مركز أبوظبي للصحة العامة
ABU DHABI PUBLIC HEALTH CENTRE

SCIENTIFIC RESEARCH MONITORING ON COVID-19

15 JULY 2021

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SCIENTIFIC RESEARCH MONITORING ON COVID-19

(Issue 429)

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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Research

Titles

Statistics

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

- Effectiveness of the BNT162b2 Covid-19 Vaccine against the B.1.1.7 and B.1.351 Variants
- Prevention and Attenuation of Covid-19 with the BNT162b2 (Pfizer- BioNTech) and mRNA-1273 (Moderna) Vaccines
- Should we vaccinate children against SARS-CoV-2?
- COVID-19 vaccines for children younger than 12 years: are we ready?
- Single-dose SARS-CoV-2 vaccination efficacy in the elderly

VARIANTS

- SARS-CoV-2 Variants and Vaccines
- The Emergence of SARS-CoV-2 Variant Lambda (C.37) in South America

EPIDEMIOLOGY

FROM 21 JAN 2020 TO 14 July 2021

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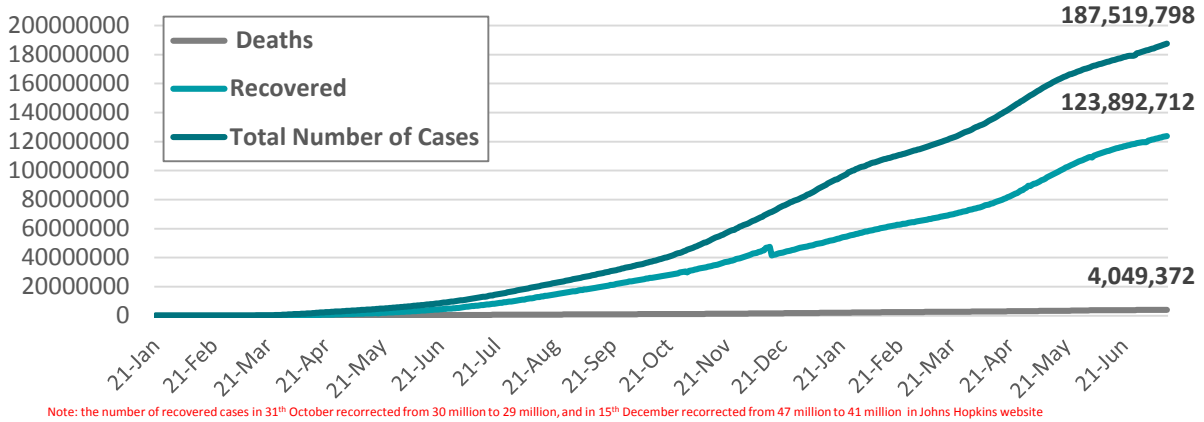
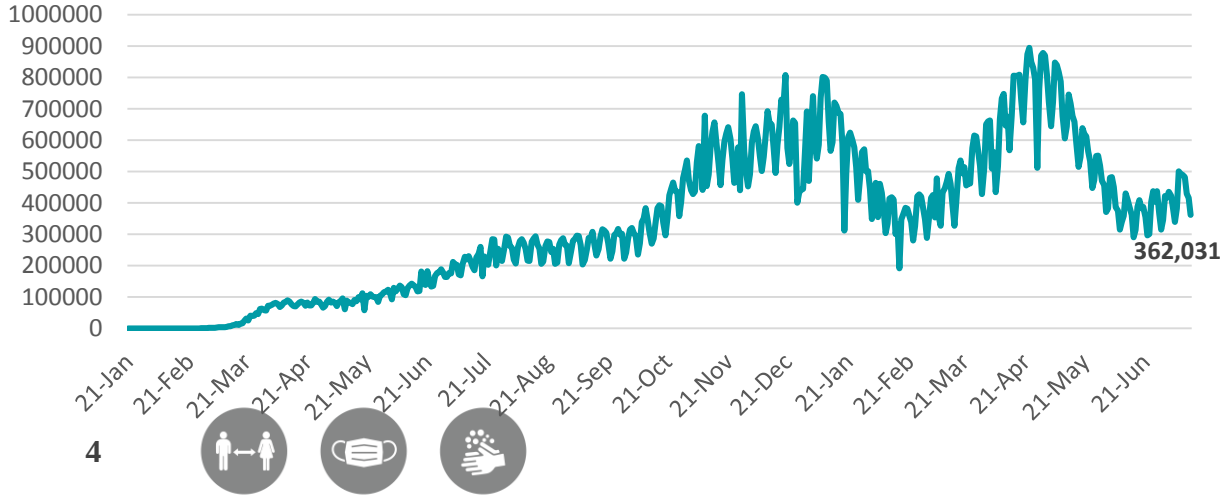
Figure 1: Total Number of Infected, Recovered, and Death Cases



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

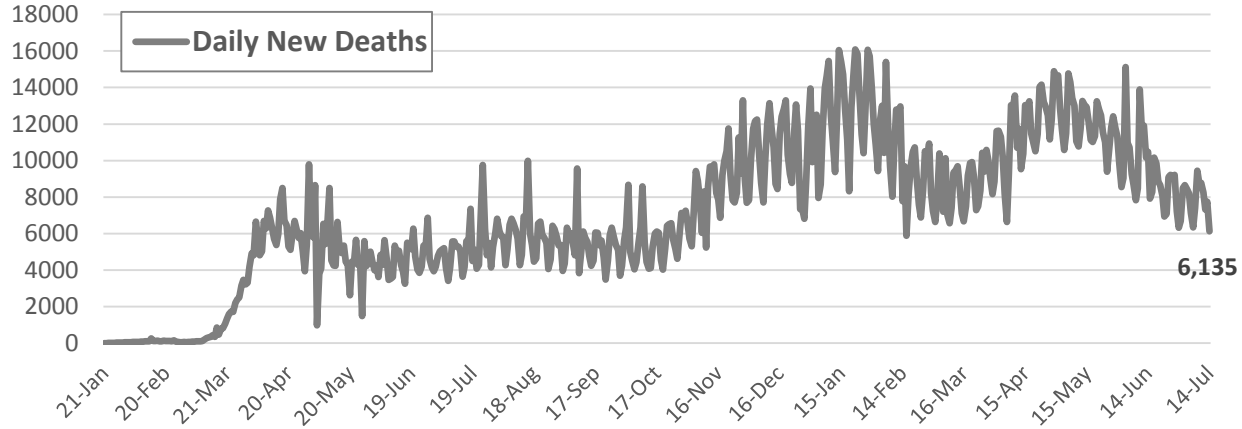
Figure 2: Daily New Infected COVID-19 Cases



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

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



EPIDEMIOLOGY

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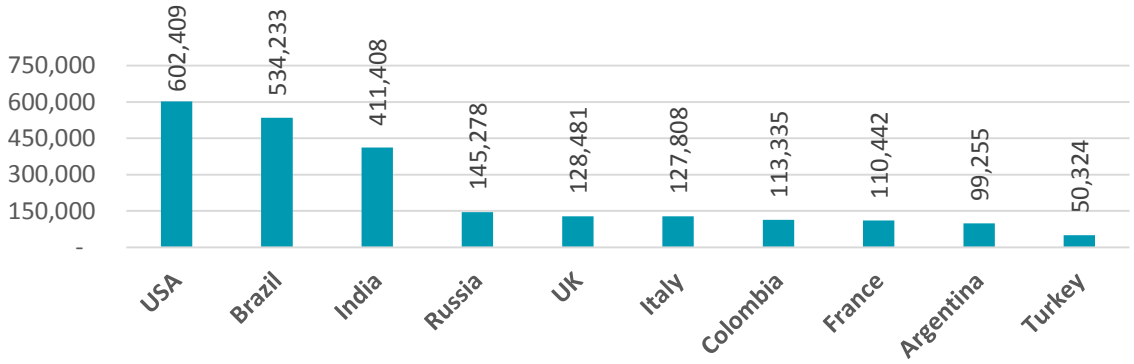
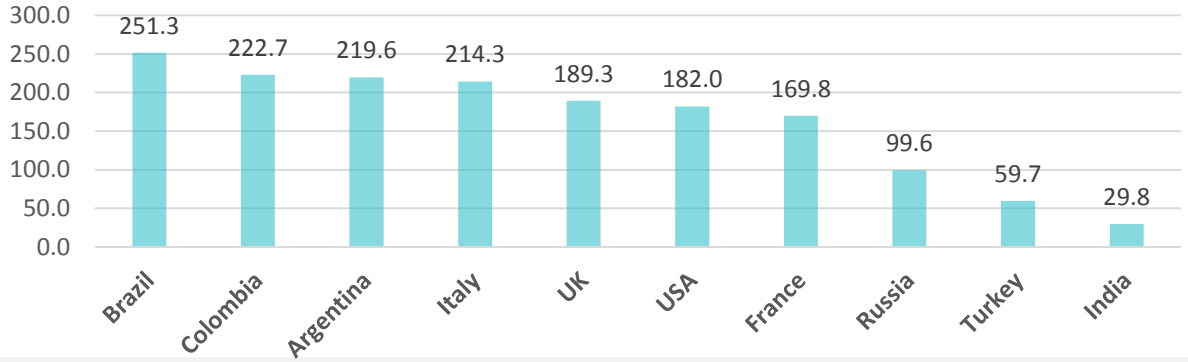
Figure 5: Top 10 Countries in the Total Number of Cases Due to COVID-19

