مركز أبوظبي للصحة العامة
ABU DHABI PUBLIC HEALTH CENTRE

SCIENTIFIC RESEARCH MONITORING ON COVID-19

26 APRIL 2021

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SCIENTIFIC RESEARCH MONITORING ON COVID-19

(Issue 420)

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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

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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

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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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TREATMENT

- Effect of a Single High Dose of Vitamin D3 on Hospital Length of Stay in Patients With Moderate to Severe COVID-19
- Vitamin D3 to Treat COVID-19 Different Disease, Same Answer
- Association of Vitamin D Levels, Race/Ethnicity, and Clinical Characteristics With COVID-19 Test Results"
- Vitamin D supplementation to prevent acute respiratory infections: a systematic review and meta-analysis of aggregate data from randomised controlled trials

PUBLIC HEALTH RESPONSE

- Prioritising COVID-19 vaccination in changing social and epidemiological landscapes: a mathematical modelling study
- Vaccination and non-pharmaceutical interventions for COVID-19: a mathematical modelling study

EPIDEMIOLOGY

FROM 21 JAN 2020 TO 25 APR 2021

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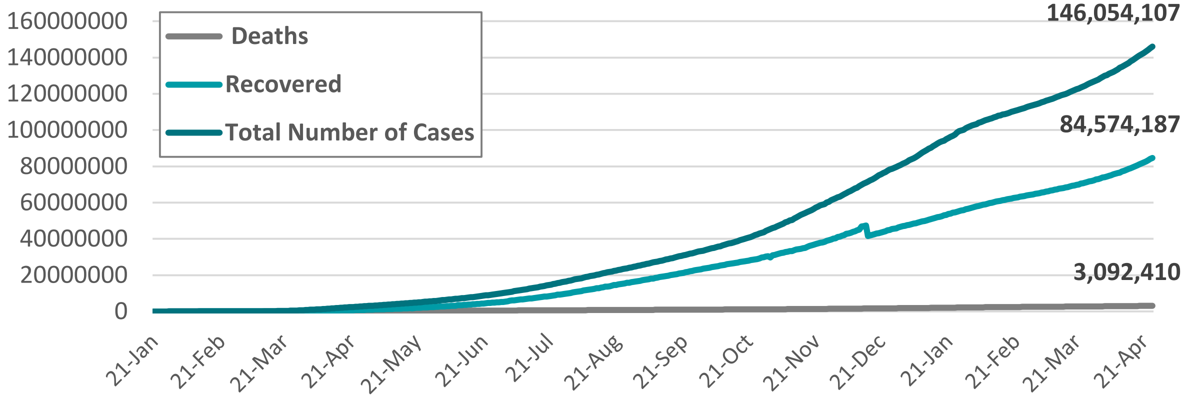
Figure 1: Total Number of Infected, Recovered, and Death Cases



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

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

Figure 2: Daily New Infected COVID-19 Cases

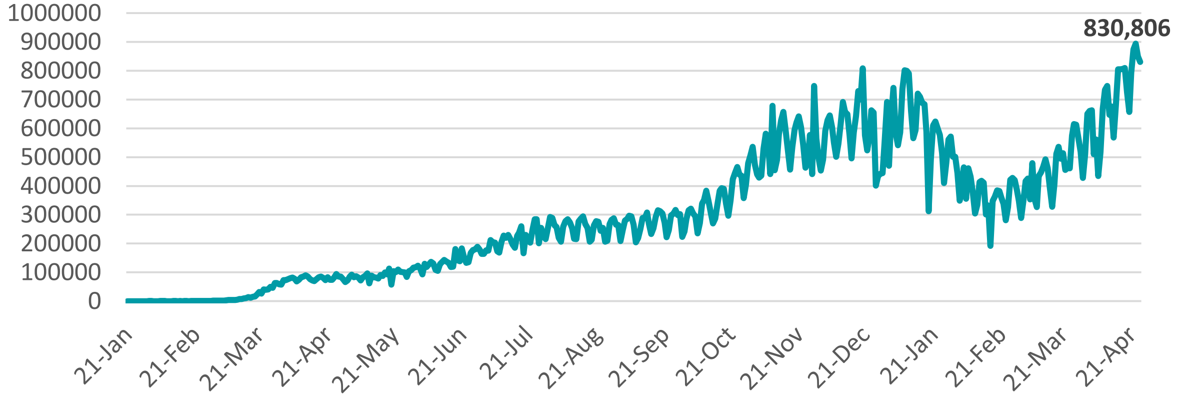
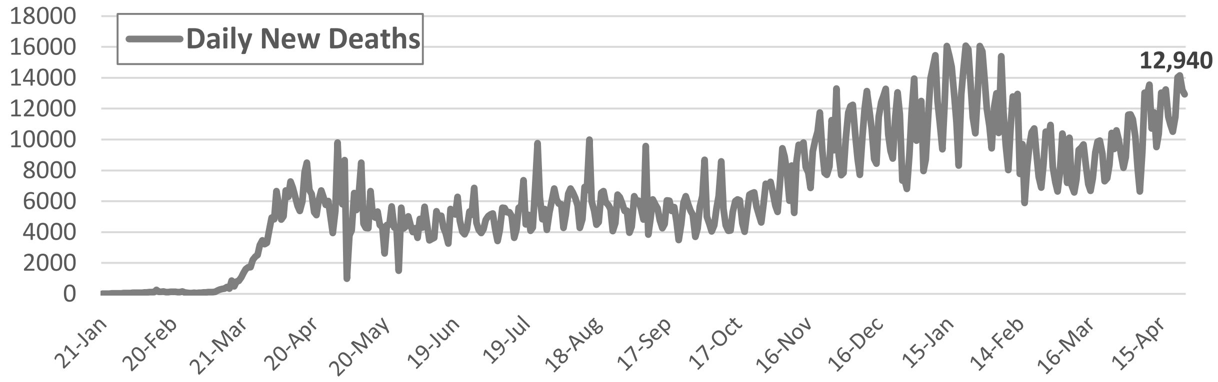


Figure 4: Global Daily New Deaths Due to COVID-19



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

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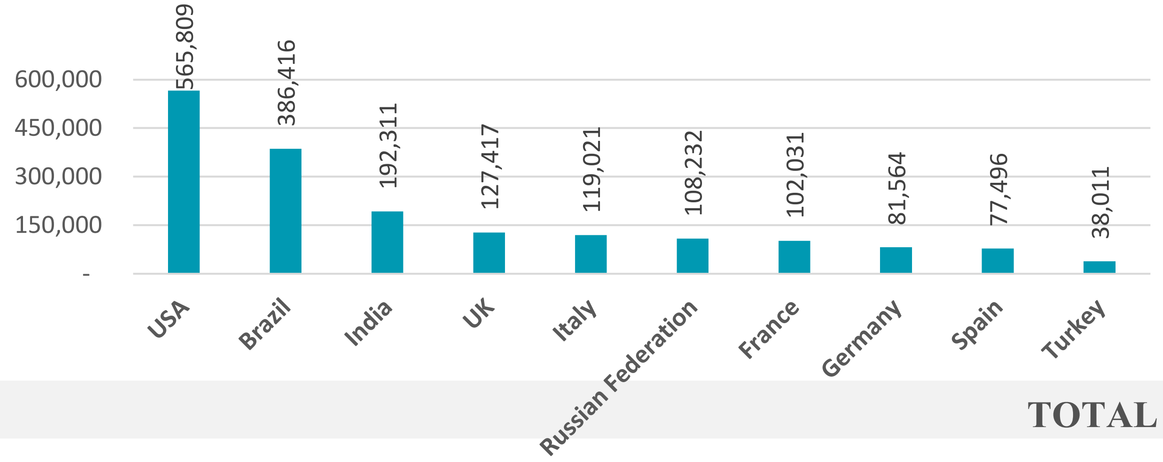
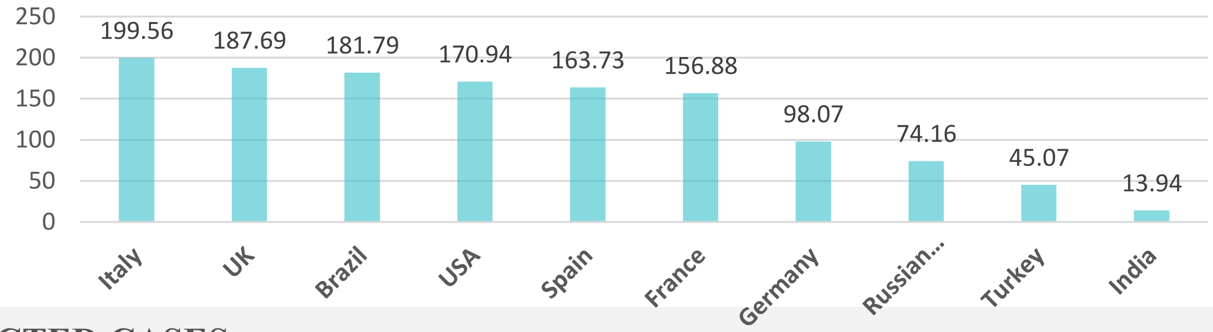
Figure 5: Top 10 Countries in the Total Number of Cases Due to COVID-19

