.29**	**0.145**	**0.87**	**0.69**
131	Switzerland	831,880	11,043	8,732,094	**9.53**	**0.126**	**0.73**	**0.60**
132	Syria	31,426	2,158	18,019,550	**0.17**	**0.012**	**0.01**	**0.06**
133	Taiwan	16,168	841	23,869,578	**0.07**	**0.004**	**0.01**	**0.02**
134	Tanzania	1,367	50	61,809,309	**0.00**	**0.000**	**0.00**	**0.00**
135	Thailand	1,524,613	15,884	70,014,501	**2.18**	**0.023**	**0.17**	**0.11**
136	Togo	24,902	216	8,515,582	**0.29**	**0.003**	**0.02**	**0.01**
137	Trinidad and Tobago	49,111	1,432	1,405,038	**3.50**	**0.102**	**0.27**	**0.49**
138	Tunisia	702,503	24,654	11,969,921	**5.87**	**0.206**	**0.45**	**0.98**
139	Turkey	6,932,453	62,307	85,449,351	**8.11**	**0.073**	**0.62**	**0.35**
140	UAE	733,972	2,083	10,036,566	**7.31**	**0.021**	**0.56**	**0.10**
141	Uganda	122,591	3,137	47,501,802	**0.26**	**0.007**	**0.02**	**0.03**
142	UK	7,565,867	135,803	68,322,636	**11.07**	**0.199**	**0.85**	**0.95**
143	Ukraine	2,370,425	55,284	43,411,651	**5.46**	**0.127**	**0.42**	**0.61**
144	Uruguay	388,068	6,049	3,488,473	**11.12**	**0.173**	**0.85**	**0.83**
145	Venezuela	358,462	4,346	28,337,197	**1.26**	**0.015**	**0.10**	**0.07**
146	Vietnam	728,435	18,017	98,410,349	**0.74**	**0.018**	**0.06**	**0.09**
147	Yemen	8,789	1,658	30,628,062	**0.03**	**0.005**	**0.00**	**0.03**
148	Zambia	208,715	3,641	19,011,936	**1.10**	**0.019**	**0.08**	**0.09**
149	Zimbabwe	128,804	4,592	15,127,461	**0.85**	**0.030**	**0.07**	**0.14**

Sources and data used were provided under Latest Updates from WHO/World meter's on September 23, 2021
Figures obtained for USA were used as the comparism factor (CF), which is a ratio of figure obtained to the respective country
population divided by the value obtained for USA.
Values of CF1 and CF2 represent case/incidence and mortality index.
Factor of more than 1 = very high infection and mortality index
Factor of approximately 1 = high infection and mortality index
Factor of ≤1 but ≥0.5 = moderately high infection and mortality index
Factor of ≤ 0.5 but ≥ 0.1 = low infection and mortality index
Factor of <0.1 = very low infection, mortality and recovery index

