مركز أبوظبي للصحة العامة
ABU DHABI PUBLIC HEALTH CENTRE

SCIENTIFIC RESEARCH MONITORING ON COVID-19

26 APRIL 2022

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SCIENTIFIC RESEARCH MONITORING ON COVID-19

(Issue 439)

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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 monthly 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
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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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- Transitioning to endemicity with COVID-19 research
- COVD19 Variants: What Next?
- Effectiveness of SARS-CoV-2 vaccines in the post-natural infection world
- The intersecting pandemics of tuberculosis and COVID-19: population-level and patient-level impact, clinical presentation, and corrective interventions
- The crucial need for tuberculosis translational research in the time of COVID-19

EPIDEMIOLOGY

FROM 26 February 2020 TO 24 April 2022

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

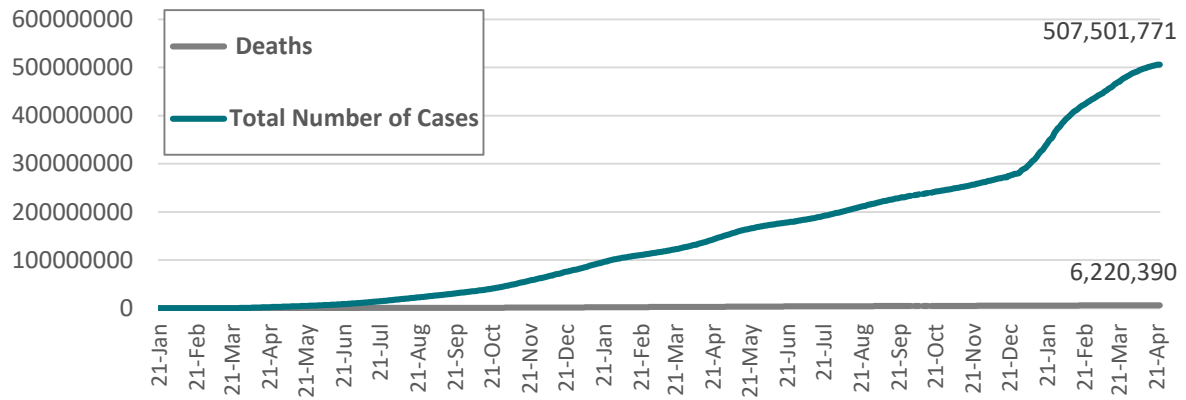


Figure 2: Daily New Infected COVID-19 Cases

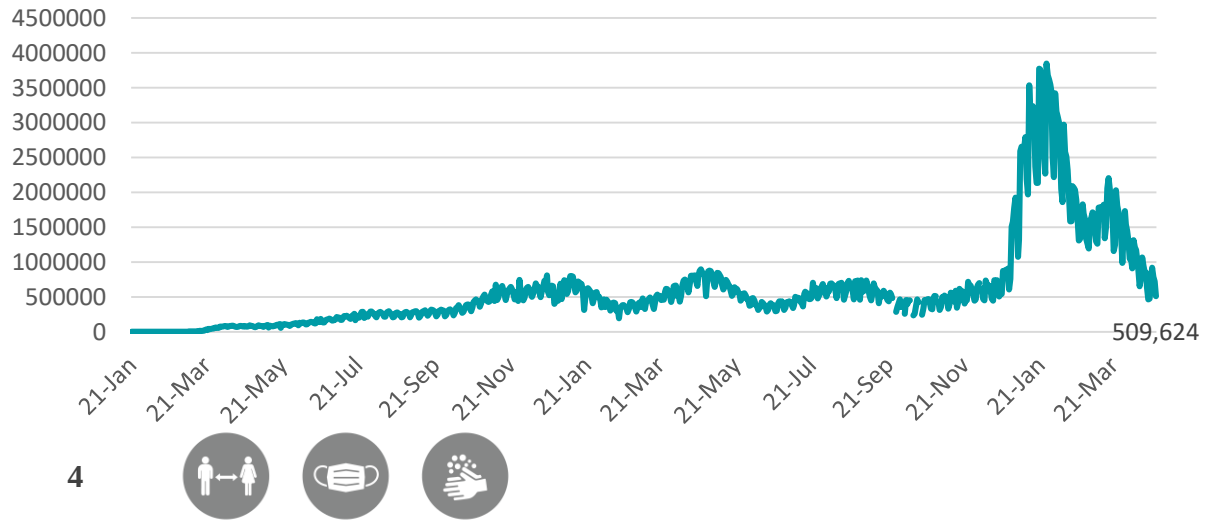
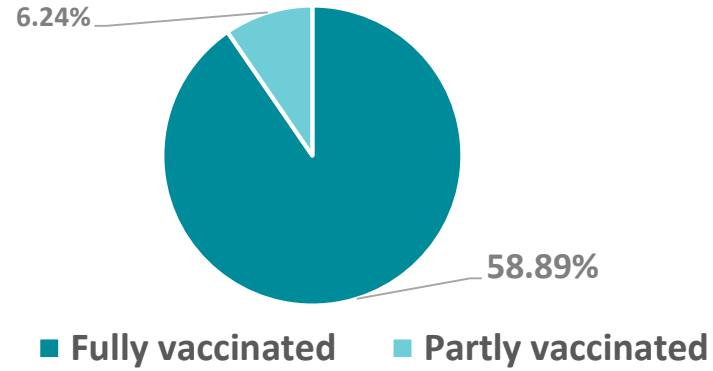
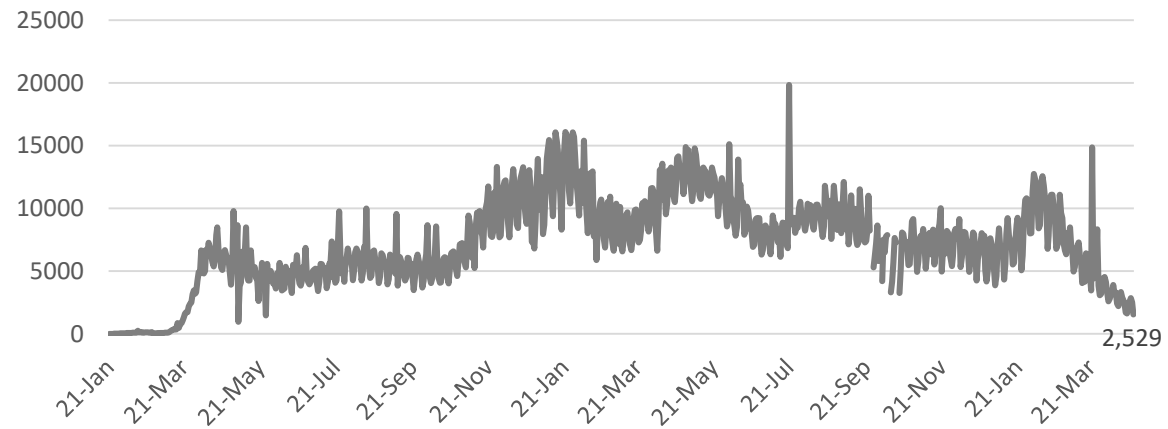