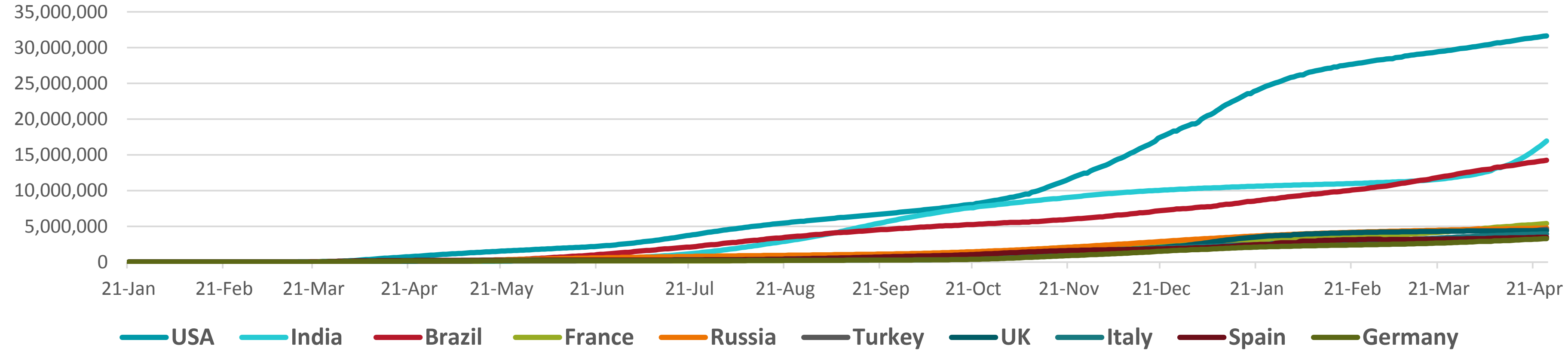
TOTAL DEATHS



DEATHS PER MILLION



TOTAL INFECTED CASES



USA	31,656,636
India	16,960,172
Brazil	14,237,078
France	5,390,187
Russia	4,762,569
Turkey	4,591,416
UK	4,403,174
Italy	3,949,517
Spain	3,456,886
Germany	3,287,418

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

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

Daily Tests	Daily Cases	Daily Recovered	Daily Deaths
192,769.4 Average Tests	**1,940.6** Average Cases	**1,791.9** Average Recovered	**2.4** Average Deaths
1,949.1 per 100k population	**19.6** per 100k population	**18.1** per 100k population	**0.0** per 100k population
1.0% Positive Rate			**0.1%** Case Fatality Rate

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

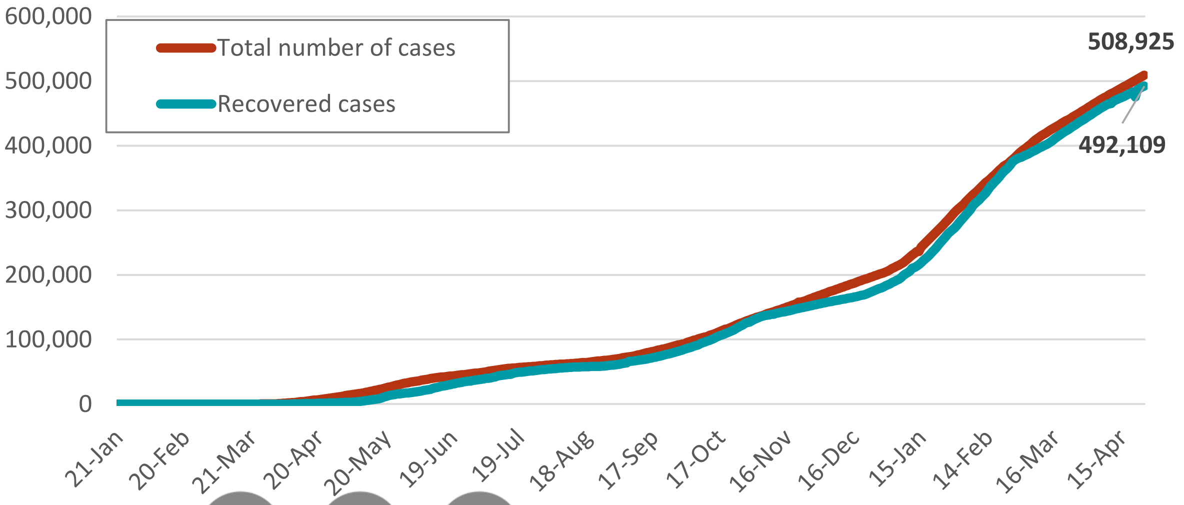
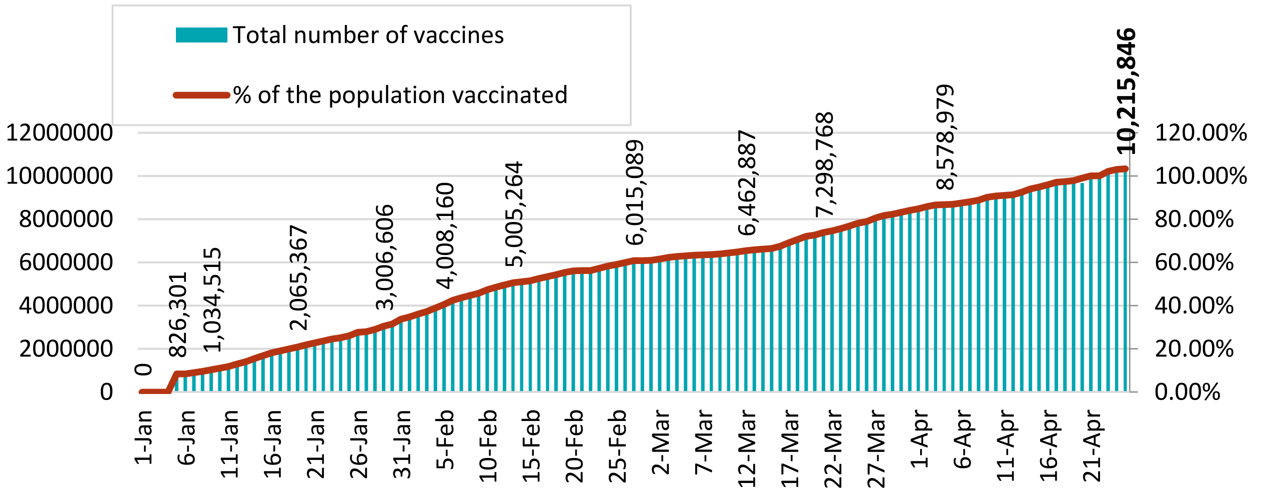