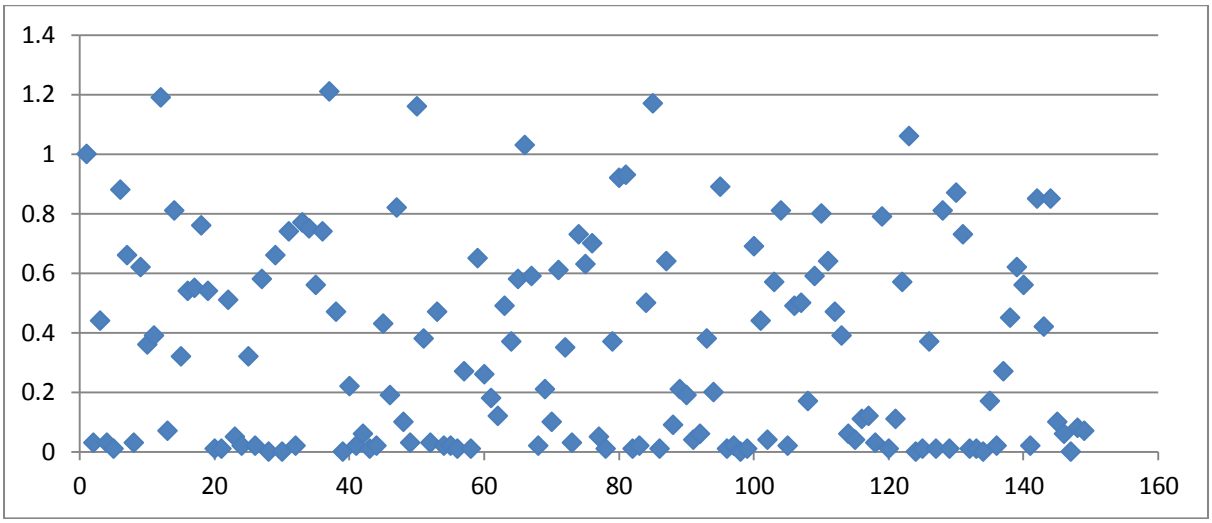

Figure 1: graph comparing infection per country relative to USA

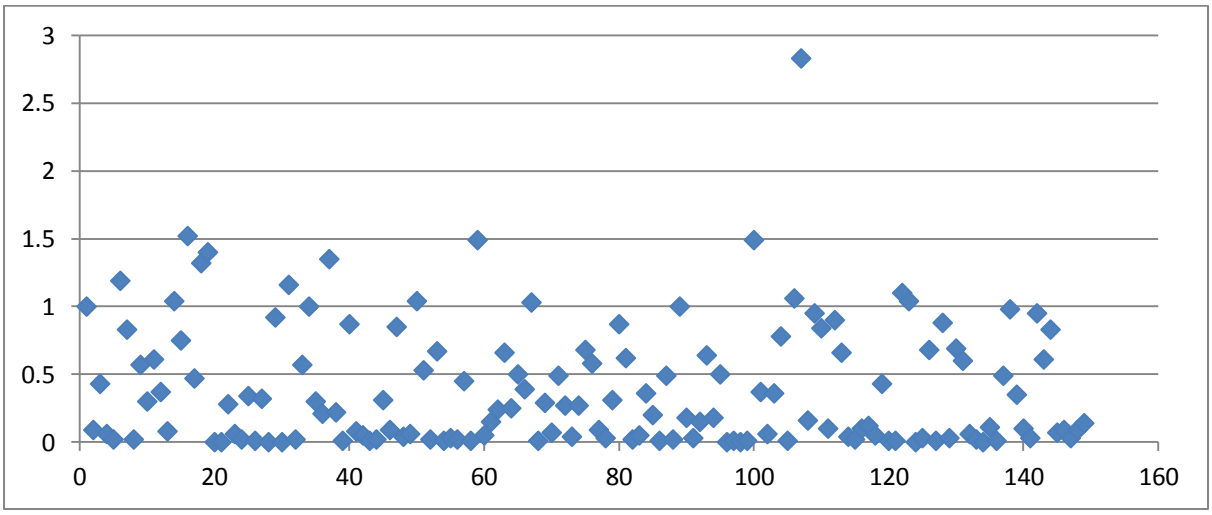

Figure 2: graph comparing death per country relative to USA

IV. Discussion

The COVID-19 pandemic has led to a dramatic loss of human life worldwide and presents an unprecedented challenge to public health, food systems and the world of work[16]. The economic and social disruption caused by the pandemic is devastating. The highly infectious COVID-19 Delta variant has been reported in several countries, and it could cause hundreds of thousands to millions of deaths if not properly contained[17,18]. Luckily enough, vaccines have recently been developed by different countries and companies to protect against the disease. The high cost of vaccination has made it necessary to determine the distribution and availability of the vaccine across regions and countries based on relative urgency and emergency[19].

Mutations in the COVID-19 virus, known as delta variant, was earlier detected in South Africa and the United Kingdom in December, 2020, is significantly more transmissible and raising prospects that the second

wave could become even more dispersed and lethal[20,21]. In South Africa, the mutated strain of the virus is dominant and driving the second wave [22]. Result of this study indicated that many western, Asian and African countries have an improved comparism factor (CF) to USA relative to previous study. The USA, which is the power and health giant of the world, appears to experience less controlled and spiral increase in infection and death rate when compared to most other countries who have promptly and steadily applied measures to curb the spread and manage the disease. This may be due to genetics, environmental, political and/or racial division [22,23,24]. Compared to previous studies, most European countries have steadily improved on their indexes despite the second wave and mutated strain of the virus[25]. This may be due to better understanding of the virus, united approach, herd immunity and previous exposure to similar or cross s train of the virus.