Figure 3: % of people vaccinated fully & partly against COVID-19



Total:
65.13 %

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



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

EPIDEMIOLOGY

FROM 21 JAN 2020 TO 24 April 2022

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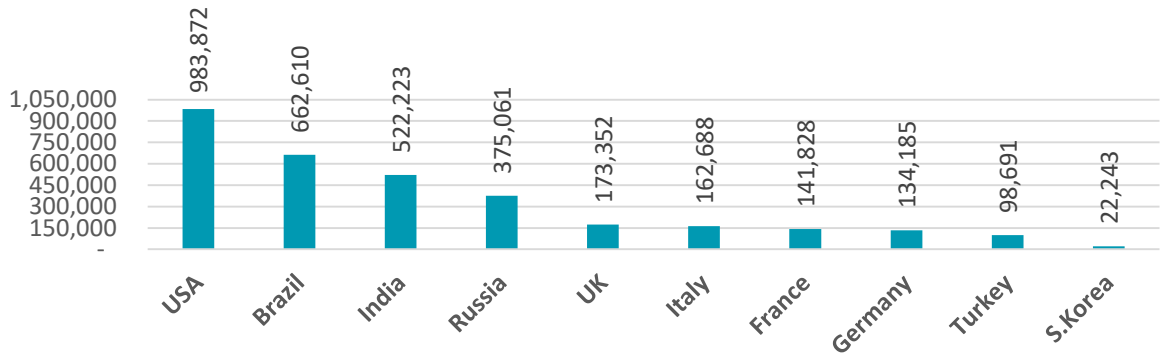
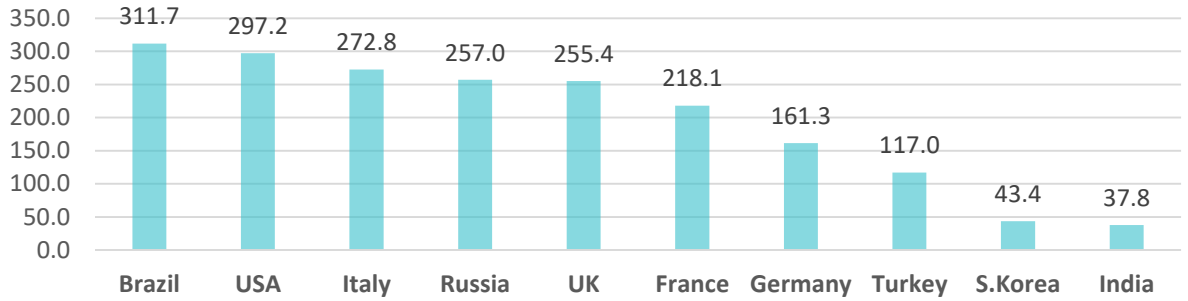
Figure 5: Top 10 Countries in the Total Number of Cases Due to COVID-19

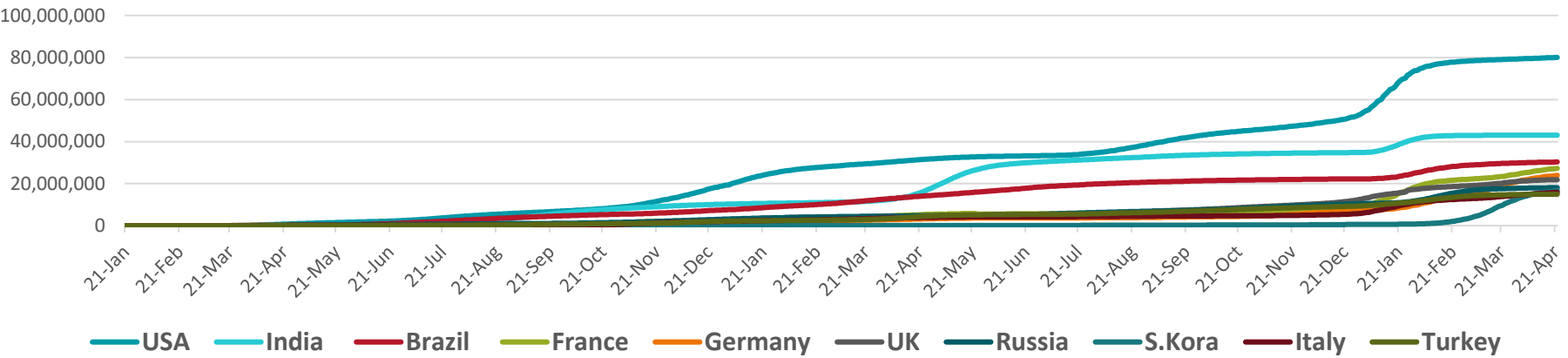
TOTAL DEATHS



DEATHS PER MILLION



TOTAL INFECTED CASES



USA	80,174,978
India	43,060,086
Brazil	30,345,654
France	27,497,092
Germany	24,200,596
UK	21,933,210
Russia	18,144,788
S.Korea	16,929,564
Italy	16,136,057
Turkey	15,018,547

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
284,172.6 Average Tests
2,873.2 per 100k population
0.1% Positive Rate

Daily Cases
241.1 Average Cases
2.4 per 100k population

Daily Recovered
356.7 Average Recovered
3.6 per 100k population

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

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

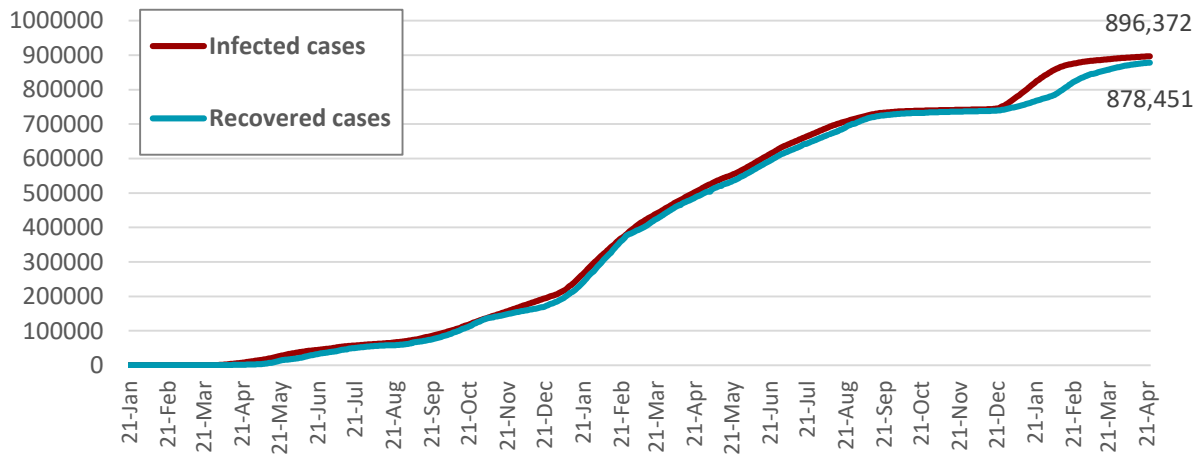
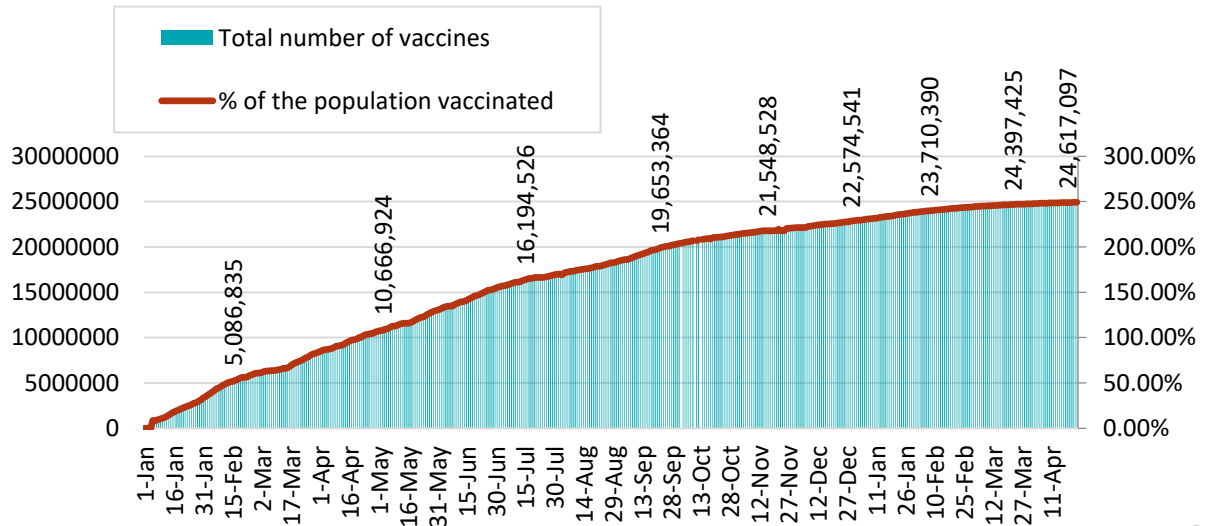