Figure 6 B: TOTAL NUMBER and Percentage of UAE population Vaccinated



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

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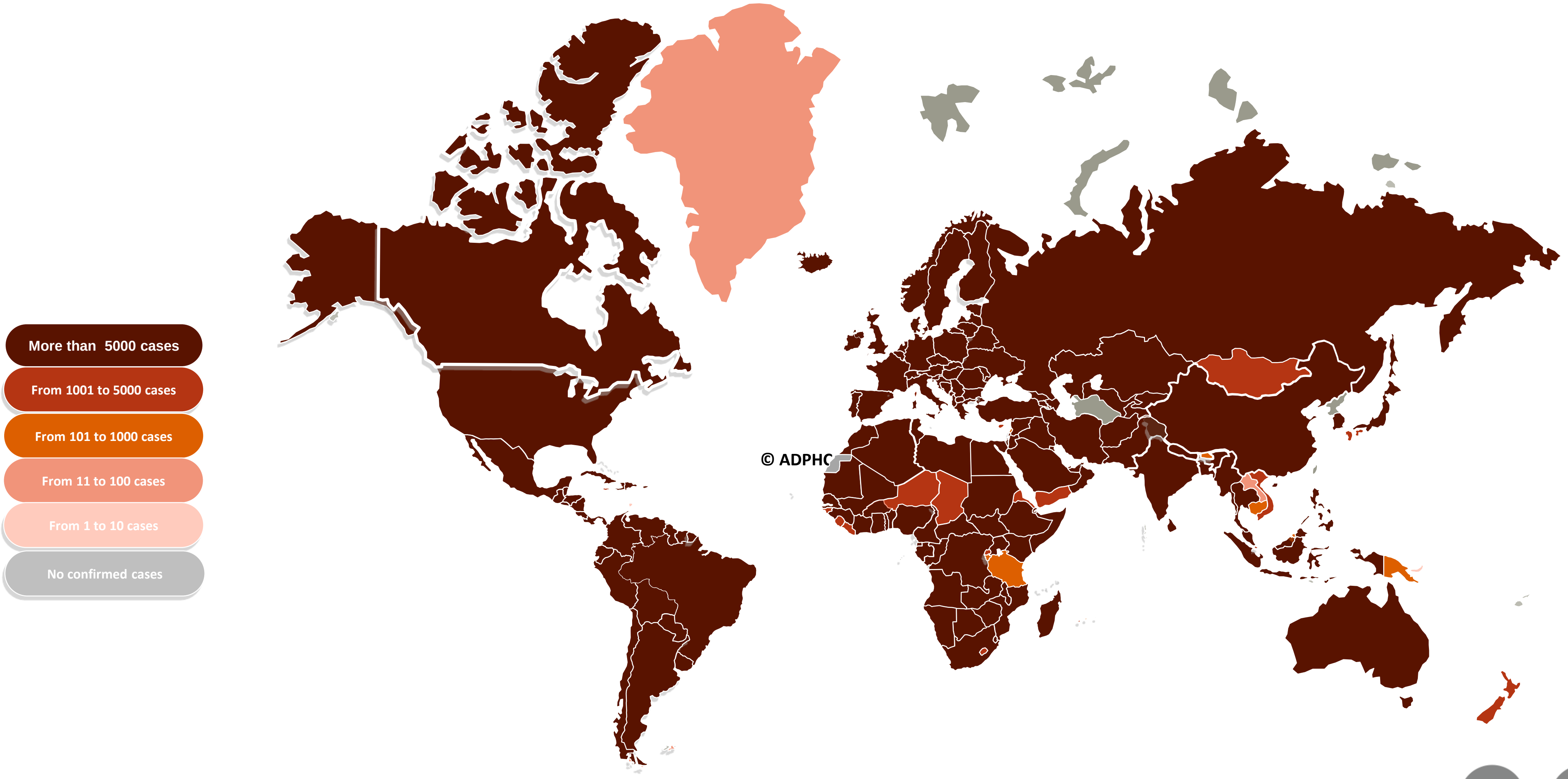
Figure 7A : Global Distribution of COVID-19 Cases



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

FROM 21 JAN 2020 TO 25 APR 2021

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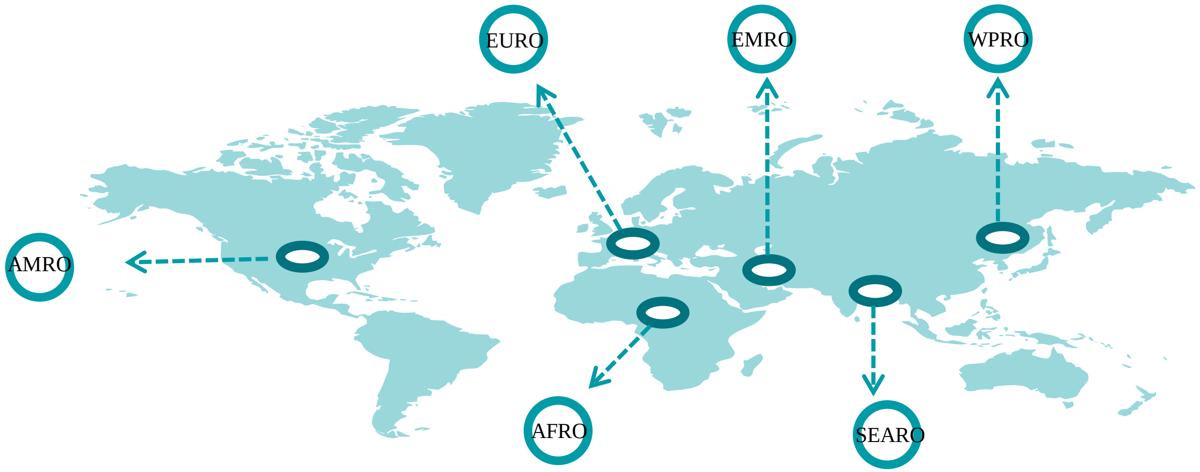
Figure 7B: Bar Chart Illustrates the Global Distribution of COVID19 Cases

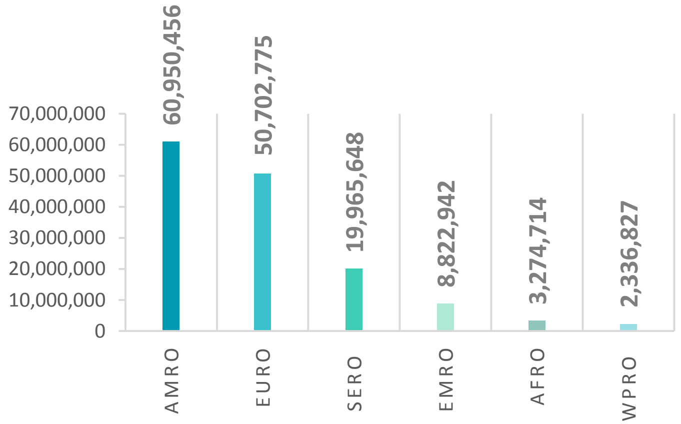
Other*:includes cases and deaths reported under the international conveyance(Diamond Princess)

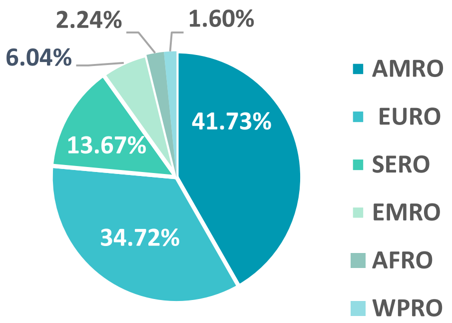
Graphs published by Abu Dhabi Public Health Center 2021 | **Data resources: WHO**

