مركز أبوظبي للصحة العامة
ABU DHABI PUBLIC HEALTH CENTRE

SCIENTIFIC RESEARCH MONITORING ON COVID-19

10 MAY 2021

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SCIENTIFIC RESEARCH MONITORING ON COVID-19

(Issue 422)

مركز أبوظبي للصحة العامة
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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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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.
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RESEARCH UPDATES

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VACCINE

- **Thromboembolism and the Oxford–AstraZeneca COVID-19 vaccine: side-effect or coincidence?**
- **Operation Warp Speed: implications for global vaccine security?**
- **Antibody Responses after a Single Dose of SARS-CoV-2 mRNA Vaccine**
- **BNT162b2 mRNA Covid-19 Vaccine Effectiveness among Health Care Workers**

EPIDEMIOLOGY

FROM 21 JAN 2020 TO 09 May 2021

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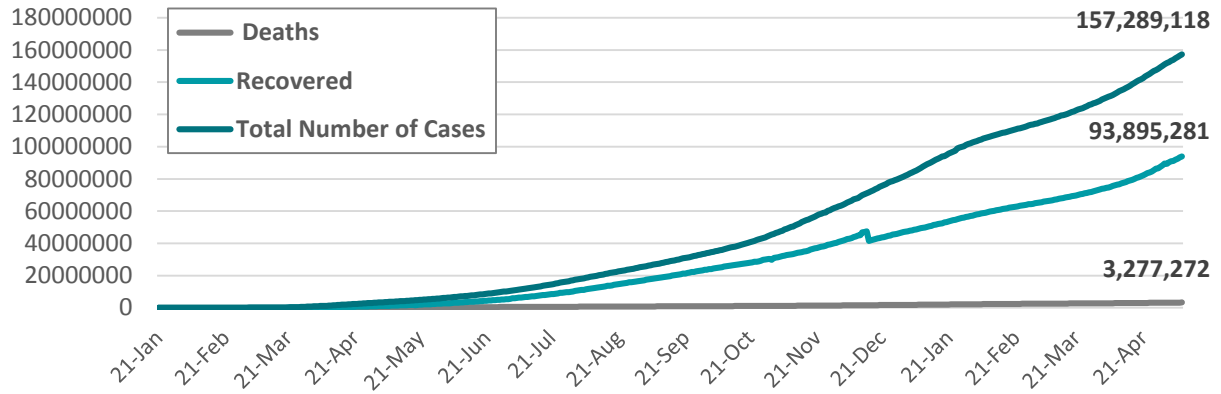
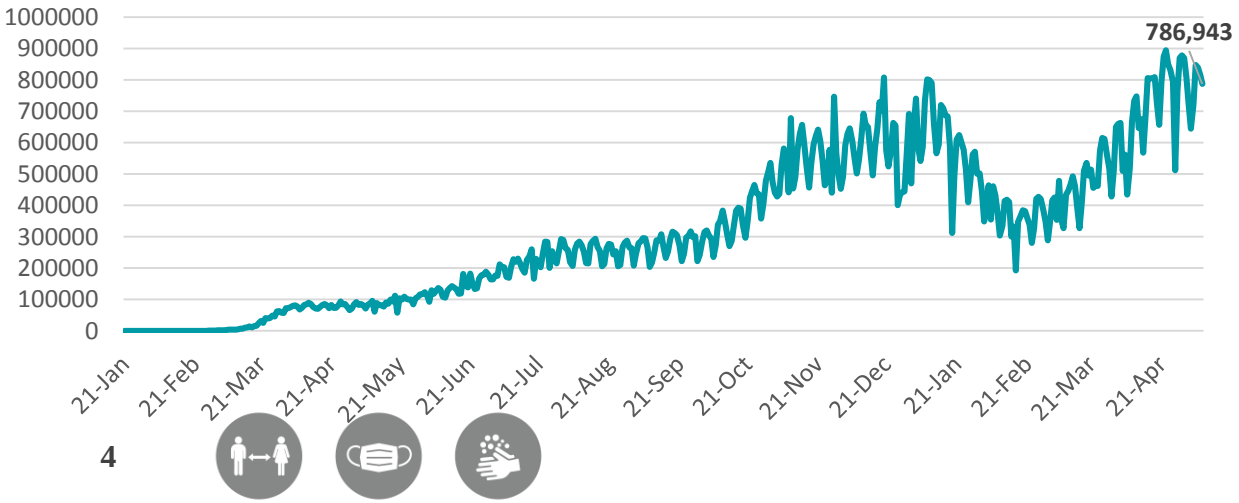
Figure 1: Total Number of Infected, Recovered, and Death Cases



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 2: Daily New Infected COVID-19 Cases



4

Figure 3: % of people who received at least one dose of COVID-19 vaccine around the world

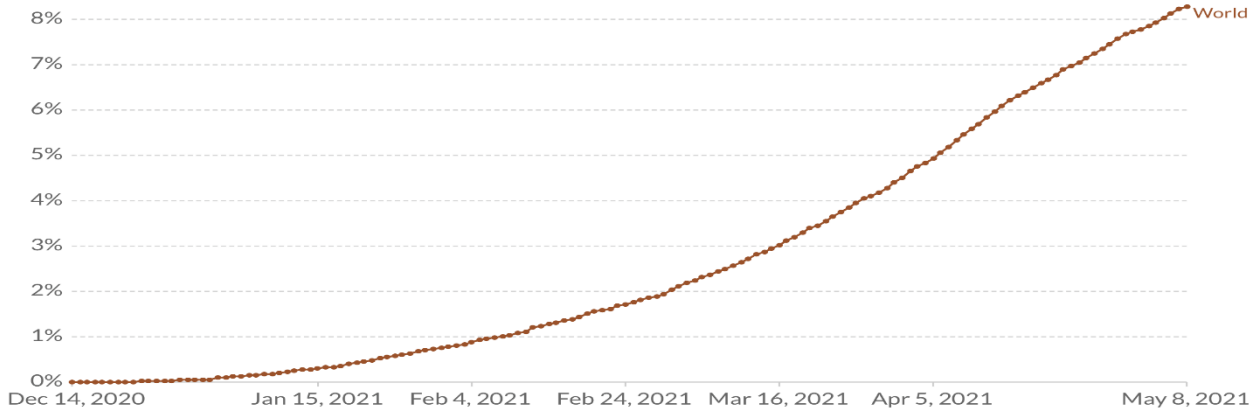
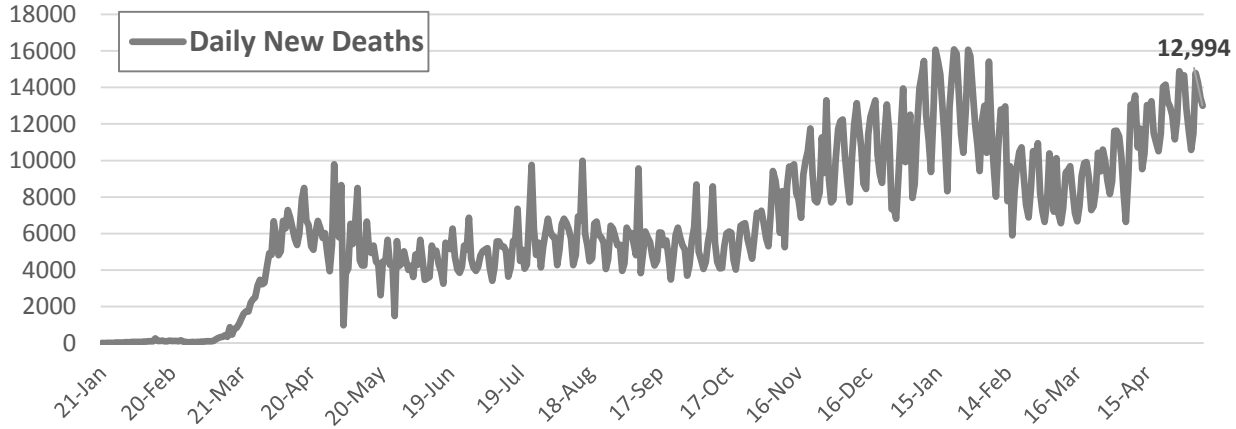


Figure 4: Global Daily New Deaths Due to COVID-19



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

EPIDEMIOLOGY

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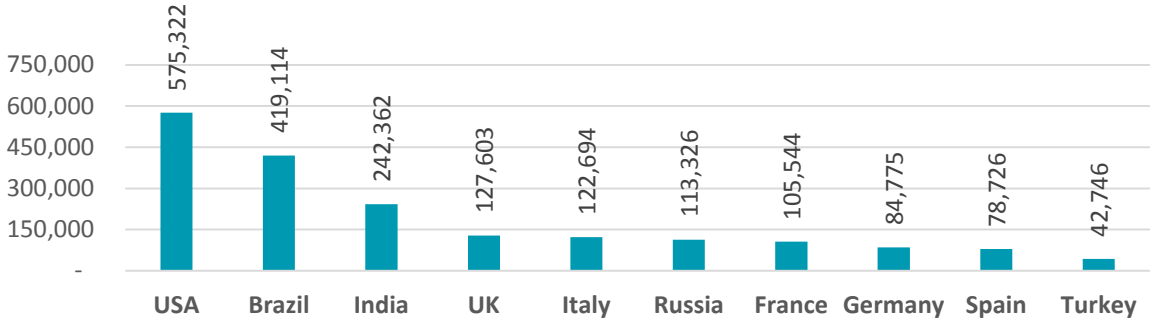
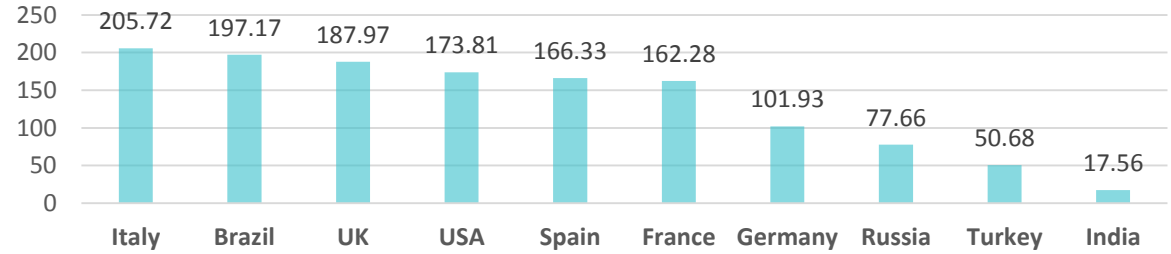
Figure 5: Top 10 Countries in the Total Number of Cases Due to COVID-19

