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للصحة العامة
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HEALTH CENTRE

SCIENTIFIC RESEARCH MONITORING ON COVID-19

14 DECEMBER 2020

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SCIENTIFIC RESEARCH MONITORING ON COVID-19 (ISSUE 315)

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
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Note : All articles presented in this report represent the authors' views and not necessarily represents Abu Dhabi Public Health Center views or directions. Due the nature of daily posting , some minor language errors are expected.
For further inquiries you may communicate with us as PHP@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

A The results of phase 3 trial of the BioNTech / Pfizer vaccine a review information from press release from the company and FDA

Vaccine

"When Will We Have a Vaccine?" — Understanding Questions and Answers about Covid-19 Vaccination

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UAE Research

Detection and quantification of SARS-CoV-2 RNA in wastewater and treated effluents: Surveillance of COVID-19 epidemic in the United Arab Emirates

Vaccine

Safety and efficacy of the ChAdOx1 nCoV-19 vaccine (AZD1222) against SARS-CoV-2: an interim analysis of four randomised controlled trials in Brazil, South Africa, and the UK

EPIDEMIOLOGY

FROM 21 JAN TO 13 DEC 2020

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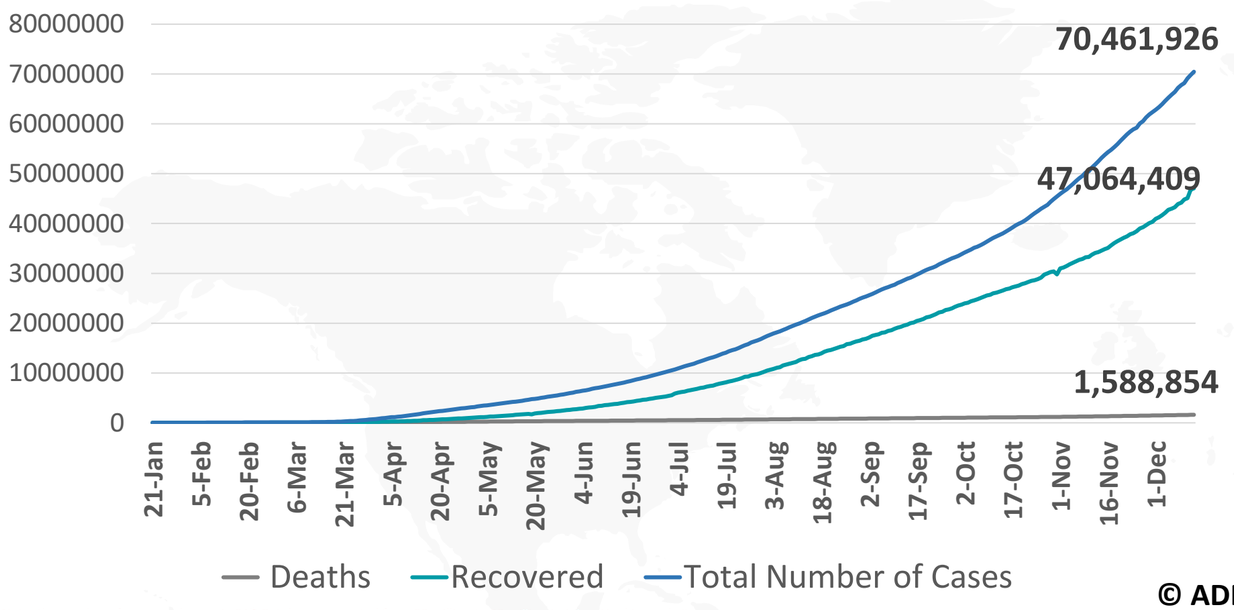
Figure 1: Total Number of Infected, Recovered, and Death Cases



Note: the number of recovered cases in 31th October recorrected from 30 million to 29 million in Johns Hopkins website

Figure 2: Daily New Infected COVID-19 Cases (China and rest of the world)