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

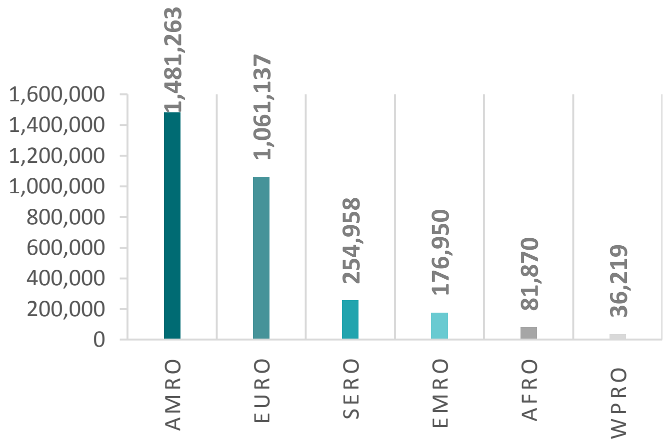


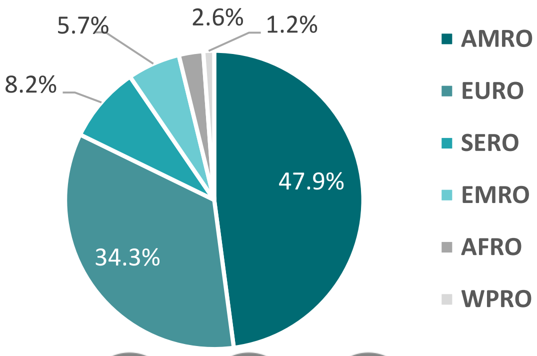
INFECTED





DEATHS

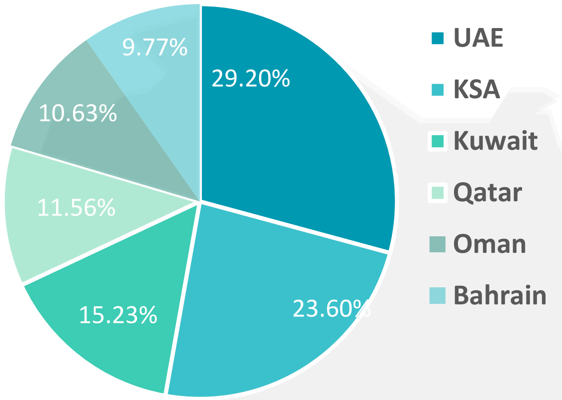


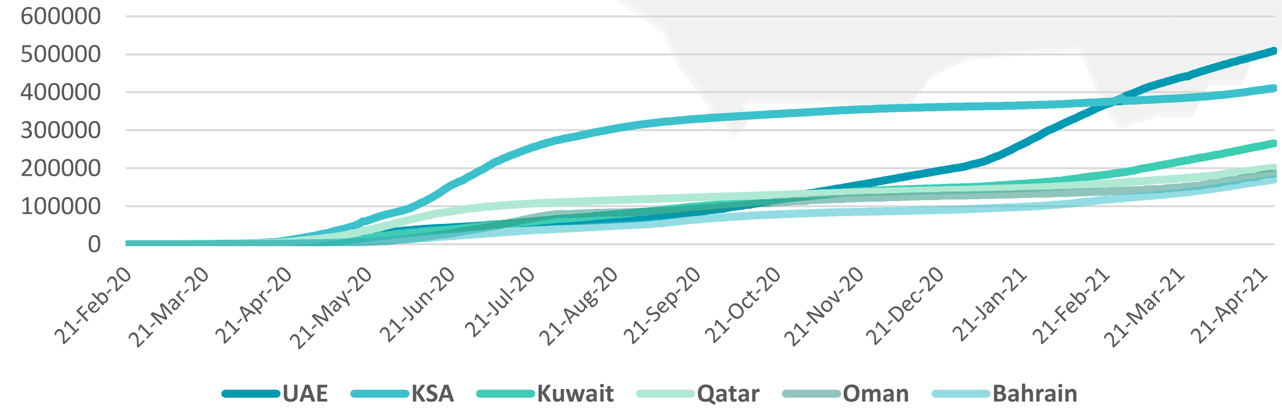


Graphs published by Abu Dhabi Public Health Center 2021 | Data resources: John Hopkins, WHO

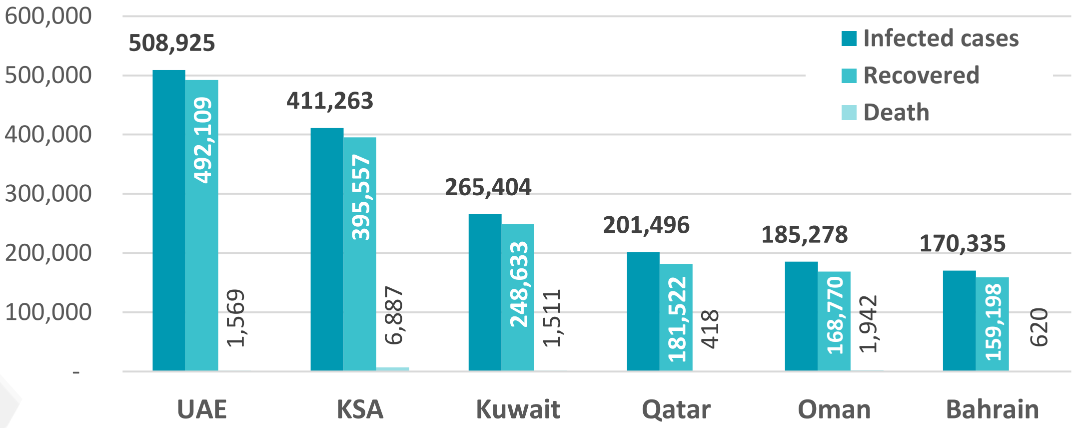
Figure 7: Comparative Analysis of the Distribution of COVID-19 Cases in GCC Countries

TOTAL NUMBER OF INFECTED CASES

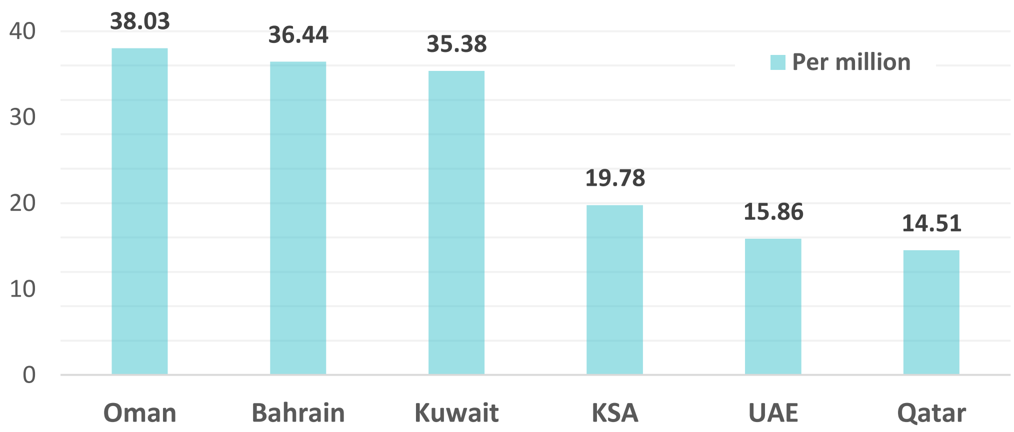




TOTAL NUMBER OF INFECTED, RECOVERED AND DEATHS



DEATHS PER MILLION



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

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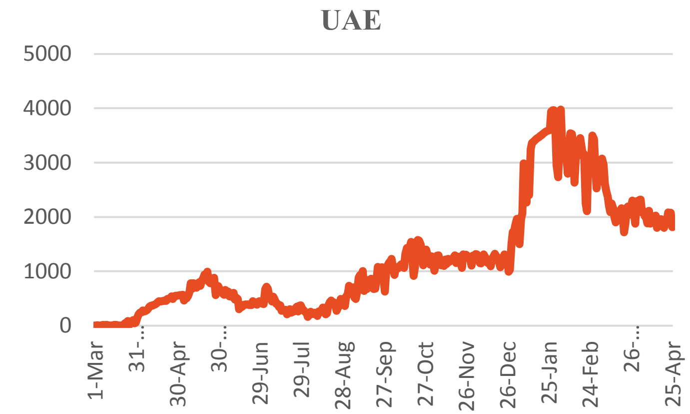
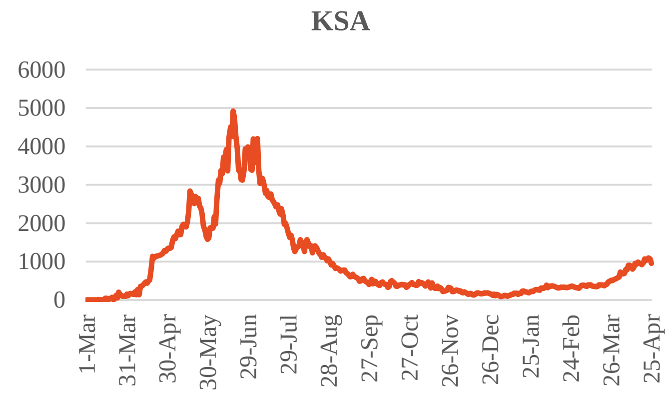
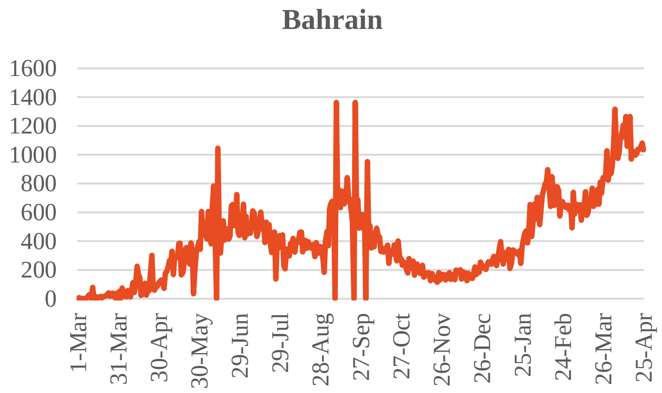
Figure 10: Comparative Analysis of the Distribution of COVID-19 New Cases in GCC Countries



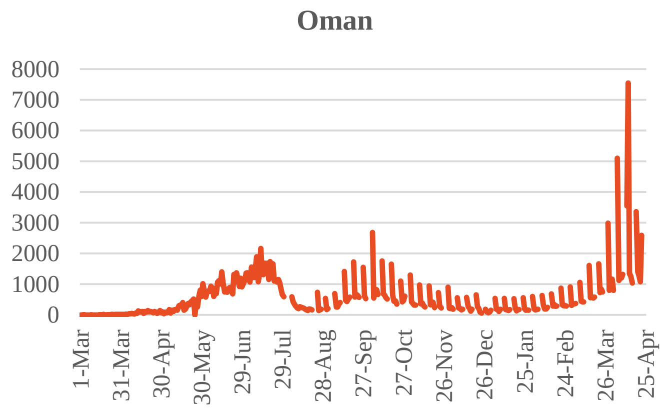
Source : National Emergency Crisis and Disaster Management Authority