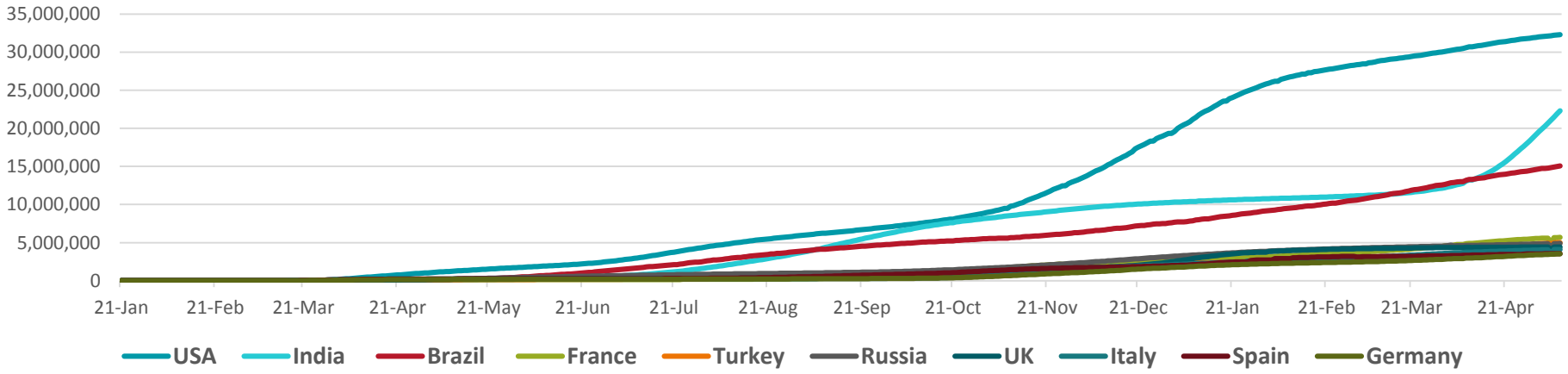
TOTAL DEATHS



DEATHS PER MILLION



TOTAL INFECTED CASES



USA	32,300,609
India	22,296,414
Brazil	15,082,449
France	5,676,293
Turkey	5,016,141
Russia	4,880,262
UK	4,433,094
Italy	4,102,921
Spain	3,559,222
Germany	3,520,329

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

EPIDEMIOLOGY

FROM 21 JAN 2020 TO 09 May 2021

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

Daily Tests
193,307.3 Average Tests
1,954.5 per 100k population
0.9% Positive Rate

Daily Cases
1,746.0 Average Cases
17.7 per 100k population

Daily Recovered
1,725.4 Average Recovered
17.4 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

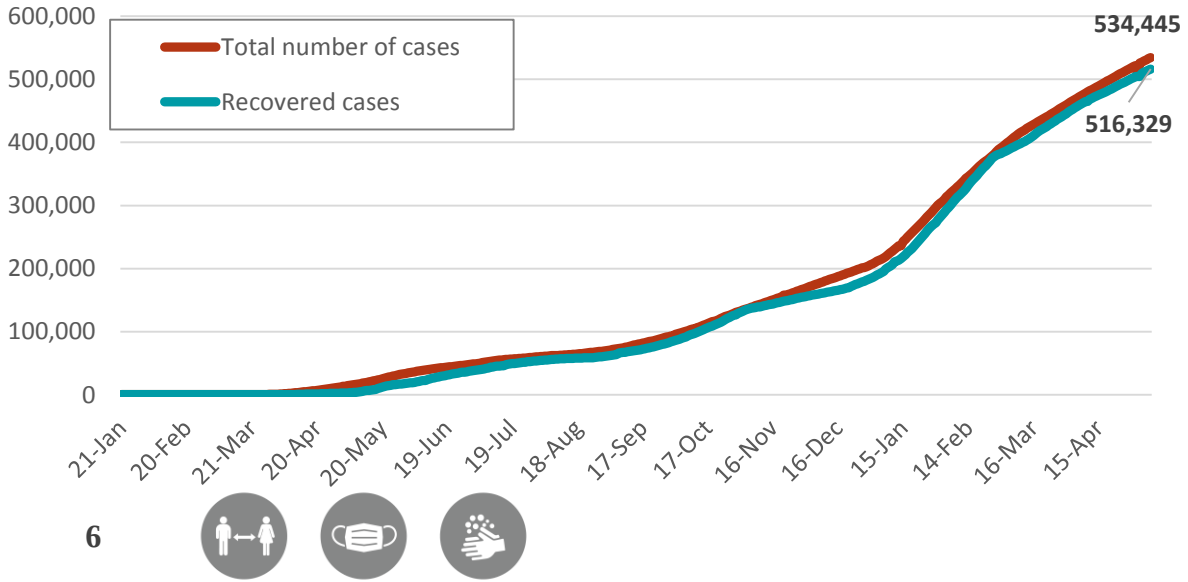
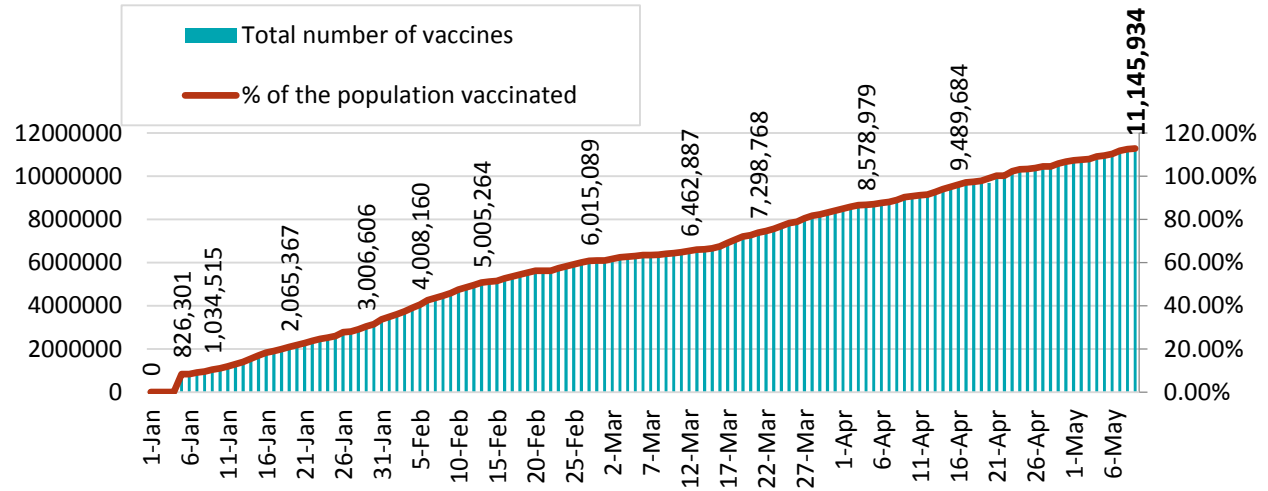


