مركز أبوظبي للصحة العامة
ABU DHABI PUBLIC HEALTH CENTRE

SCIENTIFIC RESEARCH MONITORING ON COVID-19

24 MAY 2021

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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

- National differences in vaccine hesitancy: a concern for the external validity of vaccine studies
- SARS-CoV-2 Infection after Vaccination in Health Care Workers in California
- Single-dose administration and the influence of the timing of the booster dose on immunogenicity and efficacy of ChAdOx1 nCoV-19 (AZD1222) vaccine: a pooled analysis of four randomized trials
- Antibody Persistence through 6 Months after the Second Dose of mRNA-1273 Vaccine for Covid-19
- Development of COVIDVax Model to Estimate the Risk of SARS-CoV-2–Related Death Among 7.6 Million US Veterans for Use in Vaccination Prioritization
- In Search of the Best Way to Identify Those Who Would Benefit Most From COVID-19 Vaccination—Who Goes First?

EPIDEMIOLOGY

FROM 21 JAN 2020 TO 23 May 2021

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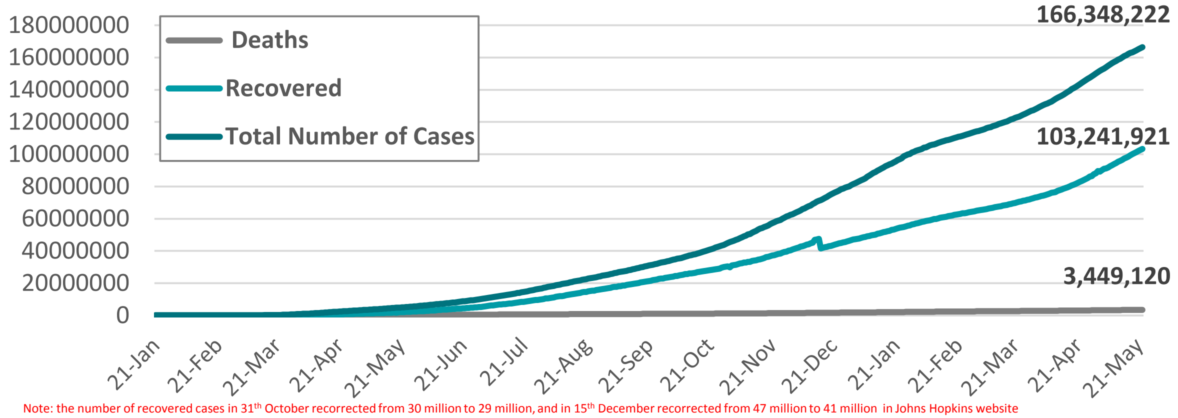
Figure 1: Total Number of Infected, Recovered, and Death Cases



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: % of people who received at least one dose of COVID-19 vaccine around the world

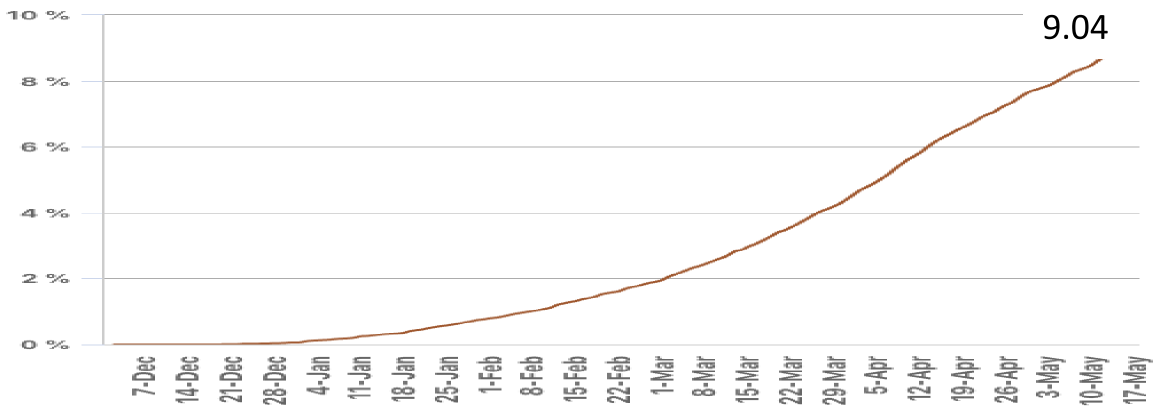


Figure 2: Daily New Infected COVID-19 Cases

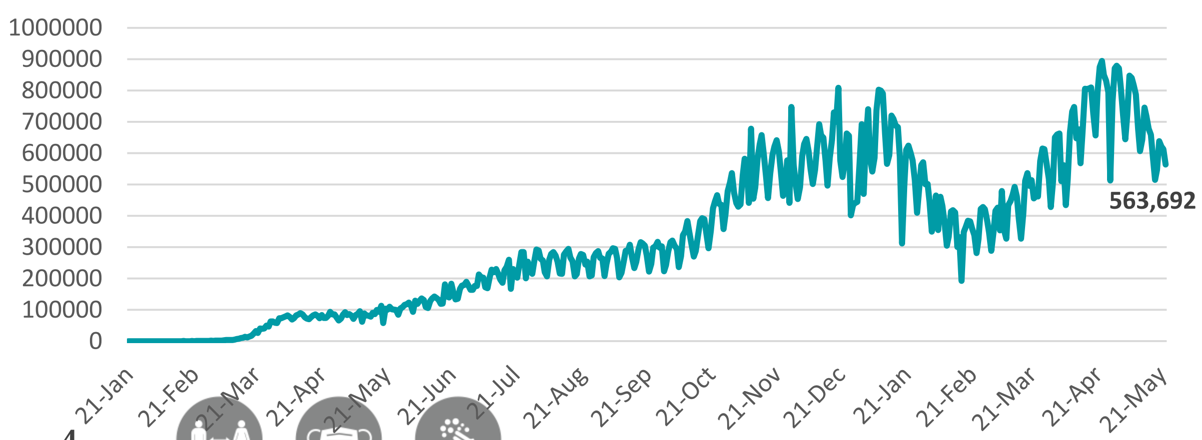
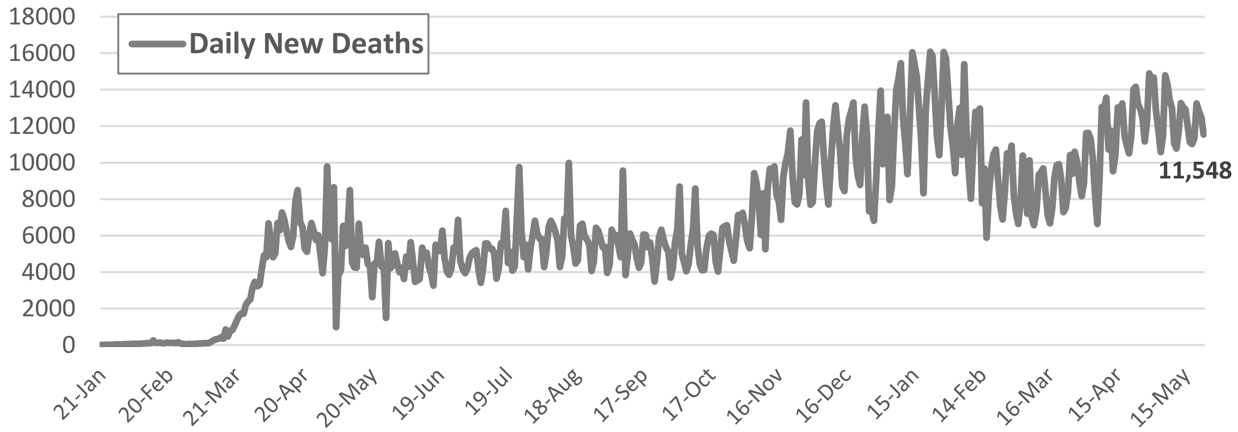