Figure 6 B: TOTAL NUMBER and Percentage of UAE population Vaccinated



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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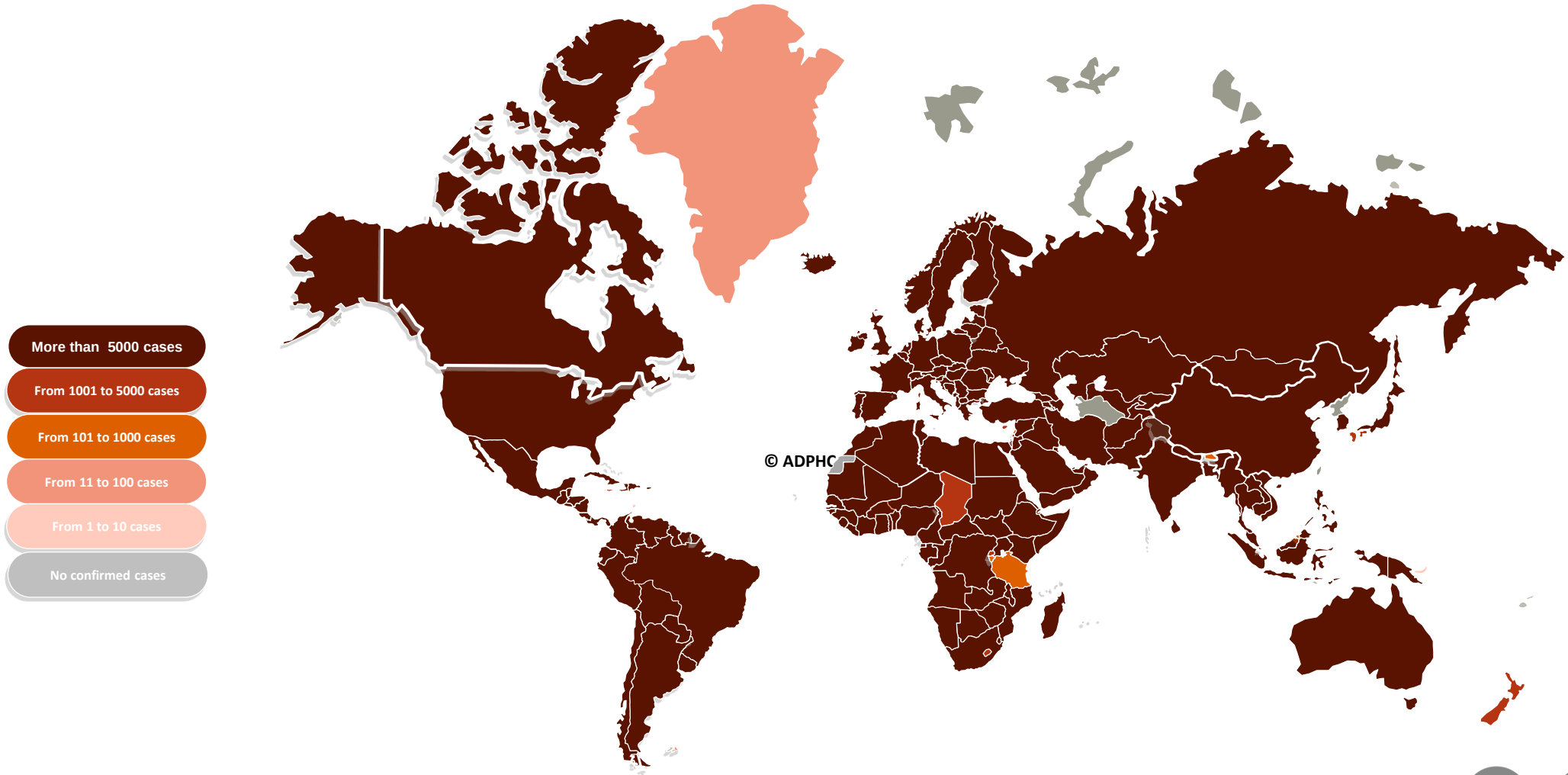
Figure 7A : Global Distribution of COVID-19 Cases



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

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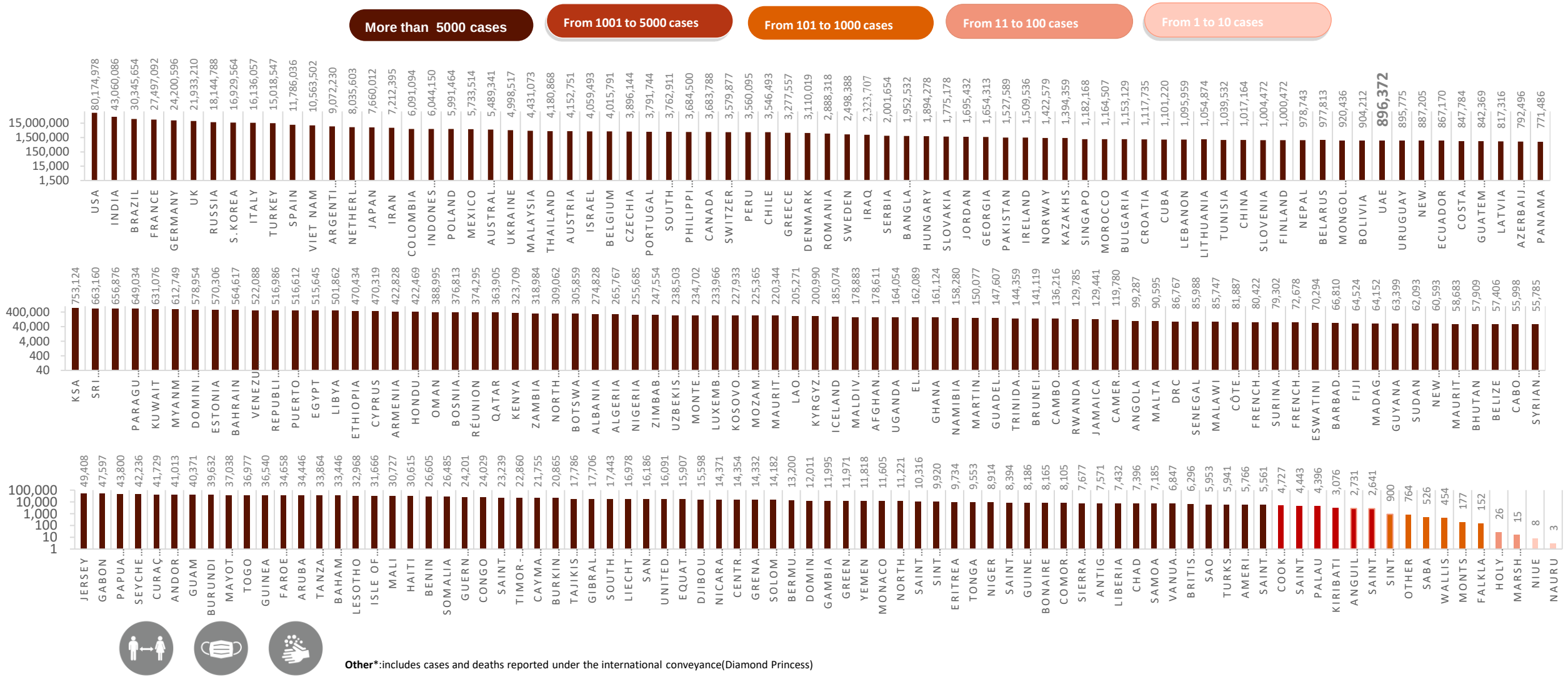
Figure 7B: Bar Chart Illustrates the Global Distribution of COVID19 Cases