Figure 6 B: TOTAL NUMBER and Percentage of UAE population Vaccinated



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

EPIDEMIOLOGY

FROM 21 JAN 2020 TO 09 May 2021

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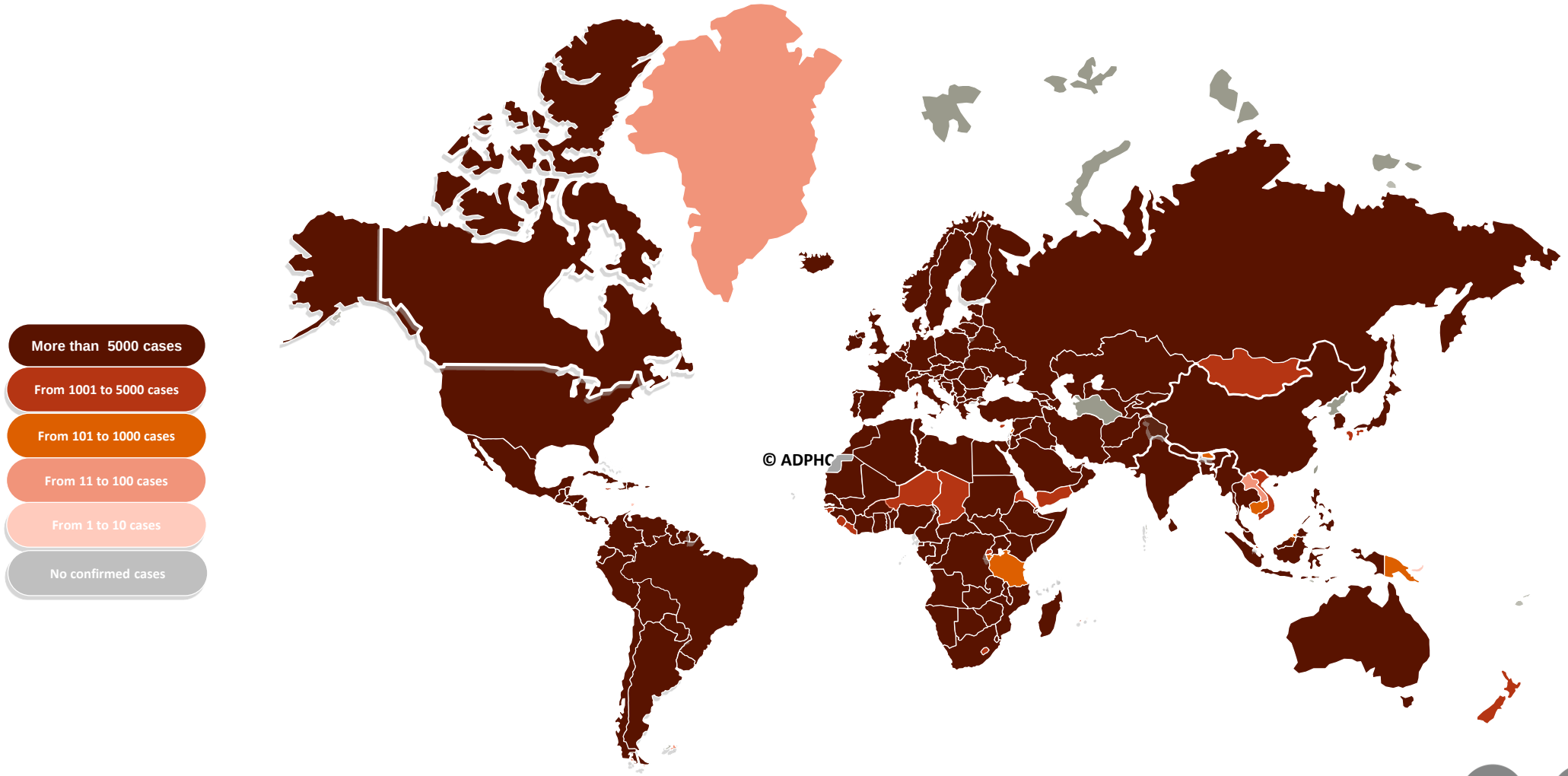
Figure 7A : Global Distribution of COVID-19 Cases



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

EPIDEMIOLOGY

FROM 21 JAN 2020 TO 09 May 2021

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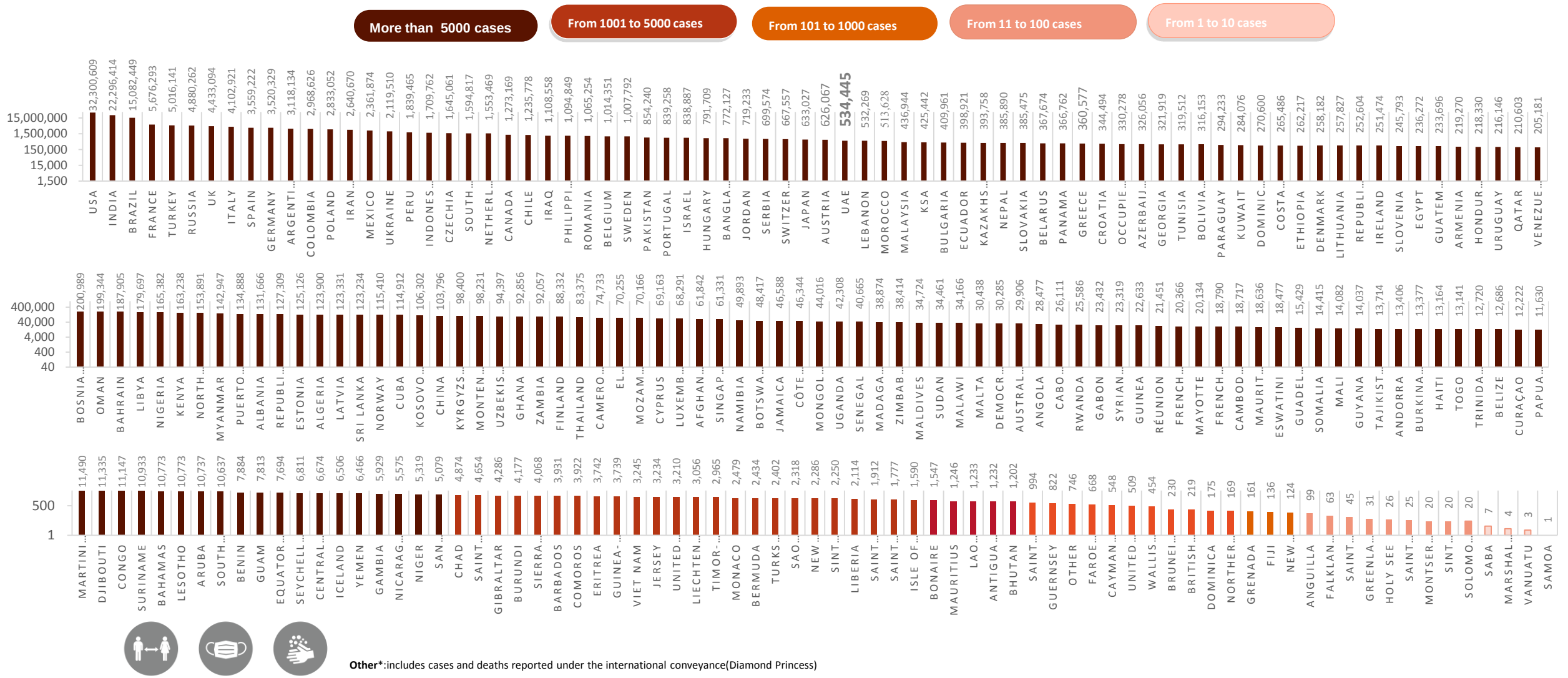
Figure 7B: Bar Chart Illustrates the Global Distribution of COVID19 Cases



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 09 May 2021

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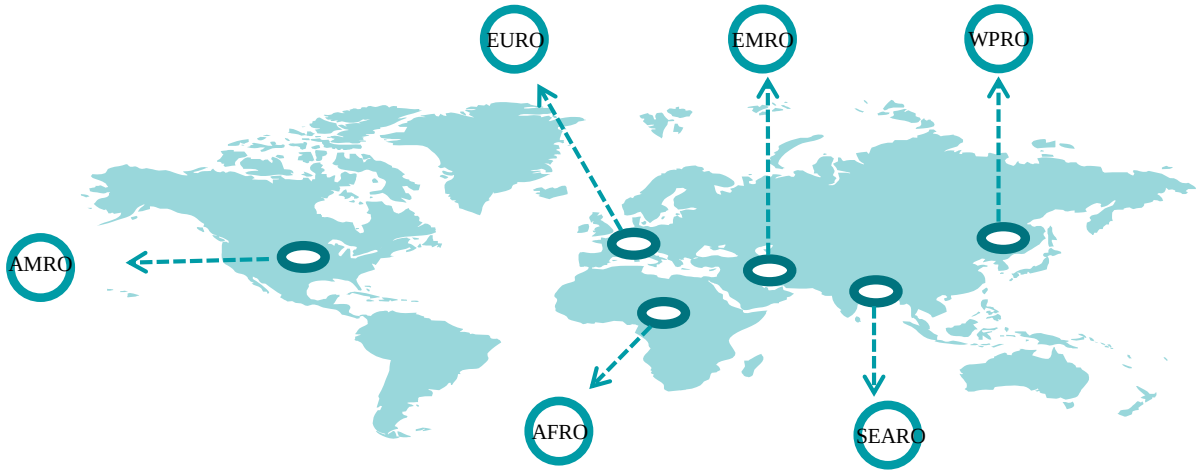
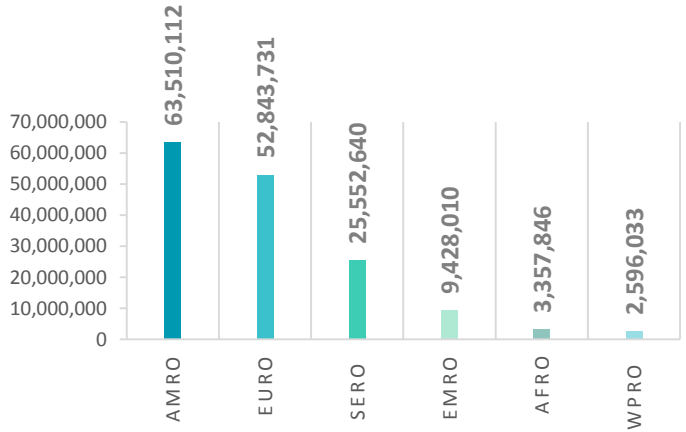
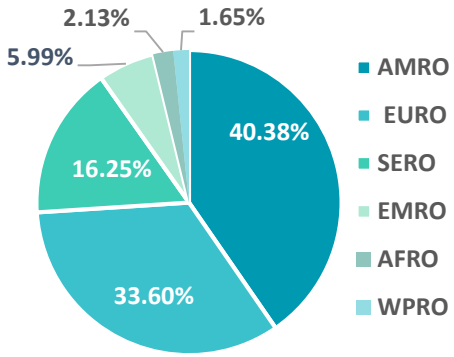
Figure 6: Global Distribution of COVID-19 Cases per Region