Figure 4: Global Daily New Deaths Due to COVID-19



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

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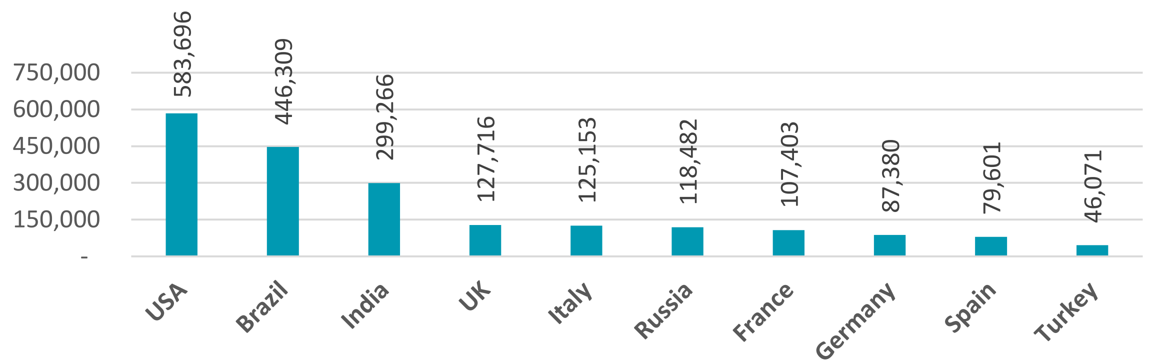
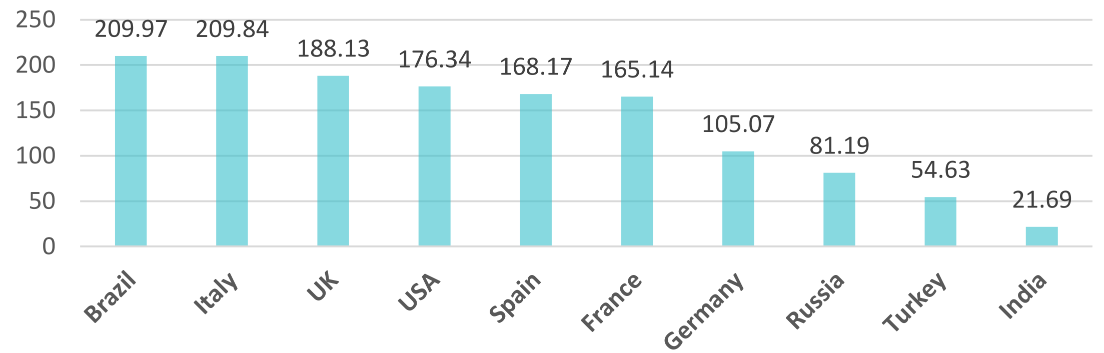
Figure 5: Top 10 Countries in the Total Number of Cases Due to COVID-19

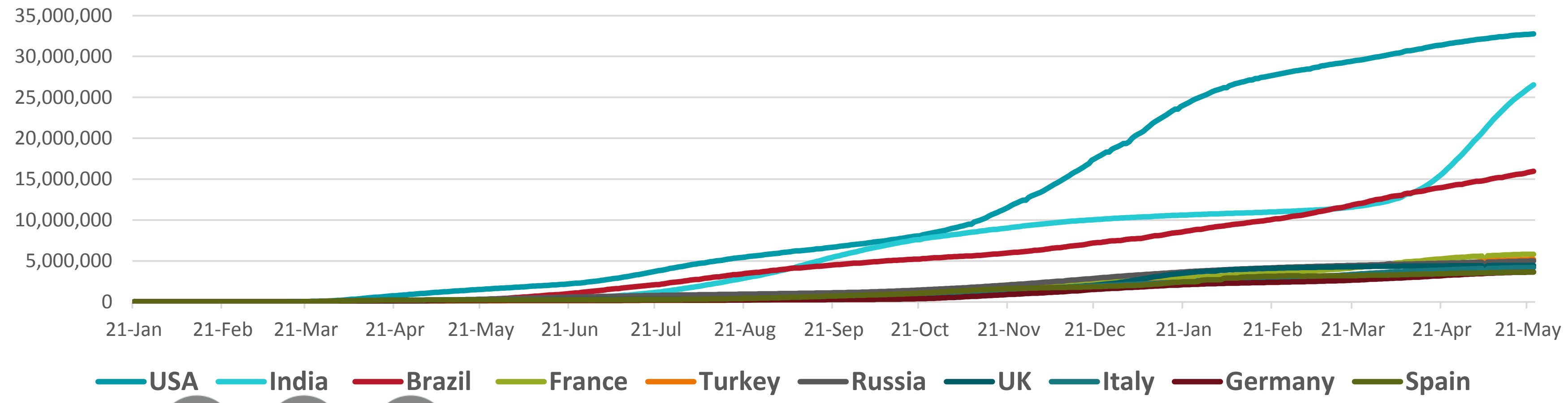
TOTAL DEATHS



DEATHS PER MILLION



TOTAL INFECTED CASES



USA	32,762,914
India	26,530,132
Brazil	15,970,949
France	5,820,918
Turkey	5,178,648
Russia	5,001,505
UK	4,460,450
Italy	4,188,190
Germany	3,648,958
Spain	3,631,661

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

FROM 21 JAN 2020 TO 23 May 2021

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

Daily Tests
220,338.3 Average Tests
2,227.8 per 100k population
0.6% Positive Rate

Daily Cases
1,417.9 Average Cases
14.3 per 100k population

Daily Recovered
1,392.6 Average Recovered
14.1 per 100k population

Daily Deaths
2.9 Average Deaths
0.0 per 100k population
0.2% Case Fatality Rate

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

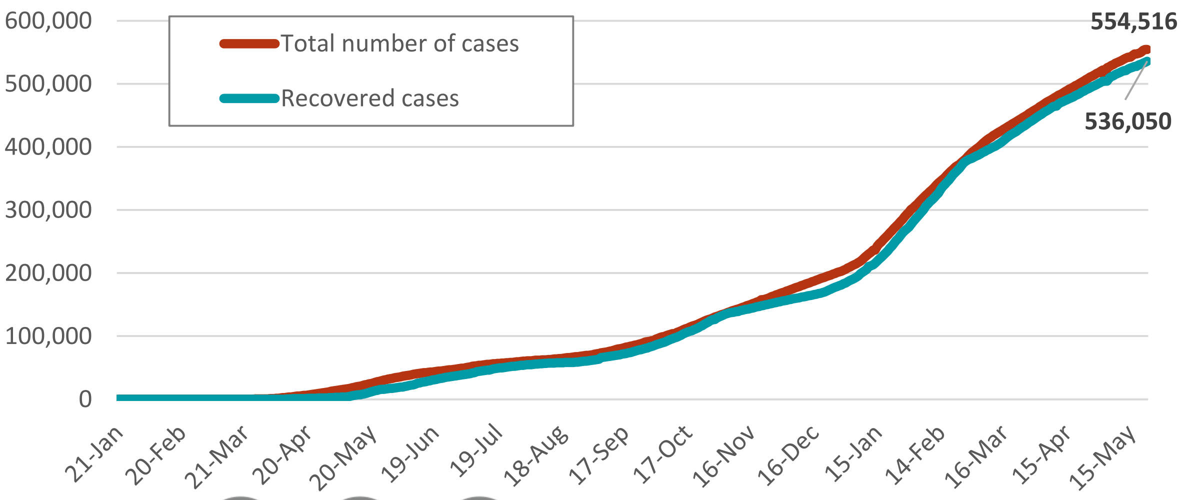
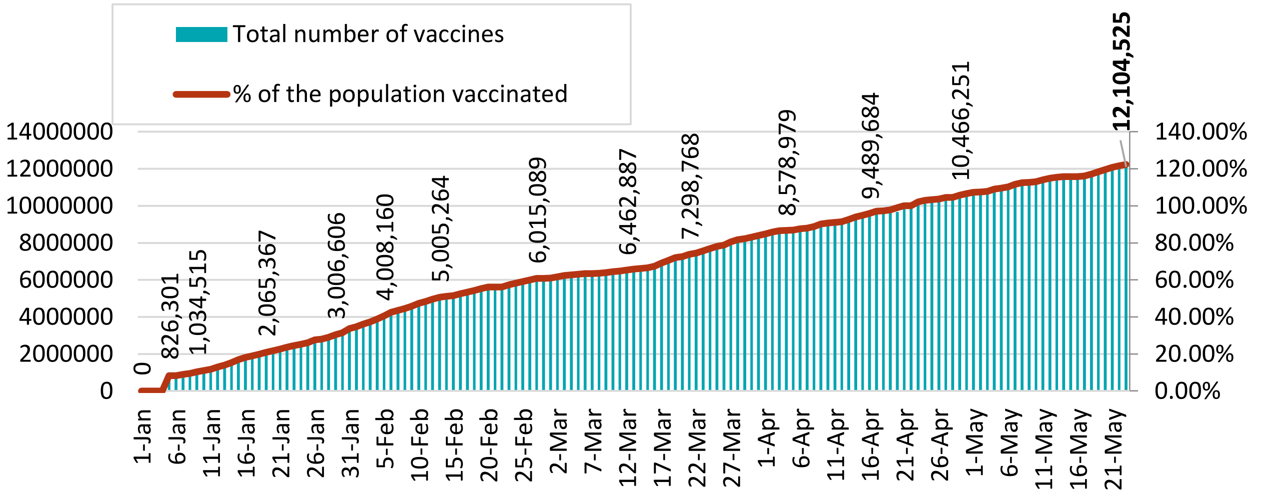