Africa is the least affected of all the continents. Africa is confronted by heavy burden of diseases, both communicable and non-communicable. [26,27,28,29]. From the onset of viral outbreak, the World Health Organization (WHO) has rushed to improve the ability of African countries to test for the virus and train health professionals in caring for people affected by it [30,31,32]. From the table above Algeria and South Africa are the only African countries with mild infection and mortality factor while most African countries have very low infection and mortality factor. Most countries in Africa have a communal lifestyle compared to the isolational lifestyle of western countries [33,34,35]. Hence, the virus is naturally expected to spread faster and consequence of infection to be more pronounce. it is possible that most African countries have been exposed to COVID-19 but few have presented visible symptoms or tested positive to the virus. Interestingly, Africa-American are the most hit among other Americans in this pandemic [36, 37]. It is expected that due to the virus mode of transmission, the index value should be very high for African countries when compared to other countries. There have been several explanations why Africa appears to be less affected by the pandemic. These include notable differences in the population age pyramids of USA, European and African countries, slow or low testing rate, low records of hospital reporting the disease, relatively high temperature and high humidity and high consumption of antioxidant food/fruit substances [37,38]. Also, because of the density of the virus in tropical Africa, it cannot travel far [38]. Hence, the recommendation of two meters of social distancing rule does not apply because the virus cannot go far. Africans food contents also raised the diet factor. Africans also take a lot of phytomedicines which contains a lot of antioxidant. Thus, having a more robust immune response [39].

Another very possible reason is that African countries may have been exposed to genetically and/or environmentally related organism this pre-exposure may have lead to development of immunity against related or not closely related micro-organism like covid-19 virus. Evolutionary or adaptive immune response to the virus may also have immensely contributed to low infectious and mortality case in Africa. Since African-American population is more affected by COVID-19 when compared to other Americans in the USA [4,11,40], it is unlikely to be genetic, but more likely related to the environment. A study showed that children in low- and middleincome countries experience a high incidence of infectious disease in their first years of life [15,41]. Babraham Institute in2020, studied immune responses of African children compared to Dutch children. They found that the immune systems of African children develop faster than those of Dutch children [42]. Exposure to germs in childhood may have helped to strengthen the immune system and protect children from developing allergies, asthma and other infectious diseases, on subsequence exposure to the same/similar allergen/pathogen or cross allergen/pathogen. This supports the 'hygiene hypothesis which contends that such diseases are more common in the developed world where the prevalence of antibiotics and antibacterial reduce children's exposure to microbes [10,41,44]. Thus, early exposure to some diseases in Africa may have resulted in a more robust innate and/or adaptive immune response. As a result countries in Africa are both vulnerable and potentially more resilient to the corona virus. The immune system is a network of biological processes that protects an organism from diseases [10,33,45]. It detects and responds to a wide variety of pathogens, from viruses to parasitic worms, as well as cancer cells and objects such as wood splinters, distinguishing them from the organism's own healthy tissue. Many species have two major subsystems of the immune system. The innate immune system provides a preconfigured response to broad groups of situations and stimuli. The adaptive immune system provides a tailored response to each stimulus by learning to recognize molecules it has previously encountered. Both use molecules and cells to perform their functions [7,21,35,46]. The innate response is usually triggered when microbes are identified by pattern recognition receptors, which recognize components that are conserved among broad groups of microorganisms [23,27,32,47], or when damaged, injured or stressed cells send out alarm signals, many of which are recognized by the same receptors as those that recognize pathogens [30,35,44]. Innate immune defenses are non-specific, meaning these systems respond to pathogens in a generic way [30,32,37,47]. This system does not confer long-lasting immunity against a pathogen. Cells in the innate immune system use pattern recognition receptors to recognize molecular structures that are produced by pathogens.[21] They are proteins expressed, mainly, by cells of the innate immune system, such as dendritic cells, macrophages, monocytes, neutrophils and epithelial cells [3,15,48] to identify two classes of molecules: pathogen-associated molecular patterns (PAMPs), which are associated with microbial

pathogens, and damage-associated molecular patterns (DAMPs), which are associated with components of host's cells that are released during cell damage or cell death. The adaptive immune response is antigen-specific and requires the recognition of specific "non-self" antigens during a process called antigen presentation [15,38,49]. Antigen specificity allows for the generation of responses that are tailored to specific pathogens or pathogen-infected cells. The ability to mount these tailored responses is maintained in the body by "memory cells". Should a pathogen infect the body more than once, these specific memory cells are used to quickly eliminate it [14,19,21,35,50].