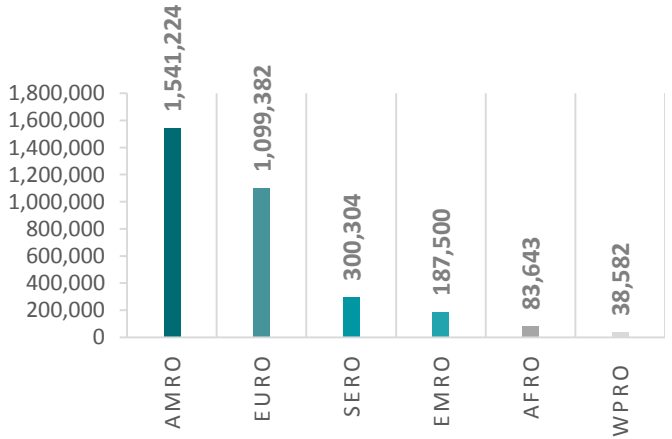


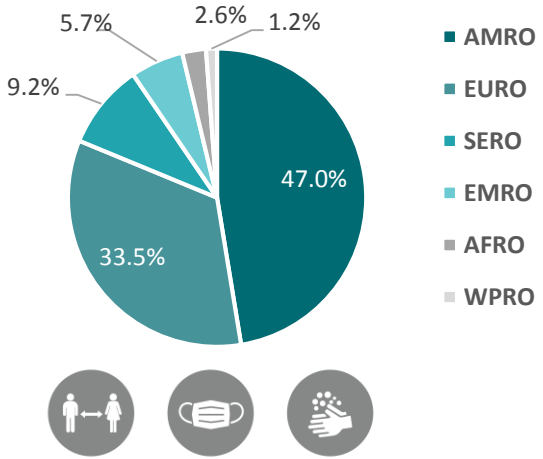
INFECTED





DEATHS





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

EPIDEMIOLOGY

FROM 21 JAN 2020 TO 09 May 2021

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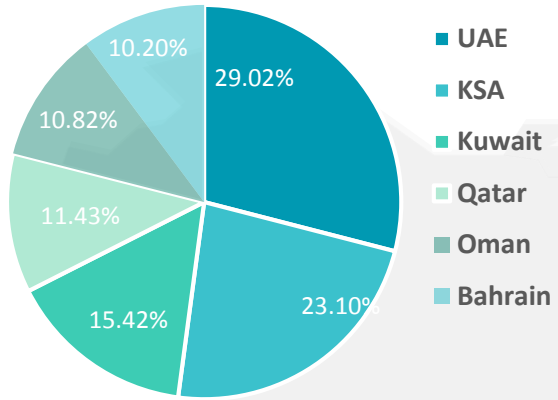
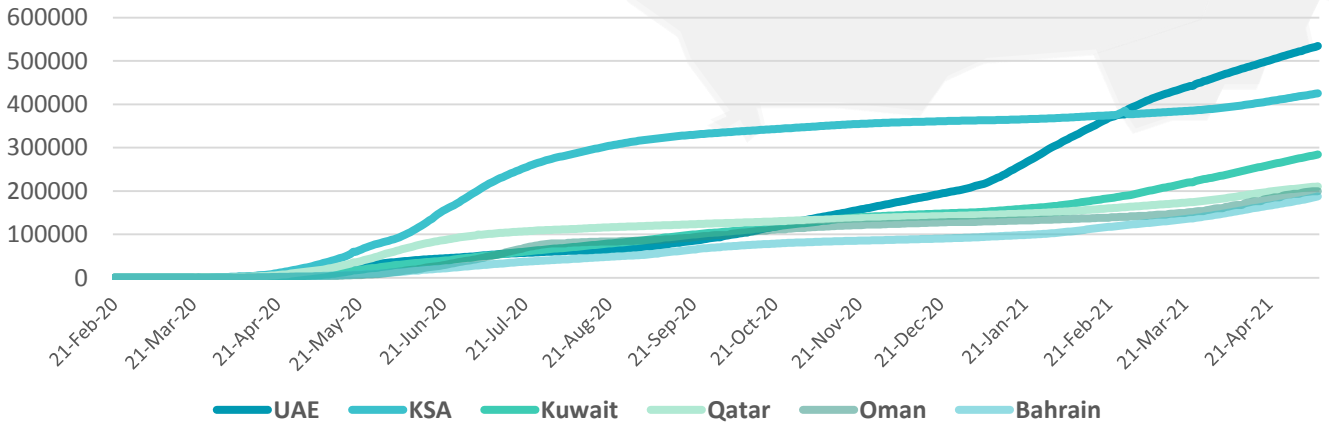
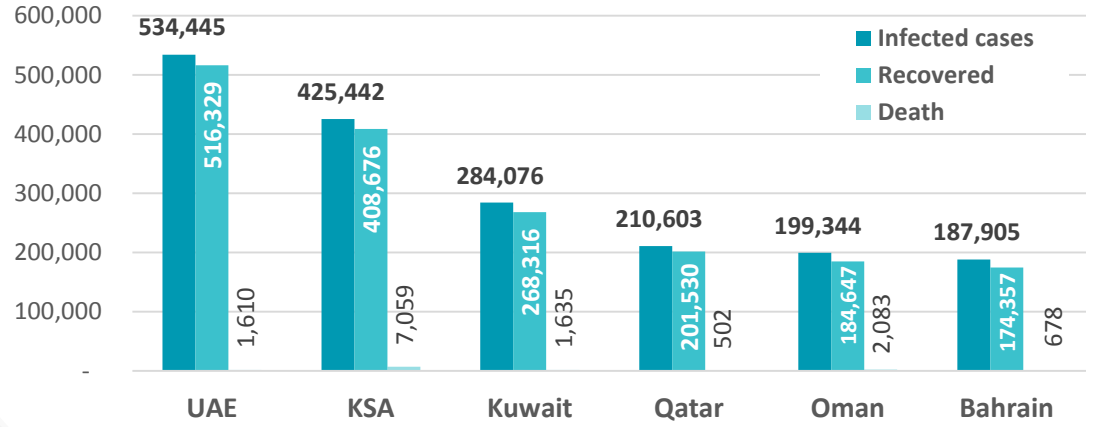
Figure 7: Comparative Analysis of the Distribution of COVID-19 Cases in GCC Countries

TOTAL NUMBER OF INFECTED CASES

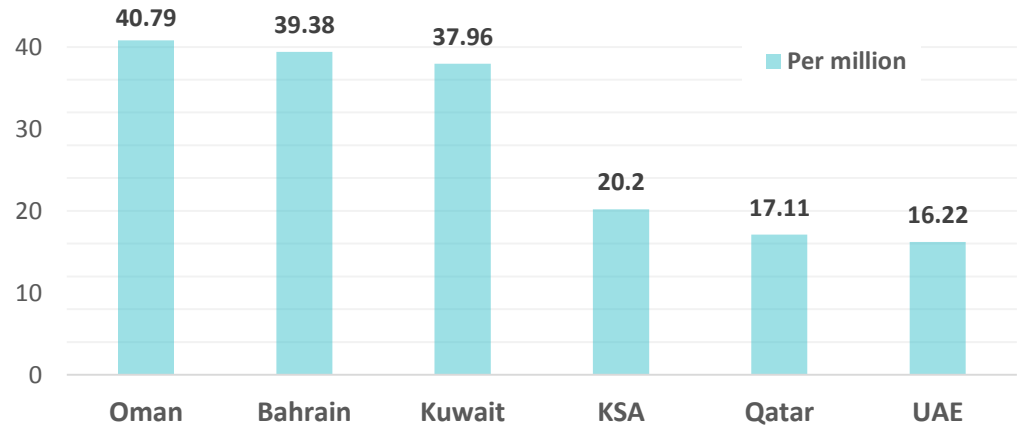




TOTAL NUMBER OF INFECTED, RECOVERED AND DEATHS

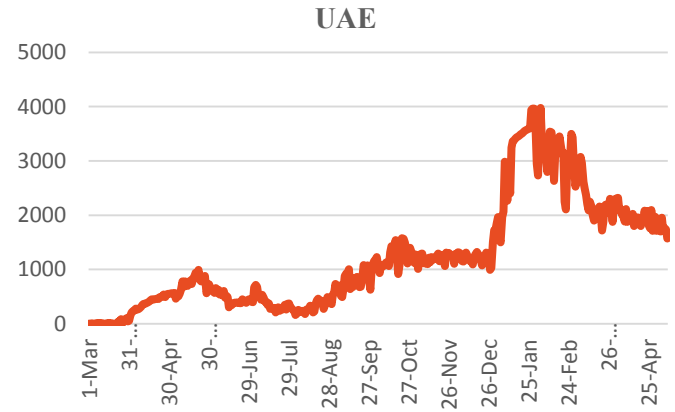


DEATHS PER MILLION

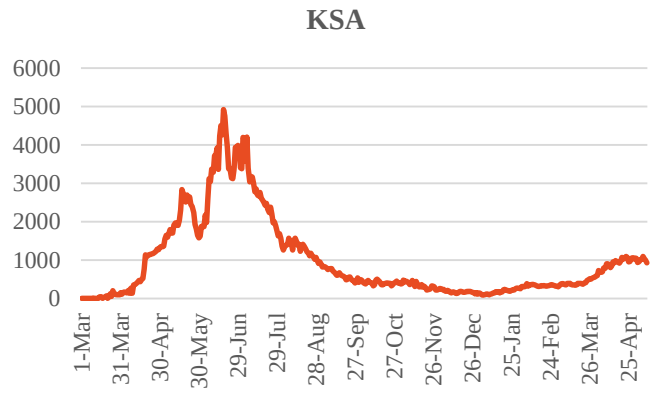


Graphs published by Abu Dhabi Public Health Center 2021 | Data resources: John Hopkins, WHO

