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ABU DHABI PUBLIC HEALTH CENTRE

SCIENTIFIC RESEARCH MONITORING ON COVID-19

19 APRIL 2021

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https://www.doh.gov.ae/ar/covid-19/Healthcare-Professionals/Scientific-Publication

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Abu Dhabi Public Health Center (ADPHC) is gathering the latest scientific research updates and trends on coronavirus disease (COVID-19) in a daily report. The report provides summaries on breakthrough or updated research on COVID-19 to allow health care professionals and public health professionals get easy and fast access to information.

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Articles
Summary

Note : All articles presented in this report represent the authors' views and not necessarily represents Abu Dhabi Public Health Center views or directions. Due the nature of daily posting , some minor language errors are expected.
For further inquiries you may communicate with us as PHR@adphc.gov.ae

RESEARCH UPDATES

The views and opinions expressed in this report are those of the authors and do not reflect the official policy or position of the Abu Dhabi Public Health Center (ADPHC).

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VACCINE

- Navigating post-vaccine COVID-19 futures in the health and economic context

EPIDEMIOLOGY

- Assessment of protection against reinfection with SARS-CoV-2 among 4 million PCR-tested individuals in Denmark in 2020: a population-level observational study
- Risk of SARS-CoV-2 reinfection after natural infection

TRANSMISSION

- Do asymptomatic carriers of SARS-COV-2 transmit the virus?
- Another Explanation for Why Cloth Masks Reduce COVID-19 Severity

EPIDEMIOLOGY

FROM 21 JAN 2020 TO 18 APR 2021

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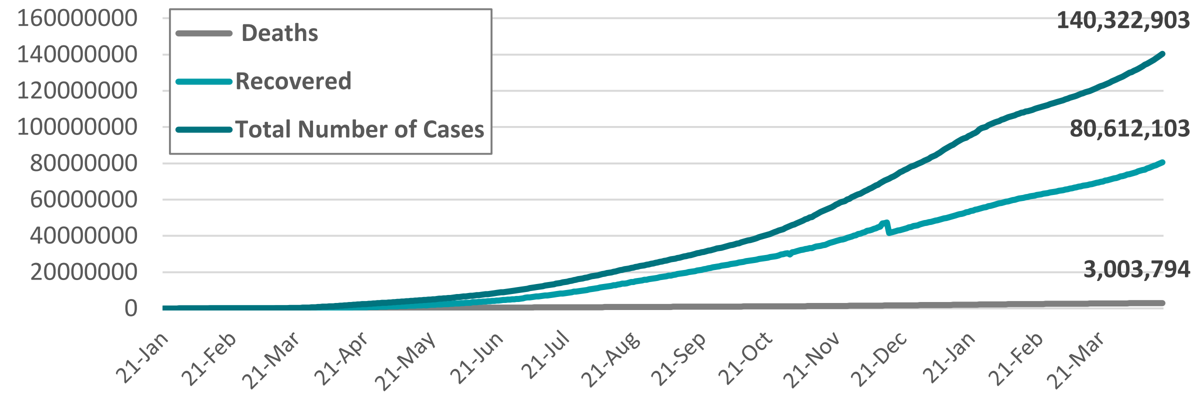
Figure 1: Total Number of Infected, Recovered, and Death Cases



Note: the number of recovered cases in 31th October recorrected from 30 million to 29 million, and in 15th December recorrected from 47 million to 41 million in Johns Hopkins website

Figure 3: Total Number of Death Due to COVID-19 (china and result of the world)

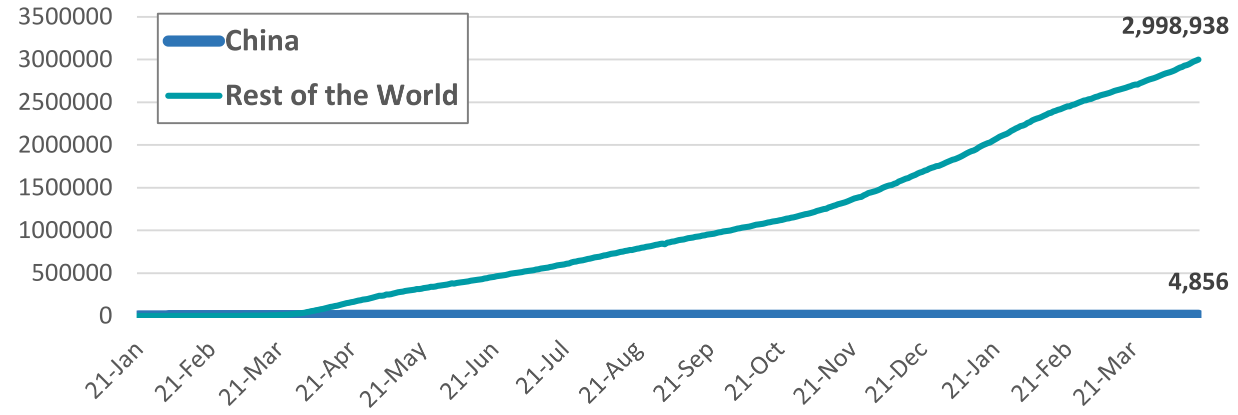


Figure 2: Daily New Infected COVID-19 Cases (China and rest of the world)

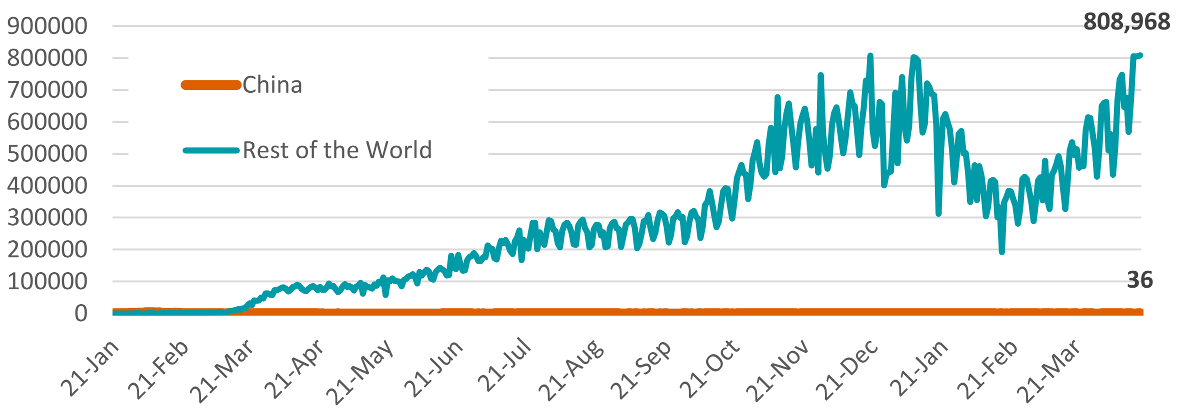
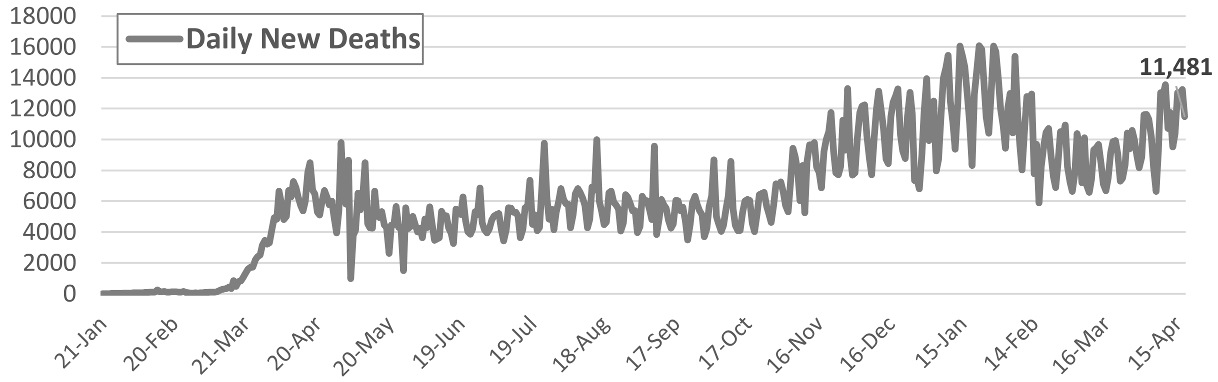