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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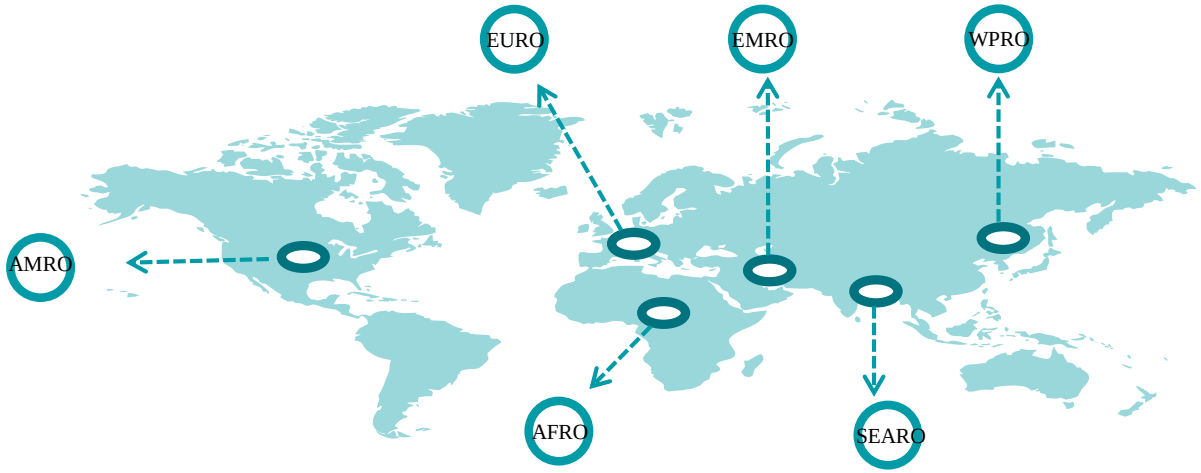
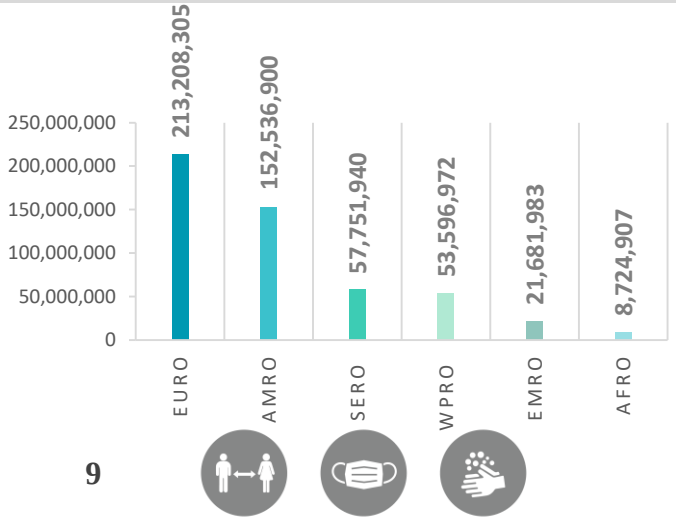
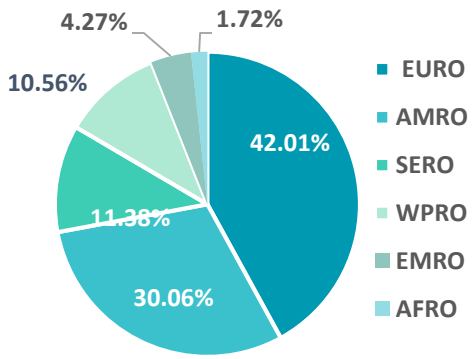
Figure 8: Global Distribution of COVID-19 Cases per Region

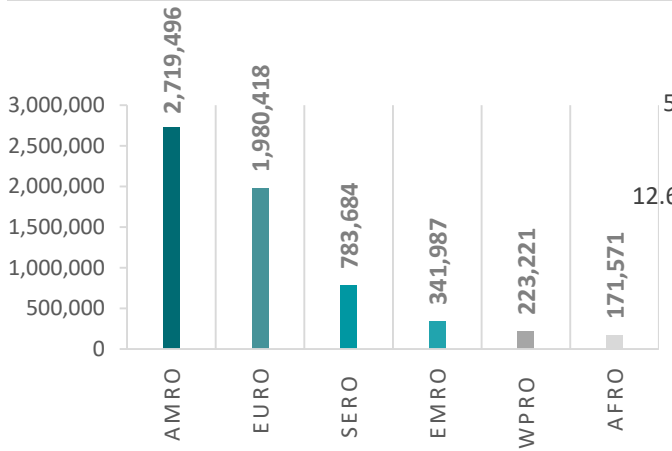


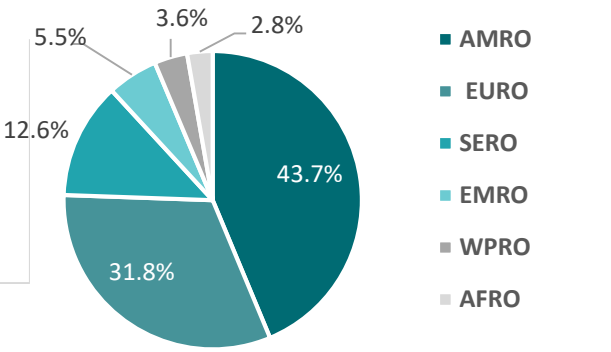
INFECTED





DEATHS





9

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

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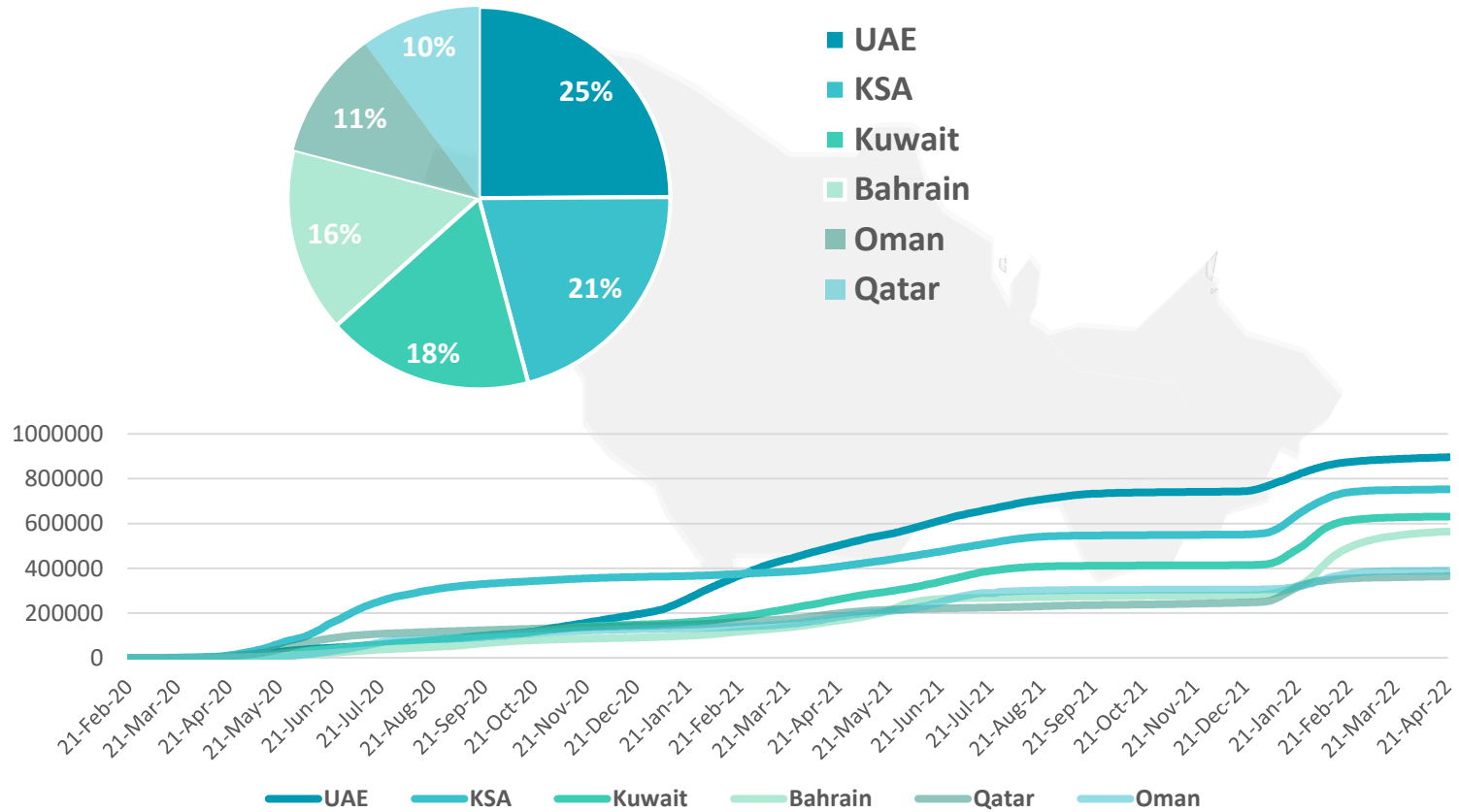
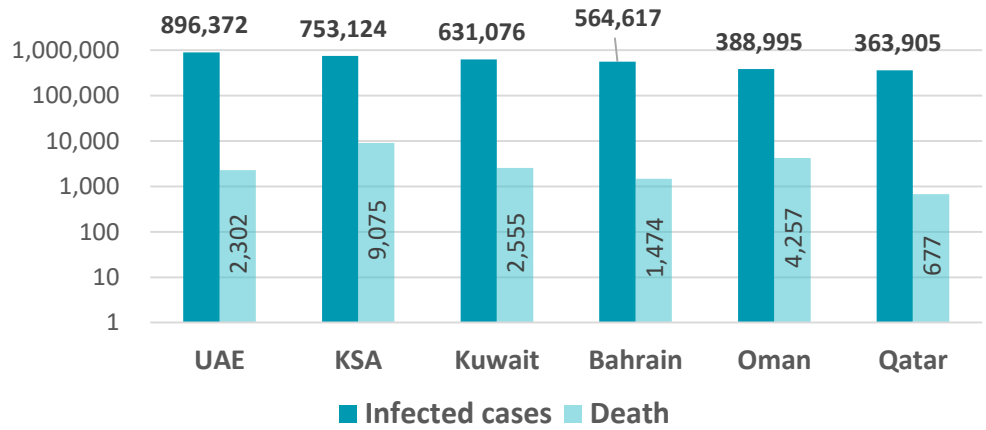
Figure 9: Comparative Analysis of the Distribution of COVID-19 Cases in GCC Countries