V. Conclusion

Coronaviruses are a large family of viruses, known to cause illness ranging from the common cold to more severe diseases as Middle East Respiratory Syndrome (MERS), Severe Acute Respiratory Syndrome (SARS) etc. Many countries, have made plausible gain in their comparism factor when compare to few months ago. This may be due to united approach, improved management, herd immunity and vaccination among the populace. Also, this work agrees with previous study, Africa has been a responsible bed to several viral diseases, which include dengue fever, small pox, chicken pox, measles, Ebola, bump and polio disease. The body may have been immune or found a way to cope with same or likely related infection. This innate and adaptive biological process may have resulted in positive response to other similar or different viral infection including corona virus disease. Also, the communal system and poor health regulation African government would have allowed for rapid transmission of the virus from person(s) to person(s) within the shortest possible time. This means most Africans may have been exposed to the virus with few or no noticeable symptoms from which they may have recovered while very few people have shown symptom to the disease. Thus, there is need for COVID-19 antibody and antigen testing, which will give a true picture of who has been exposed than the current antigen testing which only provides information on active state of the disease. Like other continents, Africa needs vaccine, but vaccination may relatively not be an emergency when compared to western world because most persons in Africa countries may have been naturally and unconsciously inoculated.

Recommendation

More studies and surveys need to be conducted to understand why and how primarily the virus affects Africa and it significances to Africa and maybe the world.

Conflict of Interest

The authors declare that there are not any potential conflicts of interest.

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Reference

[1]. Tamara A, Tahapary DL (2020). "Obesity as a predictor for a poor prognosis of COVID-19: A systematic review". Diabetes & Metabolic Syndrome. **14** (4): 655–659.

[2]. Petrakis D, Margină D, Tsarouhas K, Tekos F, Stan M, Nikitovic D, et al. (July 2020). "Obesity – A risk factor for increased COVID-19, severity and lethality (Review)". Molecular Medicine Reports. **22** (1): 9–19.

[3]. Roca-Fernández A, Dennis A, Nicholls R, McGonigle J, Kelly M, Banerjee R, et al. (2021). "Hepatic Steatosis, Rather Than Underlying Obesity, Increases the Risk of Infection and Hospitalization for COVID-19". Frontiers in Medicine. **8**: 636-637.

[4]. Coronavirus Disease 2019 (COVID-19)". Centers for Disease Control and Prevention. 11 February 2020.

[5]. Joseph O.S., Builders M., Emem E.U and Joseph O.T. (2019). effect of ethanol leaf extract of Cassia angustifolia extract on kidney of Wister Rats. Global Scientific Journal. Volume 8, Issue 9. Page 1023-1031.

[6]. Devresse A, Belkhir L, Vo B, Ghaye B, Scohy A, Kabamba B, et al. (2020). "COVID-19 Infection in Kidney Transplant Recipients: A Single-Center Case Series of 22 Cases From Belgium". Kidney Medicine. **2** (4): 459–466.

[7]. Joseph O.S., Builders M., Emem E.U and Joseph O.T. (2019). effect of ethanol leaf extract of cassia angustifolia extract on liver of wister rats. Global Scientific Journal. Volume 8, Issue 9. Page 1112-11120.

[8]. Builders M., Joseph O. S., Timothy O. O., Philip B. (2020). Antimalarial Drugs and COVID -19. Sumerianz Journal of Medical and Healthcare. Vol. 3, No. 12, pp. 111-116.

[9]. Shelton JF, Shastri AJ, Ye C, Weldon CH, Filshtein-Sonmez T, Coker D, et al. (2021). "Trans-ancestry analysis reveals genetic and nongenetic associations with COVID-19 susceptibility and severity". Nature Genetics. **53** (6): 801–808.

[10]. Wallis C. "One in Seven Dire COVID Cases May Result from a Faulty Immune Response". Scientific American.

[11]. Bastard P, Rosen LB, Zhang Q, Michailidis E, Hoffmann HH, Zhang Y, et al. (2020). "Autoantibodies against type I IFNs in patients with life-threatening COVID-19". Science. **370** (6515):

[12]. Fusco DN, Brisac C, John SP, Huang YW, Chin CR, Xie T, et al. (2013). "A genetic screen identifies interferon-α effector genes required to suppress hepatitis C virus replication". Gastroenterology. **144** (7): 1438–49, 1449.e1-9.

[13]. Joseph OS , Builders M , Joseph O T , Famojuro TI, Ogira JO, Moses FD, Musa TL. (2021). Effect of the Demographic of Covid-19 on Different Countries; Using the USA for Comparism. International journal of multidisciplinary research and analysis. Volume 04 Issue 02. Page 193-203.

[14]. Joseph O S., Musa T L., Joseph O T. , Ibhafidon I. (2020). The Dynamics of Differential Impacts of COVID-19 on African Countries Compared to Other Parts of the World. International journal of multidisciplinary research and analysis. Volume 03 Issue 11. Page 185-198.