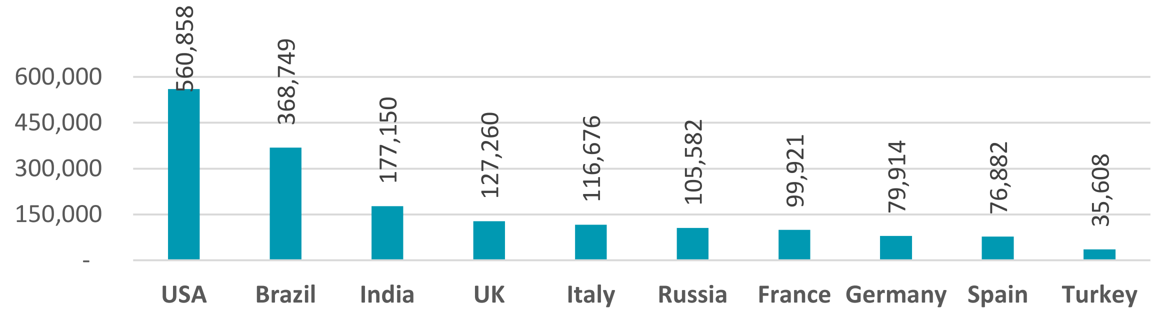
Figure 4: Global Daily New Deaths Due to COVID-19



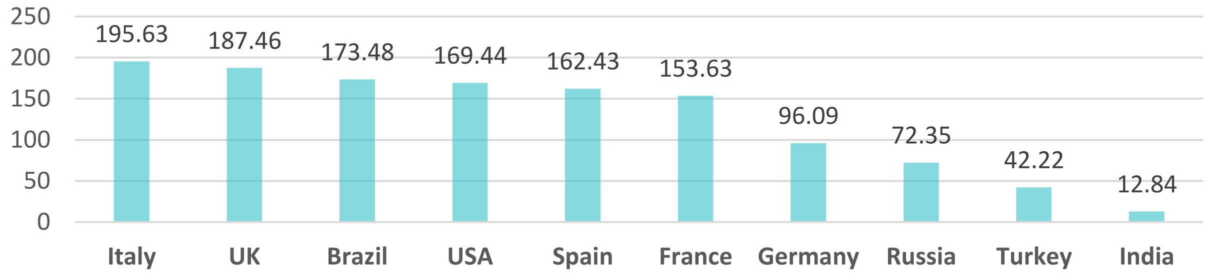
Graphs published by Abu Dhabi Public Health Center 2021 | Data resources: John Hopkins, WHO

Figure 5: Top 10 Countries in the Total Number of Cases Due to COVID-19

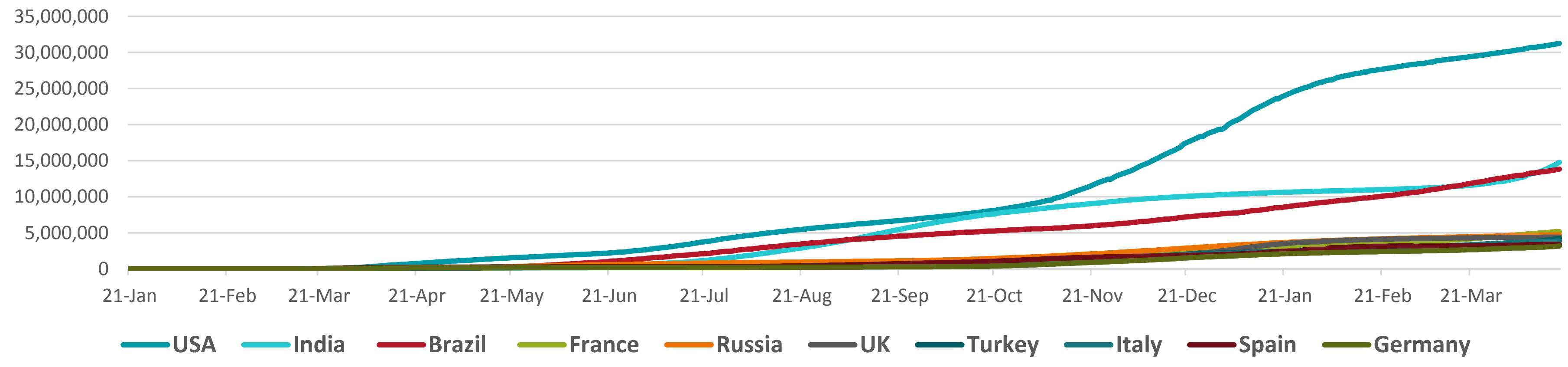
TOTAL DEATHS



DEATHS PER MILLION



TOTAL INFECTED CASES



USA	31,250,635
India	14,788,109
Brazil	13,832,455
France	5,178,513
Russia	4,702,101
UK	4,385,942
Turkey	4,212,645
Italy	3,857,443
Spain	3,396,685
Germany	3,142,262

Graphs published by Abu Dhabi Public Health Center 2021 | Data resources: WHO

EPIDEMIOLOGY

FROM 21 JAN 2020 TO 18 APR 2021

Figure 8: COVID-19 Status in the UAE (Federal Competitiveness and Statistics Authority Dashboard)

Daily Tests	Daily Cases	Daily Recovered	Daily Deaths
214,768.3 Average Tests	1,915.3 Average Cases	1,587.1 Average Recovered	3.3 Average Deaths
2,171.5 per 100k population	19.4 per 100k population	16.0 per 100k population	0.0 per 100k population
0.9% Positive Rate			0.2% Case Fatality Rate

Figure 6A: TOTAL Number Of Infected And Recovered Cases Due To Covid-19 Reported By The UAE