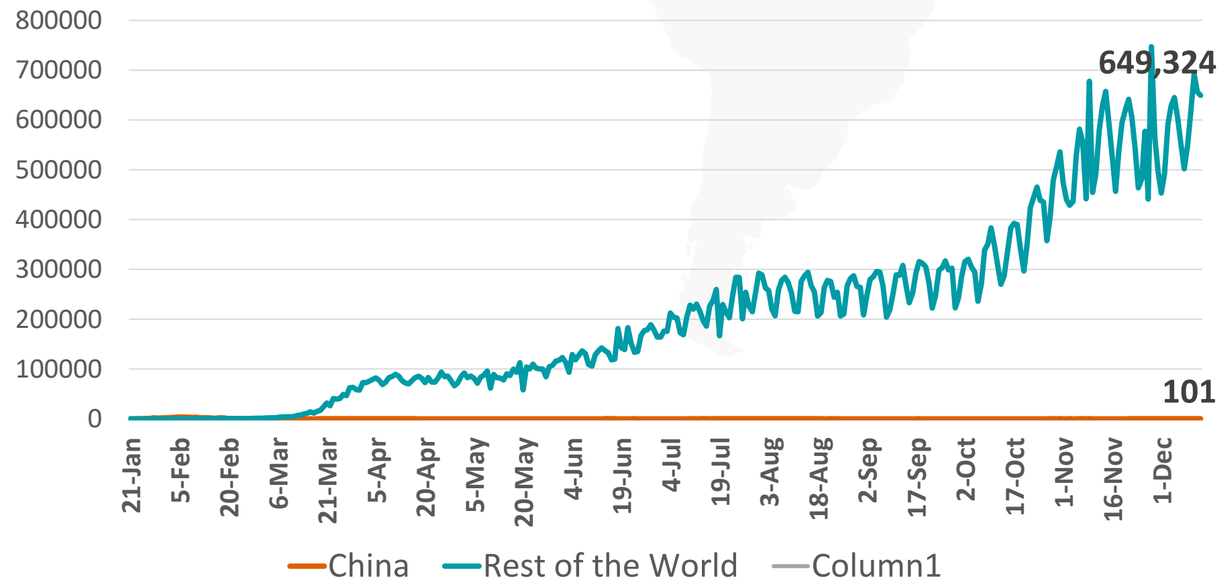


Figure 3: Total Number of Death Due to COVID-19 (china and result of the world)