Figure 6 B: TOTAL NUMBER and Percentage of UAE population Vaccinated



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

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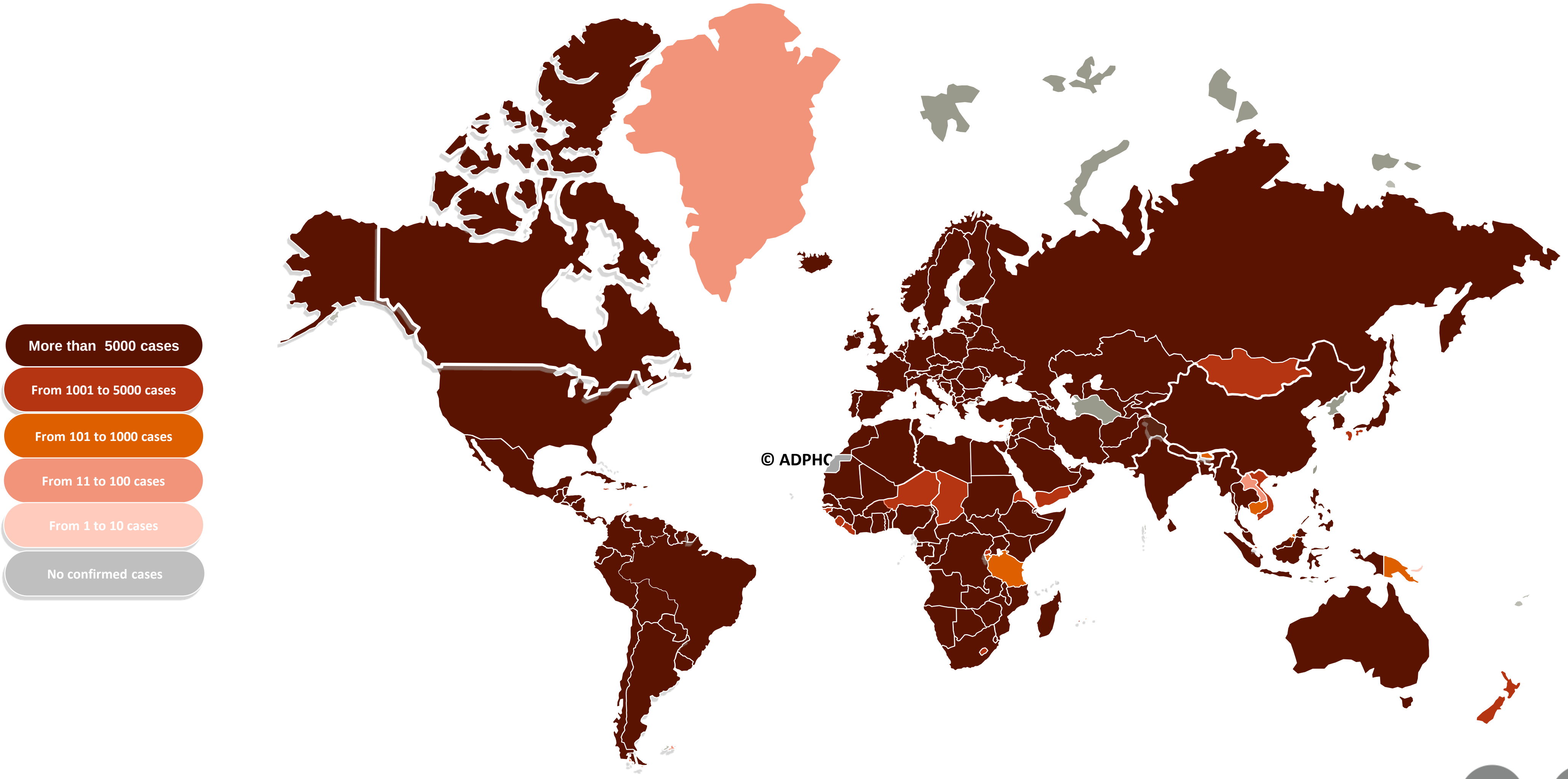
Figure 7A : Global Distribution of COVID-19 Cases



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

EPIDEMIOLOGY

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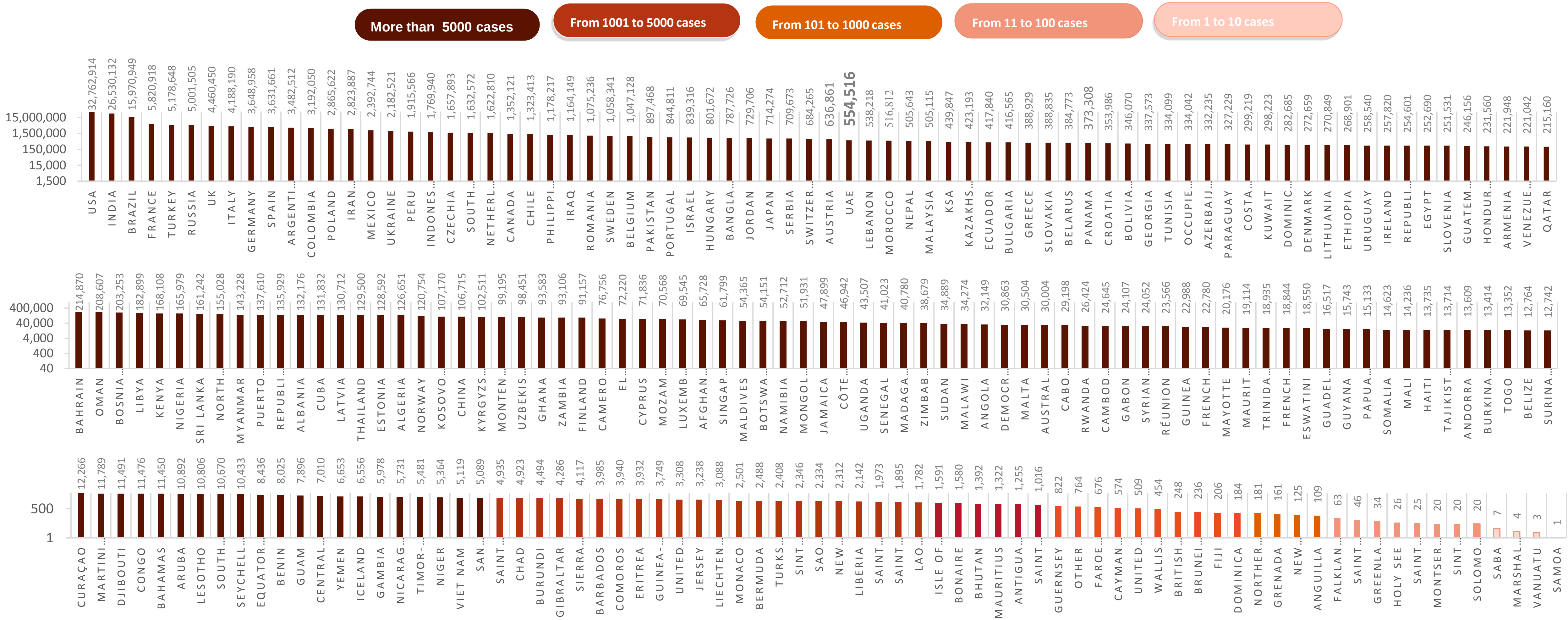
Figure 7B: Bar Chart Illustrates the Global Distribution of COVID19 Cases