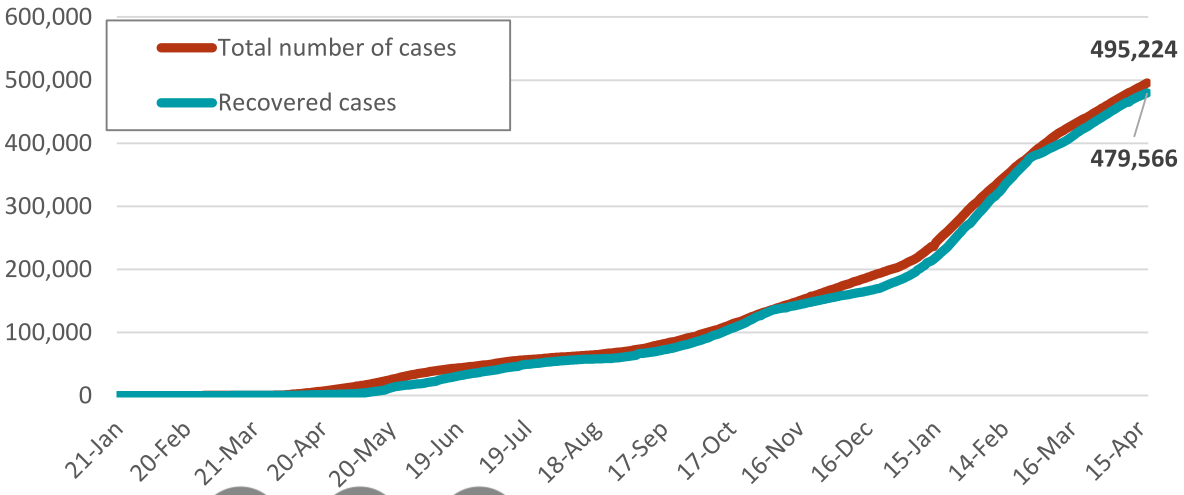
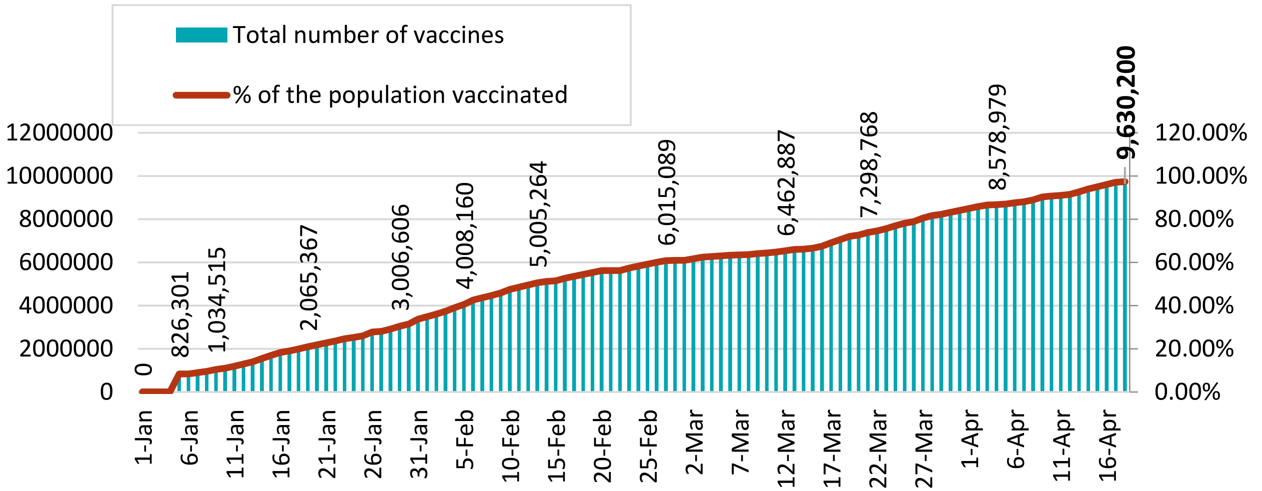
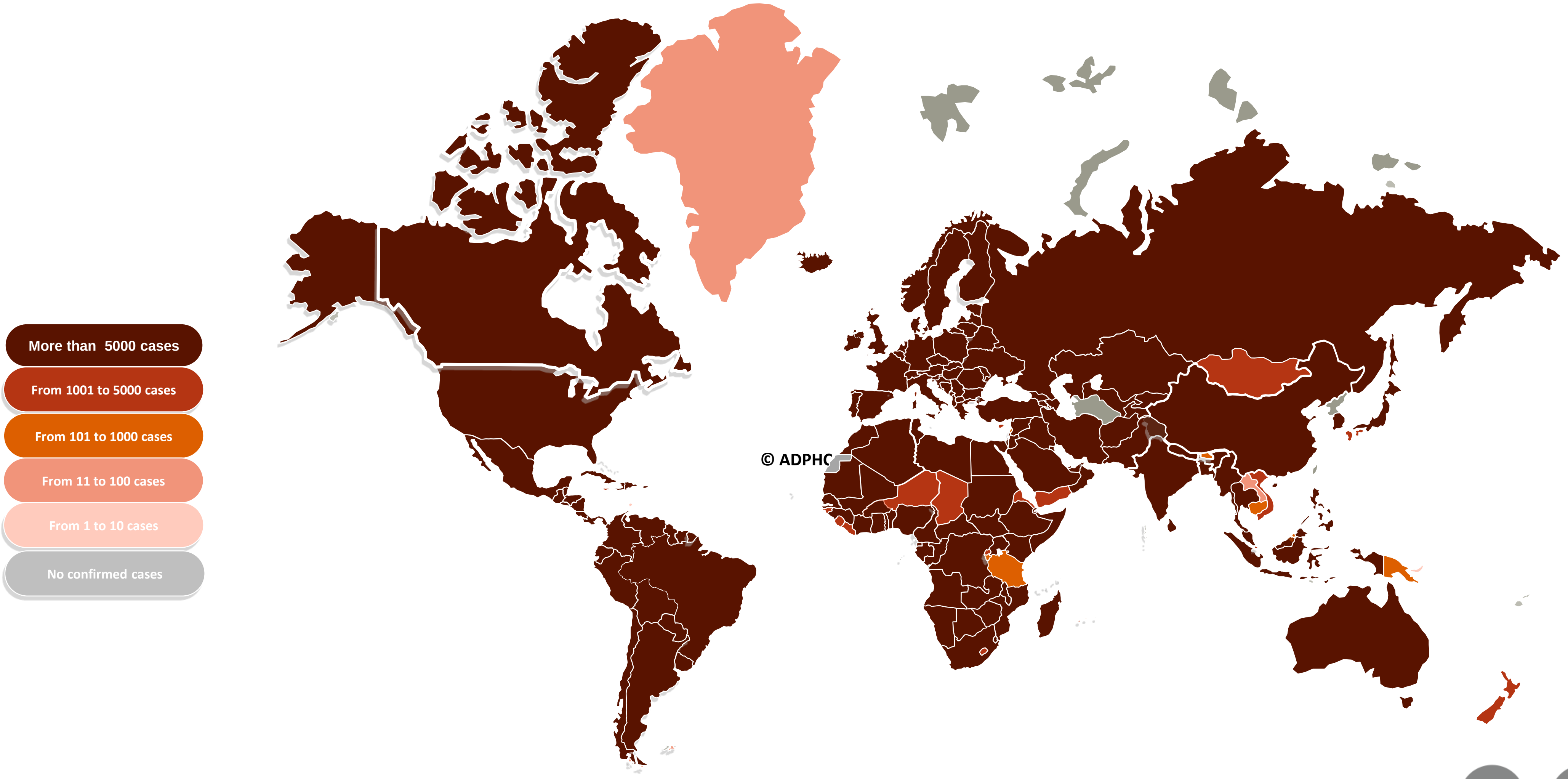


Figure 6 B: TOTAL NUMBER and Percentage of UAE population Vaccinated



Graphs published by Abu Dhabi Public Health Center 2021 | Data resources: FCSA, WHO, John Hopkins, National Emergency Crisis and Disaster Management Authority

Figure 7A : Global Distribution of COVID-19 Cases



Graphs published by Abu Dhabi Public Health Center 2021 | Data resources: WHO

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Figure 7B: Bar Chart Illustrates the Global Distribution of COVID19 Cases

Other*:includes cases and deaths reported under the international conveyance(Diamond Princess)