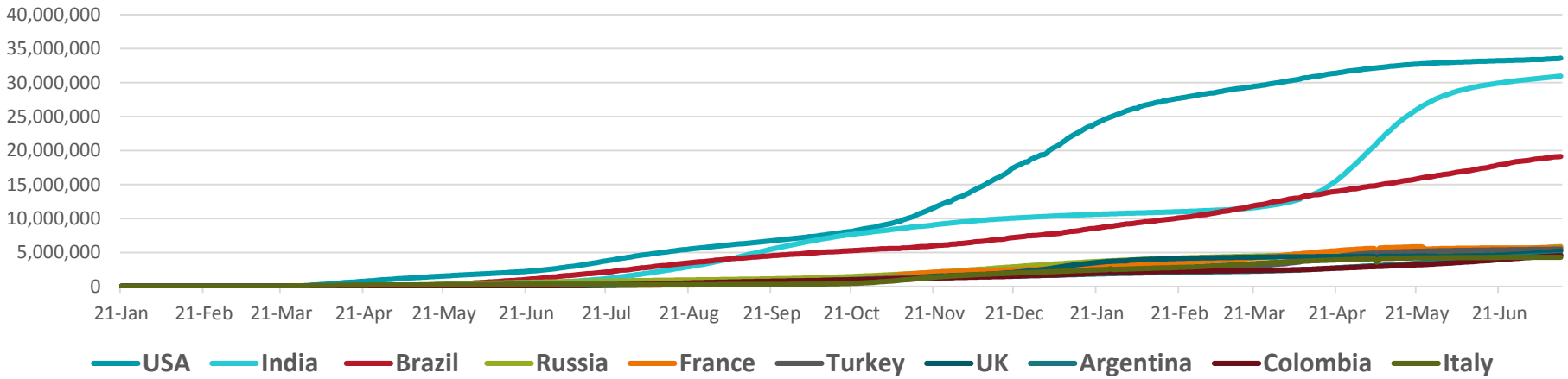
TOTAL DEATHS



DEATHS PER MILLION



TOTAL INFECTED CASES



USA	33,572,715
India	30,946,074
Brazil	19,106,971
Russia	5,857,002
France	5,705,517
Turkey	5,493,244
UK	5,191,463
Argentina	4,662,937
Colombia	4,530,610
Italy	4,273,693

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

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

Daily Tests
277,507.6 Average Tests
2,805.8 per 100k population
0.6% Positive Rate

Daily Cases
1,528.4 Average Cases
15.5 per 100k population

Daily Recovered
1,496.3 Average Recovered
15.1 per 100k population

Daily Deaths
4.7 Average Deaths
0.0 per 100k population
0.3% Case Fatality Rate

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

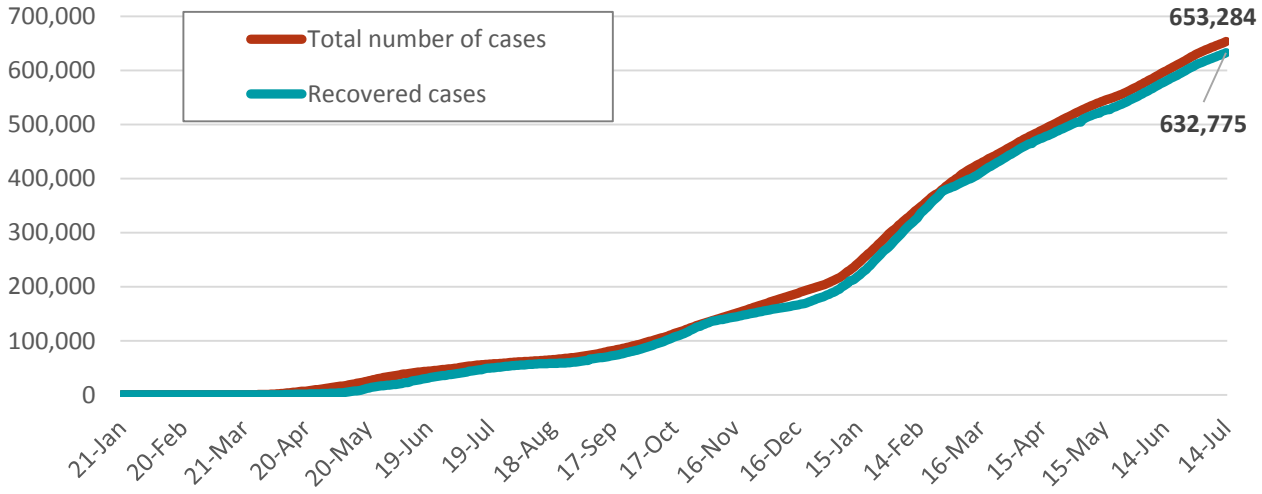
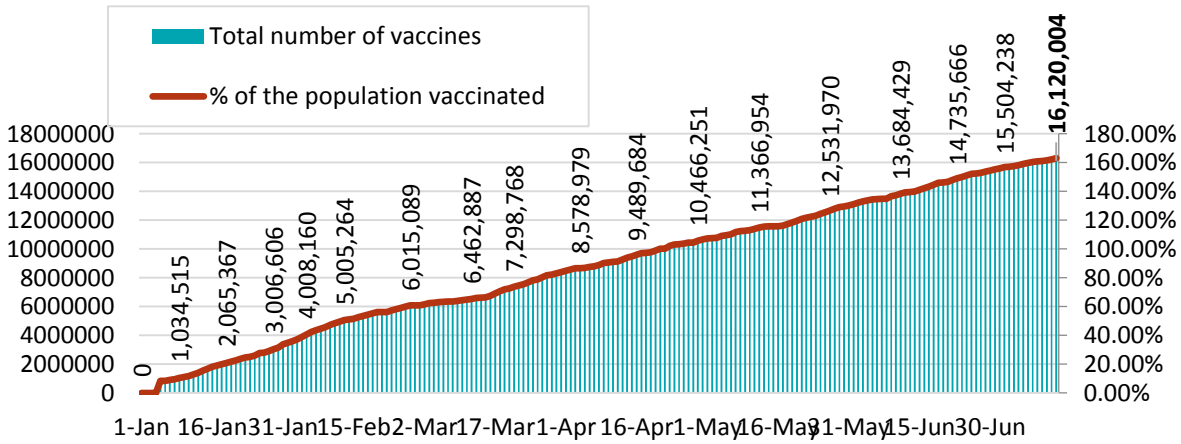