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

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

EPIDEMIOLOGY

FROM 21 JAN 2020 TO 23 May 2021

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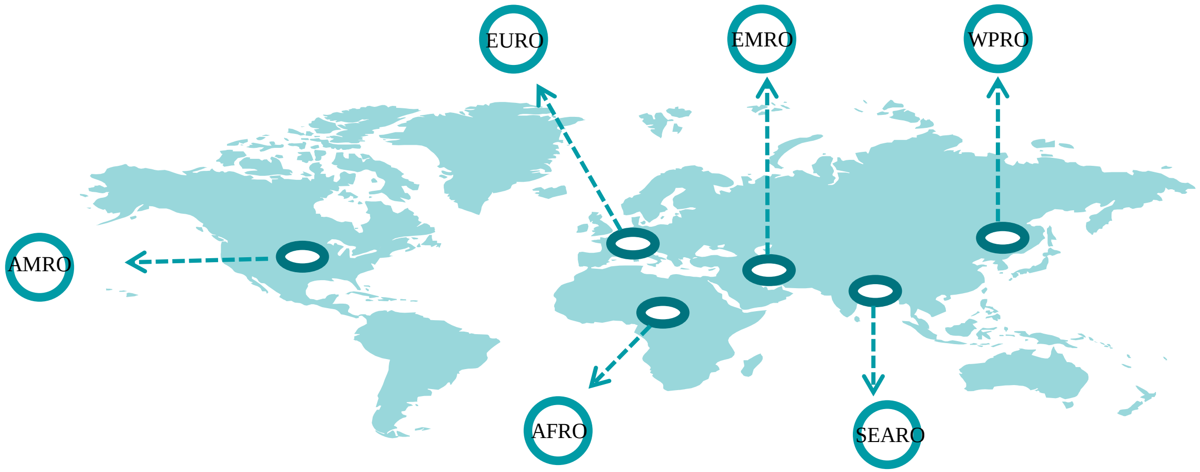
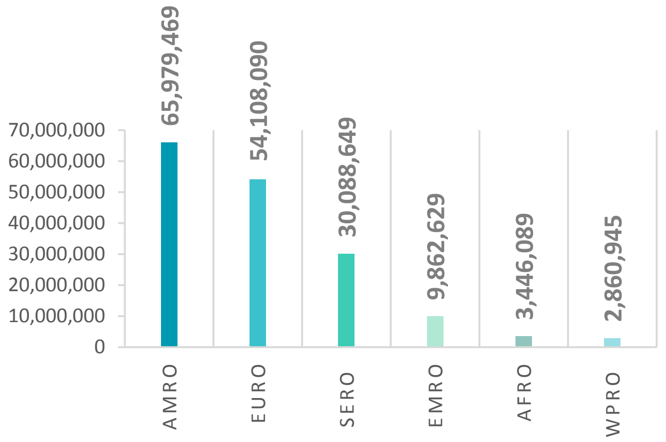
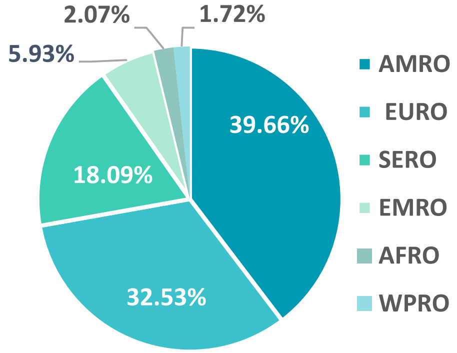
Figure 6: Global Distribution of COVID-19 Cases per Region

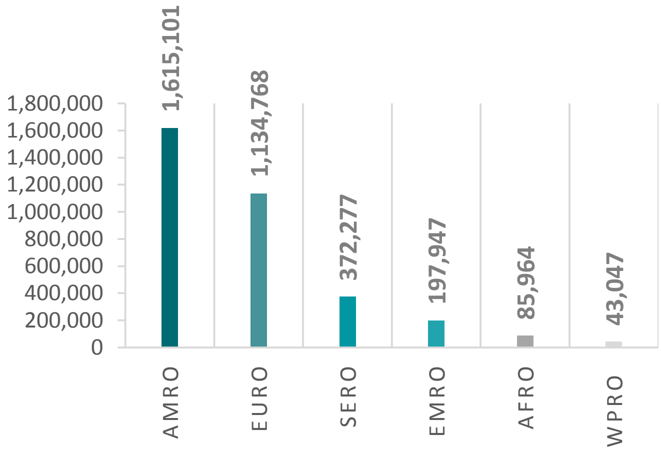


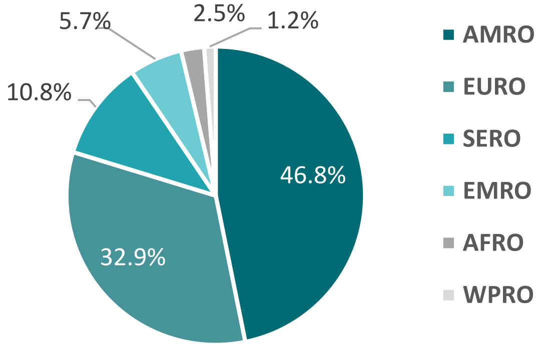
INFECTED





DEATHS





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EPIDEMIOLOGY

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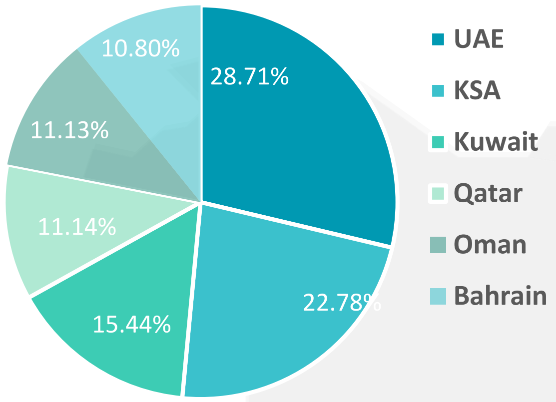
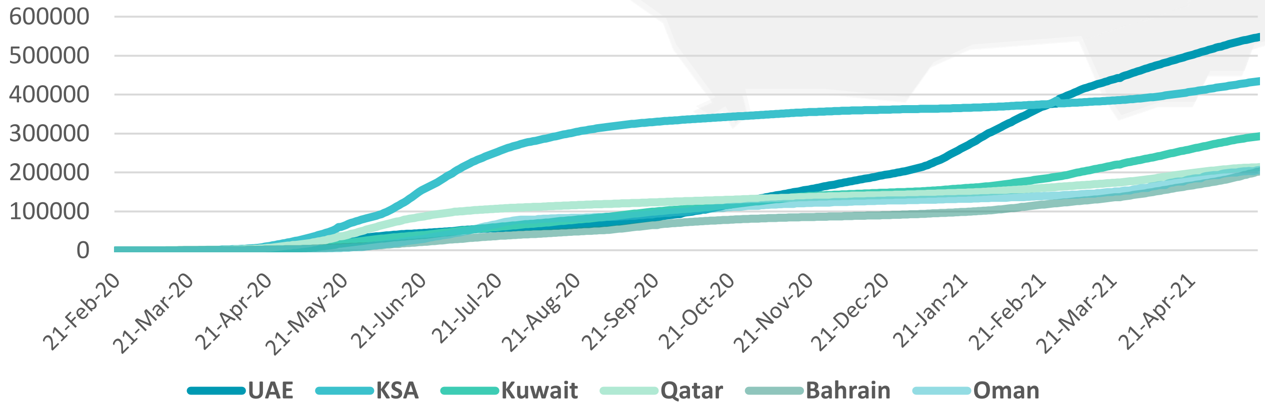
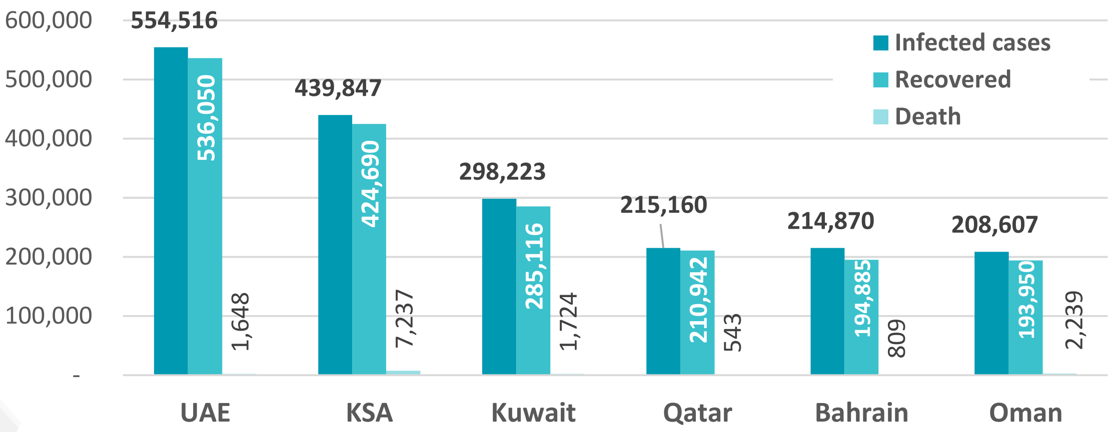
Figure 7: Comparative Analysis of the Distribution of COVID-19 Cases in GCC Countries