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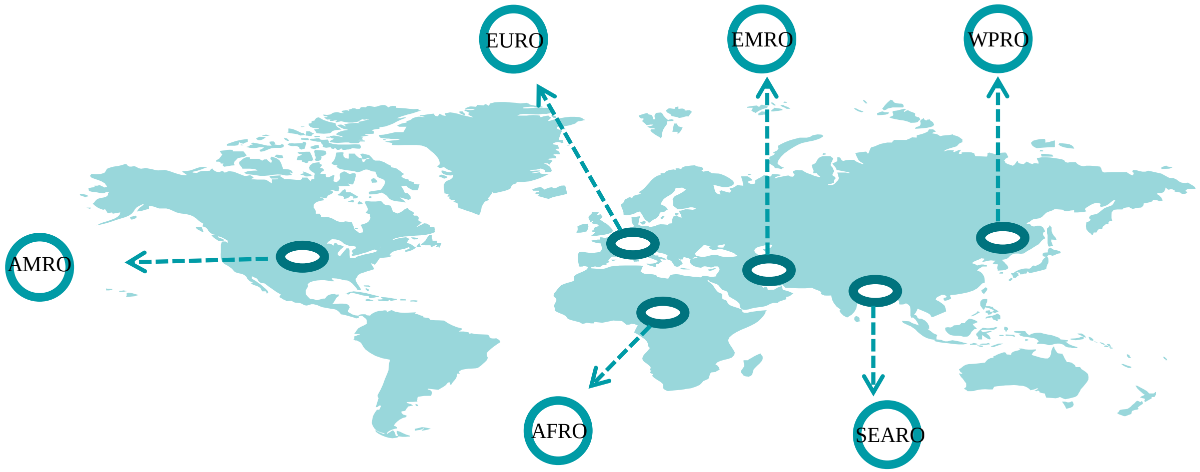
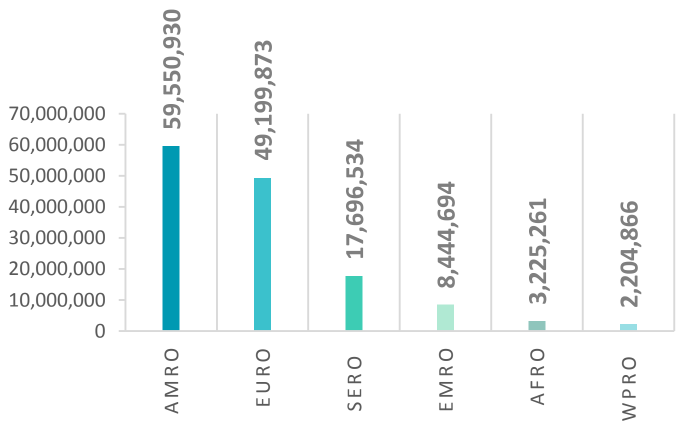
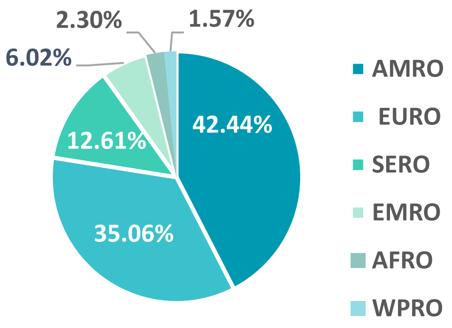
Figure 6: Global Distribution of COVID-19 Cases per Region

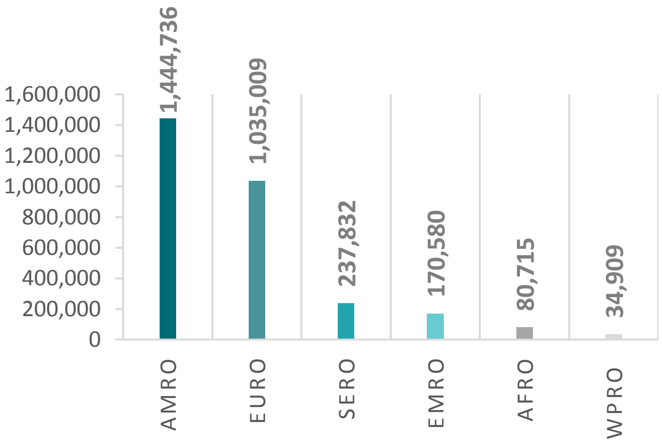


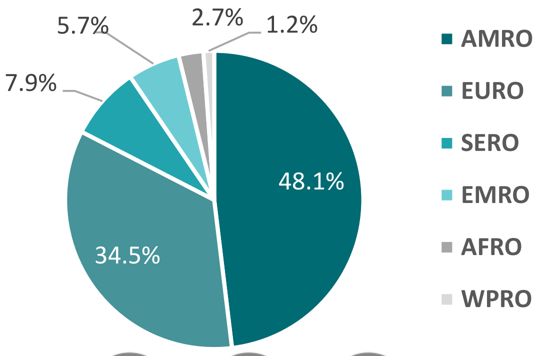
INFECTED





DEATHS





Graphs published by Abu Dhabi Public Health Center 2021 | Data resources: John Hopkins, WHO

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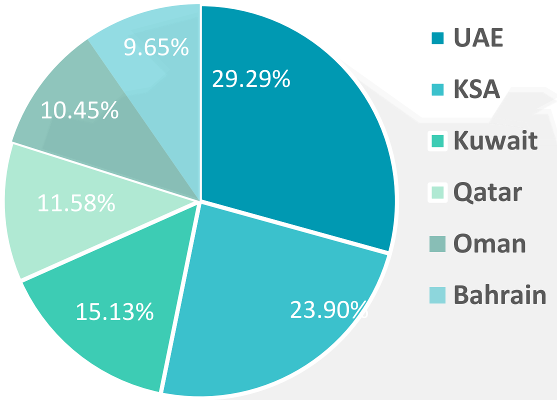
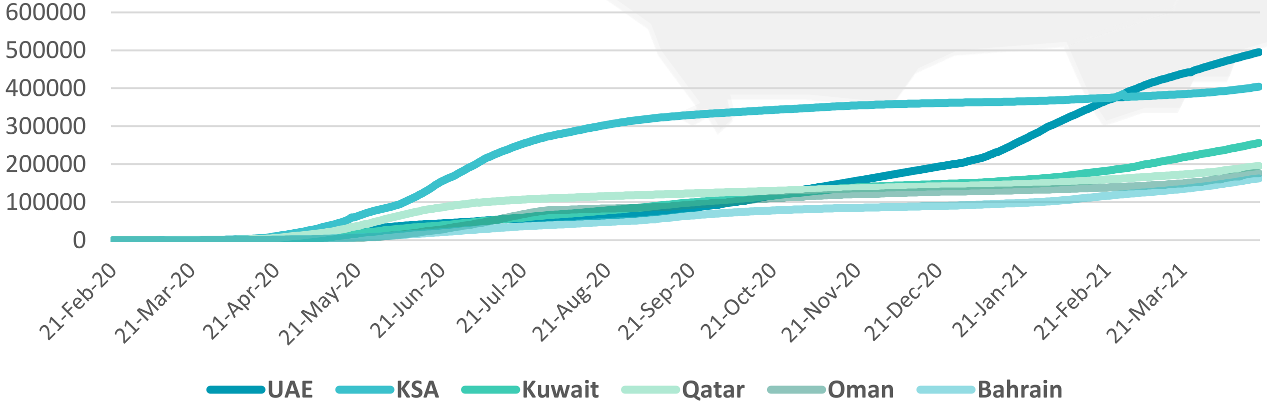
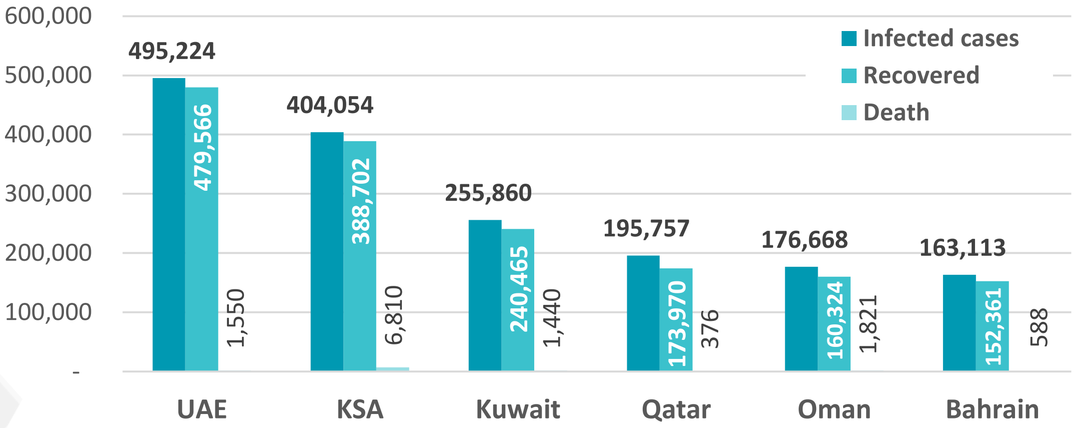
Figure 7: Comparative Analysis of the Distribution of COVID-19 Cases in GCC Countries