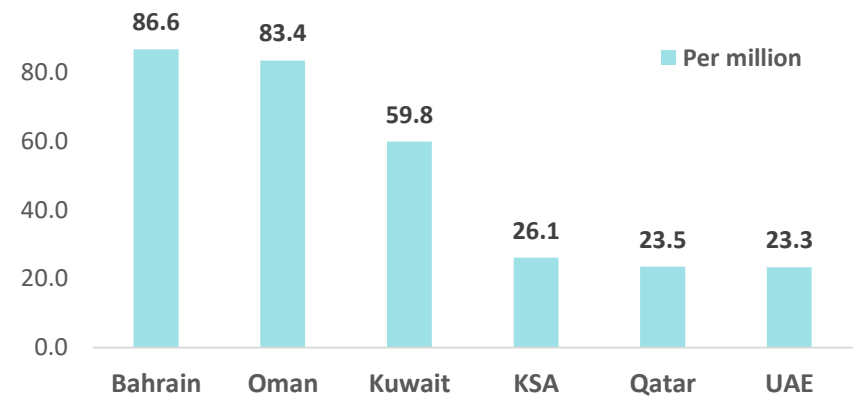
TOTAL NUMBER OF INFECTED CASES



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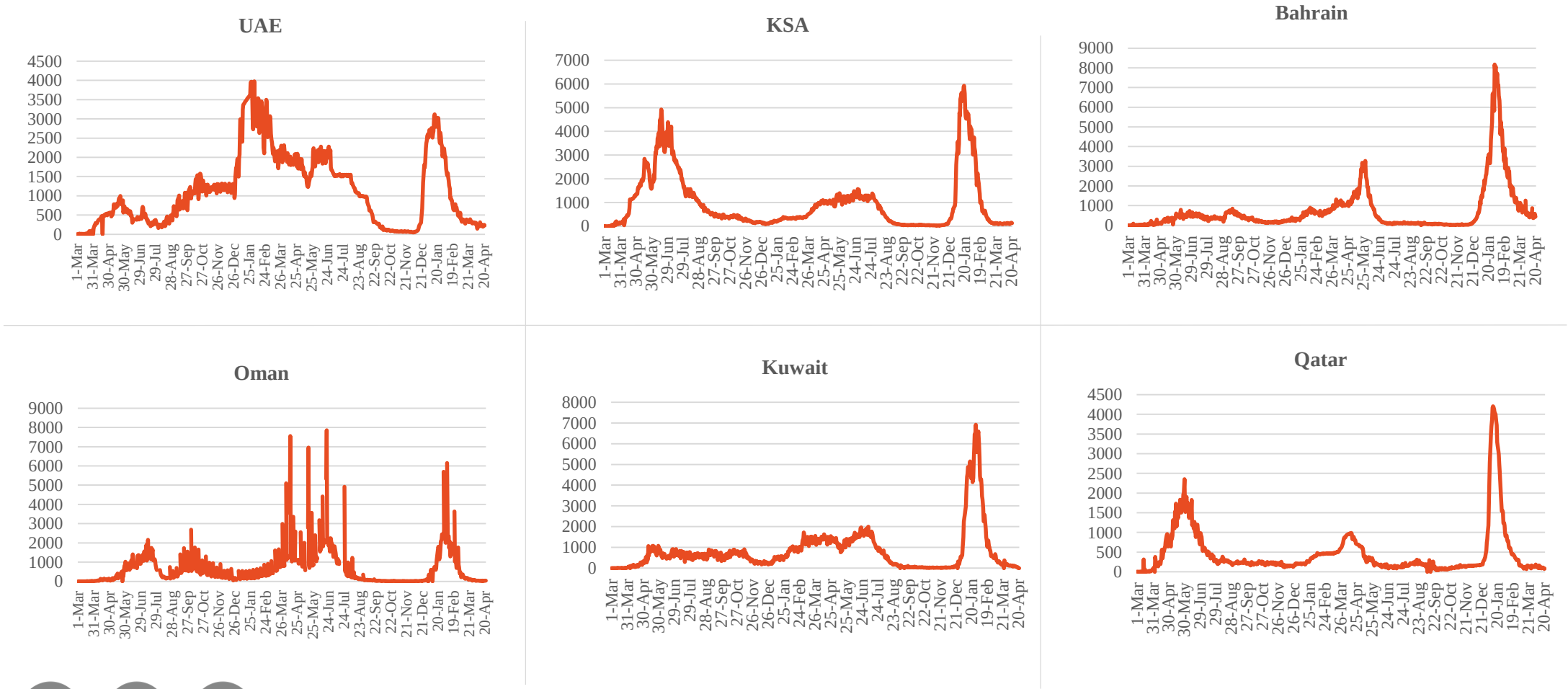
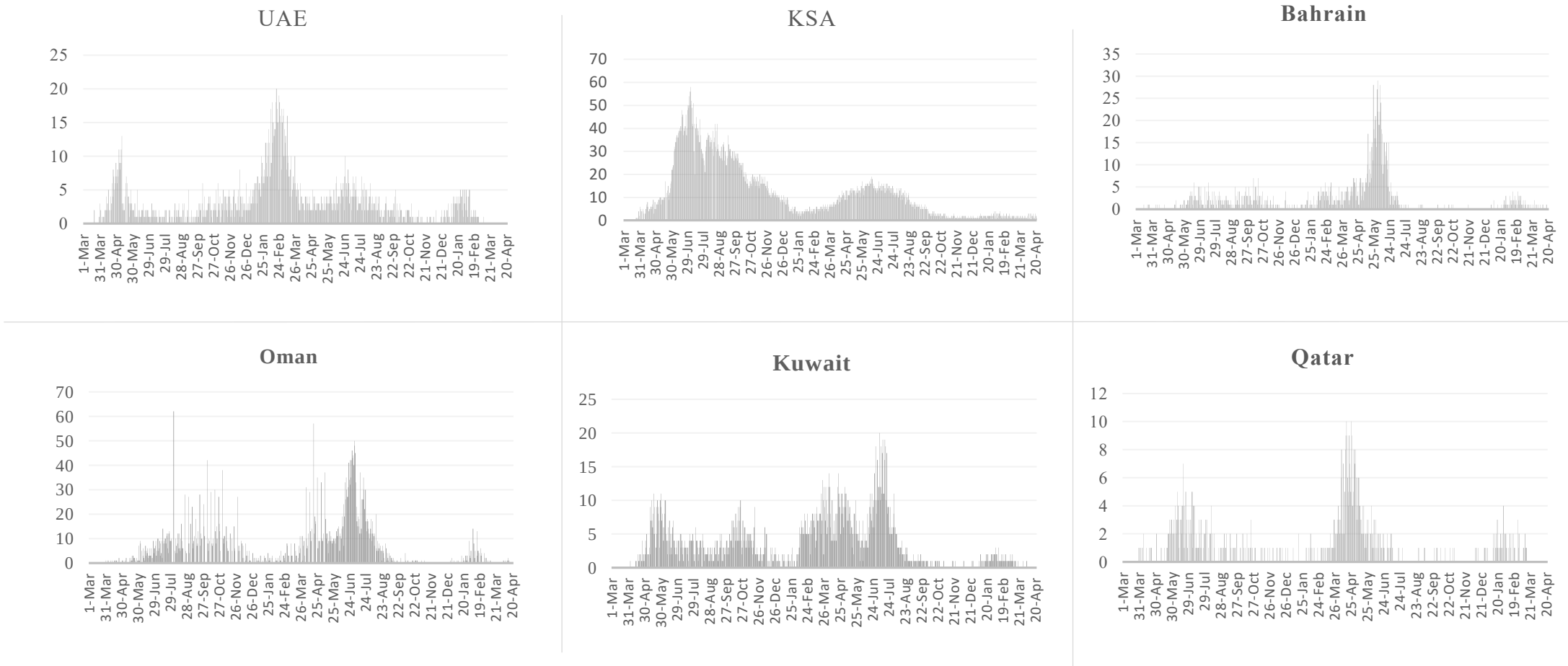
Figure 10: Comparative Analysis of the Distribution of COVID-19 New Cases in GCC Countries