Figure 6 B: TOTAL NUMBER and Percentage of UAE population Vaccinated



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

EPIDEMIOLOGY

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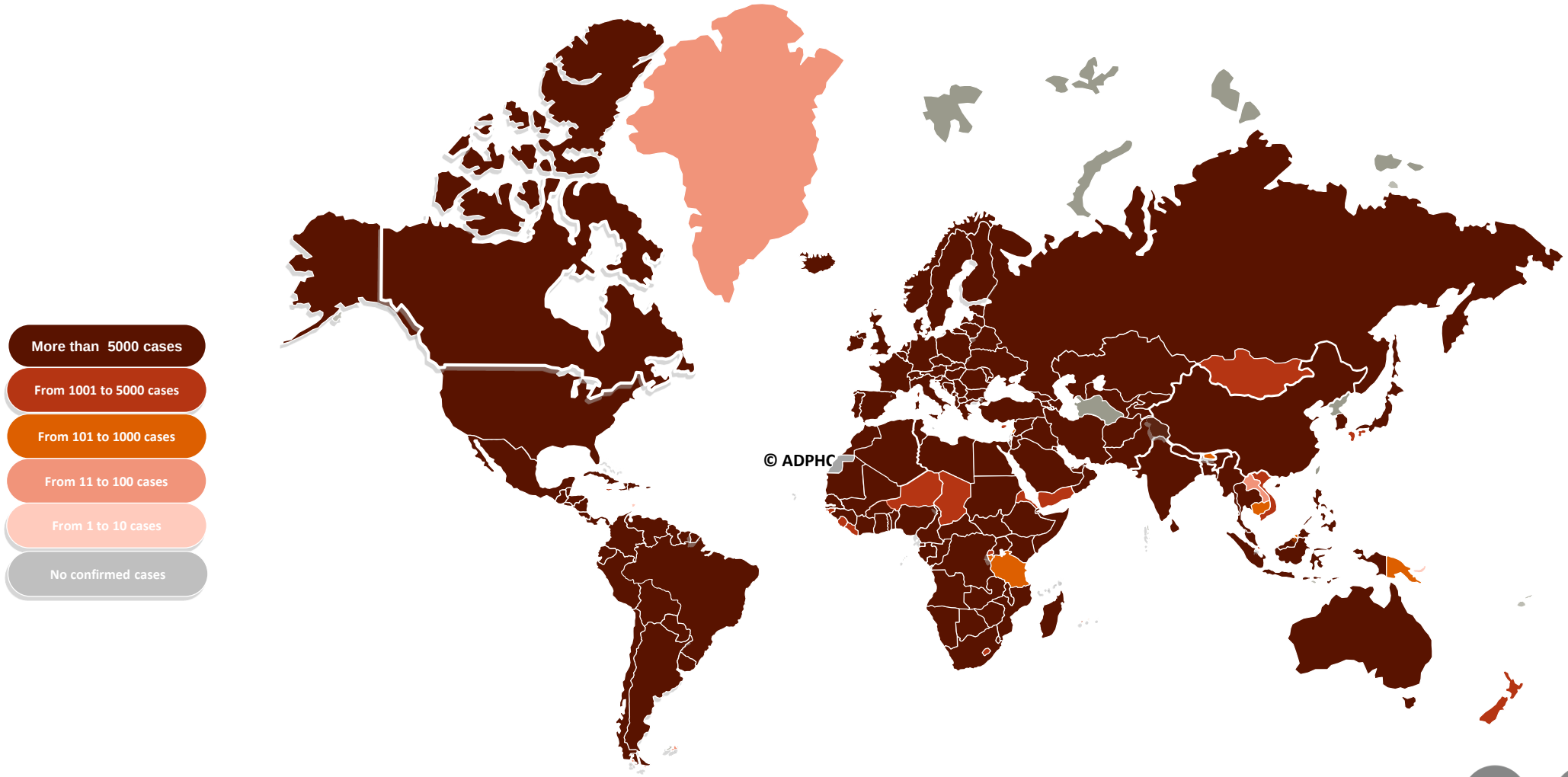
Figure 7A : Global Distribution of COVID-19 Cases



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

EPIDEMIOLOGY

FROM 21 JAN 2020 TO 14 July 2021

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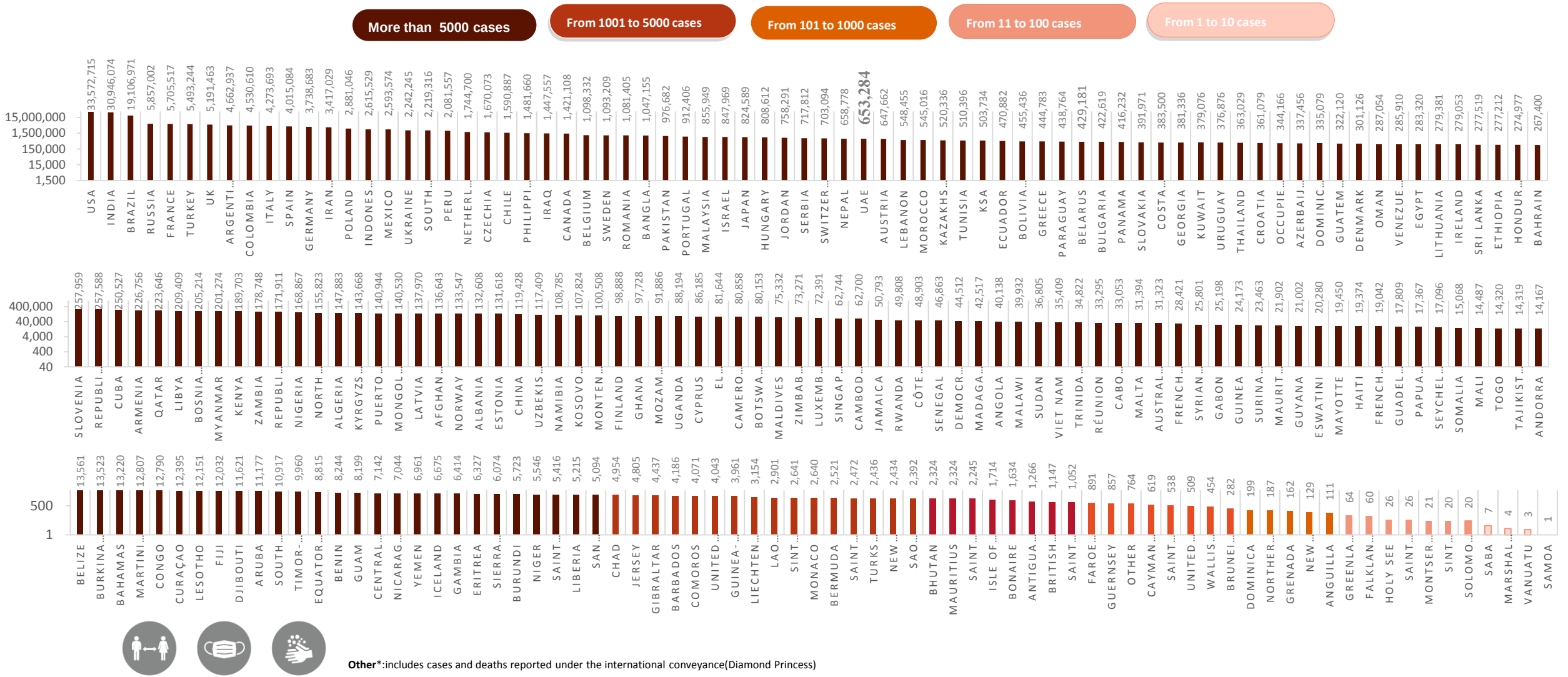
Figure 7B: Bar Chart Illustrates the Global Distribution of COVID19 Cases



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

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

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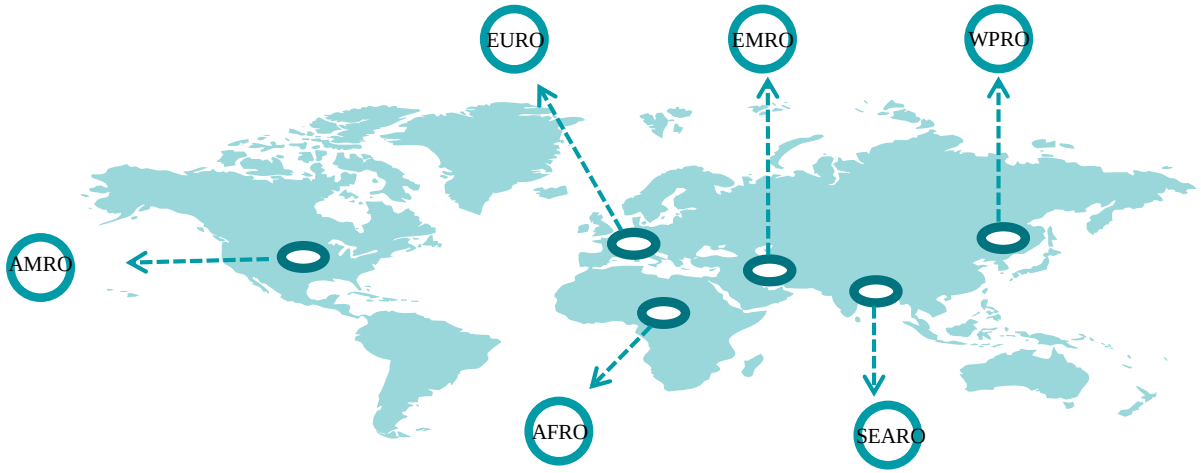
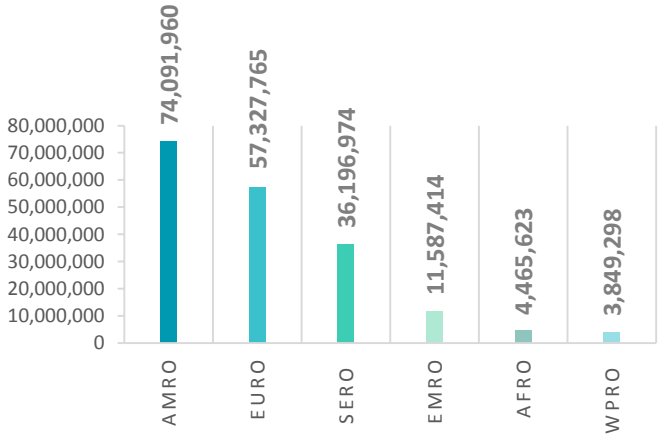
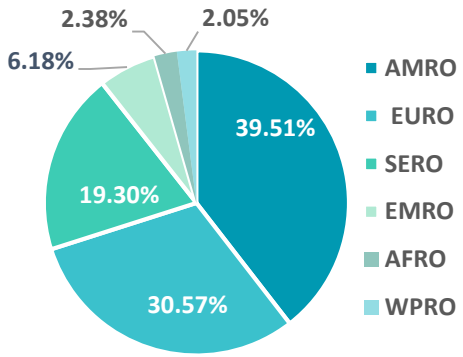
Figure 6: Global Distribution of COVID-19 Cases per Region