TOTAL NUMBER OF INFECTED CASES

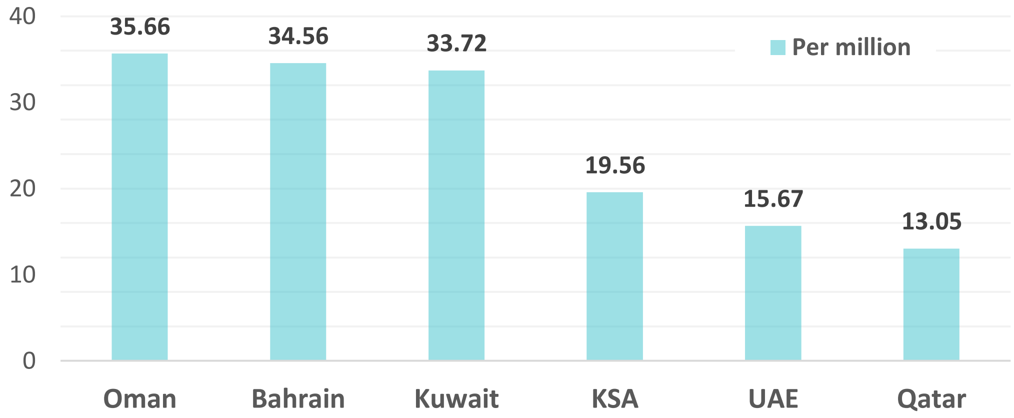




TOTAL NUMBER OF INFECTED, RECOVERED AND DEATHS

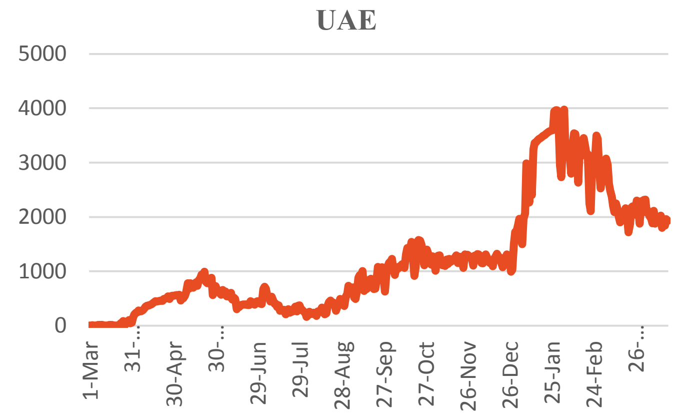


DEATHS PER MILLION

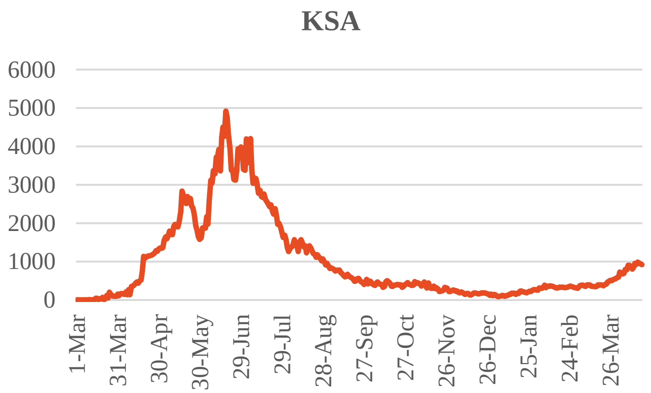


Graphs published by Abu Dhabi Public Health Center 2021 | Data resources: John Hopkins, WHO

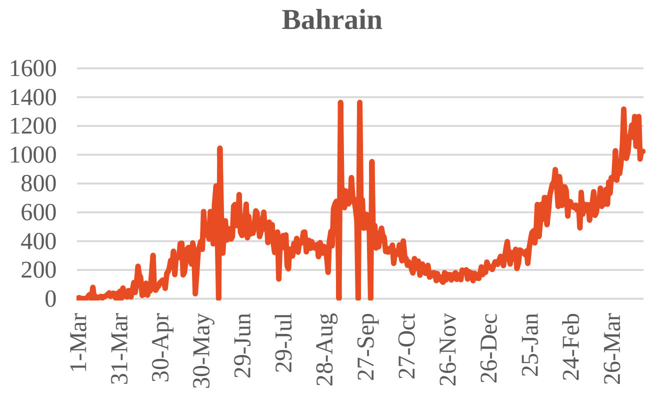
Figure 10: Comparative Analysis of the Distribution of COVID-19 New Cases in GCC Countries



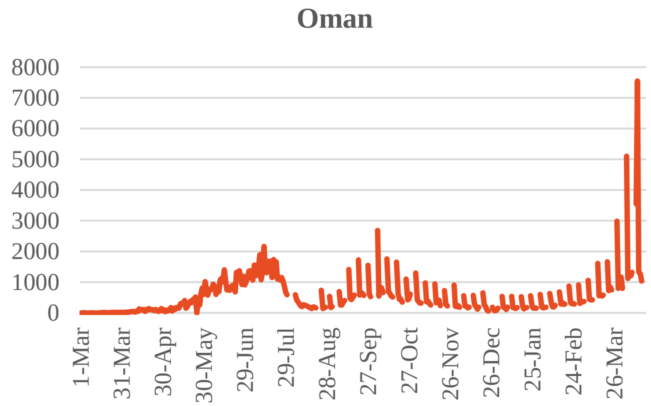
Source : National Emergency Crisis and Disaster Management Authority