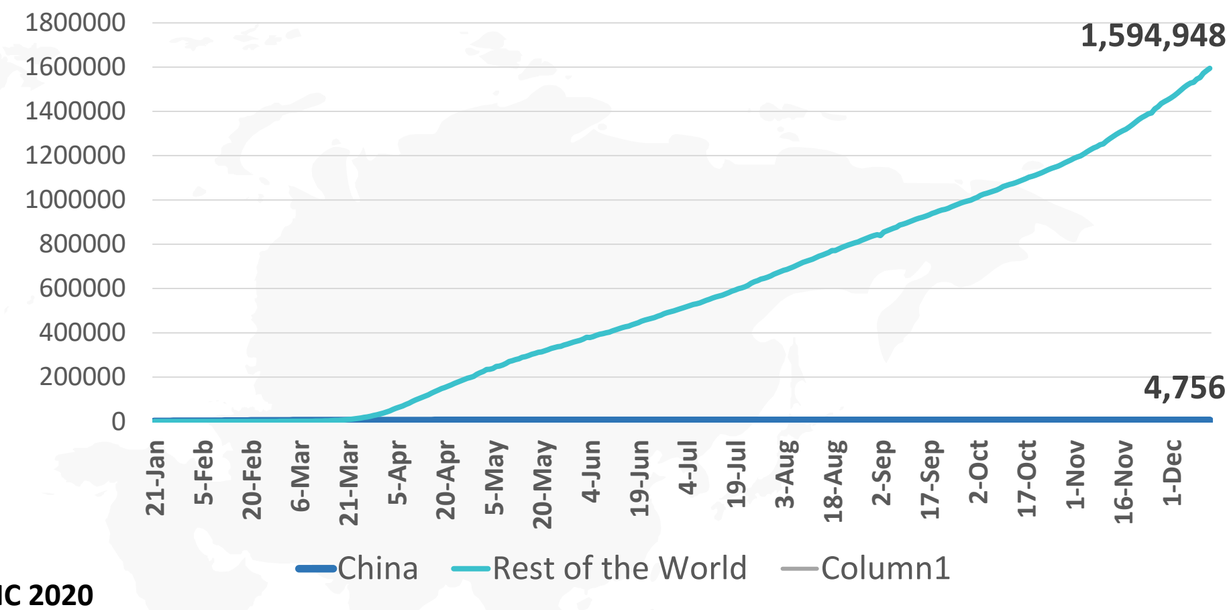
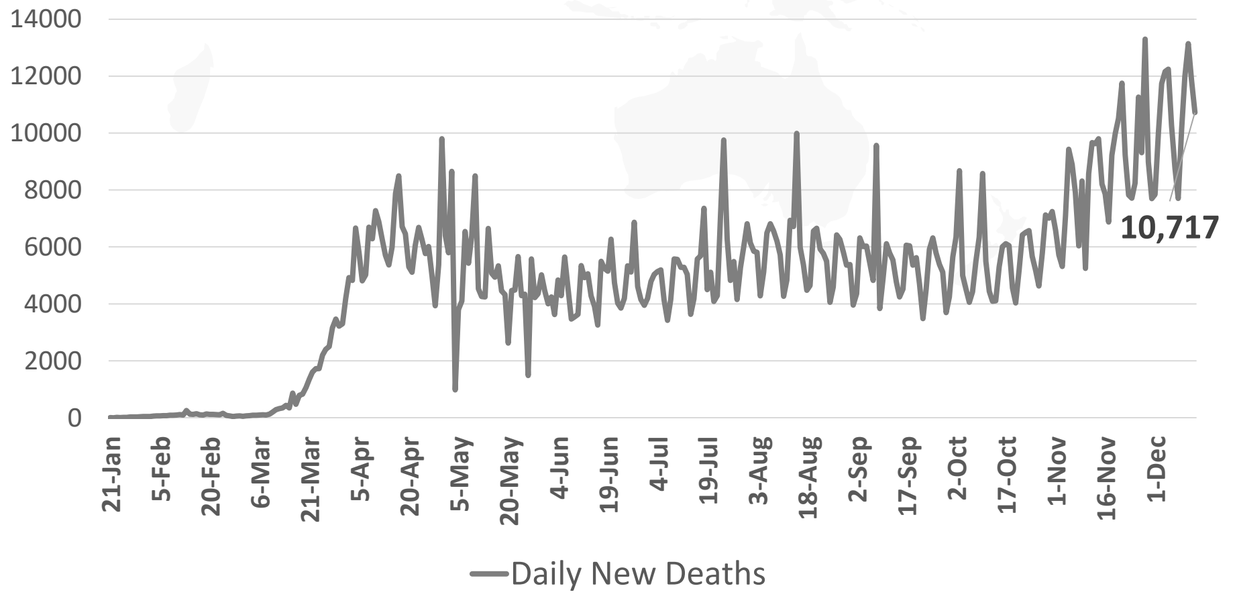


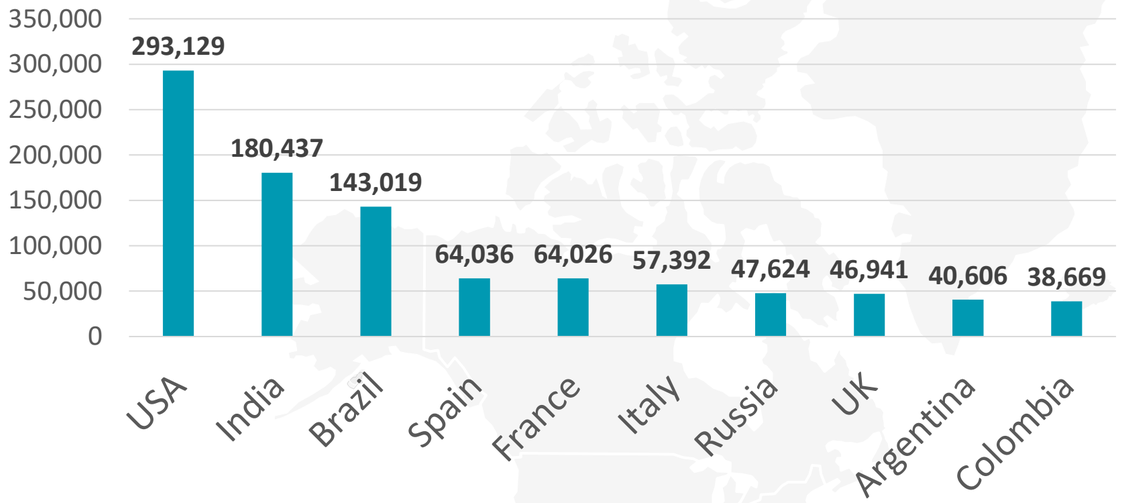
Figure 4: Global Daily New Deaths Due to COVID-19 (china and rest of the world)