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

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



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

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Article 1

Transitioning to endemicity with COVID-19 research

Published February 10, 2022 in The Lancet

- The article discusses that new cases of COVID-19 sparked by the omicron (B.1.1.529) variant of SARS-CoV-2 is on the decline and the effects of COVID-19 research on other areas of research towards the control of infectious diseases.
- COVID-19 is transitioning into an endemic disease that will always exist among us. Although endemic does not always imply mild, after high levels of population immunity, and accounting for patient age and underlying illnesses, the severity of COVID-19 approaches that of seasonal influenza.
- Breast neoplasia, HIV infection, obesity, lung neoplasia, and type 2 diabetes were the five diseases with the highest number of scientific papers each year from 2010 to 2019. COVID-19 has dominated biomedical research articles in the last two years, as evidenced by PubMed. COVID-19 papers surpassed 78,000 in 2021, but publications on the pre-pandemic top five diseases decreased.
- Editors of The Lancet Infectious Diseases, observed a decrease in the number and quality of research articles submitted on subjects other than COVID-19 towards the end of 2021.
- To know about the experience of research during the pandemic, 23 members of the journal's international advisory board (IAB) are contacted. According to the members, COVID-19 had taken up majority of their clinical obligations and research efforts. Others worked on COVID-19 while maintaining their existing research projects, resulting in extremely high workloads and a negative impact on staff mental health. Additionally, people with public health expertise were transferred to work on COVID-19 from tasks, such as responsibilities linked to antibiotic resistance.

Continued

- The research of several IAB members were disrupted by travel restrictions, difficulty recruiting patients, laboratory closures, and staff recruitment and retention issues. Apart from those relating to COVID-19, industry-sponsored clinical studies in infectious diseases have nearly "come to a halt," according to one IAB member. Funding redistribution was also mentioned as a problem. Some IAB members expressed concern about the pandemic's impact on tuberculosis control, a concern echoed by the WHO's Global tuberculosis report 2021, which concluded that the epidemic has halted progress in providing tuberculosis services and reducing disease burden.

- On the contrary, some IAB members reported new opportunities for research collaborations. The Carter Centre announced on Jan 26th that only 14 human cases of Guinea worm illness (dracunculiasis) were reported in four countries in 2021, compared to 27 instances in six countries in 2020, pushing the aim of eradicating the disease even closer.
- COVID-19 has been the subject of a massive research effort for the past two years, and it has provided us with the tools to change a pandemic disease into a controllable, endemic one. To continue this achievement, better vaccines and treatments will be necessary, and vaccines are still unavailable to a substantial portion of the world's population. However, using lessons learnt from combating COVID-19, research organizations, funding bodies, and industry should now lead a compensatory effort to refocus research on infectious diseases and non-communicable diseases that claim lives year after year.

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Article 2

Preprint

March, 2022.

COVD19 Variants: What Next?

We need to go beyond developing potent and variant-resistant vaccines and therapies.

- Omicron has changed global expectations in declaring the ending of the time line for the ongoing COVID 19 pandemic since 2 years .In November 2021 the World Health Organization has announced the presence of variant of concern which is highly transmissible compared to another variant named as the Omicron. This has a shown to have a high transmission rate and has shown to infect those individuals who have received vaccines

- This is a concern and has made our approach to control the pandemic and question the utility of vaccines and boosters to stop such a rapidly evolving virus. The pandemic has caused untold misery and suffering for over two years from an ongoing battle against COVID19.

- Unfortunately, the struggle continues with the emergence of circulating of multiple variants. We have learned about COVID19 more than any other disease ever and we are seeing how technology has supported the deployment of vaccines at a very rapid speed. However, it seems that administration of vaccine and booster doses fall short of being the lifesaving solution as expected! Globalization, open economy, and lack of following public health safety measures have made it difficult to control variants spread over continents.

- The World Health Organization has prioritized ongoing research for vaccine development, diagnosis, and treatment to tackle the COVID19 pandemic.

- Evidence based research has clearly supported the need for public health response to address the ongoing challenges as a result of the pandemic The quest and wait for a potent vaccine resistant to all type of variants might not come soon enough to allay the fears of the global community , therefore governments and researchers need to invest their resources and redouble their efforts in controlling the spread or to stop the evolution of new variants in the community.

- Over 200 COVID19 vaccines are currently under the d evelopment and about 26 of them are authorized for use. The current focus on reducing severe disease as one of the main vaccine's outcomes does not guarantee stopping the emergence of the more aggressive variants in the future. Research and public health efforts should be devoted now toward more practical solutions which aim to interrupt the chain of transmission using alternative routes of vaccine administration or different strategies for vaccine delivery.

VARIANTS

Continued

- By using different routes of vaccine administration such as nasal or sublingual may show an additional benefit in comparison with the commonly used intermuscular route. These alternative routes will enhance the IgA immune response. IgA antibodies are mainly presented in mucosal surfaces of Human entry points such as upper respiratory surfaces (nose and mouth) thus can prevent viral shedding and replication when person infected with the virus. Vaccinated individuals might still transmit the disease but using alternate routes of vaccine development or as vaccine adjuvant might support controlling community transmission in a more rapid and efficient way. There is a new vaccine developed by Bharat company produced in an intranasal form currently under phase2/3 trial. Due to the less humoral response of intranasal vaccine, the utility of such vaccine still poses unknown effect but as mentioned above it might serve as better option as a vaccine adjuvant or prophylaxis.

- .Strategies for delivering vaccines such as mass vaccination have been slow to outpace the speed of evolution of new variants; a situation which has been worsened by the unequal access to vaccines and lack of vaccine equity around the world.

- Ring vaccination and dose-sparing vaccination strategies are other available strategies to deliver vaccines.

- Modeling studies have speculated that ring vaccination (a method in which vaccination is provided to the contacts of infected individuals) can control spread of an outbreak with a reproductive number of 1.6 or an infection with a higher transmissibility but with effective control measures.

- As we expect new COVID19 variant in the future with various reproductive numbers; such method might be more convenient in certain setting and context. Dose- sparing strategies have been also implemented during the COVID era by some countries to increase the coverage especially in situation where limited vaccine supply existed. This strategy has received wide acceptance as it postulated to slowdown the evolution of new variants. It is worth noting that when the wave of a new variant present, is at the peak stage there needs to be increased vaccination rates and stringent policies to follow public health guidelines such as masking, and to maintain social distancing.

- As the virus might continue to circulate for some time, social distancing and other restrictive measures cannot be sustained for long-term. Research can support governments by guiding the public health measures towards economically safe new normal approach. Instead of lock down measures, a report published by CDC has shown that Wastewater Surveillance System may serve to detect areas of hot spot earlier than other usual Surveillance metrics.

Continued

- By identifying areas of hot spots, mobility restriction and mass testing can be targeted in only on those areas with high transmission and spare others to practice normal activities. Furthermore, Using GIS analysis in COVID19 played a key role in decision making for governments. The European Union Commission collected GIS imaging for the purpose of research to plan supply chain, health infrastructure and to determine the compliance of social distancing measures. Using GIS system and data mining in research have contribute to study and monitor the COVID19 control measure, identify transmission and environmental dynamic. Singapore has developed a good example of creating an infrastructure for modeling studies. They have utilized the previous data from an influenza data base model that integrate social interaction from home, workplace, and schools to predict the risk of transmission of COVID19 in these different setting at early stage of the pandemic. By now a wealth of data are there for us to use and create a database for COVID19 research which can support modeling studies which can guide the control measure and lower its negative impact.