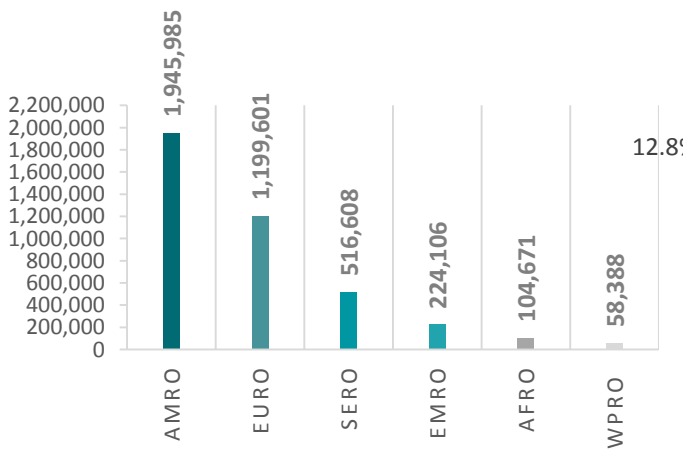


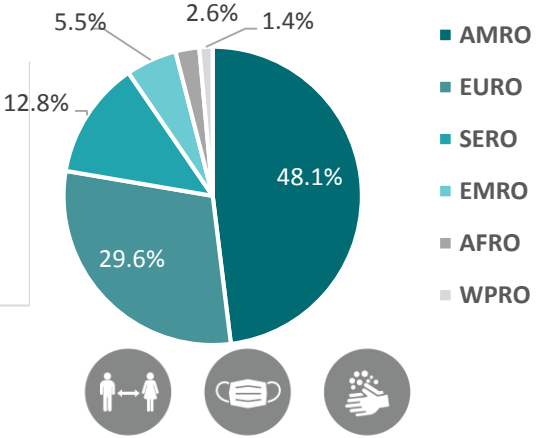
INFECTED





DEATHS

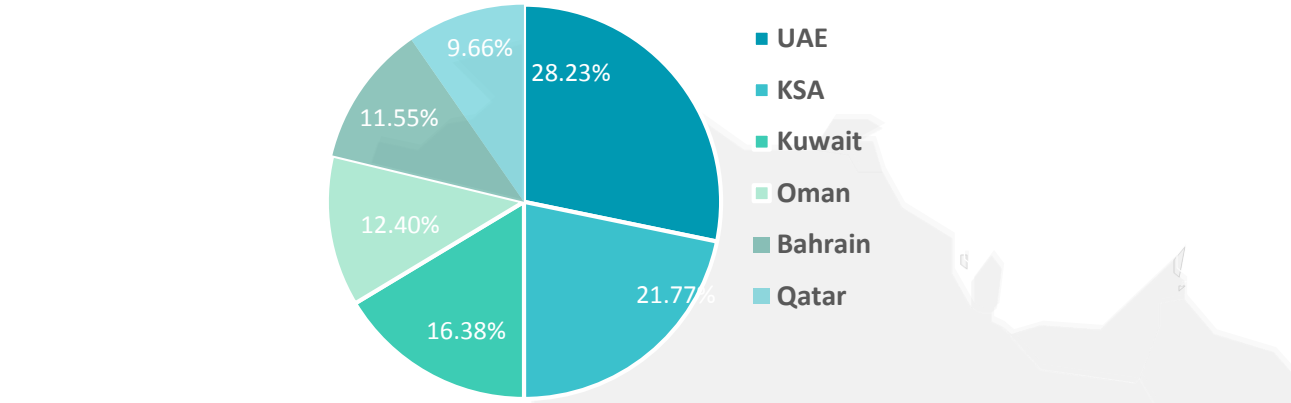


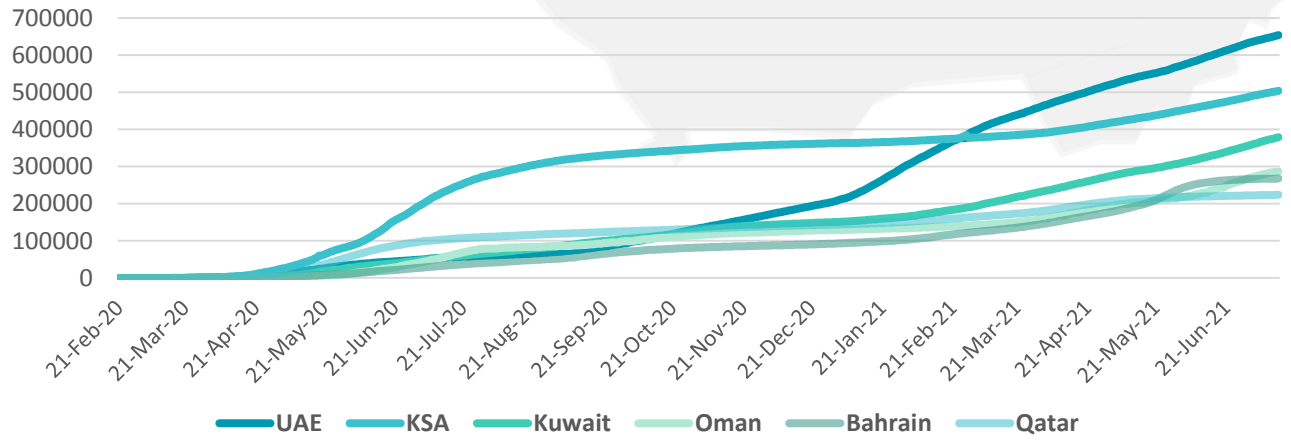


Graphs published by Abu Dhabi Public Health Center 2021 | Data resources: John Hopkins, WHO

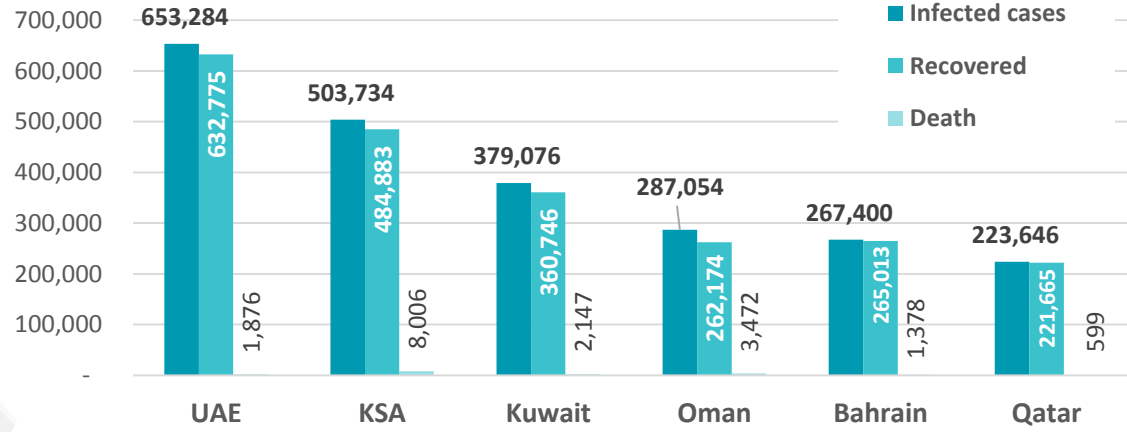
Figure 7: Comparative Analysis of the Distribution of COVID-19 Cases in GCC Countries