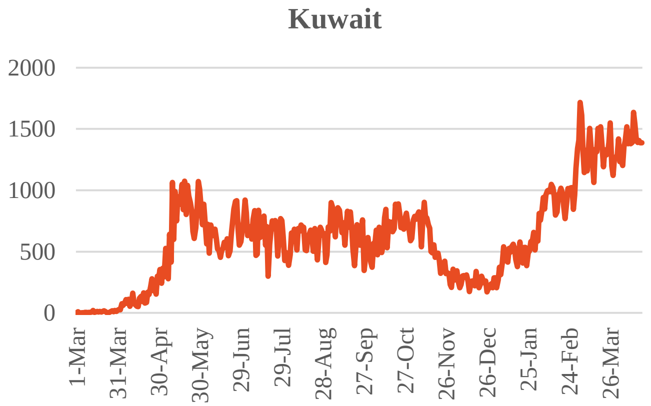
Source : KSA ministry of health



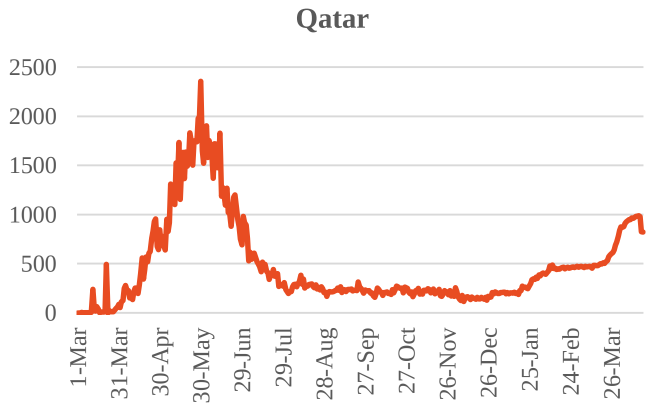
Source :WHO



Source :Oman ministry of health



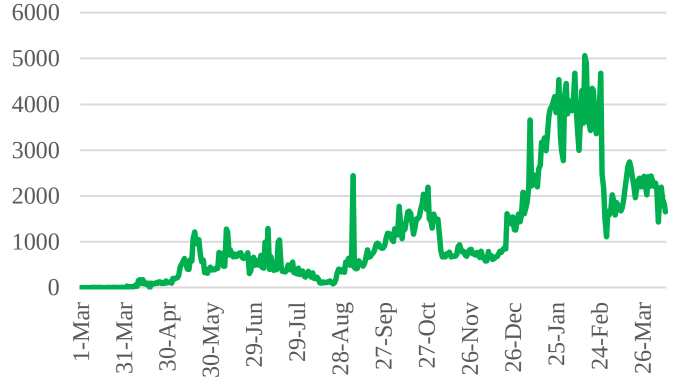
Source : Kuwait ministry of health



Source : Qatar ministry of health

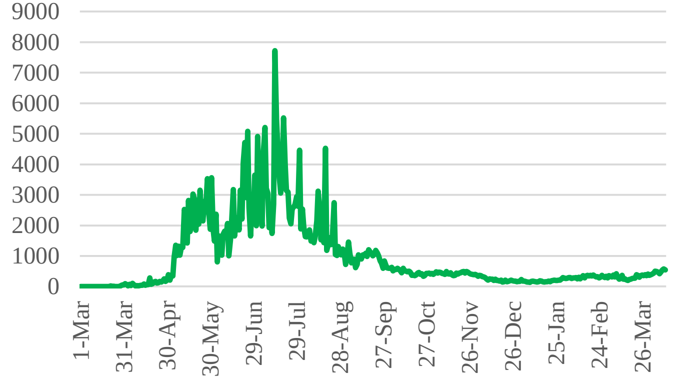
Figure 11: Comparative Analysis of the Distribution of COVID-19 Recovered Cases in GCC Countries

UAE



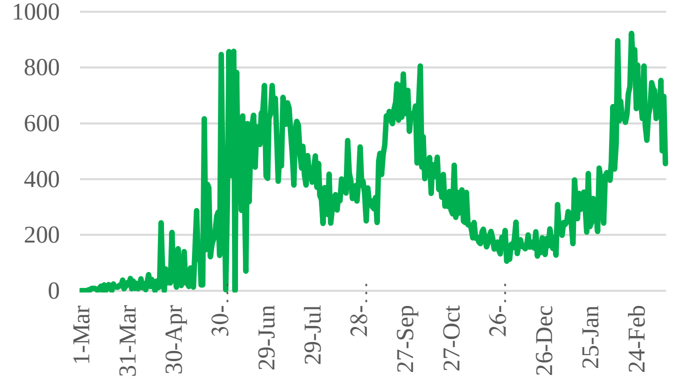
Source : National Emergency Crisis and Disaster Management Authority