TOTAL NUMBER OF INFECTED CASES

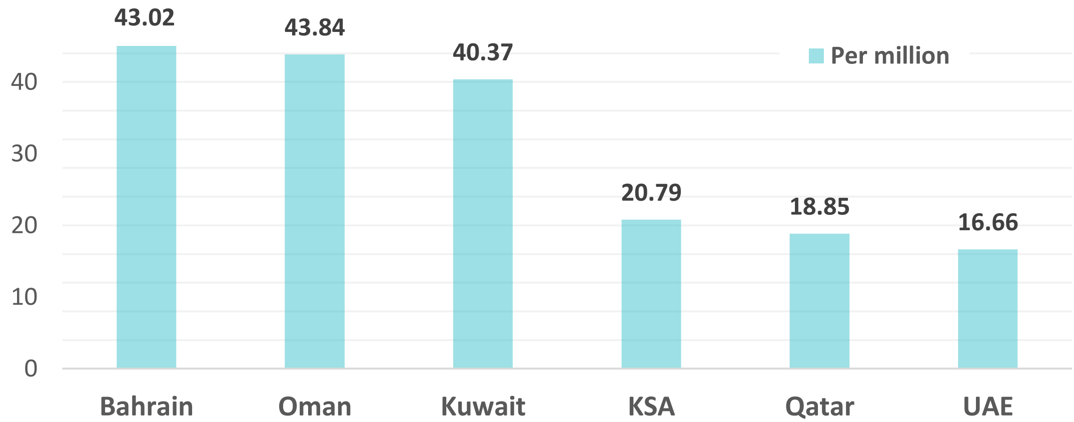




TOTAL NUMBER OF INFECTED, RECOVERED AND DEATHS



DEATHS PER MILLION



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

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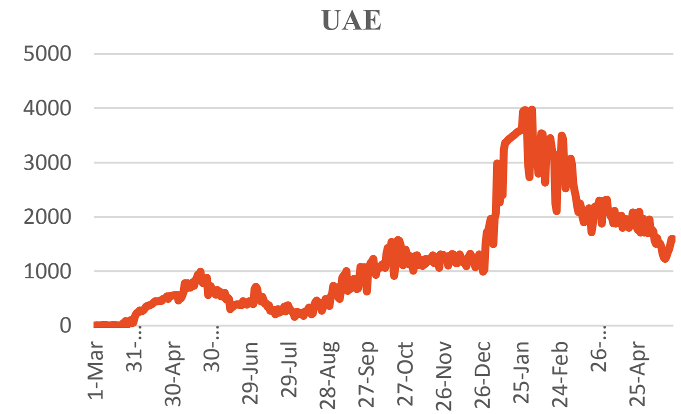
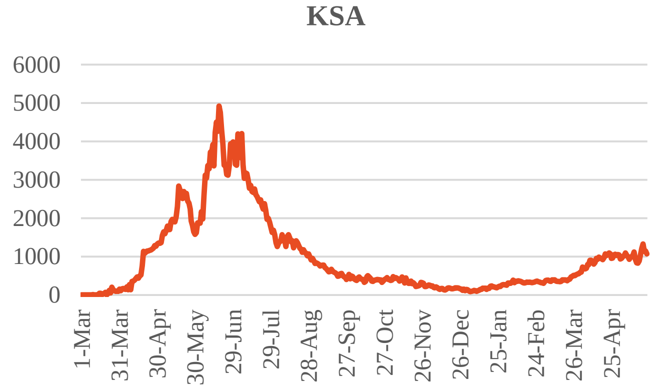
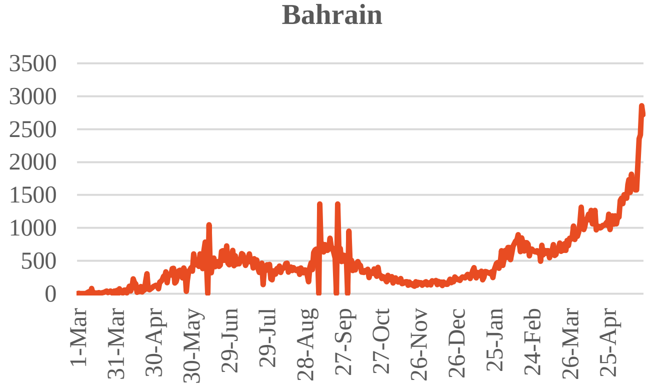
Figure 10: Comparative Analysis of the Distribution of COVID-19 New Cases in GCC Countries



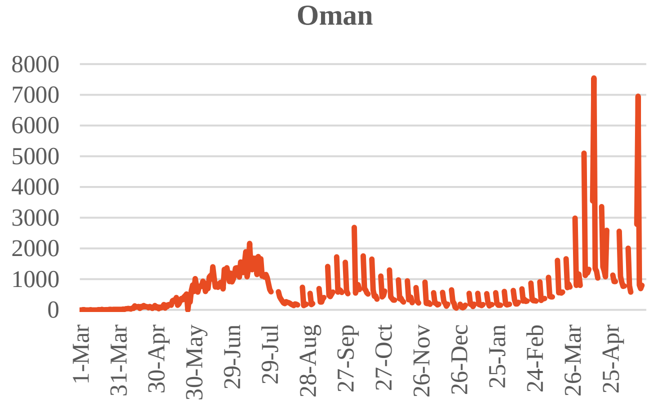
Source : National Emergency Crisis and Disaster Management Authority



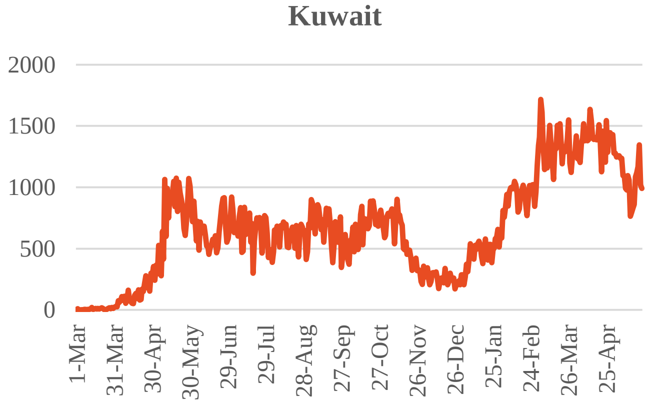
Source : KSA ministry of health



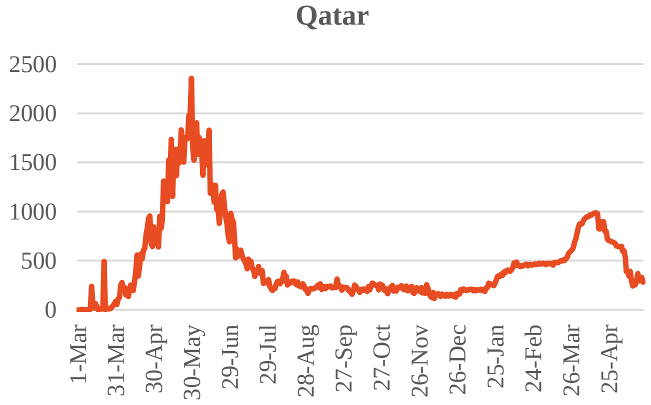
Source :WHO



Source :Oman ministry of health



Source : Kuwait ministry of health



Source : Qatar ministry of health

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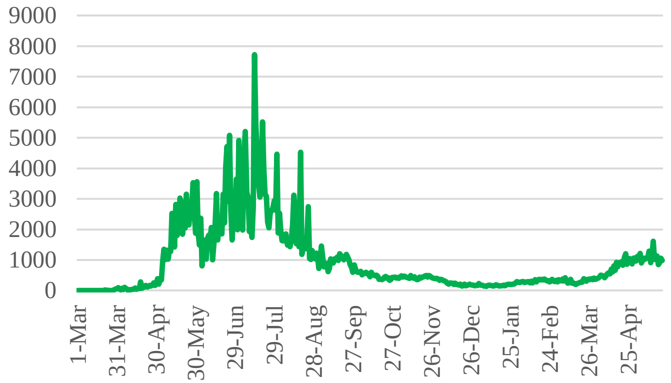
Figure 11: **Comparative Analysis of the Distribution of COVID-19 Recovered Cases in GCC Countries**

UAE

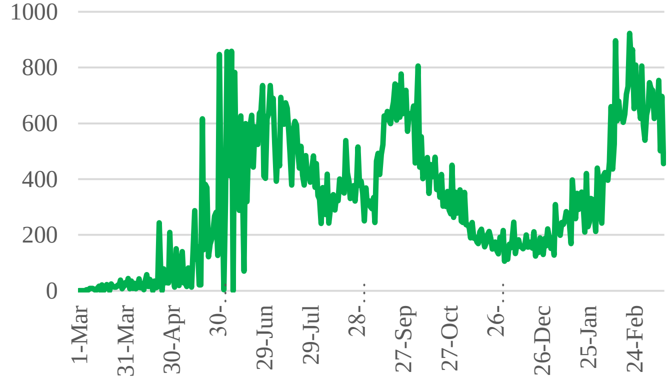
Source : National Emergency Crisis and Disaster Management Authority