TOTAL NUMBER OF INFECTED CASES

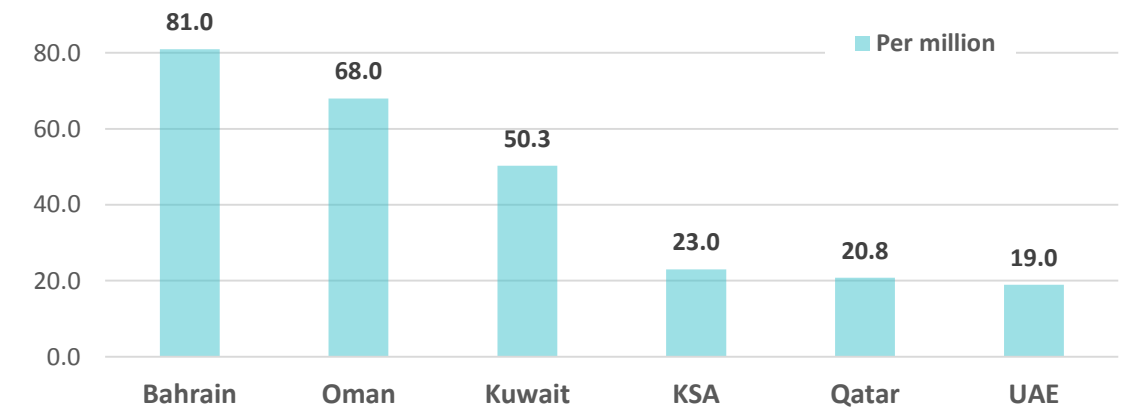




TOTAL NUMBER OF INFECTED, RECOVERED AND DEATHS



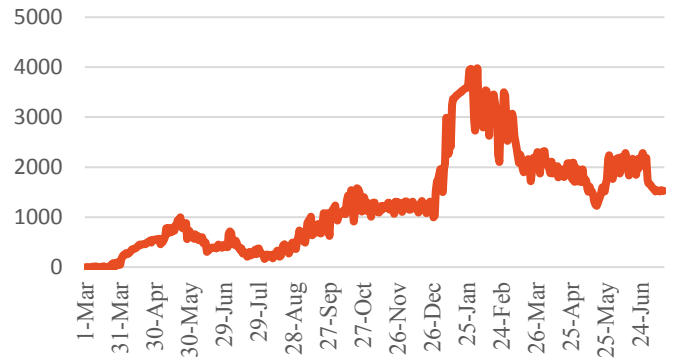
DEATHS PER MILLION



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

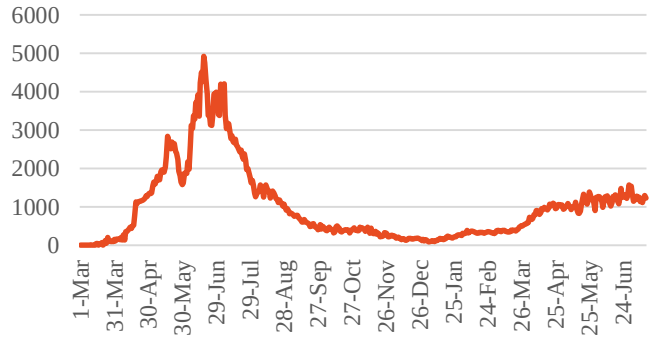
Figure 10: Comparative Analysis of the Distribution of COVID-19 New Cases in GCC Countries

UAE



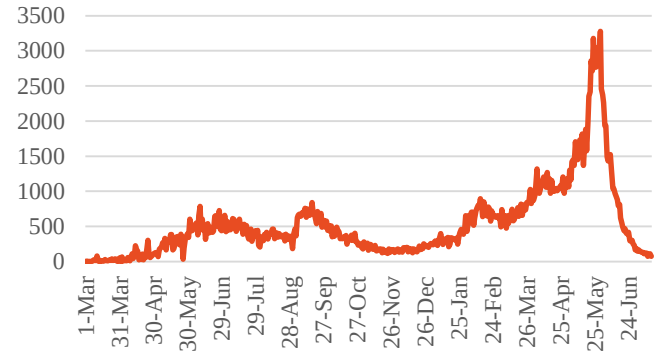
Source : National Emergency Crisis and Disaster Management Authority