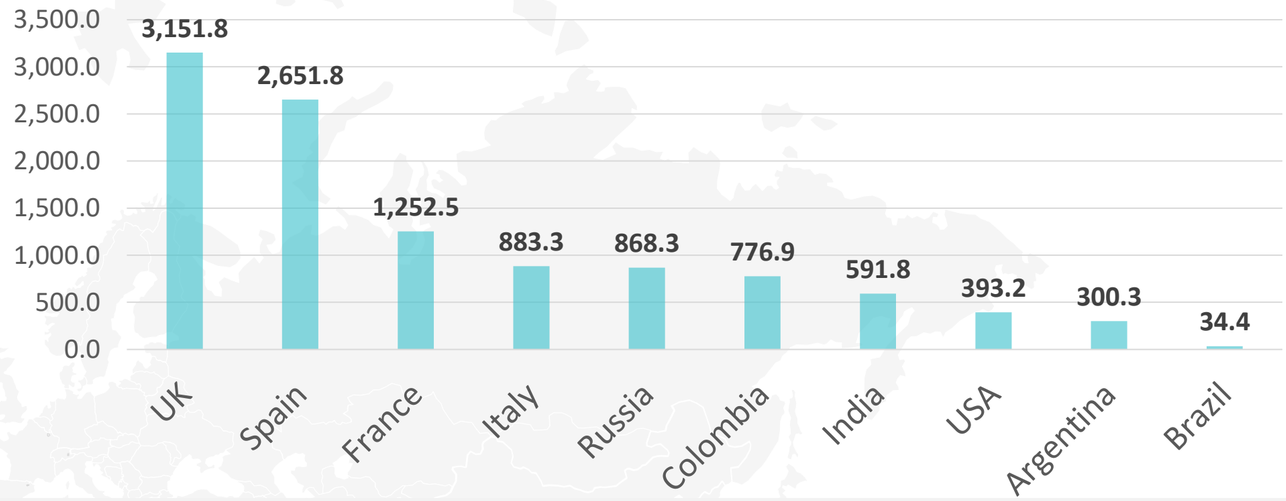
Graphs published by Abu Dhabi Public Health Center 2020 | Data resources: John Hopkins, WHO