KSA



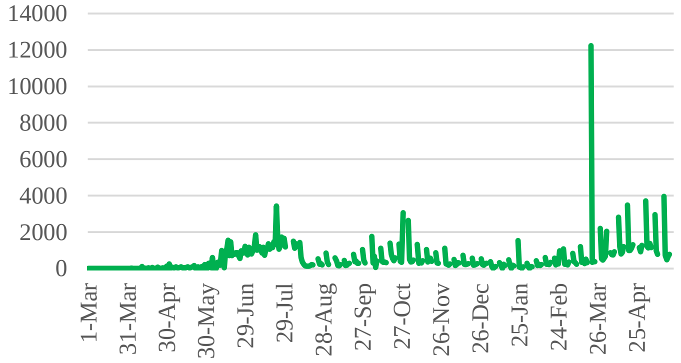
Source : KSA ministry of health

Bahrain



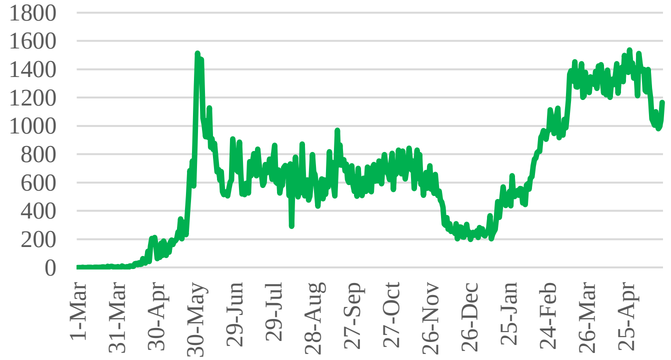
Source : Bahrain ministry of health

Oman



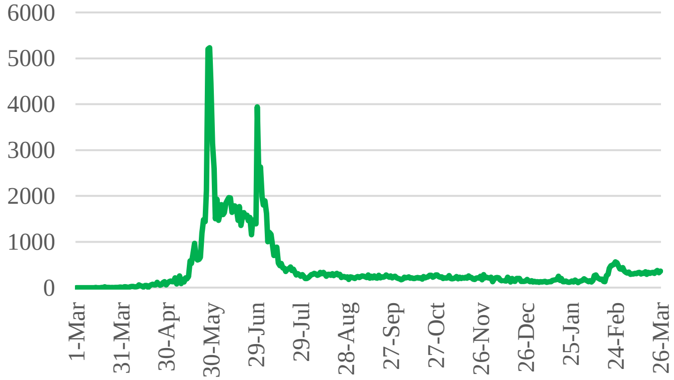
Source :Oman ministry of health

Kuwait



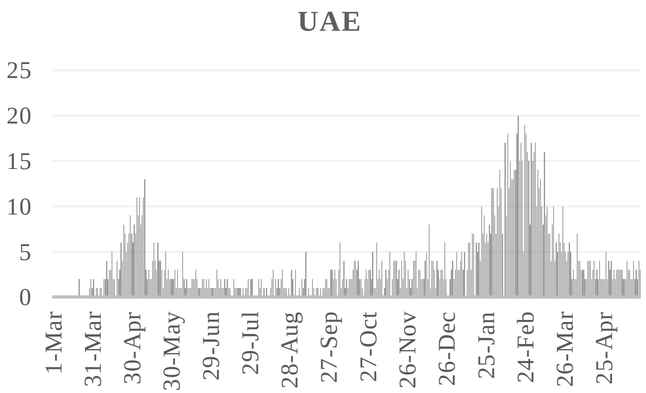
Source : Kuwait ministry of health

QATAR

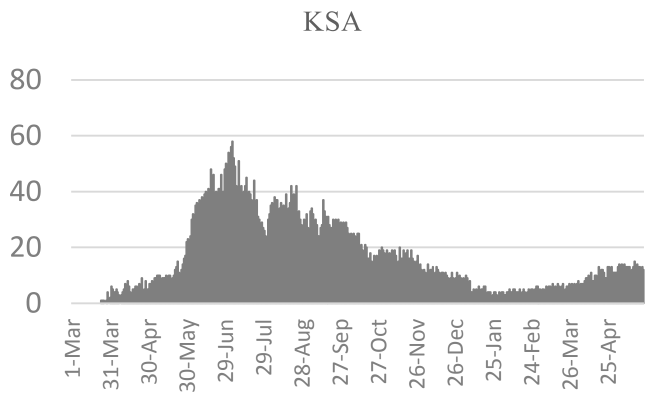


Source : Qatar ministry of health

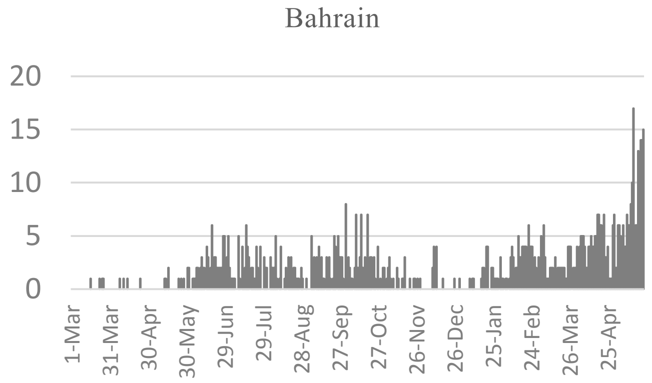
Figure 12: Comparative Analysis of the Distribution of COVID-19 New Death Cases in GCC Countries



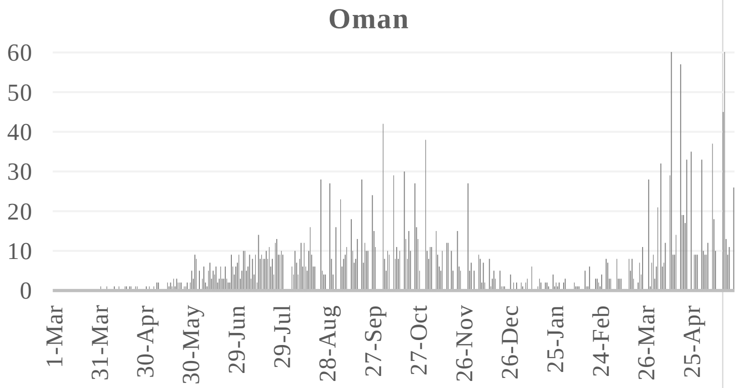
Source : National Emergency Crisis and Disaster Management Authority



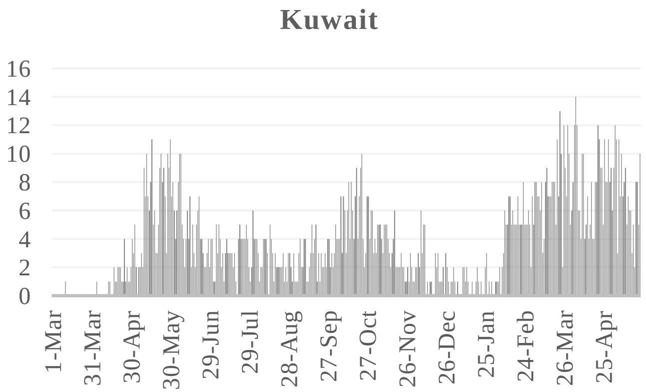
Source : KSA ministry of health



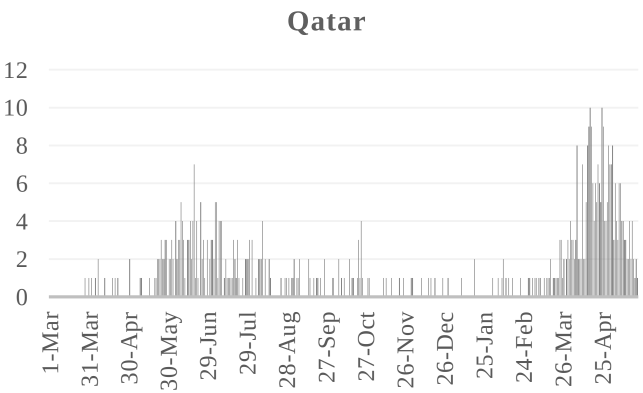
Source :WHO



Source :Oman ministry of health



Source : Kuwait ministry of health



Source : Qatar ministry of health

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Article 1

National differences in vaccine hesitancy: a concern for the external validity of vaccine studies

Published

March 26, 2021 in THE LANCET

- This article published in *The Lancet Rheumatology* discusses the difference in vaccine hesitancy noted among different nationals which is a concern for the external validity of vaccine studies.

- The discussion is based on studies by Renaud Felten & colleagues and Laura Boekel & colleagues published in *The Lancet Rheumatology,* both of which contributed to essential insights into the perspective of patients with autoimmune and rheumatic diseases on COVID-19 vaccination. The authors reported a moderate willingness (54% to 61%) to be vaccinated against COVID-19 in the two study populations.

- The authors raise their concerns about **the lack of focus on national differences in vaccine hesitancy** in both studies presented by Felten and colleagues & Boekel and colleagues. In Felten and colleagues' international cohort, 25·3% of 1266 participants were French, whereas all 1727 participants in the cohort of Boekel and colleagues were from the Netherlands.

- Data from 2019, showed that the **perception of vaccine safety varies considerably with nationality**. In Denmark, 47·2% of the population strongly agreed that vaccines are safe, compared with only 29·8% of the population in the Netherlands and 29·7% of the French population. Overall, perception of vaccine safety is more pessimistic in the European and the Western Pacific region.