- In conclusion, it is crucial to have ongoing research and have policies at all levels to support the public health response to the ongoing COVID19 pandemic. Efforts are needed to focus on creating guidelines to bring a balance between health and economic losses by adopting to the new normal while using public healthy safety measures with the minimal negative consequences until ultimate solutions are available.

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Article 3

Published

Effectiveness of SARS-CoV-2 vaccines in the post-natural infection world

March 31, 2022 in The Lancet

- Obtaining natural viral infection can provide immunity from subsequent infection through the memory T cells and B cells unless the virus significantly mutates. Vaccines are presented as inactivated, attenuated whole virus or immunogenic subunit such as spoke proteins as in SARS-CoV-2. It is essential to vaccinate naïve population, but it is unclear if it is important to vaccinate people who previously had COVID-19 infection. In addition, vaccinations are utilized to boost natural immunity due to decline in immunity and antibody titers, and various SARS-CoV-2 mutations.
- Data was collected from Brazil to evaluate effectiveness against symptomatic infection, hospitalization, and death for CoronaVac (Sinovac), ChAdOx1 nCoV-19 (Oxford-AstraZeneca), Ad26.COV2.S (Janssen), and BNT162b2 (Pfizer-BioNtech) vaccines. The study enrolled 22,566 symptomatic patients with PCR positive reinfection and 145,055 negative PCR. After adjusting for confounders, the efficacy against symptomatic infection was 39·4% (95% CI 36·1–42·6) for CoronaVac, 56·0% (51·4–60·2) for ChAdOx1 nCoV-19, 44·0% (31·5–54·2) for Ad26.COV2.S (single-dose vaccine), and 64·8% (54·9–72·4) for BNT162b2 vaccine 14 days or more after completing the vaccination post previous natural infection. Additionally, protection against hospitalization or mortality was 81·3% (75·3–85·8) for CoronaVac, 89·9% (83·5–93·8) for ChAdOx1 nCoV-19, 57·7% (–2·6 to 82·5) for Ad26.COV2.S, and 89·7% (54·3–97·7) for BNT162b2. Several strengths of the study is having three national database, comprehensive evaluation of global vaccines effectiveness, and dose-response relationship. However, the study did not include vaccine effectiveness against different SARS-CoV-2 variants.
- In another study by Hall et al., the effectiveness of vaccination remained greater than 90% for more than 6 months, even for those who were infected more than 12 months prior to vaccination. In addition, Hammerman et al., showed 82% effectiveness who previously received a single dose of vaccine after being infected. An in-vitro immunological studies confirmed with these clinical findings, given that the multiple exposure, natural infection and vaccination, provided humoral and cellular immune responses. Moreover, cellular T-cell responses provided further protection against severe disease, hospitalization, and death.
- Given the previous results, it is challenging to provide a population-level herd immunity through natural infection. It is suggested that patient who previously were infected would benefit from the vaccine in terms of severe disease.
- There still remains some questions to further explore, such as the effect of first exposure immunity on the durability and breadth of immune responses, other type of protections from natural infection, and the optimal timing for vaccination post natural infection.
- In conclusion, adapting a hybrid immunity from both natural infection and vaccination can provide long-term protection against SARS-CoV-2 and will likely be the normal approach globally.

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Article 4

Published

The intersecting pandemics of tuberculosis and COVID-19: population-level and patient-level impact, clinical presentation, and corrective interventions

March 23, 2022 in The Lancet

- Compared with 2019, tuberculosis (TB) cases in 2020 was less by18%. This data was confirmed by the WHO
- The incidence of tuberculosis has been slowly declining over the past few years. However, with COVID-19 pandemic, the rate of TB has been abruptly and dramatically reversed. This could have been explained in many parts of the world, there was a substantial reduction in tuberculosis testing and related health services
- It remains unclear to what extent diminished case detection can be attributed to reduced access to care versus reduction in M tuberculosis transmission due to for example mask wearing or lockdowns, like those seen for other respiratory infections such as influenza, respiratory syncytial virus, Streptococcus pneumoniae, and Haemophilus influenzae.
- In China, for instance, since the national lockdown was lifted, tuberculosis notifications have gradually approached pre-lockdown levels.
- In South Africa, TB testing had decreased by more than 50% compared with the previous year. Further, the microbiological confirmation of drug-sensitive tuberculosis also declined by 40%, and numbers of rifampicin-resistant tuberculosis cases fell by about 50%
- In India, modelling study in 2020 estimated that each month of lockdown would result in 40 685 additional people developing tuberculosis that year and an additional 151 120 tuberculosis deaths over the next 5 years
- COVID-19 has affected tuberculosis vaccination, including a reduction in Bacillus Calmette-Guérin (BCG) vaccination of up to 60% in some parts of the world
- In conclusion, It is crucial to support and revitalize both tuberculosis and HIV programs.

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Figure 1: Impact of the COVID-19 pandemic on global, regional, and national tuberculosis detection and mortality