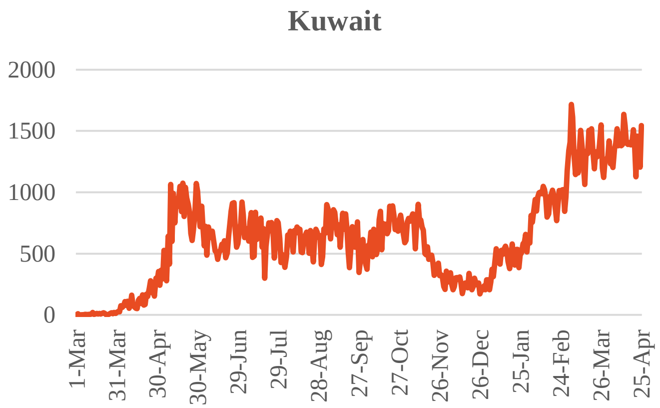
Source : KSA ministry of health



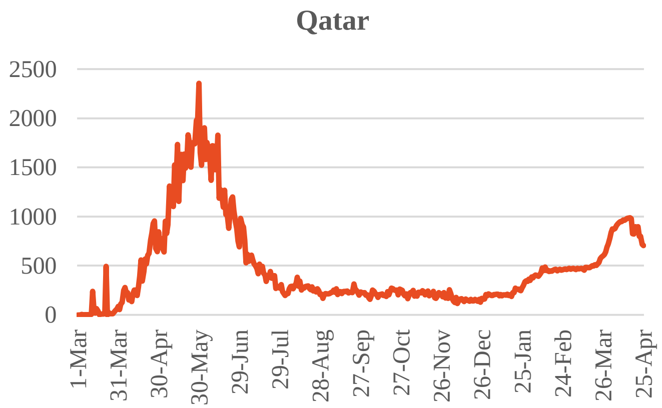
Source :WHO



Source :Oman ministry of health

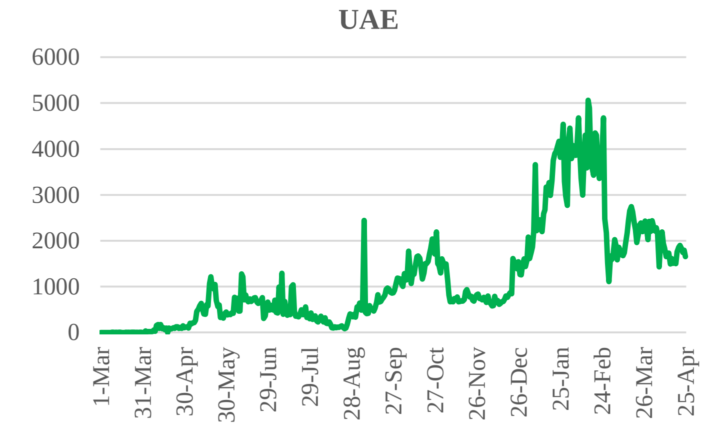


Source : Kuwait ministry of health

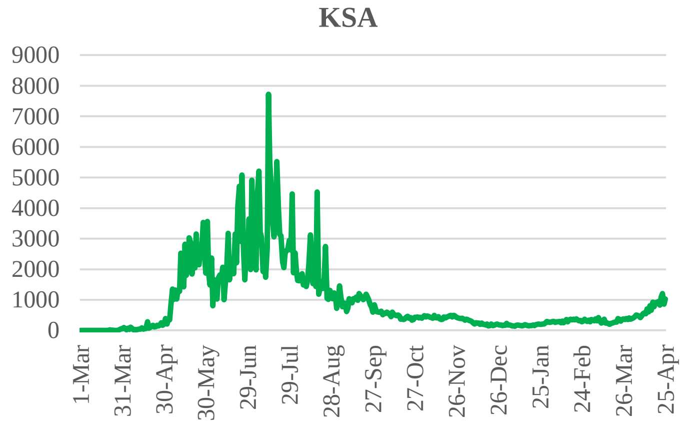


Source : Qatar ministry of health

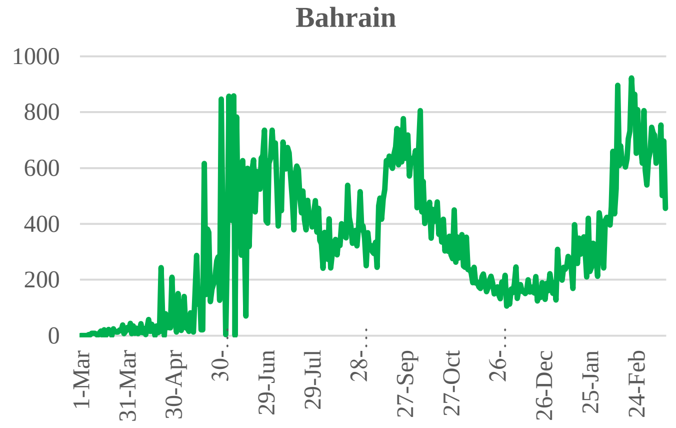
Figure 11: Comparative Analysis of the Distribution of COVID-19 Recovered Cases in GCC Countries



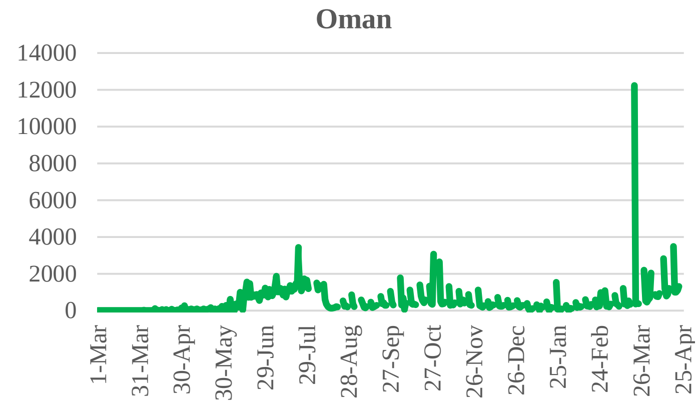
Source : National Emergency Crisis and Disaster Management Authority



Source : KSA ministry of health

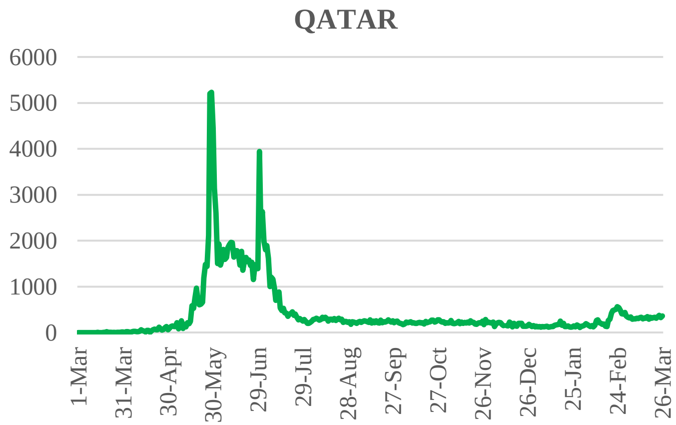


Source : Bahrain ministry of health



Source :Oman ministry of health

Source : Kuwait ministry of health



Source : Qatar ministry of health

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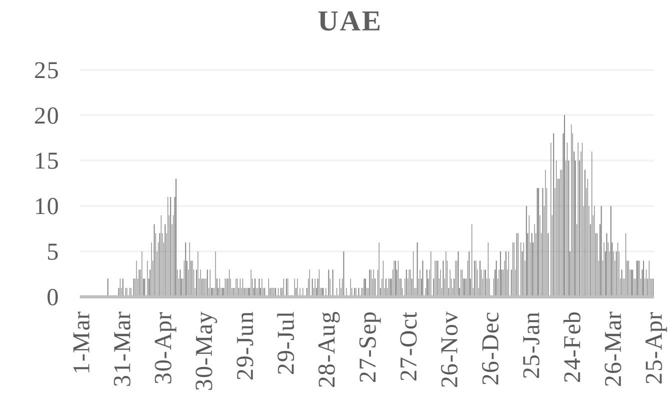
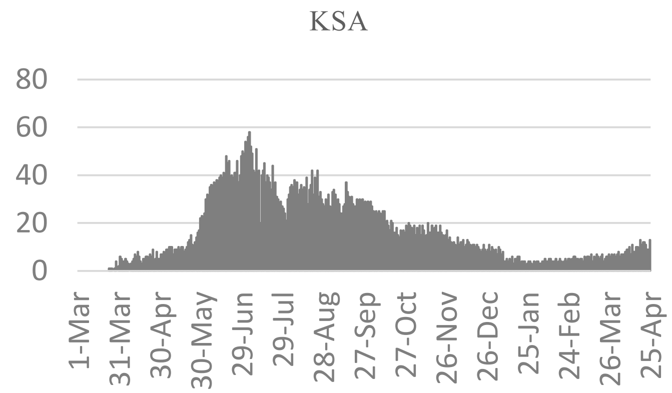
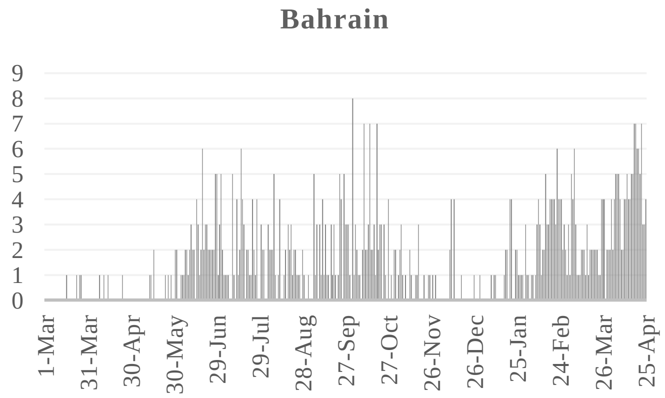
Figure 12: Comparative Analysis of the Distribution of COVID-19 New Death Cases in GCC Countries