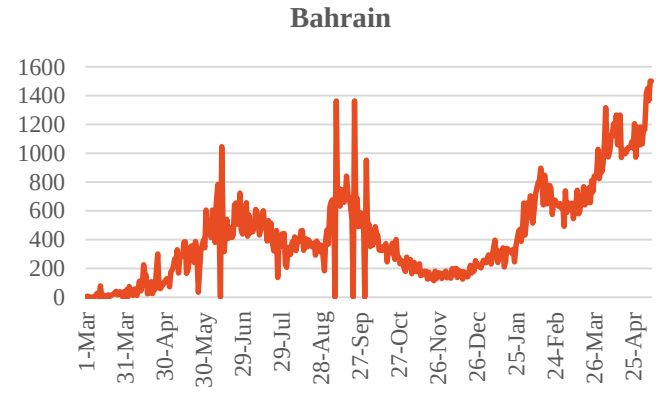
Figure 10: Comparative Analysis of the Distribution of COVID-19 New Cases in GCC Countries



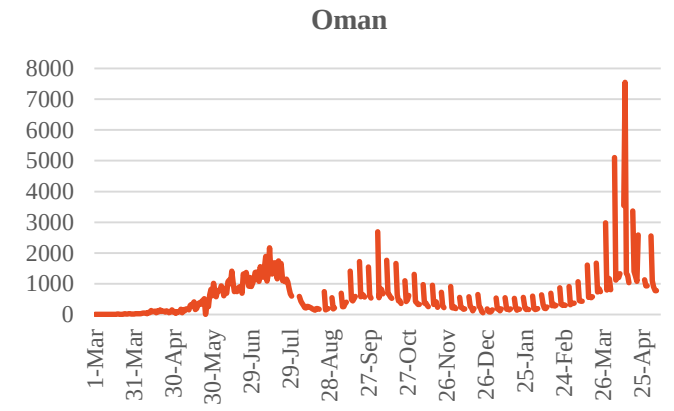
Source : National Emergency Crisis and Disaster Management Authority



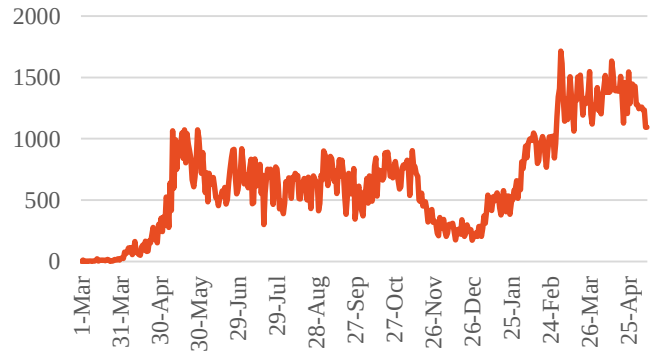
Source : KSA ministry of health



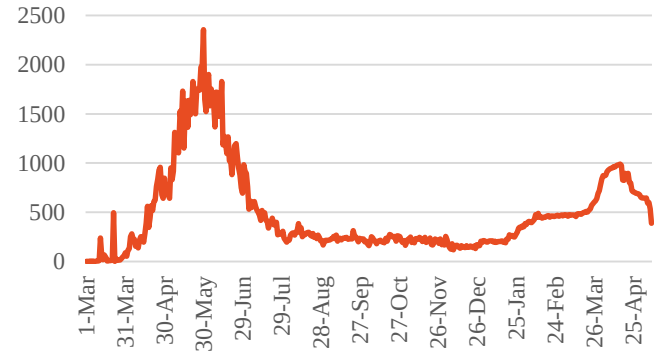
Source :WHO



Source :Oman ministry of health



Source : Kuwait ministry of health



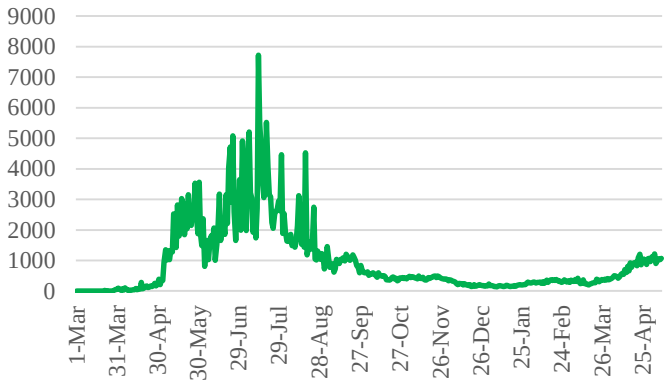
Source : Qatar ministry of health

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

UAE

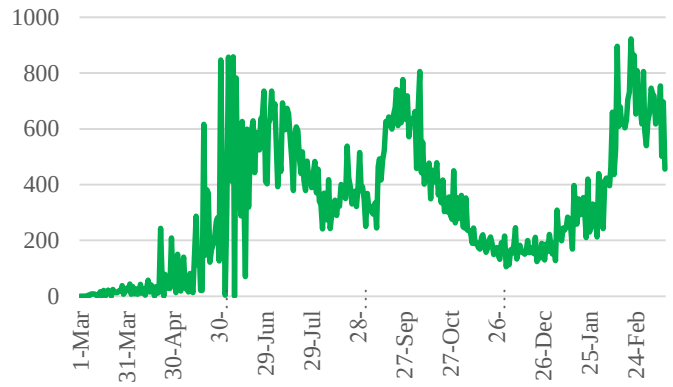
Source : National Emergency Crisis and Disaster Management Authority