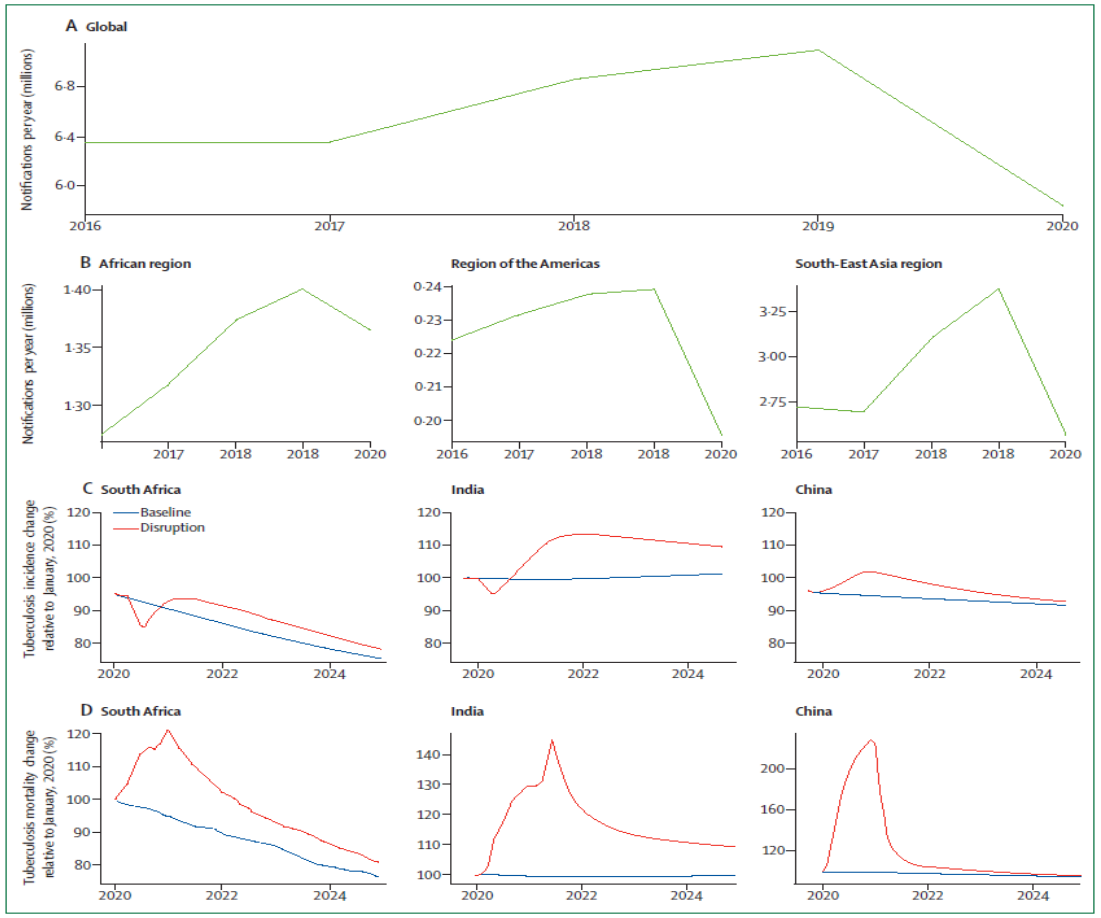
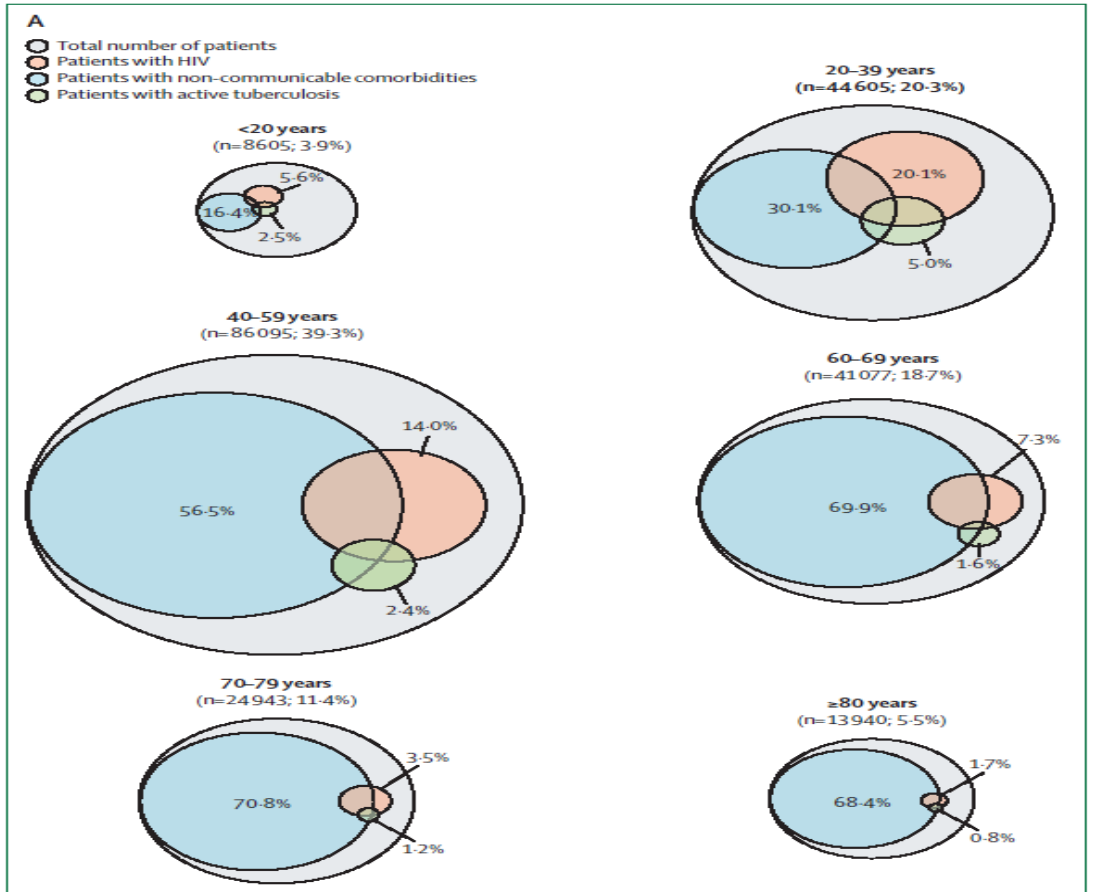


Figure 2: Evidence for factors related to transmission by Mycobacterium tuberculosis and SARS-CoV-2

	Mycobacterium tuberculosis	SARS-CoV-2
Transmission by small aerosol particles	Strong	Strong
Transmission by large aerosol particles (droplets)	Rare	Strong
Transmission by fomites or contact	No	Weak
Isolation of viable pathogen in room air	No	Yes
Identification of pathogen by PCR in room air	Yes	Yes
Isolation (culture) of pathogen from cough aerosols	Yes	No
Isolation of pathogen from exhaled breath	Yes	Yes
Risk to household contacts	High	High
Risk to health-care providers	High	High
Risk with proximity to index case	High	High
Risk of transmission from asymptomatic case	Probable	High
Risk of transmission outdoors	Low	Low
Risk of transmission indoors	High	High
Reduction of risk by patient mask use	Yes	Yes
Susceptibility of pathogen to ultraviolet light	High	Probably high
Superspreading epidemiology	Yes	Yes

Continued

Figure 3: Co-prevalence of COVID-19, tuberculosis, HIV, and non-communicable diseases



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Article 5 The crucial need for tuberculosis translational research in the time of COVID-19

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- While the world is still grappling with the devastating effects of COVID-19 more than two years into the pandemic, countries with high COVID-19 vaccination rates are transitioning to the new normal living with SARS-COV2, but low and middle income countries (LMICs) are struggling to vaccinate their populations while concurrently fighting other communicable diseases, key among them tuberculosis. The burden of tuberculosis, the leading cause of death from an infectious disease before COVID-19 emerged, has been deeply affected by the pandemic.

- In the first of a Series of three papers published in The Lancet Respiratory Medicine and eBioMedicine, Keertan Dheda and colleagues discuss the effects of COVID-19 on efforts to end tuberculosis and the need for wide-ranging interventions to restore tuberculosis control, including the need to implement and enhance tuberculosis diagnostic tests to reduce under-diagnosis.

- In the second paper, Ruvandhi Nathavitharana and colleagues highlight progress in the development of non-sputum-based diagnostic tests with potential for decentralised deployment. Finally, Hanif Esmail and colleagues discuss optimal treatment regimens across the full spectrum of tuberculosis infection and tuberculosis disease, previously known as latent tuberculosis and active tuberculosis, respectively.

- Although these articles apply mainly to pulmonary tuberculosis, advances in the diagnosis and treatment of extrapulmonary tuberculosis will have to be made concurrently in addressing the substantial burden of disease. Importantly, the various sequelae after tuberculosis need to be understood and optimally managed.

- To improve the diagnosis of tuberculosis, new diagnostic tools, especially non-sputum-based tests, and enhancement of existing tuberculosis diagnostic tests will be crucial. Nathavitharana and colleagues highlight the need to develop a sensitive and specific, rapid, non-sputum-based tuberculosis test by harnessing existing resources invested in COVID-19 detection. By use of easily accessible clinical samples, such as urine or oral swabs for diagnosis and implementing point-of-care tests, tuberculosis diagnosis could be enhanced in LMICs, where the majority of the world's tuberculosis burden is found.

- The gold-standard tuberculosis cultures and drug-susceptibility tests remain unavailable in most LMICs, but the advent of whole-genome sequencing shortens the time to determine anti-tuberculosis drug susceptibility for more effective tuberculosis treatment. Such technology, if made available across resource settings, would help to stem transmission of both drug-susceptible and drug-resistant Mycobacterium tuberculosis because it allows prompt initiation of effective anti-tubercular treatment.

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- Finally, options for the prevention of tuberculosis in the form of robust vaccines need to be developed.Translational research will underpin progress in preventing and managing the entire spectrum of tuberculosis, and a pressing need exists for investment and support to strengthen research capacity.

- To optimally manage tuberculosis infection and disease, new approaches to diagnosis will need to go hand in hand with improved tuberculosis prevention and treatment, for which drug discovery together with repurposing of existing drugs needs to be undertaken. Esmail and colleagues propose an approach in which tuberculosis treatment and management are tailored across the tuberculosis spectrum, instead of being provided within the binary framework of tuberculosis infection and tuberculosis disease. However, extensive work is needed before this concept can be realized in clinical practice.

- Research on extrapulmonary tuberculosis has been modest compared with that for pulmonary tuberculosis, but remains just as important, and research efforts are needed to better understand and manage extrapulmonary tuberculosis.

- The long-term sequelae of tuberculosis should not be forgotten. It is well recognized that lung function and quality-of-life decrease after pulmonary tuberculosis disease, but the extent of the global burden of lung disease after tuberculosis infection is poorly defined and likely to be under-reported.

Conclusion

- Altogether, tuberculosis translational research remains key to advancing prevention and management across the entire spectrum of tuberculosis, which is still a leading killer globally. Despite the catastrophic setbacks from COVID-19, researchers need to continue to push ahead to reach the ultimate goal of ending tuberculosis.

- As has been seen for COVID-19, a whole-of-government approach for tuberculosis is needed for the development of effective diagnostic and treatment approaches to stem transmission and save lives.

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