[15]. Joseph O. S., Builders M., Joseph O. T., Sabastine A. Z. (2020). Assessing differential impacts of COVID-19 on African countries: A comparative study. International Journal of Research and Innovation in Applied Science. Vol. 5, Issue 5. Page 197-203

[16]. Wertheim JO, Chu DK, Peiris JS, Kosakovsky Pond SL, Poon LL (2014). A case for the ancient origin of corona viruses. Journal of Virology. 87 (12): 7039–45.

[17]. Novel Corona virus (2019-nCoV) situation reports - World Health Organization (WHO)

[18]. 2019 Novel Corona virus (2019-nCoV) in the U.S. -. U.S. Centers for Disease Control and Prevention (CDC)

[19]. Joseph O. S., Jude E.O and Joseph O. T. (2018). Hepatoprotective activity of extract of Homalium Letestui stem against carbon tetrachloride-induced liver injury. Advance Herbal Medicine. Vol 4(4), Page 1-11.

[20]. Outbreak Notification - National Health Commission (NHC) of the People's Republic of China

[21]. Joseph O. S., Builders M., Joseph O. T., Zubairu S.A., Musa T. and Oyepata p.j. (2019). Sub-acute toxicity study of ethanol leaf extract of Ocimum canum on the kidney of wistar rats. African Journal of Pharmaceutical Research & Development. Vol. 11 No.1. Page 1-7.

[22]. Joseph O.S., Builders M., Emem E.U and Joseph O.T. (2019). effect of ethanol leaf extract of cassia angustifolia extract on liver of wister rats. Global Scientific Journal. Volume 8, Issue 9. Page 1112-11120.

[23]. Grant MC, Geoghegan L, Arbyn M, Mohammed Z, McGuinness L, Clarke EL, Wade RG (23 June 2020). "The prevalence of symptoms in 24,410 adults infected by the novel coronavirus (SARS-CoV-2; COVID-19): A systematic review and meta-analysis of 148 studies from 9 countries". PLOS ONE. **15** (6): e0234765.

[24]. Clinical characteristics of COVID-19. European Centre for Disease Prevention and Control. Retrieved 29 December 2020.

[25]. Niazkar HR, Zibaee B, Nasimi A, Bahri N (July 2020). "The neurological manifestations of COVID-19: a review article". Neurological Sciences. **41** (7): 1667–1671.

[26]. Interim Clinical Guidance for Management of Patients with Confirmed Coronavirus Disease (COVID-19)". U.S. Centers for Disease Control and Prevention (CDC). 6 April 2020. Archived from the original on 2 March 2020. Retrieved 19 April 2020.

[27]. Oran DP, Topol EJ (January 2021). "The Proportion of SARS-CoV-2 Infections That Are Asymptomatic : A Systematic Review". Annals of Internal Medicine. **174** (5): 655–662.

[28]. Joseph O. S., Builders M., Joseph O. T. (2020). Effect of Caffeine on Diazepam - Induced Sedation and Hypnosis in Wister Rat. Global Scientific Journal. Vol. 8, Issue 9. Page 451-466.

[29]. "Transmission of COVID-19". European Centre for Disease Prevention and Control. Retrieved 6 December 2020.

[30]. Nogrady B (2020). "What the data say about asymptomatic COVID infections". Nature. **587** (7835): 534–535.

[31]. Joseph OS and Joseph O T (2021). Effect of Clinical Study of Moringa oleifera on Body mass index, Low density lipoprotein and Triglyceride level in Patients on Tenofovir/lamivudine/efavirenz Combination Therapy. Advanced Herbal Med. Vol. 6. Issue 1. Page. 14-27

[32]. Gao Z, Xu Y, Sun C, Wang X, Guo Y, Qiu S, Ma K (2021). "A systematic review of asymptomatic infections with COVID-19". Journal of Microbiology, Immunology, and Infection = Wei Mian Yu Gan Ran Za Zhi. **54** (1): 12–16.

[33]. Murthy S, Gomersall CD, Fowler RA (2020). "Care for Critically Ill Patients With COVID-19". JAMA. **323** (15): 1499–1500.

[34]. Cascella M, Rajnik M, Cuomo A, Dulebohn SC, Di Napoli R (2020). "Features, Evaluation and Treatment Coronavirus (COVID-19)". StatPearls. Treasure Island (FL): StatPearls Publishing. PMID 32150360. Retrieved 18 March 2020.