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

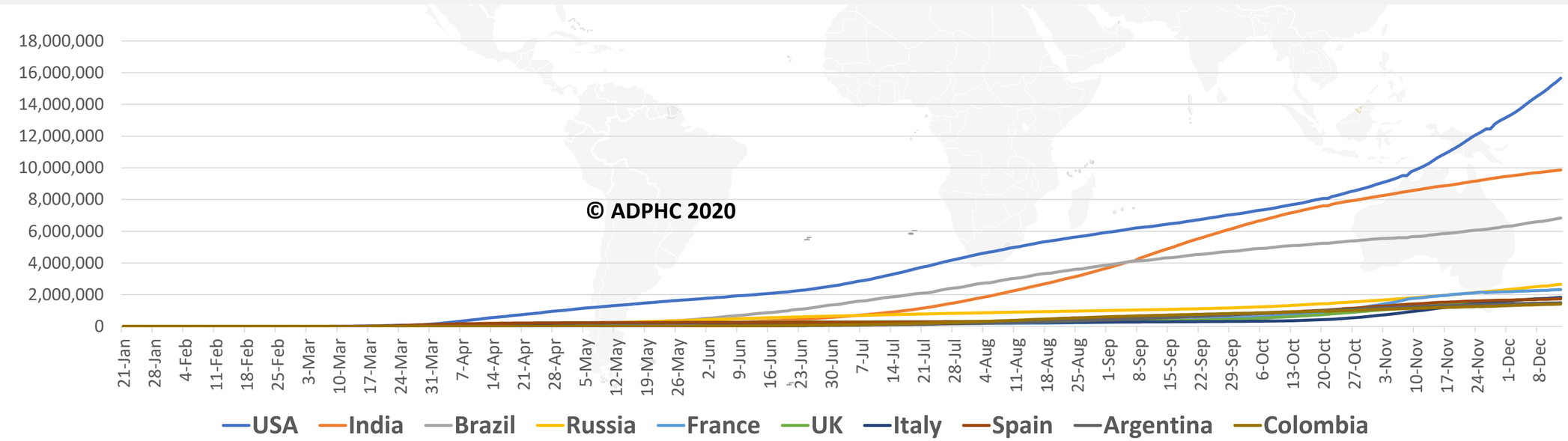
TOTAL DEATHS



DEATHS PER MILLION



TOTAL INFECTED CASES



USA	15,648,098
India	9857029
Brazil	6,836,227
Russia	2,653,928
France	2,324,603
UK	1,830,960
Italy	1,825,775
Spain	1,730,575
Argentina	1,489,328
Colombia	1,408,909

Graphs published by Abu Dhabi Public Health Center 2020 | Data resources: WHO

EPIDEMIOLOGY

FROM 21 JAN TO 13 DEC 2020

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Figure 6: COVID-19 Status in the UAE (Federal Competitiveness and Statistics Authority Dashboard)

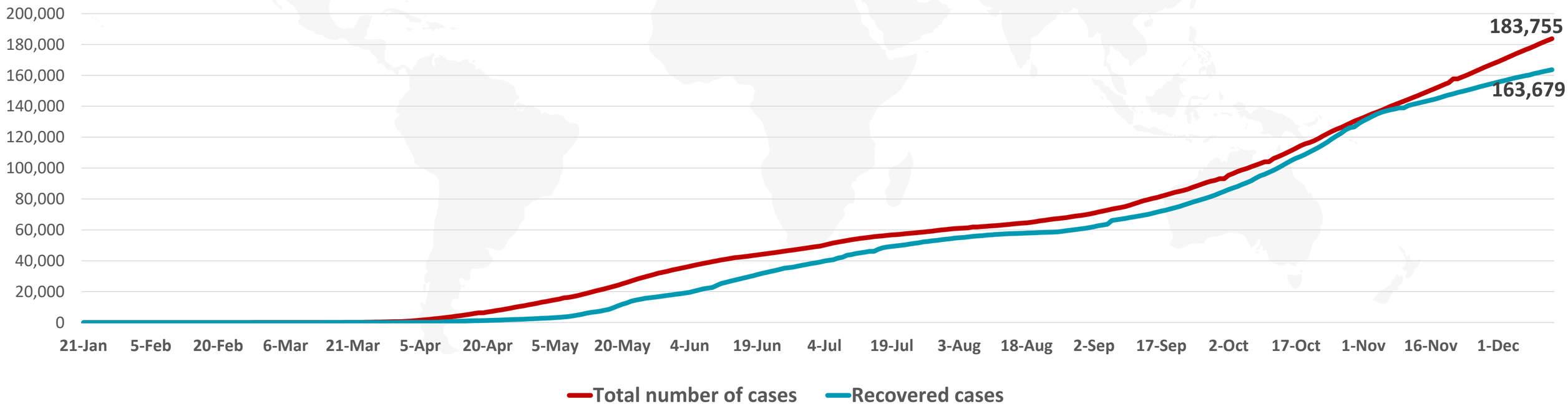
Daily Tests
143,360.6 Average Tests
1,449.5 per 100k population
0.8% Positive Rate