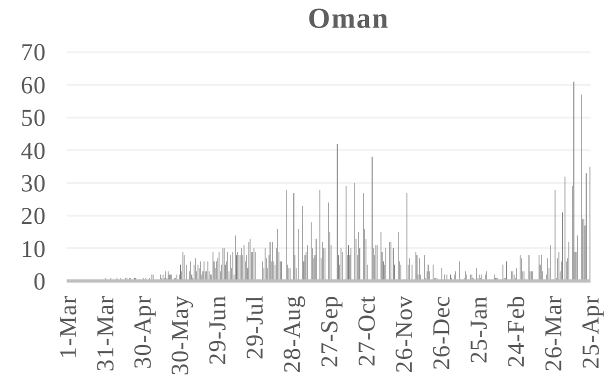
Source : National Emergency Crisis and Disaster Management Authority



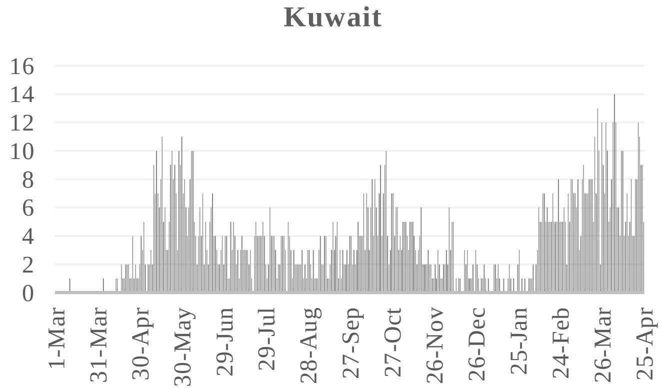
Source : KSA ministry of health



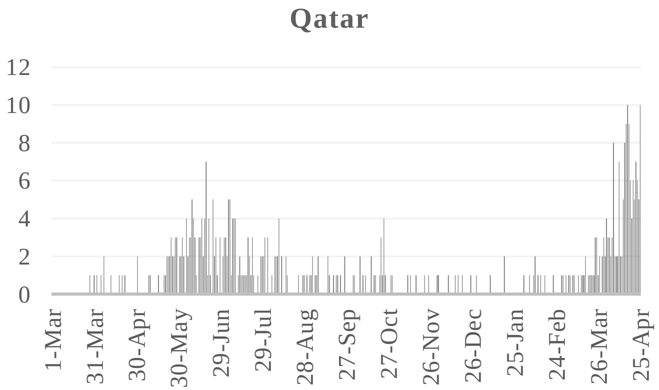
Source :WHO



Source :Oman ministry of health



Source : Kuwait ministry of health



Source : Qatar ministry of health

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Article 1

Effect of a Single High Dose of Vitamin D3 on Hospital Length of Stay in Patients With Moderate to Severe COVID-19

Published

February 17, 2021 in JAMA

This article expressed the author's concern about the efficacy of vitamin D3 supplementation in COVID-19. It aimed to investigate if a single high dose of vitamin D3 affected hospital length of stay in COVID-19 patients.

- From June 2, 2020, to August 27, 2020, 240 hospitalized patients with COVID-19 who were moderate to seriously ill were enrolled in this multicenter, double-blind, randomized, placebo-controlled study in Brazil. Patients were allocated at randomly to obtain either a single oral dose of 200 000 IU of vitamin D3 (n = 120) or a placebo (n = 120).
- Primary outcome: length of stay (the date of randomization to hospital discharge). Prespecified Secondary outcomes: mortality during hospitalization; the number of patients admitted to the intensive care unit; the number of patients who required mechanical ventilation and the duration of mechanical ventilation; and serum levels of 25-hydroxyvitamin D, total calcium, creatinine, and C-reactive protein.

RESULTS

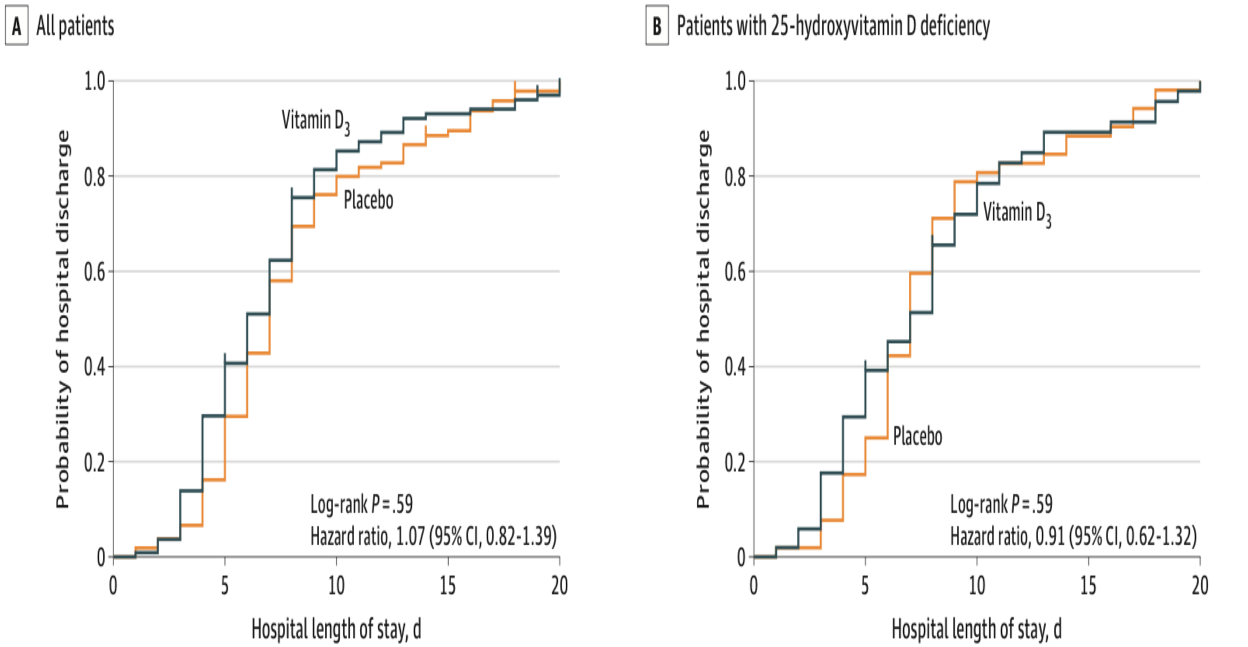
- A total of 237 people were included in the primary study (mean age was 56.2 years; 43.9 percent women;
- Mean baseline 25-hydroxyvitamin D level, 20.9 ng/mL).
- Median (interquartile range) length of stay was not significantly different between the vitamin D3 (7.0 [4.0-10.0] days) and placebo groups (7.0 [5.0-13.0] days).