KSA



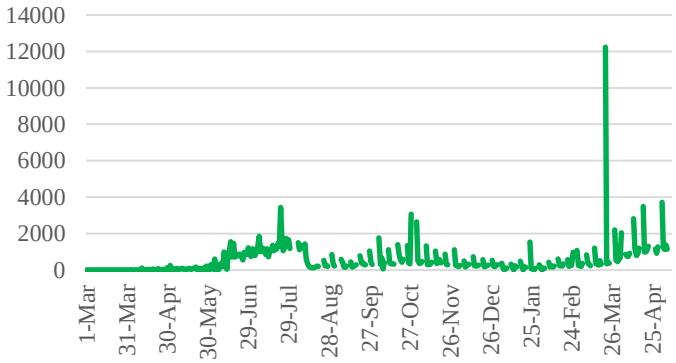
Source : KSA ministry of health

Bahrain



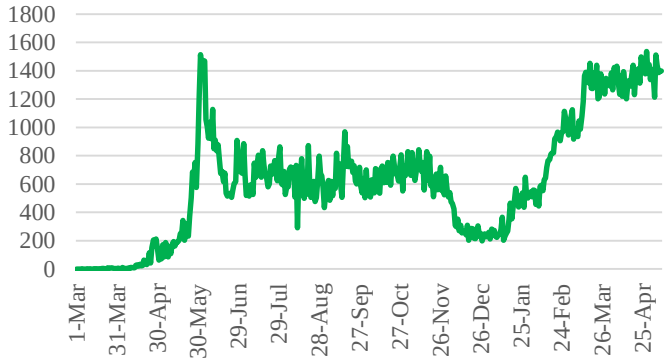
Source : Bahrain ministry of health

Oman



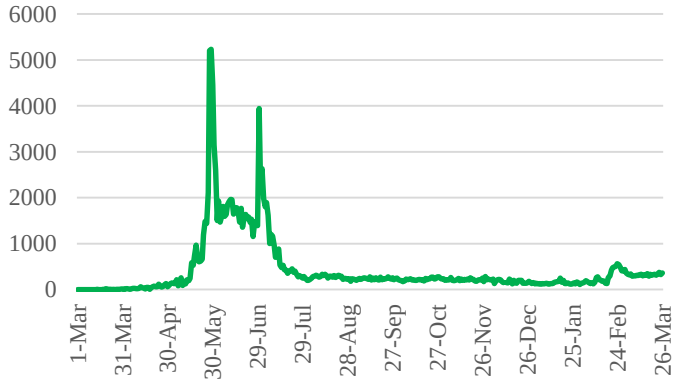
Source :Oman ministry of health

Kuwait



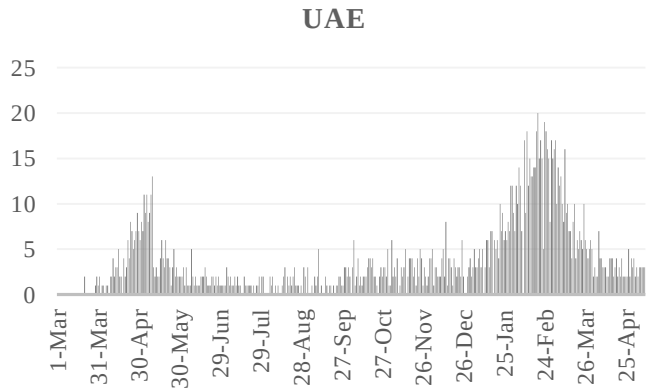
Source : Kuwait ministry of health

QATAR

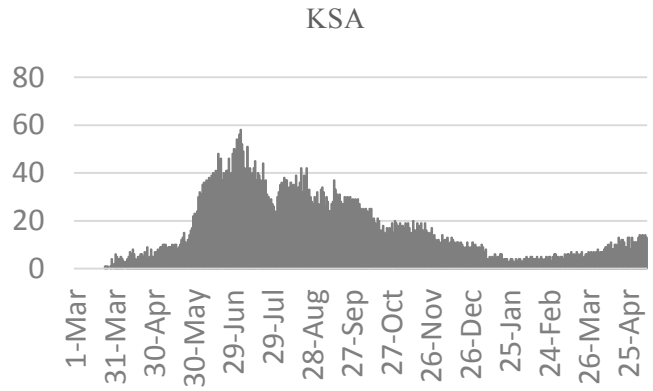


Source : Qatar ministry of health

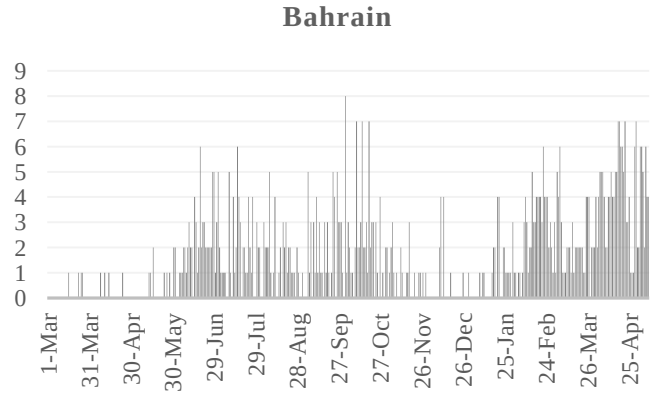
Figure 12: Comparative Analysis of the Distribution of COVID-19 New Death Cases in GCC Countries



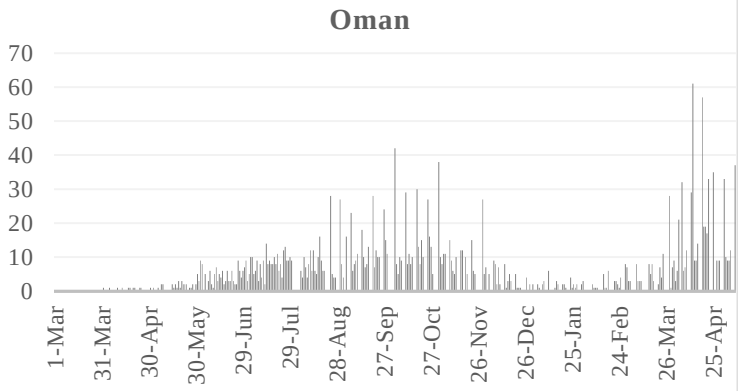
Source : National Emergency Crisis and Disaster Management Authority



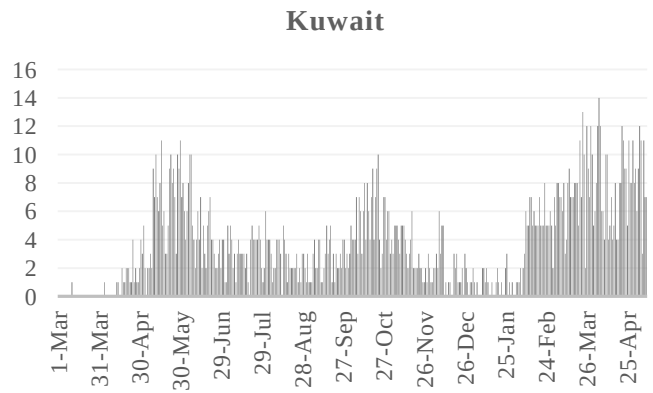
Source : KSA ministry of health



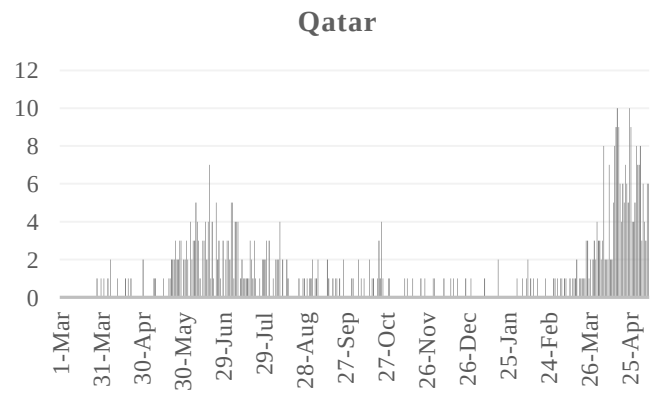
Source :WHO



Source :Oman ministry of health



Source : Kuwait ministry of health



Source : Qatar ministry of health

VACCINE

Article 1

Published March 30, 2021 in THE LANCET

Thromboembolism and the Oxford–AstraZeneca COVID-19 vaccine: side-effect or coincidence?

- This study published in the Lancet aims to inform the ongoing discussion on the safety of the Oxford–AstraZeneca COVID-19 vaccine by analysing nationwide population-based data from Denmark to estimate the natural incidence of venous thromboembolism. According to the European Medicines Agency (EMA), 30 cases of thromboembolic events (predominantly venous) had been reported by March 10, 2021, among the approximately 5 million recipients of the Oxford–AstraZeneca COVID-19 vaccine in the European Economic Area.

- All Danes who were at least 18 years old between Jan 1, 2010, and Nov 30, 2018 were identified from the Danish Civil Registration System. Using data from the Danish National Patient Registry, all first-time cases of venous thromboembolism in the general adult population in this period (corresponding to the available data period) was identified. The focus was on venous thromboembolism because the thromboembolic events reported in relation to the Oxford–AstraZeneca COVID-19 vaccine by March 10, 2021, were predominantly venous, according to publicly available data on EudraVigilance.

- All individuals were followed from Jan 1, 2010, or their 18th birthday (whichever came first), until their first incident venous thromboembolism (see definition below), death, emigration, or Nov 30, 2018. Individuals with a diagnosis of venous thromboembolism before Jan 1, 2010, or their 18th birthday were not included in the analyses.

- Incident venous thromboembolism was defined as the first primary or secondary inpatient hospital diagnosis or outpatient clinic diagnosis of venous thromboembolism. Specifically, the following diagnoses were included in the outcome definition: deep vein thrombosis, pulmonary embolism, portal vein thrombosis, hepatic vein thrombosis, thrombophlebitis migrans, embolism or thrombosis of vena cava, embolism or thrombosis of renal vein, mesenteric thrombosis, cerebral infarction due to non-pyogenic cerebral venous thrombosis and non-pyogenic thrombosis of intracranial venous system. The diagnoses of venous thromboembolism in the Danish National Patient Registry have a documented high positive predictive value.

- The incidence rates for venous thromboembolism were calculated (any of the diagnoses listed above) for all Danish adults (aged 18 years or older censored at the 100th birthday) as well as for Danes aged 18–64 years. The 18–64-year age group represents the age group in which the Oxford–AstraZeneca COVID-19 vaccine, due to initial perceptions of limited evidence on its efficacy among those aged 65 years and older, has predominantly been used in most European countries—with the exception of the UK, where the vaccine has also been administered among those aged 65 years and older from the outset.

VACCINE

Continued

- The analysis was repeated restricting outcomes to deep vein thrombosis or pulmonary embolism, as they account for more than 95% of all diagnoses, and stratified by sex..
- In a population of 5 million people, this incidence would correspond to approximately 169 expected cases of venous thromboembolism per week, or 736 expected cases per month (if based on the incidence rate among the 18–99-year-old Danes). Similarly, if estimated based on the incidence rate among 18–64-year-old Danes, one would expect 91 cases of venous thromboembolism per week, or 398 cases per month.
- The Danish data provided here cannot rule out the possibility that some venous thromboembolic events reported in relation to the use of the Oxford–AstraZeneca COVID-19 vaccine are caused by the vaccine. However, although affected by several limitations, these data suggest that the **reported number of thromboembolic events among Europeans who have received the Oxford–AstraZeneca COVID-19 vaccine** (at least those reported as deriving from the venous system) **does not seem to be increased relative to the expected number estimated from incidence rates** from the entire Danish population before the introduction of the vaccination programme.

- The authors highlight the importance of interpreting results within the context of their limitations. The number of cases of thromboembolism reported in relation to the Oxford–AstraZeneca COVID-19 vaccine cannot be directly compared to the numbers estimated based on the incidence rates from the Danish population for several reasons.
- First, data on the sex and age distribution from those who received the Oxford–AstraZeneca COVID-19 vaccine are not yet publicly available while in Denmark, about 99% of those having receiving the Oxford–AstraZeneca COVID-19 vaccine are health-care workers. The median age of all COVID-19 vaccinated health-care workers in Denmark is 47 years and 82·2% of health-care workers are women.
- Second, data on the duration of the period during which the Oxford–AstraZeneca COVID-19 vaccinated population developed the reported thromboembolic events are also not publicly available, making it impossible to estimate incidence rates for this population. Third, detailed clinical descriptions of the thromboembolic events reported in relation to Oxford–AstraZeneca COVID-19 vaccinations are still lacking.