KSA



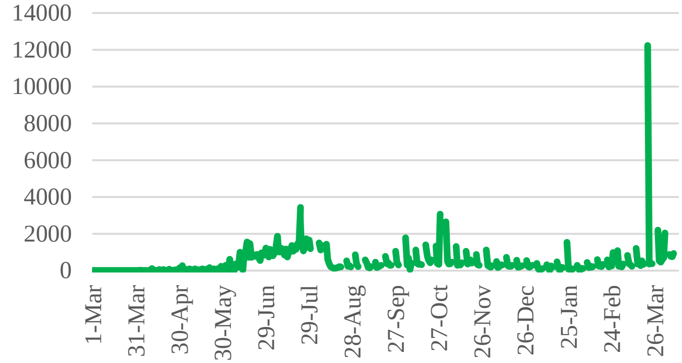
Source : KSA ministry of health

Bahrain



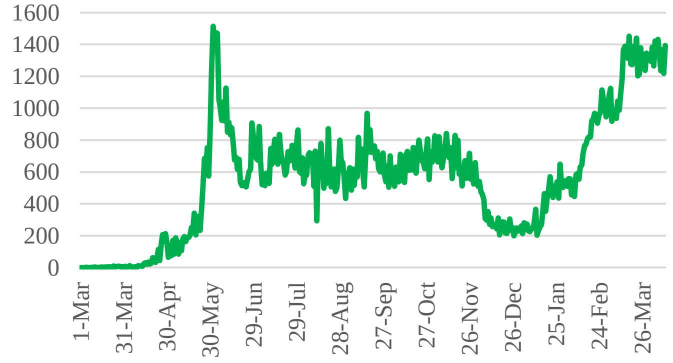
Source : Bahrain ministry of health

Oman



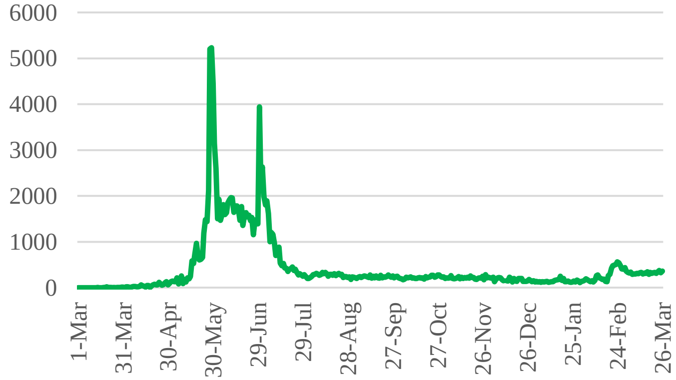
Source :Oman ministry of health

Kuwait



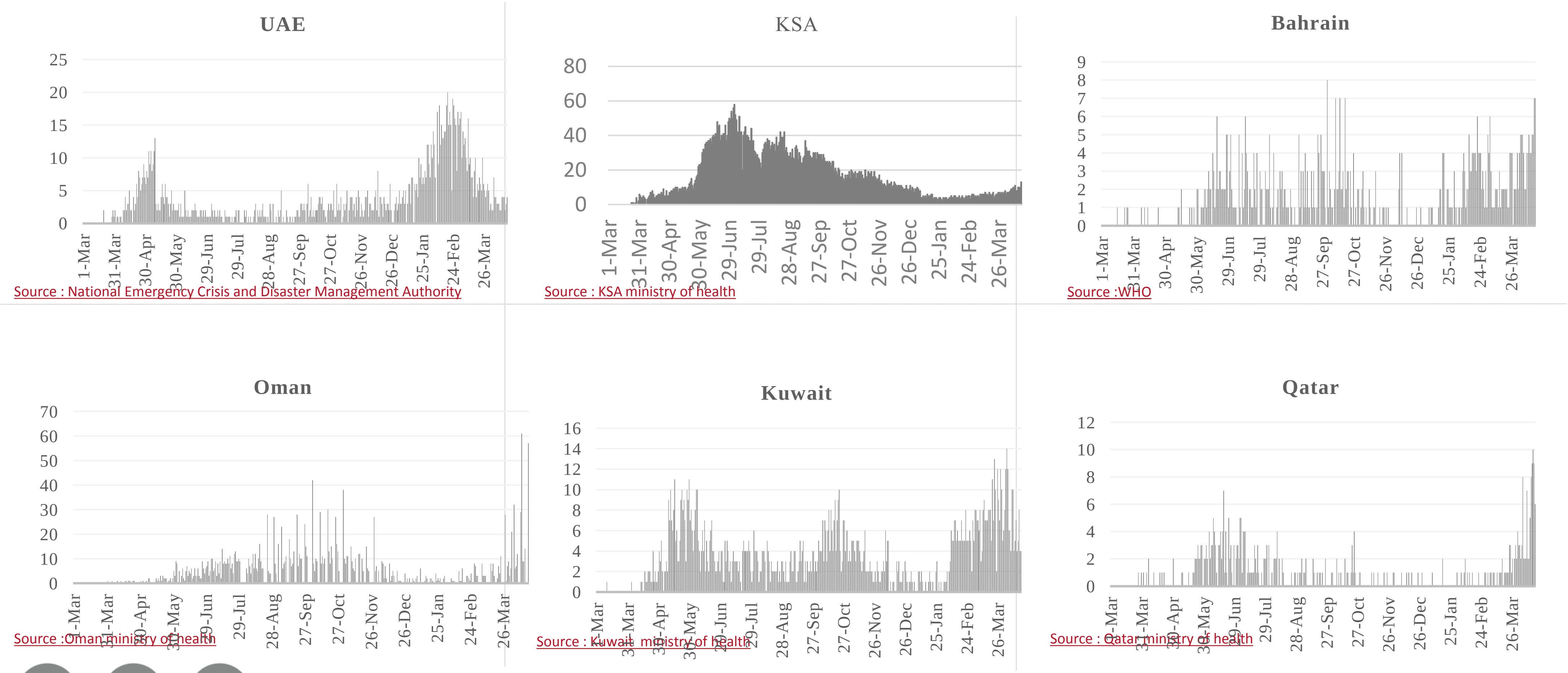
Source : Kuwait ministry of health

QATAR



Source : Qatar ministry of health

Figure 12: Comparative Analysis of the Distribution of COVID-19 New Death Cases in GCC Countries



Article 1

Do asymptomatic carriers of SARS-COV-2 transmit the virus?

Published March 20, 2021 in THE LANCET

- This article discusses about the effect of asymptomatic index cases (AIC) on the transmission and spreading of the SARS-CoV2.
- In a study, AIC of 283 were notable (0.02) in comparison to 567 symptomatic index cases (SIC; 0.04) according to secondary attack rates. AIC infected 0.6 contacts which is slightly lower than SIC (0.7 contacts). Similar differences were found within households.
- According to 13 other meta-analysis studies, in 111 AIC the transmission rates **were 0-2.2%** in contrast to **0.8-15.4% for SIC**. Additionally, the meta-analysis for household transmission from AIC was 0-4.9% in contrast to 18.0% for SIC. Another study concluded that AIC caused one fifth of household infections and were four times likely to transfer the virus to a household contact.
- On the other hand, post lockdown major study in Wuhan determined that among 34,424 recovered patients, 107 tested positive which corresponds to 310 per 100,000 symptomatic patients. So, these symptomatic patients did not clear the virus even after several months. On the contrary, 3 per 100,000 asymptomatic patients continued to harbor the virus for several months. The number of close contacts of AIC was 1,174 that were found to be PCR-negative, and none became positives during isolation. This study concluded that PCR-positive asymptomatic individuals do not transfer the virus to others.
- Significant studies suggest, the epidemiological context in Wuhan was varied from the Luxembourg and most other reports. Luxembourg study found 66% of SIC and 33% AIC out of all the index cases. The meta-analysis also concluded that 83% of cases were symptomatic; therefore, vast number of PCR-positives were symptomatic according to all studies.

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Continued

- The meta-analysis including 43 studies of 3,229 **subjects mentioned that RNA of the virus was detected on average for 17 days, but reports stated durations up to 83 days**. On the contrary, a follow up study of 10 million participants in Wuhan showed 50,000 confirmed cases and ten times as many positive antibodies. Roughly 60 per 100,000 infected individuals continued to harbor the detectable virus RNA, after weeks and months later; thus, this supports the conclusion of the rare long term virus persistence.
- In four studies, viral loads of asymptomatic cases were similar and in two studies, it was lower than symptomatic cases during the early days of infection.

- The crucial information deduced were that asymptomatic individuals should be incorporated in testing strategy, during acute phase of COVID19, with their contacts traced, as they can cause inapparent spread of the virus like symptomatic cases. Secondly, the rare long-term category of SARS-COV-2 carriers have minimal virus transmission risk but the proportion of this category of asymptomatic carriers will rise as the virus retreats. Lastly, the rare long-term carriers have potential to cause recurrent outbreaks by becoming virus reservoirs.

Article 2

Another Explanation for Why Cloth Masks Reduce COVID-19 Severity

Published March 23, 2021 in THE JAMA

- This article discusses about cloth masks reducing COVID-19 severity.
- Although cloth masks are poor at filtering the smallest aerosol particles reaching the lower respiratory tract, it is associated with the decreased disease severity.
- Researchers at National Institute of Health (NIH) found in a recent study that humidity produced inside the mask assists to protect against severe COVID-19.
- In an experiment, volunteers breathed into a sealed steel box, using 4 varieties of masks; a 2-ply cotton-polyester mask, a 3-ply disposable surgical mask, an N95 respirator, and a heavy cotton mask. Volunteers' faces were firmly fitted against high-density foam rubber to eliminate leakage around the masks' edges.
- Respiratory epithelium is hydrated by inhaling increased humid air; therefore, it benefits the immune system, enhances production of interferons that attack viruses, promotes the removal of mucus and protects the lungs form detrimental particles.

Article 3

Navigating post-vaccine COVID-19 futures in the health and economic context

Published March 18, 2021 in THE LANCET

- This article discusses about the research provided by Sandmann and his colleagues on a sensible pathway to achieve the best-case health and economic scenario.
- The study suggests that mass vaccination of adults and children will contribute to health and economic benefit.
- Vaccine efficacy rate of 95% along with 3-year protection against the infection will result in minimal requirements for social distancing. However, vaccine efficacy of 50% along with 45-week protection against the disease and not the infection, will result in recurrent epidemics with an increased requirement for social distancing.
- Phase 3 trial reports 63-95% efficacy rate for symptomatic infection and mRNA vaccines showed maximum efficacy. The ChAdOx1 nCoV-19 vaccine trial showed a lower efficacy for asymptomatic infection.
- Economic costs are greater for low efficacy vaccines and provides marginal benefits in comparison to no vaccination. However, economic losses are substantially lower for vaccines with high efficacy rate. **Thus, efficacy rate is the most influential factor for economic recovery.**
- To acquire the best-case scenario, governments need to procure vaccines with highest efficacy rate. If lower efficacy vaccines are utilized, long term health and economic burden will equate to the situation of not using vaccine.

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Continued

- The duration of vaccine induced immunity affects economic costs and boosters will be necessary for an extended period of vaccine induced immunity. Studies show that presence of long-lasting natural immunity, reduces the economic value of immunization; however, mRNA vaccines contribute to greater neutralizing antibody titers compared to convalescent sera. In Manaus, Brazil it was found that by October 2020, 76% of the population were infected, but subsequently a large second wave has occurred.
- The rollout of ChAdOx1 nCoV-19 vaccine was halted by the South African Government because the efficacy rate against variant B1.351 was obtained to be 10.4 %.
- Recurring revision of vaccine antigens will be necessary if all vaccines must be matched to emergent variants; thus, it will increase future costs.