TREATMENT

Continued

The difference between the vitamin D3 and placebo groups **<u>was not statistically significant for:</u>**

- In-hospital mortality (7.6% vs 5.1%. P = .43)
- Admission to the intensive care unit (16.0% vs 21.2%. P = .30)
- Need for mechanical ventilation (7.6% vs 14.4%.P = .09).
- Mean serum levels of 25-hydroxyvitamin D significantly increased after a single dose of vitamin D3 vs placebo (44.4 ng/mL vs 19.8 ng/mL.P < .001).
- Adverse events: an episode of vomiting was associated with the intervention.
- **The study concluded that a single high dose of vitamin D3 did not significantly reduce hospital length of stay Among hospitalized patients with COVID-19, compared with placebo. The findings do not support the use of a high dose of vitamin D3 to treat moderate to severe COVID-19.**



Article 2

Vitamin D3 to Treat COVID-19 Different Disease, Same Answer

Published February 17, 2021 in JAMA

This report provided clinical feedback on the Randomized Clinical Trial published in Jama under the title: "Effect of a Single High Dose of Vitamin D3 Hospital Length of Stay in Patients With Moderate to Severe COVID-19". Despite being the largest published randomized, double-blind, placebo-controlled trial of vitamin D3 administration among hospitalized patients with COVID-19 to date, the author described several limitations that should be addressed in future studies.

- First, they described that the study was underpowered. Since the number of participants was determined based on feasibility, they would have an 80% power to detect a 50% difference in hospital length of stay. This is an improbable result.
- Second, the results cannot be generalized to critically ill patients because of the study excluded:
  - Patients who required invasive mechanical ventilation
  - Patients admitted to the intensive care unit
  - Patients who required noninvasive ventilation

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Continued

This practice would leave out moderately ill patients. This is important as the benefit of other anti-inflammatory therapies (e.g., dexamethasone, tocilizumab) was highly dependent on the severity of illness among patients with COVID-19.

- Third, only 48.3% of the study participants had vitamin D deficiency, and only about one-fourth of the patients had severe vitamin D deficiency.
- Fourth, the authors did not measure the circulating levels of 1,25-dihydroxyvitamin D, the active form of vitamin D. Accordingly; it is unclear whether patients were able to efficiently convert 25(OH)D to 1,25-dihydroxyvitamin D, because this conversion is inhibited by the osteocyte-derived hormone fibroblast growth factor 23, which is elevated in acutely ill patients.

Moreover, the study:

- Did not rule out the possibility of clinically gain (or harm) from high-dose vitamin D3 administration in hospitalized patients with moderate to severe COVID-19.
- Did not address the use of vitamin D for patients with mild (outpatient) COVID-19 who were early in their symptom course or for use as prophylaxis against COVID-19.

As a result of not achieving the target enrollment, the authors concluded that the results reported by AUTHER. did not support routine administration of vitamin D in hospitalized patients with moderate to severe COVID-19.

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Article 3

Published March , 2021 in The JAMA

Association of Vitamin D Levels, Race/Ethnicity, and Clinical Characteristics With COVID-19 Test Results"

- In this study, the author questioned if deficient/insufficient 25-hydroxyvitamin D (calcifediol) levels were associated with coronavirus disease 2019 (COVID-19). The study attempted to examine whether COVID-19 test results were associated with variations in vitamin D levels of 30 ng/mL or higher in both White and Black people.
- From March 3 to December 30, 2020, a single-center retrospective cohort study was performed using participants' data on vitamin D levels within 365 days of COVID-19 testing. The main outcome was a positive PCR result for COVID-19.

Characteristic	(n = 4638)	IRR (95% CI)	P value	IRR (95% CI)	P value	(n = 2120)	IRR (95% CI)	P value	IRR (95% CI)	P value
Race										
White	1999 (43)	1 [Reference]	NA	1 [Reference]	NA	1108 (52)	1 [Reference]	NA	1 [Reference]	NA
Black	2288 (49)	1.49 (1.15-1.92)	.003	1.48 (1.14-1.91)	.003	873 (41)	1.28 (0.88-1.86)	.20	1.28 (0.87-1.87)	.20
Other	351 (8)	0.84 (0.52-1.33)	.45	0.83 (0.52-1.32)	.42	139 (7)	1.01 (0.46-2.18)	.99	0.96 (0.44-2.06)	.91
Ethnicity										
Non-Hispanic	4331 (93)	1 [Reference]	NA	1 [Reference]	NA	2003 (94)	1 [Reference]	NA	1 [Reference]	NA
Hispanic	307 (7)	1.41 (0.91-2.19)	.12	1.42 (0.92-2.19)	.12	117 (6)	1.36 (0.66-2.79)	.41	1.39 (0.67-2.88)	.37

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RESULTS:

A total of 4638 individuals (mean age 52.8 years; 3205 women), including:

- 49% Black individuals,
- 43% White individuals,
- 8% other race/ethnicity (eg, Asian, Mideast Indian).

Active treatment 14 d before first COVID-19 test order date	Individuals with positive COVID-19 test result/total tested, No. (%)				
		Most recent vitamin D level from 14 to 365 d before first COVID-19 test order, ng/mL			
	Total	<20	20-29	30-39	≥40
Total	299/4258 (7.0)	100/1076 (9.3)	70/1175 (6.0)	72/961 (7.5)	57/1046 (5.4)
None	239/3338 (7.2)	81/900 (9.0)	53/917 (5.8)	59/733 (8.0)	46/788 (5.8)
1-1000 IU/d D_3 or multivitamin	45/616 (7.3)	13/116 (11.2)	13/171 (7.6)	12/167 (7.2)	7/162 (4.3)
1001-2000 IU/d D_3	9/173 (5.2)	2/36 (5.6)	4/57 (7.0)	0/39	3/41 (7.3)
≥2001 IU/d D_3	6/131 (4.6)	4/24 (16.7)	0/30	1/22 (4.5)	1/55 (1.8)

- Controlling for demographic characteristics/comorbidity indicators and months and treatment changes since the vitamin D level was measured, the multivariable analyses revealed that COVID-19 risk increased among Black individuals with vitamin D levels less than 40 ng/mL compared to those with levels of 40 ng/mL or higher and decreased with increasing levels among those with levels greater than 40 ng/mL.
- The study recommended that RCTs were needed to examine whether increasing vitamin D level to greater than 40 ng/mL affects COVID-19 risk.

Article 4

Published

March 30, 2021 in THE LANCET

Vitamin D supplementation to prevent acute respiratory infections: a systematic review and meta-analysis of aggregate data from randomised controlled trials

- This systematic review aimed to examine the link between vitamin D supplementation and the prevention of acute respiratory infections (ARIs) in an updated meta-analysis.
- Data were collected from , double-blind RCTs of vitamin D supplements for any duration, with a placebo

Subgroup analyses were done to estimate whether the effects of vitamin D supplementation on the risk of ARI varied according to:

  - Baseline 25(OH)D concentration (75·0 nmol/L)
  - Vitamin D dose (the daily equivalent of 2000 IU)
  - Dosing frequency (daily vs. weekly vs. once per month to once every three months)
  - Trial duration (≤12 months vs.>12 months)
  - Age at enrolment

- The study identified 1,528 articles, of which 46 eligible RCTs (75,541 participants).
- Primary outcome data were obtained for 98·1% of 49,419 participants (aged 0–95 years) in 43 studies.

Results

- No significant effect of vitamin D supplementation on the risk of having one or more ARIs was observed for any of the subgroups defined by baseline 25(OH)D concentration.
- However, protective effects of supplementation were observed in trials in which vitamin D was given in a daily dosing regimen (OR 0·78 [95% CI 0·65–0·94]; 19 studies, at daily dose equivalents of 400–1000 IU (0·70 [0·55–0·89]; ten studies, for a duration of 12 months or less (0·82 [0·72–0·93]; 29 studies and to participants aged 1·00–15·99 years at enrolment (0·71 [0·57–0·90]; 15 studies; I2=46·0%.

Article 5

Prioritising COVID-19 vaccination in changing social and epidemiological landscapes: a mathematical modelling study

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- The understanding of the epidemiological aspect of COVID-19 such as which strategies of vaccines rollout should be prioritized is important.
- At the same time, social/behavior dynamics (adherence to non-pharmaceutical interventions – NPIs – and changes to mobility patterns) are of great interest and play a crucial role to contain the pandemic.
- This article compared four strategies for the prioritization of COVID-19 vaccines for SARS-CoV-2 transmission while modelling social dynamics such as NPIs adherence, and schools/workplaces closure and re-opening on the basis of reported cases.
- The vaccine strategies included: oldest-first strategy (vaccinating those aged 60 years and older first), youngest-first strategy (vaccinating those younger than 20 years first), uniform strategy (vaccinating uniformly by age), and a novel contact-based strategy.
- An increased perception of COVID-19 infection risk encourages better adoption of NPIs which in turn reduces transmission, exemplifying a coupled social–epidemiological dynamic.
- The results show that effects of the four vaccination strategies depends on when the vaccine becomes available and how quickly the population can be vaccinated.
- If COVID-19 vaccines are available early in the pandemic, then oldest first strategy may provide the maximum protection against mortality.
- For later vaccination start dates when seropositivity is high due to previous pandemic waves (autumn/winter), use of vaccines to interrupt transmission, i.e., uniform, youngest-first or contact based strategies might prevent more deaths than prioritizing vulnerable age groups.