- A questionnaire study was undertaken by the authors in January 2021, of 392 Danish patients with systemic lupus erythematosus (SLE) and rheumatoid arthritis assessing their willingness to be vaccinated against COVID-19. Patient characteristics - median age 57·5 years, 82·1% were women, and 51·0% had SLE. In this population, **92·9% patients wished to be vaccinated, 3·8% were hesitant, and only 3·3% were unwilling to be vaccinated.** The primary concerns expressed by those who were **both hesitant and side-effects**, and **safety related** to the accelerated vaccine development.

- Disparity between the results of the three studies is substantial and the authors conclude that this presumably due to national differences in vaccine hesitancy and confidence. They also state that awareness of these differences is paramount, as they can diminish the external validity of studies addressing vaccine hesitancy in specific patient groups.

- The WHO named **vaccine hesitancy as one of the top ten threats** to global health in 2019; complacency, convenience, and lack of confidence were identified as key reasons underlying vaccine hesitancy. Whilst the authors support the conclusion of both studies, which is that **health-care workers have an essential role** in reassuring the community about vaccine safety, identifying the cultural backgrounds that underlie the substantial differences between countries in vaccine hesitancy and confidence could prove to be a meaningful approach when disseminating vaccine information in different nations.

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Article 2 SARS-CoV-2 Infection after Vaccination in Health Care Workers in California

Published March 23, 2021 in THE NEJM

- This study published in the New England Journal of Medicine was undertaken across two University of California sites , San Diago (UCSD) and Los Angeles (UCLA) and aims to determine rate of infection of SARS-COV-2 in health care workers following vaccination with mRNA vaccines (mRNA-1273, Moderna &BNT162b2, Pfizer). The study also compares findings with figures published from phase 3 clinical trials of these vaccines and provides potential explanations for the disparity noted.

- Vaccination for health care workers in both sites began on December 16, 2020. On the 2nd of December 2020, in addition to defining a low threshold for testing of symptomatic persons, UCSD mandated that asymptomatic health care workers undergo weekly testing by polymerase-chain-reaction (PCR) assay of nasal swabs. On December 26, UCLA instituted an optional testing program for asymptomatic health care workers with PCR assay of nasal swabs. This program has allowed for increased detection of asymptomatic SARS-CoV-2 infections after vaccination.

- Findings from pooled data obtained in de-identified format from an electronic employee health record system at UCSD and UCLA for the period December 16, 2020, through February 9, 2021, showed a **positivity rate of 0.05%** . The absolute risk of testing positive for SARS-CoV-2 after vaccination in this cohort was **1.19% among health care workers at UCSD and 0.97% among those at UCLA**; these rates are **higher than the risks reported in the trials of mRNA-1273 vaccine and BNT162b2 vaccine.**

- The authors state some possible explanations for this elevated risk noted include **the availability of regular testing** for asymptomatic and symptomatic persons at the institutions, a **regional surge in infections** in Southern California during the vaccination campaigns and **differences in demographic characteristics** between the trial participants and the health care workers in the cohort. The health care workers were younger and had an overall higher risk of exposure to SARS-CoV-2 than the participants in the clinical trials. In addition, the cut- off dates for reporting in both initial vaccine trials were well before the surge, **no testing of asymptomatic persons was included in the BNT162b2 vaccine trial**, and only a **single screening of asymptomatic persons was performed in the mRNA-1273** vaccine trial before the second dose was administered.

- The authors conclude that the rarity of positive test results 14 days after administration of the second dose of vaccine is encouraging and suggests that the efficacy of these vaccines is maintained outside the trial setting. In addition, this data underscores the **critical importance of continued public health mitigation measures** (masking, physical distancing, daily symptom screening, and regular testing), even in **environments with a high incidence of vaccination**, until herd immunity is reached at large.

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Article 3

Published

Single-dose administration and the influence of the timing of the booster dose on immunogenicity and efficacy of ChAdOx1 nCoV-19 (AZD1222) vaccine: a pooled analysis of four randomized trials

February 19, 2021 in THE LANCET

This study examined the efficacy of only 1 dose of AstraZeneca (AZ) vaccine and whether the efficacy differs by changing the interval between 1st dose and 2nd dose.

How the study was done?

- The data from 4 RCTs related to AZ vaccine conducted in the UK, Brazil and South Africa were pooled together – a total of 17, 178 individuals 18 years and above (8597 vaccine group and 8581 controls).
- Primary outcome was confirmed COVID-19 symptomatic cases more than 14 days after the second dose.
- Secondary outcome was cases occurring at least 22 days after the first dose.

What this study found?

- Overall vaccine efficacy more than 14 days after the second dose was 66.7% with 84 (1%) cases in the 8597 participants in the vaccine group and 248 (3%) in the 8581 participants in the control group.
- Hospital admissions: None in the vaccine group after the initial 21-day exclusion period, and 15 hospital admissions in the control group.
- Serious adverse events: 108 (0.9%) of in the vaccine group and 127 (1.1%) in the control group.
- Single dose efficacy: After a single standard dose of vaccine, the efficacy was 76% from day 22 to day 90 after vaccination, and protection did not wane during this initial 3-month period.
- Interval between doses: Participants who received two standard doses, after the second dose, efficacy was higher in those with a longer prime-boost interval (vaccine efficacy 81.3% at ≥12 weeks) than in those with a short interval (vaccine efficacy 55.1% at <6 weeks).
- Immunogenicity data: Antibody responses more than two-fold higher after an interval of 12 or more weeks compared with an interval of less than 6 weeks in those who were aged 18–55 years.

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Article 4

Published

Antibody Persistence through 6 Months after the Second Dose of mRNA-1273 Vaccine for Covid-19

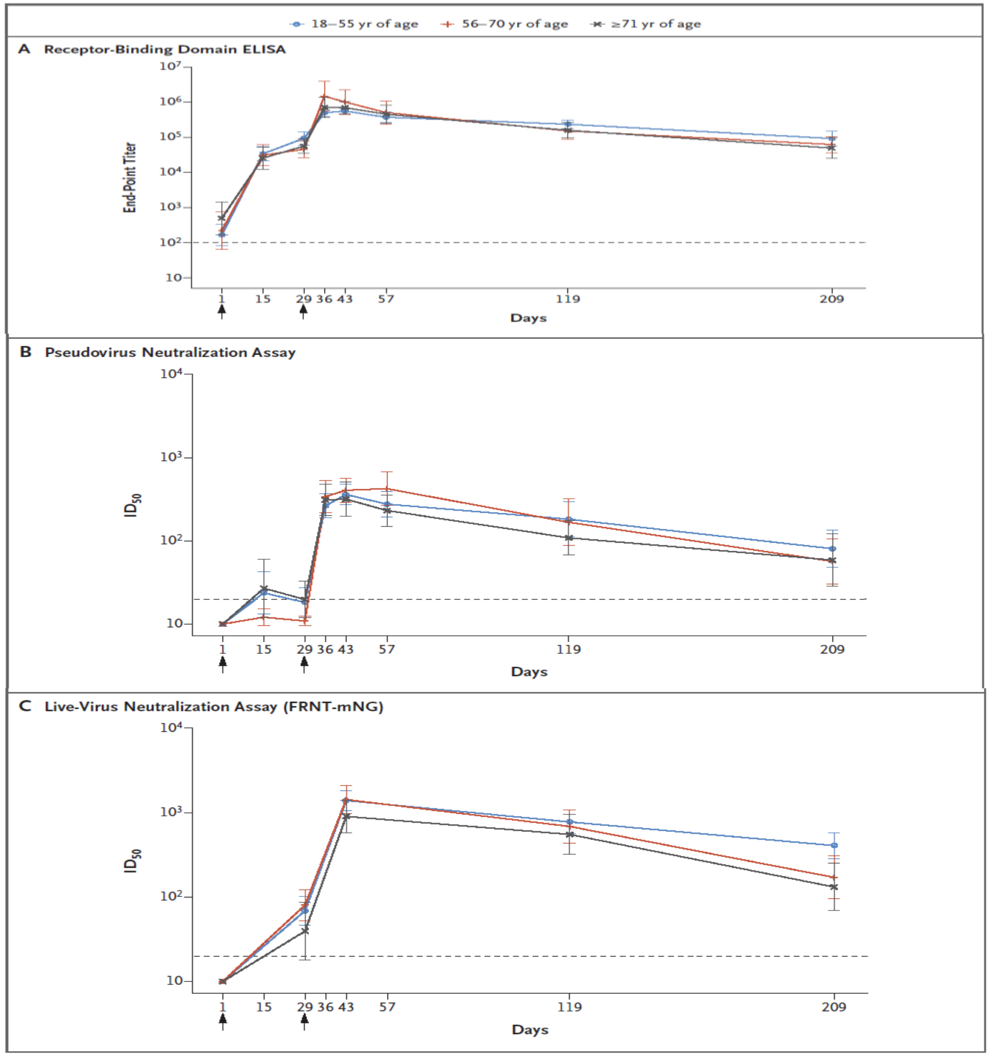
April 6, 2021 in THE NEJM

- Moderna mRNA-1273 SARS-CoV-2 vaccine indicated 94% efficacy in preventing coronavirus disease 2019 (Covid-19). Antibody activity remained high in all age groups at day 209.