KSA



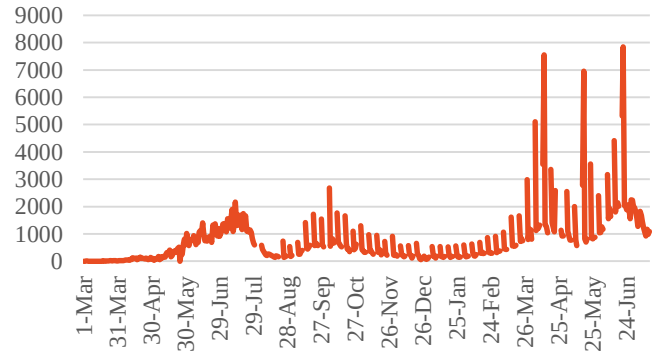
Source : KSA ministry of health

Bahrain



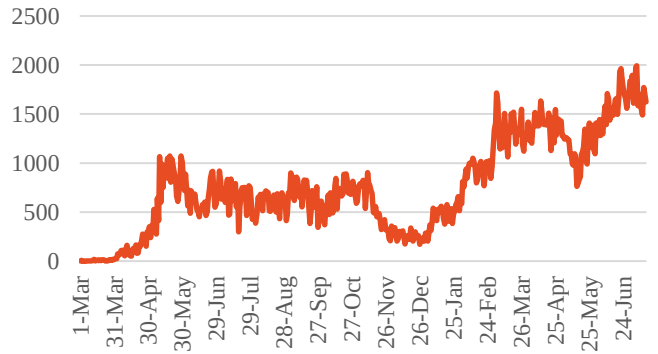
Source :WHO

Oman



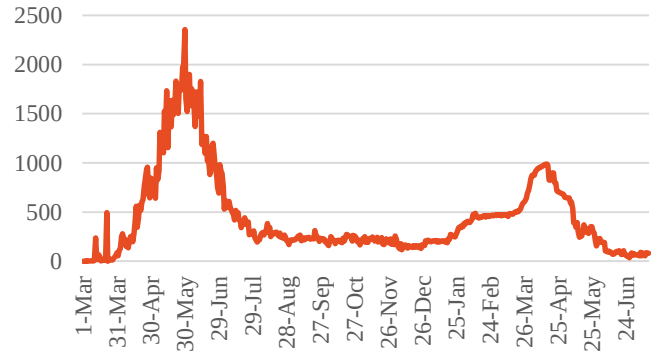
Source :Oman ministry of health

Kuwait



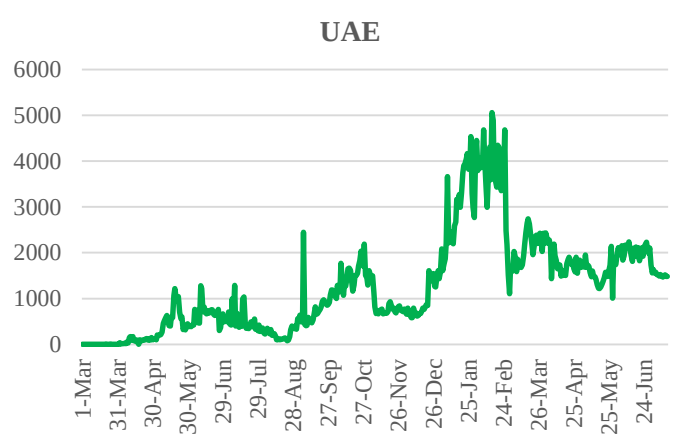
Source : Kuwait ministry of health

Qatar

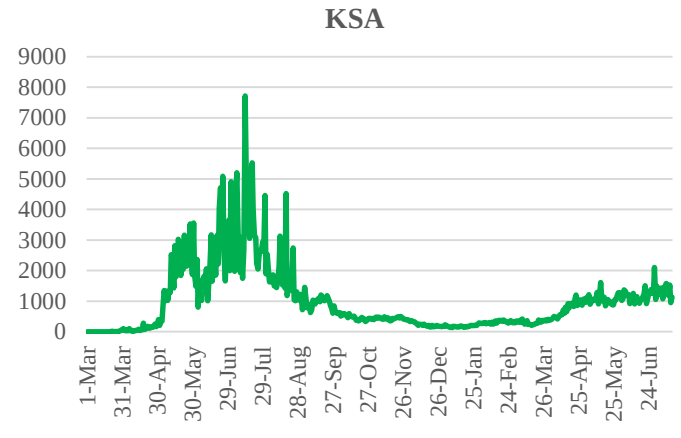


Source : Qatar ministry of health

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

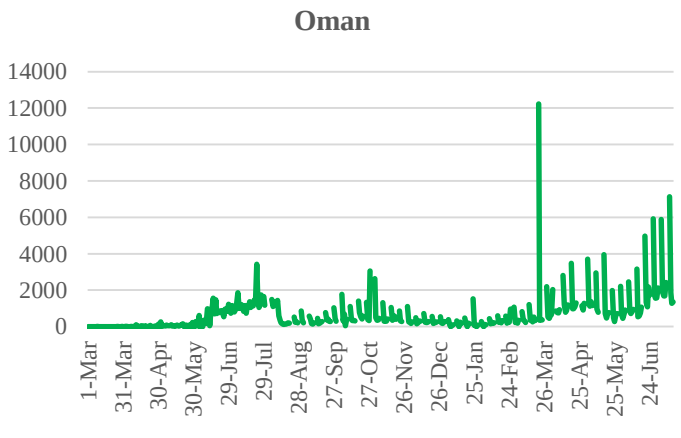


Source : National Emergency Crisis and Disaster Management Authority

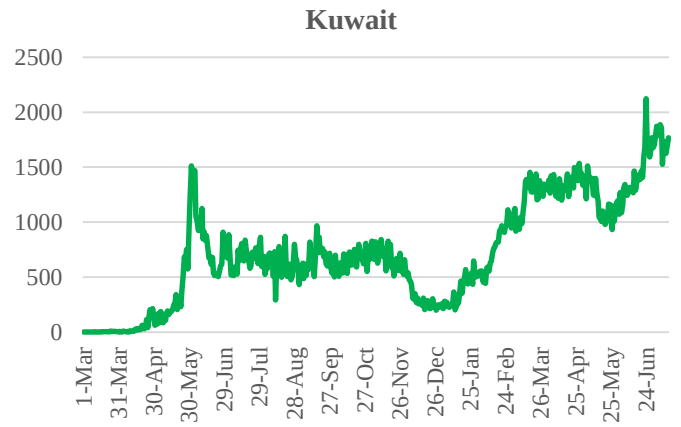


Source : KSA ministry of health

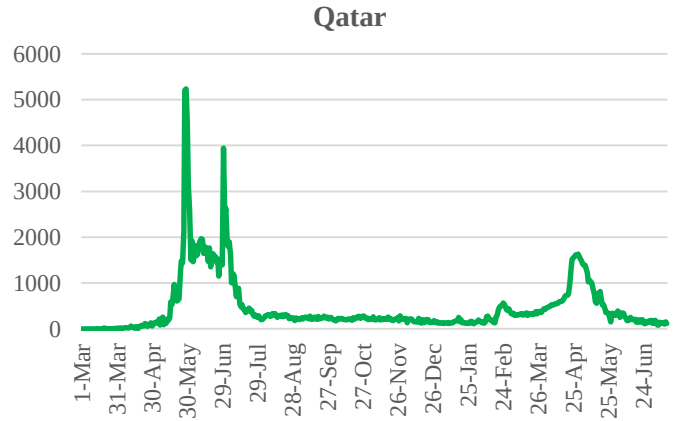
Source : Bahrain ministry of health



Source :Oman ministry of health

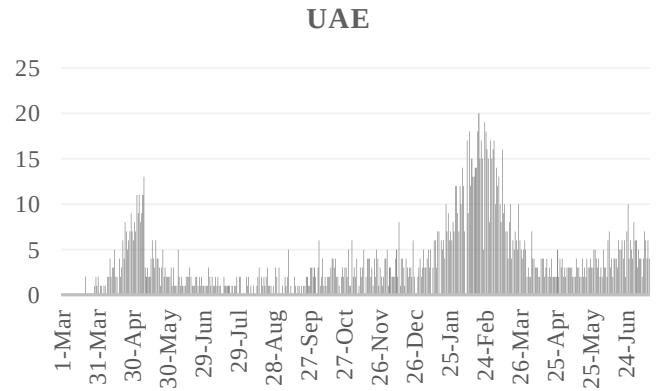


Source : Kuwait ministry of health

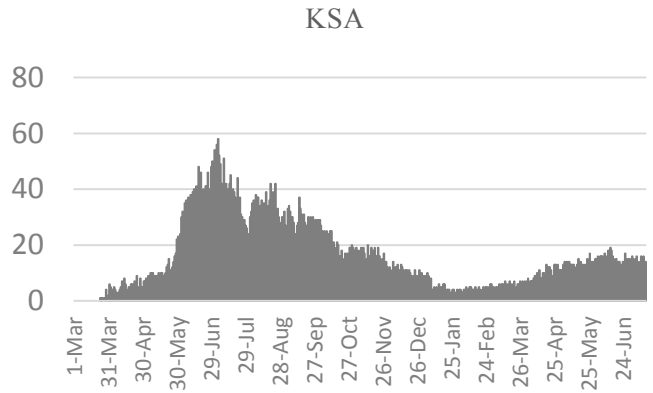


Source : Qatar ministry of health

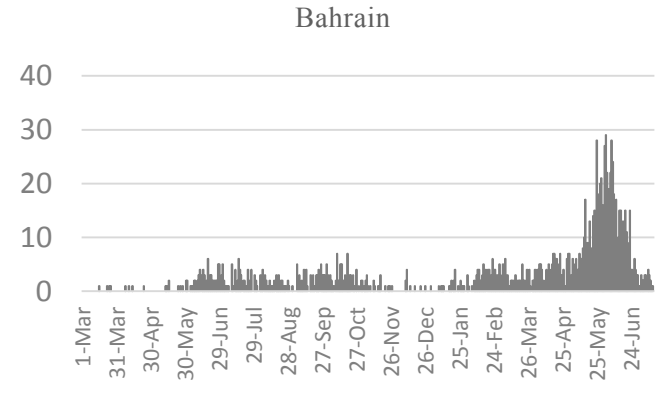
Figure 12: Comparative Analysis of the Distribution of COVID-19 New Death Cases in GCC Countries



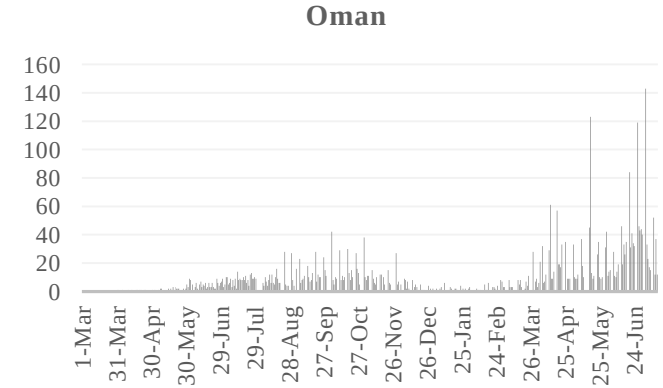
Source : National Emergency Crisis and Disaster Management Authority



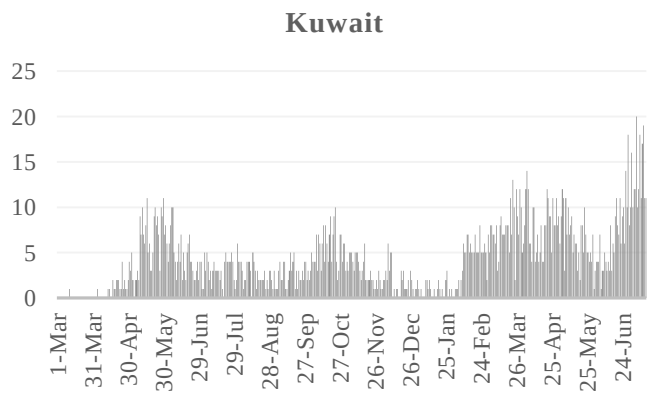
Source : KSA ministry of health



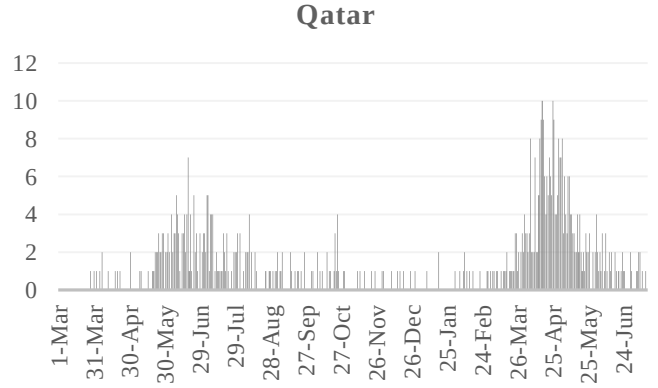
Source :WHO



Source :Oman ministry of health



Source : Kuwait ministry of health



Source : Qatar ministry of health

VACCINE

Article 1

Published July 8, 2021 in NEJM

Effectiveness of the BNT162b2 Covid-19 Vaccine against the B.1.1.7 and B.1.351 Variants

- Pfizer-BioNTech mRNA vaccine has 95% efficacy against COVID-19 disease.
- This study reported the efficacy of Pfizer vaccine for two variants of COVID-19: B.1.1.7 (Alpha or UK variant) and B.1.351 (Beta or South African variant)

How the study was done?