مركز أبوظبي
للصحة العامة
ABU DHABI PUBLIC
HEALTH CENTRE

Article 6

Vaccination and non-pharmaceutical interventions for COVID-19: a mathematical modelling study

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- This article investigated the combined role of COVID-19 vaccination program and relaxation of non-pharmaceutical interventions (NPIs) to contain the pandemic.
- Using a mathematical model, the underlying assumptions of the study were:
  - Default vaccine uptake of 95% in those aged 80 years and older, 85% in those aged 50–79 years, and 75% in those aged 18–49 years, and then varied uptake optimistically and pessimistically.
  - Vaccine efficacy against symptomatic disease was assumed to be 88% on the basis of Pfizer-BioNTech and Oxford-AstraZeneca vaccines, and protection against infection was varied from 0% to 85%.
- The outcome was prediction of reproduction number (R) and pattern of daily deaths and hospital admissions due to COVID-19 from January, 2021, to January, 2024.
- The results showed that vaccines alone are not sufficient to contain the outbreak.
- Vaccination substantially reduces total deaths, however, it only provides partial protection for the individual; for the default uptake scenario and 60% protection against infection, 48% and 16% of deaths will be in individuals who have received one or two doses of the vaccine, respectively.
- Under the default uptake scenario, removal of all NPIs once the vaccination program is complete is predicted to lead to 21,400 deaths due to COVID-19 for a vaccine that prevents 85% of infections, although this number increases to 96,700 deaths if the vaccine only prevents 60% of infections.
- Early or rapid relaxation of NPIs poses a risk and some relaxation of control measures must be done gradually to mitigate large-scale public health consequences.

مركز أبوظبي للصحة العامة
ABU DHABI PUBLIC HEALTH CENTRE

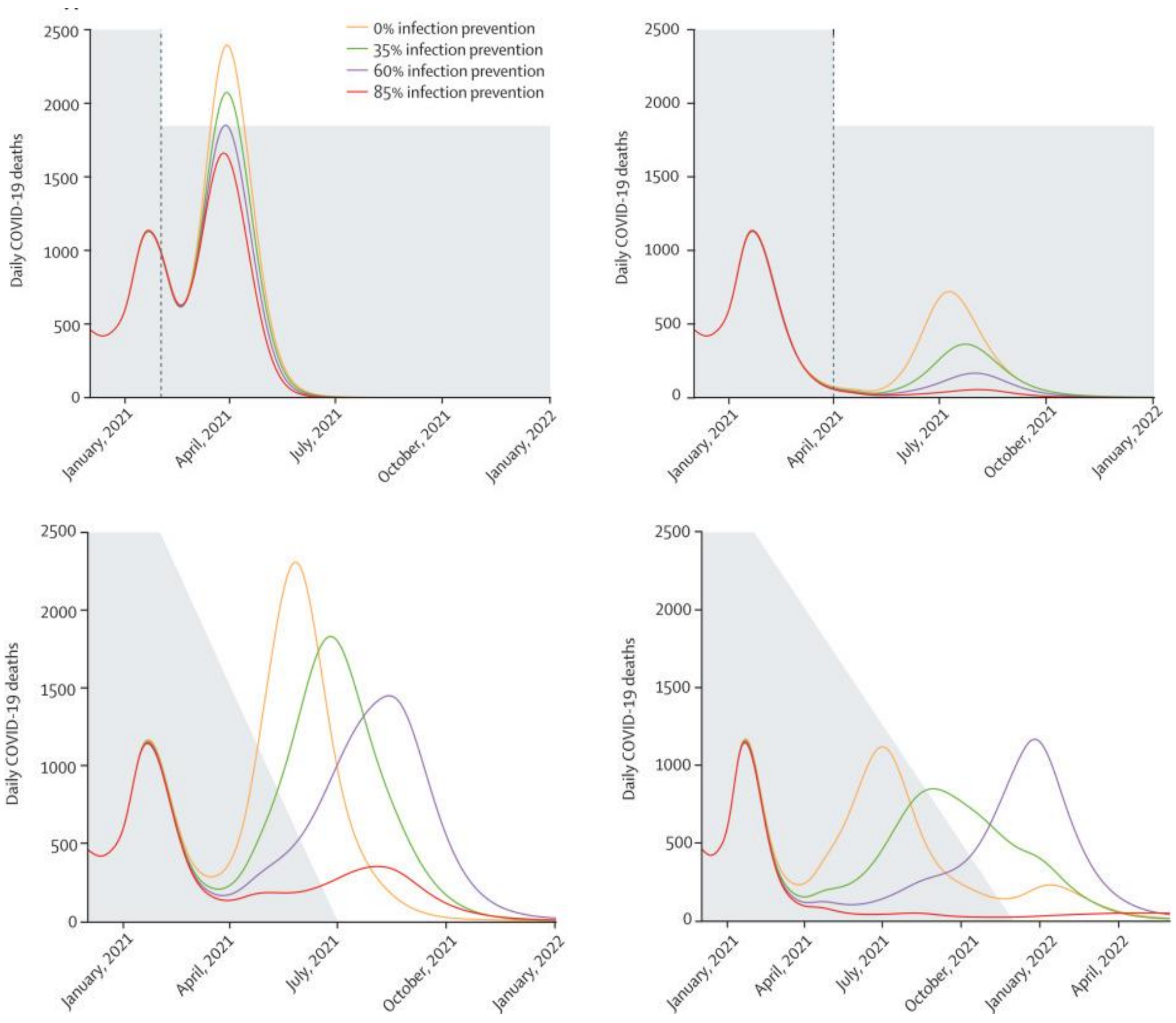
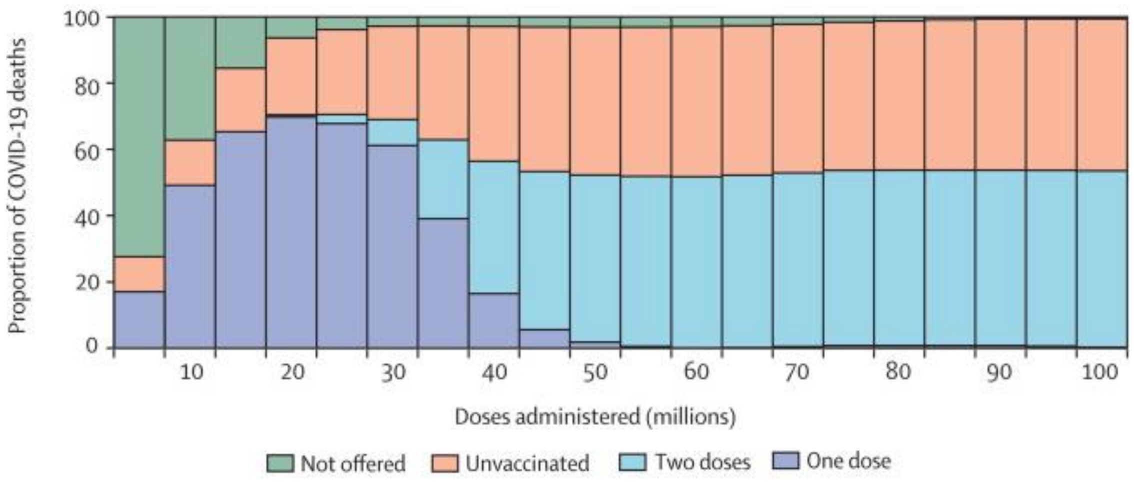


Figure. Shading indicates the level of NPIs implemented. The dashed line indicates the point of partial NPI relaxation—February, 2021 (top right panel) and April, 2021 in all other panels.

Figure. Proportion of COVID-19 deaths in terms of vaccine status as a function of the number of doses delivered so far



Dr. Javid

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ABU DHABI PUBLIC HEALTH CENTRE

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EDITORS

Dr Shereena Al Mazroui . MBBS, MPH. (**ADPHC**).
Dr Shammah Al Memari – MBBS, ABHS (FM) . **(ADPHC).**

TEAM

Shammah Al Memari. MBBS, ABHS (FM) – (**ADPHC**)
Hanan Al Mutairi, BSPH - **(ADPHC).**
Shahad Al Shamlan, BSPH - **(ADPHC).**
Ahlam Al Maskari , BSPH- **(ADPHC).**

CONTRIBUTORS

Dr. Javid Nauman, PHD in Public Health **(UAEU).**
Dr. Wasim El Nekidy, PHD in clinical pharmacology **(CCAD).**

ADPHC_AE ADPHCAE ADPHC.AE ADPHC-AE +971 56 231 2171 WWW.ADPHC.GOV.AE