VACCINE

Continued

- The present analysis does not include the rare types of multiple thrombosis, bleeding, and thrombocytopenia that are emerging, apparently similar to disseminated intravascular coagulation, occurring in otherwise healthy individuals shortly after receiving the Oxford–AstraZeneca COVID-19 vaccine.

- Fourth, as even the most efficient spontaneous reporting of adverse events is unlikely to capture all cases, the true incidence rate of thromboembolic events in relation to the Oxford–AstraZeneca COVID-19 vaccine is unknown, and the 30 reported cases by March 10, 2021, is probably an underestimate.

- Finally, the estimated weekly and monthly venous thromboembolism case numbers in the population of 5 million individuals are based entirely on incidence rates from Denmark and might not be representative of the other countries where the Oxford–AstraZeneca COVID-19 vaccine has been used. However, previous studies of the incidence rate of venous thromboembolism in other countries have found numbers within range of the Danish rates.

- Based on pre-pandemic incidence rates from the entire Danish population, the authors reported that the **number of venous thromboembolisms reported in relation to the Oxford–AstraZeneca COVID-19 vaccine does not seem to be increased beyond the expected incidence rate**. Nevertheless, recent reports of thrombocytopenia-associated cerebral venous sinus thrombosis, multiple thrombosis, and bleeding within a short timeframe after receipt of the vaccine are concerning and are receiving due attention from health authorities.

- On March 18, 2021, with reference to the Oxford–AstraZeneca COVID-19 vaccine, the EMA concluded that “benefits still outweigh the risks despite possible link to rare blood clots with low blood platelets”.

VACCINE

Article 2

Operation Warp Speed: implications for global vaccine security?

Published March 26, 2021 in THE LANCET

- This article published in the Lancet discusses how Operation Warp Speed (OWS, the US programme which provided US$18 billion in funding for development of vaccines that were intended for US populations) vaccines be used for COVID-19 prevention in global health settings. The article addresses some key questions that arise in the transition from US to global vaccine prevention efforts and from ethical and logistical issues to those that are relevant to global vaccine security, justice, equity, and diplomacy.

- OWS is the largest of the global efforts for development of COVID-19 vaccines; by comparison, the Coalition for Epidemic Preparedness Innovations (CEPI) invested $1·4 billion in support of the development of COVID-19 vaccines. CEPI funding carries commitments to ensure global access and affordable cost. Recipients of OWS funding also have clear commitments: to the USA. Companies that are supported by OWS, and manufacturers in Russia and China, have approached countries and organisations independently, creating a complicated ecosystem for COVID-19 vaccines that is comprised of a patchwork of countries that have and do not have vaccines.

- Nearly 400 million doses of COVID-19 vaccines have been administered, primarily in high-income countries that had preordered vaccine but now in other countries as well. The USA continues to lead globally in the number of COVID-19 cases however global toll of infection means that vaccines that are developed under OWS should also be considered for global distribution.

- Several of the companies that are supported by OWS also received funding from CEPI, which should require global access. Failing to provide equity in the early distribution of SARS-CoV-2 vaccines, according to modelling by Chinazzi and colleagues, could result in a doubling of global mortality. Leveraging the efforts of OWS for global health and bringing safe and effective vaccine solutions to people around the world in a timely manner is a crucial endeavour and too important to fail.

The Global access gap

- To address the gap in access to COVID-19 vaccines, Gavi, WHO, and CEPI lead an international plan for access to COVID-19 vaccines, known as the COVID-19 Vaccine Global Access (COVAX) Facility, an activity of the Access to COVID-19 Tools Accelerator. 189 countries have expressed interest in COVAX, and the partnership is working to procure 2 billion doses of safe and effective COVID-19 vaccine that has been granted emergency use listing by WHO by the end of 2021, which is roughly 20% of the vaccine needs of participating countries. $2 billion of investment are needed to purchase these vaccines. Over 90 LMICs will be eligible to receive 1 billion doses of COVID-19 vaccines at low (ie, up to $1·60 per dose) or no cost through this mechanism.

VACCINE

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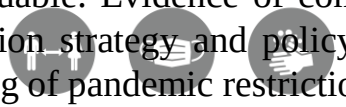
Low & Middle Income Countries (LMIC) challenges and opportunities

- Many deficiencies complicate programmes for COVID-19 prevention in low and lower-middle income countries worldwide: diagnostic testing; personal protective equipment; good epidemiological data; logistical systems to vaccinate all segments of society; and systems for reporting adverse events after vaccination. Social, political, and religious unrest can also complicate all prevention efforts. Even as OWS vaccines are applied to the global campaign against COVID-19, strengthening of health-care services in low-resource settings will be a key element for successful implementation.

- Several companies that were supported by OWS have licensed production to other manufacturers, including members of the Developing Countries Vaccine Manufacturing Network, which provides hundreds of millions of doses of vaccines worldwide that are prequalified by WHO. The global distribution of manufacturing COVID-19 vaccine is unprecedented and represents an important development not only for supply of COVID-19 vaccine but also for the recognition and use of vaccine manufacturers in LMICs.

- The ongoing OWS trials (and those of other manufacturers) are large, phase 3, randomised, blinded clinical trials. These trial designs although excellent for establishing the protection of individual participants but community protection is not evaluable. Evidence of community protection is crucial inform government vaccination strategy and policy around ancillary protective measures or justify the lifting of pandemic restrictions.



- For all of its potential benefit, OWS is a form of so-called vaccine nationalism: a country prioritising its own needs over the legitimate needs of others. COVAX is a novel solution, but if COVAX fails to secure the necessary doses and distribute equitably, it could precipitate a scramble for COVID-19 vaccines that will heighten inequity, increase mortality, and extend the crisis. Concern has arisen that the Chinese, Indian, and Russian governments and manufacturers might be using the pandemic for geopolitical purposes. Given the inward focus of OWS and concerns about the remainder of LMIC needs for COVID-19 vaccine, a more robust multilateral approach to COVAX needs to be pursued.

- Finally, an unintended consequence of OWS is its potential effect on vaccine hesitancy. Although overall vaccine confidence is robust globally,
- there is now a strong element of hesitancy regarding COVID-19 vaccines in the USA. Among the reasons for vaccine hesitancy is the so-called warp speed messaging, which has been interpreted by some people to imply that these vaccines are being rushed or not adequately tested for safety, combined with activities that are connected to committed anti-vaccine opposition groups and activists who are based in the USA and in western Europe. Increasingly, WHO and other UN agencies will be called on to address a growing infodemic (ie, the deluge of information and worryingly inaccurate information) that is seeking to discredit vaccines, masks, and other COVID-19 interventions.

VACCINE

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COVID-19 vaccine security as a global public good

- Equitable vaccine distribution, transnational collaboration (including LMICs) in development of COVID-19 vaccines, and international mechanisms for sharing of data for clinical trials and vaccine efficacy in real time will undermine the appeal and legitimacy of vaccine nationalism.

- The role that intellectual property limitations could play in limiting the full provision of COVID-19 vaccines is a concern for vaccine security, especially for LMICs. Vaccines are biological products, which are more complex and costly to manufacture than are drugs, and for much of the world, are priced for use in the public sector. Additionally, the involvement of several major vaccine manufacturers in LMICs in contract manufacturing, in primary vaccine development, and under access agreements with CEPI could ensure that global supply, once full-rate production is achieved, should be sufficient. Crucially, will this production be timely and accessible to all countries?

Conclusion

- Bringing the COVAX Facility to a successful launch, crucial vaccine technology to LMIC populations concurrent with high-income populations, and closure to a pandemic through a coordinated, multilateral solution will be an unprecedented expression of support for global vaccine security. In showing safety and efficacy of SARS-CoV-2 vaccines and preparing companies for large-scale manufacturing, OWS has, by accident or design, provided an important opportunity. The key to its success will be enabling the COVAX Facility to exploit and use this opportunity for the benefit of global health and working collaboratively to end the COVID-19 pandemic.

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Article 3

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Antibody Responses after a Single Dose of SARS-CoV-2 mRNA Vaccine

- The FDA (Food and Drug Administration) (approved 2 messenger RNA (mRNA) vaccines against SARS-CoV-2 on emergency basis (mRNA-1273, Moderna; and BNT162b2, Pfizer). Both vaccines has shown > 90% efficacy in preventing symptomatic infection after 2 doses.
- The investigators of this study sought to quantify the antibody concentration after 3 weeks of one dose of the BNT162b2 SARS-CoV-2 mRNA vaccine in 36 health care workers who had confirmed diagnosis with SARS-CoV-2 30 to 60 days and received the vaccine and 152 health with no history of infection.
- The analysis was used by a multiplex bead-binding assay (Milliplex SARS-CoV-2 Antigen Panel 1 IgG, Millipore) which measures the IgG concentration against SARS-CoV-2 spike protein subunits S1 and S2, the spike receptor-binding domain, and nucleocapsid protein.
- The authors reported that after the first vaccine dose, antibody titers in both groups of participants were enhanced against all spike protein subunits but not against nucleocapsid protein, which is not a vaccine antigen.
- At baseline, 6 of the participants with no history of SARS-CoV-2 infection had antibody levels that matched those of participants with recent infection indicating they may have had undiagnosed infection and consequently they were separated. Blocking antibodies were undetectable in the group with no history of SARS-CoV-2 infection and were detectable at various levels in the recently infected group and the undiagnosed group.
- After the first vaccine dose, recently infected participants had higher titers of antibody to S1, S2, and the receptor-binding domain than did those with no history of infection.
- At 3 weeks after a single vaccination, persons with recent SARS-CoV-2 infection or seropositive status had higher levels of antibody to four SARS-CoV-2 antigens and higher levels of antibodies with neutralizing characteristics than did those without a history of infection.