- Qatar launched the vaccination campaign for COVID-19 using Pfizer vaccine on 21st December 2020.
- Nearly all cases after 7th March 2021 in which virus was sequenced were caused by either Alpha or Beta variants.
- For this study, data on vaccinations, PCR testing, and clinical characteristics were extracted from the national, federated COVID-19 databases.
- Vaccine effectiveness was estimated with a test-negative case–control study design.

What this study found?

- Pfizer vaccine effectiveness against Alpha variant at 14 or more days after the second dose was **89.5%**.
- The effectiveness against any documented infection of Beta variant was **75%.**
- Vaccine effectiveness against severe, critical, or fatal disease due to infection with any SARS-CoV-2 (with the Alpha & Beta variants being predominant within Qatar) was very high, at **97.4%.**

Take-home Message

- Pfizer vaccine was effective against COVID-19 infection and disease.
- Although, vaccine effectiveness was lower for infection caused by Beta variant compared with Alpha; it has almost 100% protection for severe form of disease, hospitalization or death.

VACCINE

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Article 2

Published

Prevention and Attenuation of Covid-19 with the BNT162b2 (Pfizer-BioNTech) and mRNA-1273 (Moderna) Vaccines

June 30, 2021 in NEJM

- This study published in the NEJM was conducted in order to address the limited information available regarding the effectiveness of the two-dose messenger RNA (mRNA) vaccines BNT162b2 (Pfizer–BioNTech) and mRNA-1273 (Moderna) in preventing infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and **in attenuating coronavirus disease 2019 (Covid-19) including possible reductions in the severity Covid-19, viral RNA load, and duration of viral RNA detection when administered in real-world conditions.**

Methodology

- **A prospective cohort study involving 3975 health care personnel, first responders, and other essential and frontline workers was carried out**. From December 14, 2020, to April 10, 2021, participants completed weekly SARS-CoV-2 testing by providing mid-turbinate nasal swabs for qualitative and quantitative reverse-transcriptase–polymerase-chain-reaction (RT-PCR) analysis. **The formula for calculating vaccine effectiveness was 100%×(1−hazard ratio for SARS-CoV-2 infection in vaccinated vs. unvaccinated participants), with adjustments for the propensity to be vaccinated, study site, occupation, and local viral circulation**.

Results

- SARS-CoV-2 was detected in 204 participants (5%), of whom 5 were fully vaccinated (≥14 days after dose 2), 11 partially vaccinated (≥14 days after dose 1 and <14 days after dose 2), and 156 unvaccinated; the 32 participants with indeterminate vaccination status (<14 days after dose 1) were excluded. **Adjusted vaccine effectiveness was 91% with full vaccination and 81% with partial vaccination**.

- Among participants with SARS-CoV-2 infection**, the mean viral RNA load was 40% lower in partially or fully vaccinated participants than in unvaccinated participants**. In addition, the **risk of febrile symptoms was 58% lower and the duration of illness was shorter, with 2.3 fewer days spent sick in bed.**

Conclusion

- The authors concluded that **authorized mRNA vaccines were highly effective among working-age adults in preventing SARS-CoV-2 infection when administered in real-world conditions**, and **the vaccines attenuated the viral RNA load, risk of febrile symptoms, and duration of illness among those who had breakthrough infection despite vaccination**.

VACCINE

Article 3

Should we vaccinate children against SARS-CoV-2?

Published June 10, 2021 in LANCET

- This article mentions about Pfizer-BioNTech's mRNA BNT162b2 vaccine was efficacious, immunogenic, and safe in children aged 12–15 years. Several countries have authorized the use of the vaccine in this age group.
- A report published by European Centre for Disease Prevention and Control (ECDC) on June 1 lists important considerations for vaccinating their children and adolescents to the public health authorities in EU and European Economic Area countries.
- The report recommends that decisions should be made according to vaccine uptake in older age groups, incidence of COVID-19 in the general population, and issues concerning availability and access to vaccines on a global scale.
- The report emphasizes that children and adolescents will experience few direct benefits from being vaccinated; rather, the goal would be to increase overall population immunity and reduce transmission.

- Parental consent is required to vaccinate a child, and it is unlikely that parents who do not want the vaccine for themselves will want it for their children. It is important to consider and quantify the contribution of children and adolescents to transmission of SARS-CoV-2.
- Some studies have reported higher secondary attack rates from child and adolescent index cases than from adult index cases. Moreover, there is evidence that SARS-CoV-2 transmission in educational settings is a reflection of community transmission; therefore, it is unclear what impact vaccinating children and adolescents will have on transmission.
- Younger children seem less susceptible to SARS-CoV-2 and less likely to pass it on; as a result, vaccination of older children might be more beneficial than a vaccine strategy that targets all children aged 12–15 years or younger.

VACCINE

Continued

- The children who will benefit most from vaccination will be those with underlying conditions, such as cancer, cardiac disorder, diabetes, hypertension, or kidney disease, which have been shown to confer a risk of hospitalization that is similar to the risk in some adult age groups without underlying conditions.
- Vaccination of children might also improve their mental health and wellbeing and facilitate a return to normalcy, including resumption of education and social interactions important for child development. An increasing proportion of the total cases is thought to be driven by the emergence of highly transmissible variants, increased testing among school-age children, low adherence to non-pharmaceutical interventions, increased social interactions as restrictions are lifted, and increasing immunity among older age groups following vaccine rollout.

VACCINE

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Article 4

Published June 28, 2021 in LANCET

COVID-19 vaccines for children younger than 12 years: are we ready?

- On May 5, 2021, Canada was the first country to approve COVID-19 vaccine for emergency use in children aged 12–15 years. Next, the US Food and Drug Administration and European Medicines Agency also allowed the Pfizer-BioNTech COVID-19 vaccine for adolescents.
- In this article, Bihua Han and colleagues reported the results of a double-blind, randomized, controlled, phase 1/2 clinical trial, which showed that the inactivated COVID-19 vaccine (CoronaVac) had good safety, tolerability, and immunogenicity in youths aged 3–17 years.
- Children contributed 14.1% of the total COVID-19 cases in the USA. In children, COVID-19 is usually mild and often asymptomatic; however, in rare cases, children can become seriously ill and need hospitalization and intensive care.
- One of the possible adverse outcomes has been termed multisystem inflammatory syndrome in children (MIS-C); children with MIS-C have fever and become.
- severely inflamed, and develop multisystem disorders involving the heart, lungs, kidneys, brain, skin, eyes, and gastrointestinal tract. Mortality rate of MIS-C is approximately 1–2%.
- Evidence has shown an association between COVID-19 and MIS-C occurrence. These adverse outcomes justified the necessity to vaccinate children against COVID-19, as the BNT162b2 vaccine has shown 100% efficacy in children aged 12–15 years.
- A worldwide survey showed only 54% of respondents reported that they would have a COVID-19 vaccination if it were available. If children are left unvaccinated when adults achieve immune protection, there is a possibility that unvaccinated children becomes the virus shelter, given that most COVID-19 cases in children are mild and asymptomatic.

VACCINE

Continued

- The inactivated vaccine in Han's trial induced higher titers of neutralising antibodies compared with adults aged 18–59 years who received the same vaccine; the Pfizer-BioNTech vaccine showed a similar trend: vaccinees developed higher titres of neutralising antibodies in children aged 12–15 years than in those aged 16–25-years. Children's strong response means that they are more likely to develop immune overactions than adults, such as fever and allergy, so COVID-19 vaccine for children should balance a protective immune response and side-effects.
- For the inactivated vaccine, CoronaVac 3 μg dose induced higher titres of neutralising antibodies than the 1·5 μg dose, whereas it showed no significant difference in side-effects between the two doses, so 3 μg doses were used for phase 3 trials in children. But for other vaccines, such as the mRNA and viral vector vaccines, lowering the vaccination dose used in adults should be considered in the clinical trial for children.
- In children, most COVID-19 cases are mild and asymptomatic, and parents might not be aware of the infection since children get sick more frequently than adults which would make the infection rate underestimated and efficacy overestimated. Moreover, children younger than 12 years are at their key stage of growth and development; caution should be taken to evaluate the long-term effect of vaccine on children's development. Given the distinct immunogenicity profile and development stage of children, post-marketing surveillance of the vaccine safety should be done and maintained for a longer period than that in adults.