- Vaccine uncertainty and inequity in distribution might lead to a patchy uptake; as a result, the logical approach is to distribute limited supply by age and risk-based. Ring vaccination* can also be considered. Because of the extended incubation period of SARS-CoV-2, vaccines might work as post-exposure prophylaxis (PEP). A slow trickle uptake of the vaccination program results in worse health and economic burdens. Israel exhibited a significant impact of vaccination on pandemic dynamics by accomplishing mass vaccination using the mRNA vaccine in less than 2 months.

*Ring vaccination is a strategy to inhibit the spread of a disease by vaccinating those who are most likely to be infected. This strategy vaccinates the contacts of confirmed patients, and people who are in close contact with those contacts

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Article 4

Published

Assessment of protection against reinfection with SARS-CoV-2 among 4 million PCR-tested individuals in Denmark in 2020: a population-level observational study

March 17, 2021 in THE LANCET

- **Method:** In this observational study, they collected individual-level data from the Danish Microbiology Database and analyzed infection rates during the second surge of the COVID-19 epidemic, from Sept. 1 to Dec. 31, 2020, by comparison of infection rates between individuals with positive and negative PCR tests during the first surge (March to May, 2020). Using these PCR-test data from, to estimated protection towards repeat infection with SARS-CoV-2.
- **Findings:**
- During the first surge (i.e., before June, 2020), 533 381 people were tested, of whom 11 727 (2·20%) were PCR positive, and 525339 were eligible for follow-up in the second surge, of whom 11068 (2·11%) had tested positive during the first surge. Among eligible PCR-positive individuals from the first surge of the epidemic, 72 tested positive again during the second surge.
- The protection against repeat SARS-CoV-2 infection is robust and detectable in the majority of individuals, **protecting 80% or more** of the naturally infected population who are younger than 65 years against reinfections within the observation period. However, its been observed that **individuals aged 65 years and older had less than 50% protection against repeat SARS-CoV-2 infection**. Because the older age group is more prone to a serious clinical course of illness, this finding highlights the need to **implement protective measures for the older population in the form of effective vaccines and enhanced physical distancing and infection control, even in those known to be previously infected.**
- This data indicate that vaccination of previously infected individuals should be done because natural protection cannot be relied on.

Continued

	Population	Confirmed new infection during follow-up	Person-days of follow-up	Infection rate* during follow-up	Adjusted rate ratio (95% CI)†	Estimated protection (95% CI)
Main analysis of reinfection during the second surge						
Positive during first surge	11 068	72	1 346 920	5·35	0·195 (0·155–0·246)	80·5% (75·4–84·5)
Negative during first surge	514 271	16 819	62 151 056	27·06	1 (ref)	··
Alternative cohort analysis with reinfection at least 90 days after first infection‡						
Exposed periods	28 875	138	2 447 924	5·64	0·212 (0·179–0·251)	78·8% (74·9–82·1)
Unexposed periods	2 405 683	53 991	174 487 793	30·94	1 (ref)	··
Sensitivity analyses of reinfection during the second surge						
In frequently tested nurses, doctors, social workers, and health-care assistants						
Positive during first surge	658	8	80 014	10·00	0·189 (0·094–0·379)	81·1% (62·1–90·6)
Negative during first surge	14 946	934	1 798 184	51·94	1 (ref)	··
If the second surge was Aug 1 to Dec 31, 2020§						
Positive during first surge	11 068	87	1 687 700	5·15	0·233 (0·189–0·287)	76·7% (71·3–81·1)
Negative during first surge	514 562	17 110	78 098 000	21·91	1 (ref)	··
If the second surge was Oct 1 to Dec 31, 2020§						
Positive during first surge	11 068	59	1 016 359	5·81	0·172 (0·133–0·222)	82·8% (77·8–86·7)
Negative during first surge	513 025	15 573	46 739 367	33·32	1 (ref)	··

*Rate of infection per 100 000 person-days of follow-up. †Adjusted for sex, age group, and test frequency, and, for the alternative cohort analysis only, start month of follow-up. ‡Exposed periods are periods of follow-up time contributed by individuals with previous infection and unexposed periods are contributed by individuals without a previous infection. §For the sensitivity analyses exploring 2 months and 4 months of separation between the two surges, surge one was unchanged.

Table 1: Comparison of infection and reinfection rates before and after first SARS-CoV-2 infection in 2020 in Denmark

	Number of infections during follow-up		Infection rate*		Adjusted rate ratio (95% CI)†	Estimated protection (95% CI)	p value‡
	Exposed individuals	Unexposed individuals	Exposed individuals	Unexposed individuals			
Overall	138	53 991	5·64	30·94	0·212 (0·179–0·251)	78·8% (74·9–82·1)	··
Sex							
Female	78	30 225	5·68	30·87	0·209 (0·167–0·261)	79·1% (73·9–83·3)	0·84
Male	60	23 766	5·59	31·03	0·216 (0·168–0·279)	78·4% (72·1–83·2)	··
Age group, years							
0–34	49	26 829	5·92	38·13	0·173 (0·131–0·229)	82·7% (77·1–86·9)	<0·0001
35–49	32	12 071	5·16	31·92	0·199 (0·141–0·282)	80·1% (71·8–85·9)	··
50–64	26	10 111	4·25	27·42	0·187 (0·127–0·274)	81·3% (72·6–87·3)	··
≥65	31	4980	8·01	16·92	0·529 (0·372–0·753)	47·1% (24·7–62·8)	··
Time in follow-up, months							
3–6	84	37 357	5·57	27·28	0·207 (0·167–0·256)	79·3% (74·4–83·3)	0·67
≥7	54	16 634	2·66	14·48	0·223 (0·171–0·291)	77·7% (70·9–82·9)	··

*Rate of infection per 100 000 person-days of follow-up. †Adjusted for sex, age group, test frequency, and start month of follow-up. ‡p value from likelihood ratio tests comparing models with and without interaction terms to capture evidence of effect heterogeneity across subgroups.

Table 2: Protection against reinfection with SARS-CoV-2 by sex, age group, and time since first infection, in the alternative cohort analysis

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Article 5

Risk of SARS-CoV-2 reinfection after natural infection

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- This is a commentary article on the previous study :
- This report identify longitudinal studies that have investigated waning antibody levels against SARS-CoV-2, found that it last for 6 months or longer; a substantial minority serorevert to negativity.
- Two key reasons have been stated for the difficulty of calculating the risk of reinfection;

1. Most individuals around the world who became infected during the first wave of the pandemic did not access a PCR or antibody test and were not admitted to or treated in hospital, and so are not included in many COVID-19 datasets.
2. Scientific journals require specific evidence for formal reporting of reinfection, leading to probable under-reporting.

- Danish data reported that only 80·5% protection from reinfection in general, decreasing to 47·1% in people aged 65 years and older are more concerning figures than offered by previous studies.

- Until now, one of the largest datasets was from Qatar during a period of high disease burden, reported an estimated reinfection risk of 0·2%. However, a key difference between the studies is that the Danish study is based on a universally accessible testing programme for both symptomatic and non-symptomatic individuals, whereas the Qatar data are derived from a programme of PCR testing of symptomatic disease.

- The quality, quantity, and durability of protective immunity elicited by natural infection with SARS-CoV-2 are poor relative to the much higher levels of virus-neutralising antibodies and T cells induced by the vaccines currently being administered globally
- Precise correlates of protection against SARS-CoV-2 are not known, but emerging variants of concern might shift immunity below a protective margin, prompting the need for updated vaccines.

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