[35]. Heymann DL, Shindo N, et al. (WHO Scientific and Technical Advisory Group for Infectious Hazards) (February 2020). "COVID-19: what is next for public health?". Lancet. **395** (10224): 542–545.

[36]. Romiti GF, Corica B, Lip GY, Proietti M (June 2021). "Prevalence and Impact of Atrial Fibrillation in Hospitalized Patients with COVID-19: A Systematic Review and Meta-Analysis". Journal of Clinical Medicine. **10** (11): 2490.

[37]. Sabastine AZ, Olorun AF, Joseph OS,Ibhafidon I, Joseph OT. (2021). Effect of Anacardium occidentale Fruit Juice Extract on Haematological
Parameters and Spleen of Paracetamol Induced Injury in Albino Rats. Global Scientific Journal. Volume 9, Issue 7. Page 1640-1654.

[38]. Sabastine AZ, Joseph OS , Joseph OS, Famojuro TI, Olorunfemi AF. (2021). Effect of Cashew apple juice (Anacardium occidentale L.) on Hematology and Spleen of Gentamicin Induced Injury in Albino Rats. Global Scientific Journal. Volume 9, Issue 7. Page 3686-3698.

[39]. Wen W, Zhang H, Zhou M, Cheng Y, Ye L, Chen J, et al. (2020). "Arrhythmia in patients with severe coronavirus disease (COVID-19): a meta-analysis". European Review for Medical and Pharmacological Sciences. **24** (21): 11395–11401.

[40]. Long B, Brady WJ, Koyfman A, Gottlieb M (July 2020). "Cardiovascular complications in COVID-19". The American Journal of Emergency Medicine. **38** (7): 1504–1507.

[41]. Puntmann VO, Carerj ML, Wieters I, Fahim M, Arendt C, Hoffmann J, et al. (November 2020). "Outcomes of Cardiovascular Magnetic Resonance Imaging in Patients Recently Recovered From Coronavirus Disease 2019 (COVID-19)". JAMA Cardiology. **5** (11): 1265–1273.

[42]. Lindner D, Fitzek A, Bräuninger H, Aleshcheva G, Edler C, Meissner K, et al. (November 2020). "Association of Cardiac Infection With SARS-CoV-2 in Confirmed COVID-19 Autopsy Cases". JAMA Cardiology. **5** (11): 1281–1285.

[43]. Oran, Daniel P., and Eric J. Topol. (2020): "Prevalence of Asymptomatic SARS-CoV-2 Infection : A Narrative Review." Annals of Internal Medicine. vol. 173,5 362-367.

[44]. Lai CC, Liu YH, Wang CY, Wang YH, Hsueh SC, Yen MY, et al. (2020). *"Asymptomatic carrier state, acute respiratory disease, and pneumonia due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2): Facts and myths"*. Journal of Microbiology, Immunology, and Infection = Wei Mian Yu Gan Ran Za Zhi. **53** (3): 404–412.

[45]. *Furukawa NW, Brooks JT, Sobel J (July 2020).* "Evidence Supporting Transmission of Severe Acute Respiratory Syndrome Coronavirus 2 While Presymptomatic or Asymptomatic". *Emerging Infectious Diseases. **26** (7).*

[46]. *Gandhi RT, Lynch JB, Del Rio C (2020).* "Mild or Moderate Covid-19". *The New England Journal of Medicine. **383** (18): 1757–1766.*

[47]. *Wiersinga WJ, Rhodes A, Cheng AC, Peacock SJ, Prescott HC (August 2020).* "Pathophysiology, Transmission, Diagnosis, and Treatment of Coronavirus Disease 2019 (COVID-19): A Review". *JAMA. **324** (8): 782–793.*

[48]. *Islam MA (November 2020).* "Prevalence of Headache in Patients With Coronavirus Disease 2019 (COVID-19): A Systematic Review and Meta-Analysis of 14,275 Patients". *Frontiers in Neurology. **11**: 562634.*

[49]. *Saniasiaya J, Islam MA (April 2021).* "Prevalence of Olfactory Dysfunction in Coronavirus Disease 2019 (COVID-19): A Meta-analysis of 27,492 Patients". *The Laryngoscope. **131**(4): 865–878.*

[50]. Saniasiaya J, Islam MA (November 2020). "Prevalence and Characteristics of Taste Disorders in Cases of COVID-19: A Meta-analysis of 29,349 Patients". Otolaryngology–Head and Neck Surgery. **165** (1): 33–42