VACCINE

Article 5

Published June 23, 2021 in LANCET

Single-dose SARS-CoV-2 vaccination efficacy in the elderly

- This commentary summarizes the findings of two studies that investigated the efficacy of first-dose of COVID-19 vaccine in older individuals and those living in long-term care facilities

What are the findings?

- Among people aged 80 years and above who were admitted to hospitals with acute respiratory symptoms, vaccine efficacy for symptomatic disease 14 days after one dose of was 71.4 % for Pfizer and 80.4% for Oxford–AstraZeneca vaccine.
- Among people aged 65 years and older who were residents of long-term care facilities in England, vaccine efficacy was 56% at 28–34 days, and 62% at 35–48 days post-vaccination.
- Benefits of AstraZeneca vaccine were also seen at 0–6 days post-vaccination (efficacy 49%): however, a positive PCR test in this time period might indicate exposure before vaccination.

- Another findings from the study of long-term care facilities is that single-dose vaccination might affect the transmissibility of corona virus in terms of lower rates of viral shedding.
- Sensitivity analyses using the same time-period for both vaccines administration showed that efficacy for Pfizer & AstraZeneca vaccines were same. This finding suggests that other factors not controlled for in the overall analysis might affect COVID-19 risk.

Take-home Message

In conclusion

- The risk of symptomatic and asymptomatic disease substantially reduces after single-dose vaccination in groups at the highest risk of severe or fatal outcomes from COVID-19.
- The effect on symptomatic disease was seen from 14 days post-vaccination, and on asymptomatic disease from 28 days after vaccination.

VARIANTS

Article 6

Published July 8, 2021 in NEJM

SARS-CoV-2 Variants and Vaccines

- In this special report published in the NEJM, the authors identify and discuss in depth four major priorities - evaluating existing vaccines for efficacy against variants, developing modified and new vaccines to determine whether existing vaccines are losing efficacy against variants, to decide whether modified or new vaccines are warranted to restore efficacy against variants, to reduce the likelihood that variants of concern will emerge, and to coordinate international research and the response to new variants, both in general and in relation to vaccines, through the World Health Organization (WHO).

- This is in addition to the ongoing efforts to track viral mutations and emergence of new variants, in order to formulate the global response to SARS-COV-2 variants of concern . **Variants of concern with increased transmissibility are contributing to the reversal of the decreases in Covid-19 case counts that occurred in many countries earlier this year**. Many research groups are sequencing virus isolates and sharing these sequences on public databases such as GISAID (Global Initiative on Sharing All Influenza Data) which helps scientists track the ways in which the virus is evolving.

- A SARS-CoV-2 risk-monitoring and evaluation framework is being developed and continually improved by the WHO which involves enhanced surveillance, research on variants of interest and variants of concern, and evaluation of the effect of variants on diagnostic tests, therapeutic agents, and vaccines. This will assist in global decision making regarding changes in vaccines that may be necessary.

Priority 1 - Evaluating Existing Vaccines for Efficacy against Variants

- **Clinical data will continue to be needed to determine whether existing vaccines are losing efficacy against variants**. While existing vaccines are being deployed, clinical data can be sought not only from carefully planned observational studies, but also from randomized trials of vaccines versus placebo, of one vaccine versus another, or of different vaccination regimens (e.g., different doses, numbers of doses, and intervals between doses).

Priority 2 - Evaluating New or Modified Vaccines against Variants

- Although there will be reluctance to deploy vaccines that are based on new sequences before there is clear evidence that the original vaccines are failing, there will also be reluctance to allow prolonged circulation of vaccine-resistant variants while new vaccines or modified vaccines are being developed, if this can be avoided. Now is **the time to plan for the development of modified vaccines that could protect against vaccine-resistant variants, because such variants may well emerge**.

- Studies of modified vaccines should address the ability of these vaccines to elicit responses in persons who have not previously had an immunologic response against SARS-CoV-2 and in previously vaccinated persons.

VARIANTS

Continued

Priority 3 - Reducing the Risk That Variants of Concern Will Emerge

- Variants of concern have been evolving since the beginning of the Covid-19 pandemic, with selective advantage generally favouring more transmissible variants. Given the emergence of immunity-evading variants even before vaccines were broadly deployed, it is hard to implicate vaccines or vaccine deployment strategies as the major drivers of immune evasion.

- Several factors such as prolonged viral replication in the presence of partial immunity in immunocompromised persons or circumstances in which rapid transmission of high titres of virus occurs such as crowded places) and partially effective interventions could have contributed. **Limiting transmission in the general population is extremely important for slowing the emergence of additional variants of concern.**

Priority 4 – Co-ordinating a global response

- New variants of concern may emerge in any corner of the world and spread quickly, and convergent changes have been noted in variants of concern identified in various parts of the world. The modification of sequences targeted by a vaccine to meet the needs of one country could have repercussions elsewhere. **Therefore, vaccine development, vaccine modification, and vaccine deployment should be viewed as international enterprises, with international coordination by the WHO helping benefits to accrue throughout the world.**

- Coordination is essential in assessing the need for new or modified vaccines, in evaluating them, and in facilitating scientific understanding of the risk posed by novel variants and of the relationships between genetic variation and antigenic escape. Processes such as open and frequent scientific discussions, development of criteria to assess the appropriateness of given vaccines and the likely effect of emerging variants on vaccines as well as support recommendations on the development and evaluation of modified vaccines and new vaccines and the timing of their deployment are much needed.

Conclusion

- Although Covid-19 continues to present public health challenges, including the emergence of new variants, great progress has been made in understanding this disease and how to protect against it.

- **International coordination by the WHO of research efforts and sharing of data and specimens should be a priority.** Maintaining the efficacy of vaccines against emerging variants and achieving equitable access to effective vaccines in all countries will be of utmost importance as a sustainable response is built.

VARIANTS

Article 7

Published July 3, 2021 in MEDRXIV

The Emergence of SARS-CoV-2 Variant Lambda (C.37) in South America

- The evolution of SARS-CoV-2 variants with potentially increased transmissibility, virulence, and resistance to antibody neutralization poses new challenges for the control of COVID-19, particularly in low and middle-income countries (LMICs) where transmission remains high and vaccination progress is still incipient.

- Peru, one of the countries severely hit by the COVID-19 pandemic had the highest rate of COVID-19 deaths globally relative to its population (as of May 31, 2021). By June 2021, 1424 genome sequences from Peru were available on GISAID, comprising 64 circulating PANGO lineages.

- Routine genomic surveillance in early 2021 revealed a deep-branching sublineage of B.1.1.1, now classified as C.37. **It presents seven nonsynonymous mutations in the Spike gene and a deletion in the ORF1a gene (Δ3675-3677) also found in variants of concern (VOCs) Alpha, Beta, and Gamma.** The earliest record of C.37 on GISAID is from Argentina in November 2020.

- Peruvian genomes were generated at Universidad Peruana Cayetano Heredia and Instituto Nacional de Salud using the Illumina COVIDseq or the Qiagen SARS-Cov-2 panel and QIAseq FX DNA library kits.

- SARS-CoV-2 genome assemblies from Argentina, Chile and Peru available in GISAID by June 2021 were downloaded. Sequences were processed using the Nextstrain *augur* pipeline and genomes were aligned against the Wuhan reference genome. A maximum likelihood phylogeny was built and the tree was calibrated under a general time-reversible (GTR) model of nucleotide substitution, assuming a clock rate of 8×10^{-4}. Two genomes from China were used as the outgroup.

- Initially reported in Lima, Peru, in late December 2020**, it now accounts for 97% of Peruvian public genomes in April 2021**. Beyond Peru, C.37 has expanded rapidly in Chile and Argentina, reaching 33% and 12% of all sequenced genomes on GISAID by April 2021, respectively. There is evidence of onward transmission in Colombia, Ecuador, Mexico, the USA, Germany, and Israel.

- **On June 15, 2021, the World Health Organization designated C.37 as Variant of Interest (VOI) Lambda**. Expansion of C.37 has occurred in South America in the presence of hundreds of circulating lineages and VOC's Alpha and Gamma **suggesting increased transmissibility of this lineage**. **However, additional epidemiological data and analyses are needed to assess its transmission, virulence, and immune escape properties.**

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