- The estimated half-life of binding antibodies after day 43 for all the participants was 52 days CI (46 to 58) calculated with the use of an exponential decay model, which assumes a steady decay rate over time, and 109 days CI (92 to 136) calculated with the use of a power-law model (at day 119), which assumes that decay rates decrease over time.

- The neutralizing antibody half-life estimates in the two models were 69 days CI (61 to 76) and 173 days CI (144 to 225) for pseudovirus neutralization and 68 days CI (61 to 75) and 202 days CI(159 to 272) for live-virus neutralization.
- Although the antibody titers and assays that best correlate with vaccine efficacy are not currently known, antibodies that were elicited by mRNA-1273 persisted through 6 months after the second dose, as detected by three distinct serologic assays.

- Ongoing studies are monitoring immune responses beyond 6 months as well as determining the effect of a booster dose to extend the duration and breadth of activity against emerging viral variants.



Article 5 Development of COVIDVax Model to Estimate the Risk of SARS-CoV-2–Related Death Among 7.6 Million US Veterans for Use in Vaccination Prioritization

Published April 6, 2021 in THE JAMA

The aim of this study was to develop a model based on certain characteristics to predict COVID-19 related mortality in all enrollees of the US Department of Veterans Affairs (VA) health care system.

How the study was done?

- This prognostic study used data from 7.6 million individuals enrolled in the VA health care system as of May 21, 2020,
- Baseline characteristics known to be associated with SARS-CoV-2–related mortality were used.
- The cohort was split into a training period (May 21 to September 30) and testing period (October 1 to November 2).
- Main outcome was defined as death within 30 days of testing positive for SARS-CoV-2.
- A logistic regression model (COVIDVax) was developed and internally validated.

What this study found?

- 10 variables were included in the final COVIDVax model: sex, age, race, ethnicity, body mass index, Charlson Comorbidity Index, diabetes, chronic kidney disease, congestive heart failure, and Care Assessment Need score.
- The model exhibited excellent discrimination with area under the receiver operating characteristic curve (AUROC) of 85.3% which was superior to the AUROC (72.6%) of using age alone to stratify risk.
- If vaccine efficacy is 90% in preventing COVID-19 related deaths, using the COVIDVax model to prioritize vaccinations was estimated to prevent 63.5% of deaths that would occur by the time 50% of VA enrollees are vaccinated.
- Similar estimates for CDC and age-based allocation of vaccination rollout were 41.1% and 45.6%, respectively.

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Continued

Take-home Message

- Rather than using the "age-based' strategy of vaccination, more COVID-19 related deaths during the vaccination period could be prevented by using the COVIDVax model criteria to prioritize vaccine rollout.

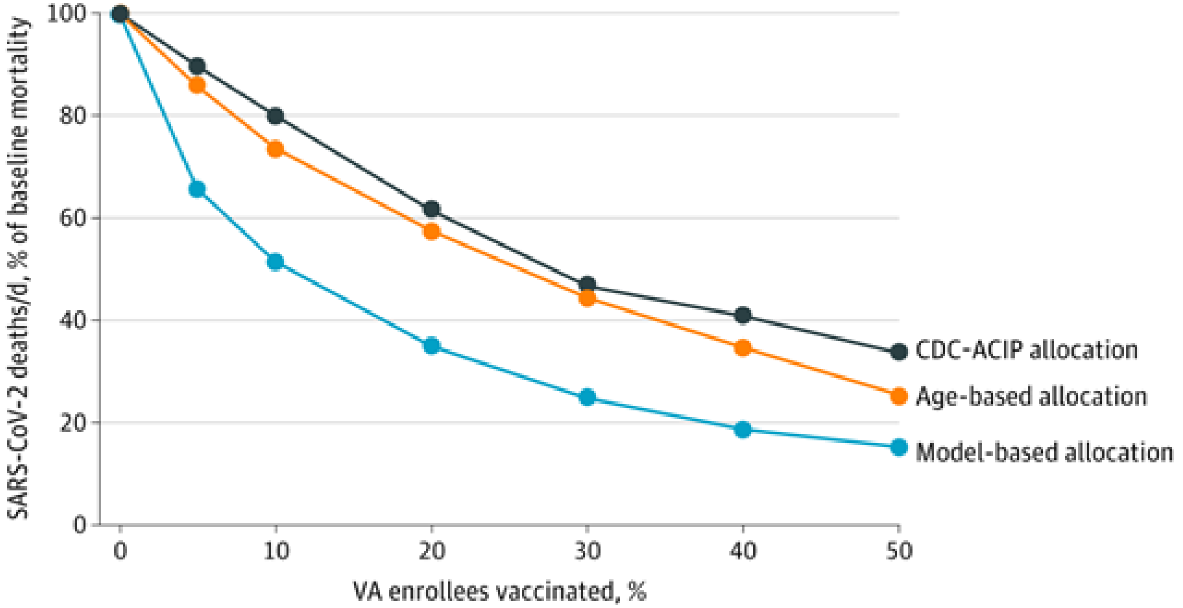

Figure. Estimated reduction in SARS-CoV-2 related mortality by levels of vaccination.

Article 6

In Search of the Best Way to Identify Those Who Would Benefit Most From COVID-19 Vaccination—Who Goes First?

Published

April 6, 2021 in THE JAMA

- This commentary published in the JAMA discusses the best approach in identifying and prioritising population groups that would benefit most from being vaccinated early on.
- Despite the remarkable achievements so far in the Covid-19 vaccination, the authors estimate it will take 8 months to vaccinate 75% of the United States population with a 2-dose regimen if the current pace is maintained. This is not nearly fast enough, considering that more transmissible and likely more deadly SARS-CoV-2 variants are spreading fast.
- Anticipating shortage of vaccine supply at the beginning of the vaccine roll out, National Academies of Sciences, Engineering, and Medicine convened an ad hoc committee to develop an overarching framework for COVID-19 vaccine allocation to assist policy makers, at the request of the CDC and National Institutes for Health.
- The report of this committee provided a roadmap based on ethical principles of maximizing benefit, equal concern for all individuals, and mitigation of inequities for fair vaccine allocation. The report recommended **a phased approach for vaccinating the population**. These overall recommendations informed more specific recommendations by the CDC Advisory Committee on Immunization Practices (ACIP) and committees advising various states in their immunization plans.
- The ultimate goals of a COVID-19 vaccination program are to reduce morbidity and mortality and to return to normal life by limiting transmission. However, the public health strategy behind the National Academies' allocation approach while supplies are limited was to prioritize the reduction of death and severe disease and the protection of the health care system rather than to interrupt transmission.
- Because vaccines are quite effective in reducing severe disease and hospitalization, the populations prioritized initially have been adults 65 years and older followed by persons with high-risk medical conditions. To date, more than half of the people who have received at least 1 dose of the COVID-19 vaccine are 65 years or older in the US.
- The authors wonder whether the mortality first strategy is the best way Is this the best way to proritise given the limited supply of COVID-19 vaccines and propose two other models as a potential way to maximize benefits.

Continued

- A model developed by Loannou et al was developed using the electronic health records of 7.6 million US veterans to better identify who to vaccinate first to prevent a greater number of COVID-19 deaths. Investigators used data on veterans available at the Veterans Affairs Corporate Data Warehouse and developed a model to estimate the risk of SARS-CoV-2–related death during follow-up using patient characteristics. Subsequently, they compared the performance characteristics of 3 COVID-19 vaccine prioritization strategies: persons vaccinated sequentially based on model scores; age-based allocation; and CDC-ACIP phased allocation. Their findings suggest that **prioritizing those more likely to die of COVID-19 during vaccine rollout would result in 22.4% fewer deaths than an approach based on the CDC-ACIP phased vaccination and 17.9% fewer deaths than an approach based solely on age.**

- Although this provides substantive evidence, this tool similar to other a driven tools rely on a robust and complete data source, such as the VA or managed care organization data. Nevertheless, the authors argue increasing the effect of each dose on mortality prevention, even if it is limited to organizations such as the VA, could be worth it.

- Another study by Bubar et al used a mathematical model and concluded that **mortality would be minimized by prioritizing adults older than 60 years**, while a vaccine that **effectively blocked transmission prioritized to adults aged 20 to 49 years would minimize incidence**.

- The authors conclude that vaccine prioritization in a public health emergency is always difficult, and scaling up rapid vaccination is hard, but it is even harder if the desire is to do it with equity. Among the 23 states in the US that have released data on data on vaccination distribution by race/ethnicity, White residents are being vaccinated at substantially higher rates than Black residents, in many cases 2 to 3 times higher. Thus, closely monitoring whichever model is being used becomes critically important, if the results are not what is desired, that course corrections be made to avoid the risk of increasing disparities with vaccination.

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