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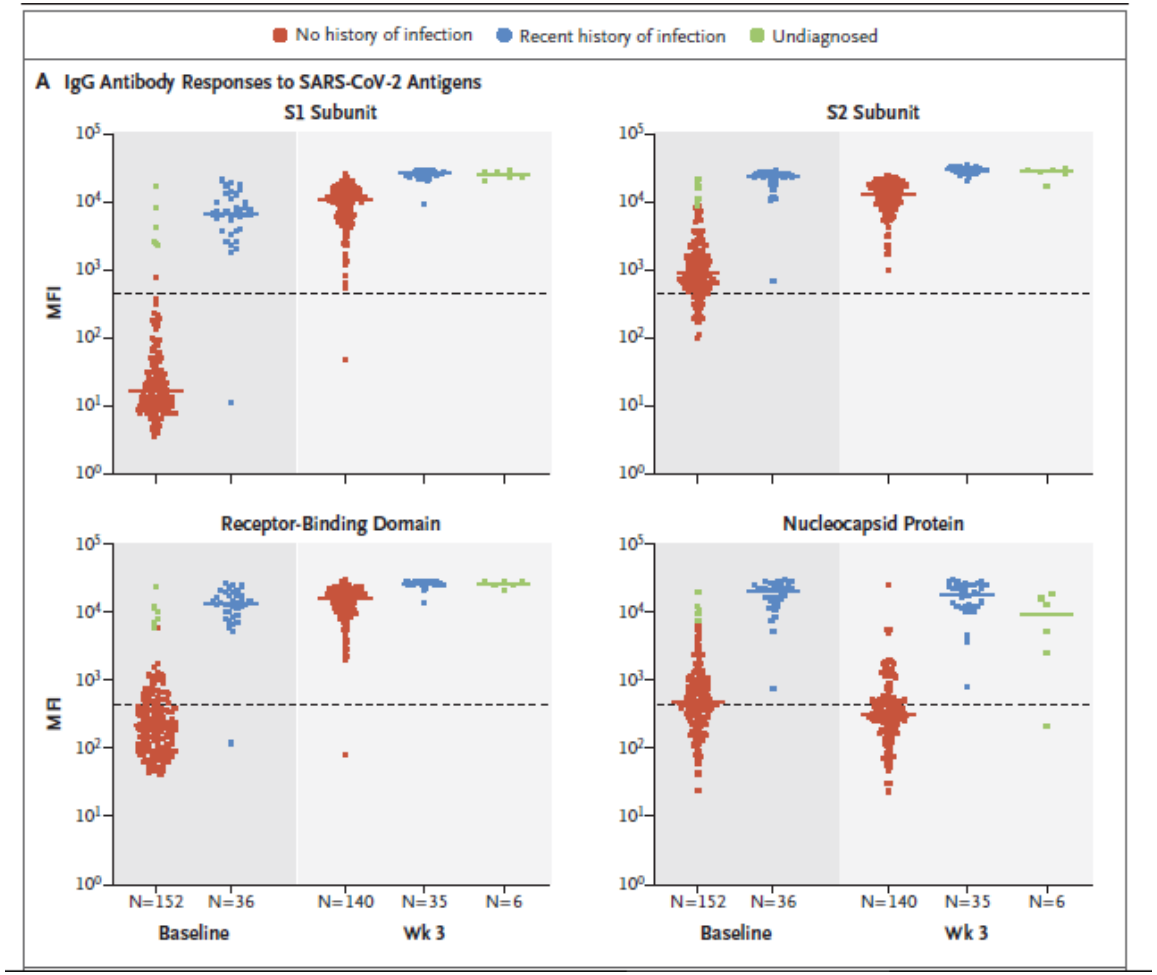
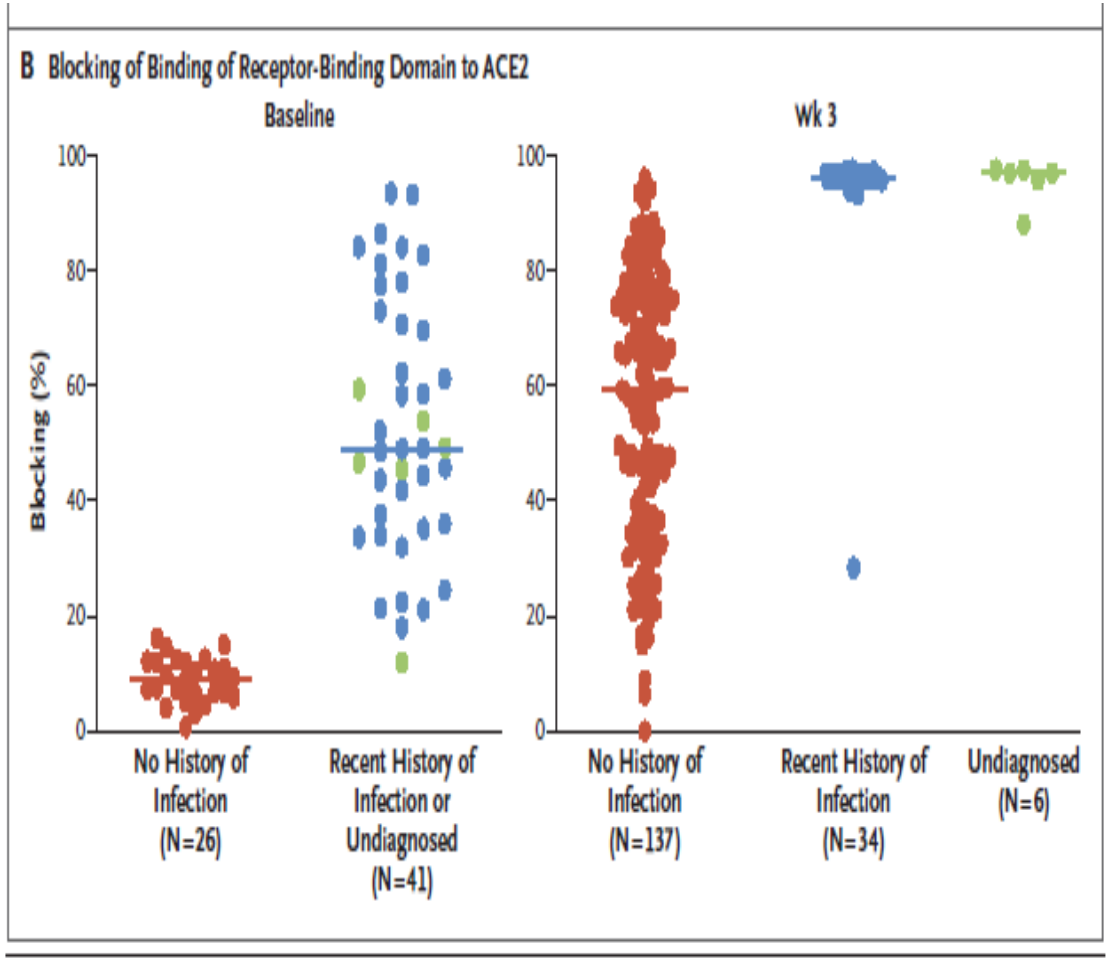

No history of infection
Recent history of infection
Undiagnosed
A IgG Antibody Responses to SARS-CoV-2 Antigens
S1 Subunit
S2 Subunit
Receptor-Binding Domain
Nucleocapsid Protein
MFI
N=152
N=36
N=140
N=35
N=6
Baseline
Wk 3


B Blocking of Binding of Receptor-Binding Domain to ACE2
Baseline
Wk 3
Blocking (%)
No History of Infection (N=26)
Recent History of Infection or Undiagnosed (N=41)
No History of Infection (N=137)
Recent History of Infection (N=34)
Undiagnosed (N=6)

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Article 4

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BNT162b2 mRNA Covid-19 Vaccine Effectiveness among Health Care Workers

- Health organization advocating to prioritize vaccination to health care workers. Data about the efficacy of the vaccines in health care workers is scarce. In this medical center, since the beginning of the epidemic through January 31, 2021, of the 6680 healt care workers, 689 (10.3%) were infected with COVID-19
- Vaccination with two doses of the Pfizer–BioNtech vaccine, given 21 days apart began on December 20, 2020. Within 8 weeks, 5297 of 6252 (84.7%) health care workers who had not been previously infected by December 20 were vaccinated.
- The investigators of this study sought to examine the vaccine effectiveness among health care workers
- Most of the health care workers (98.9%) who had received the first dose of vaccine and were not infected by day 21 received the second dose.
- Among the vaccinated workers, the weekly incidence of Covid-19 since the first dose declined notably after the second week; the incidence of infection continued to decrease dramatically and then remained low after the fourth week.
- Since September 2020, the probability of being free from Covid-19 had steadily decreased until the commencement of the two-dose vaccinations, after which infections among vaccinated health care workers occurred far less often.
- The authors of this study concluded that vaccination of health care workers with the BNT162b2 vaccine resulted in a major reduction of new cases of Covid-19 among those who received two doses of the vaccine,
- even when a surge of the B.1.1.7 (UK variant) was noted in up to 80% of cases.

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