Daily Cases
1,217.1 Average Cases
12.3 per 100k population

Daily Recovered
649.6 Average Recovered
6.6 per 100k population

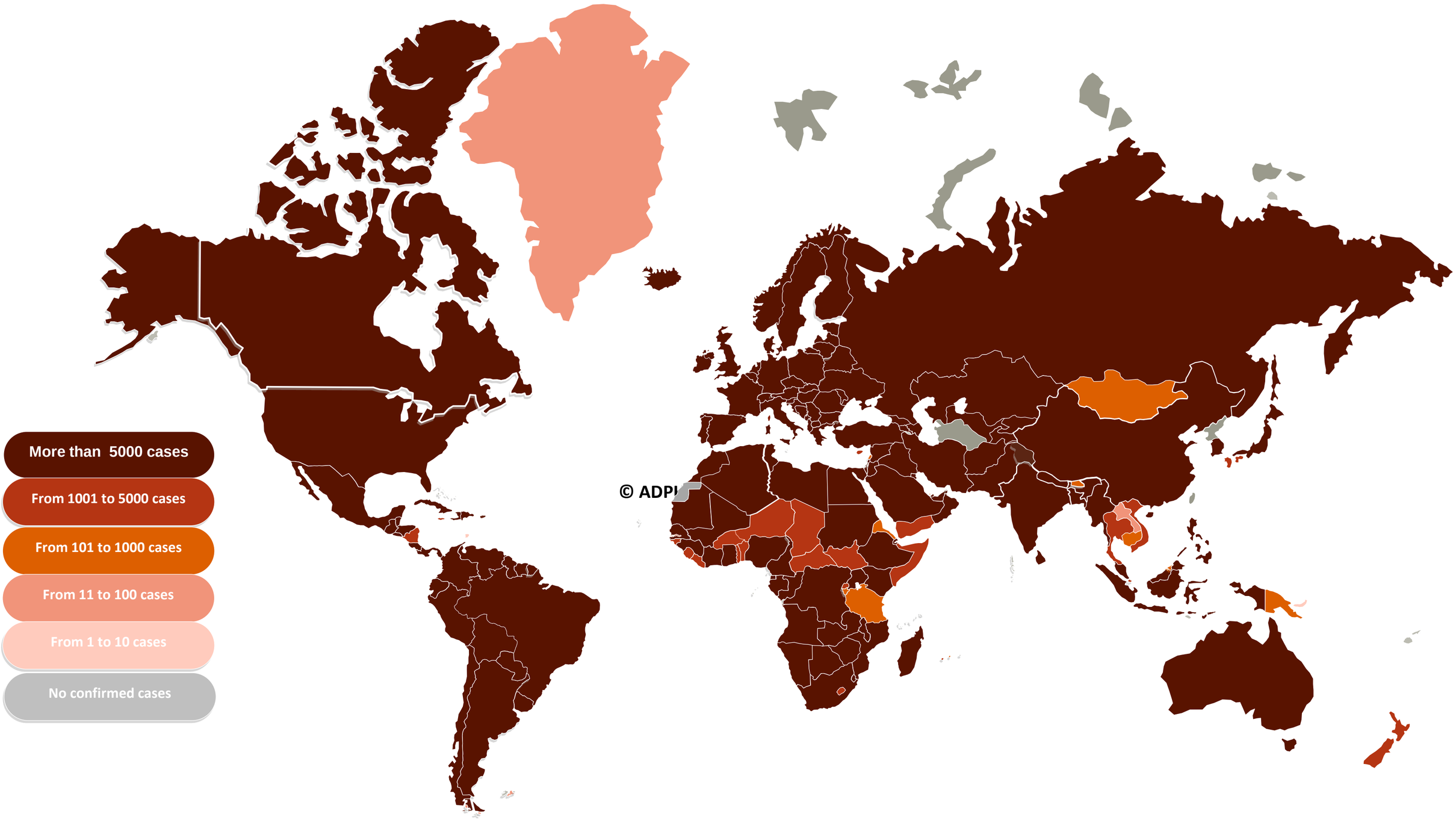
Daily Deaths
3.6 Average Deaths
0.0 per 100k population
0.3% Case Fatality Rate

TOTAL NUMBER OF INFECTED AND RECOVERED CASES DUE TO COVID-19 REPORTED BY THE UAE



Graphs published by Abu Dhabi Public Health Center 2020 | Data resources: FCSA, WHO, John Hopkins

Figure 7A : Global Distribution of COVID-19 Cases



Graphs published by Abu Dhabi Public Health Center 2020 | Data resources: WHO

EPIDEMIOLOGY

Date: 13 DEC 2020

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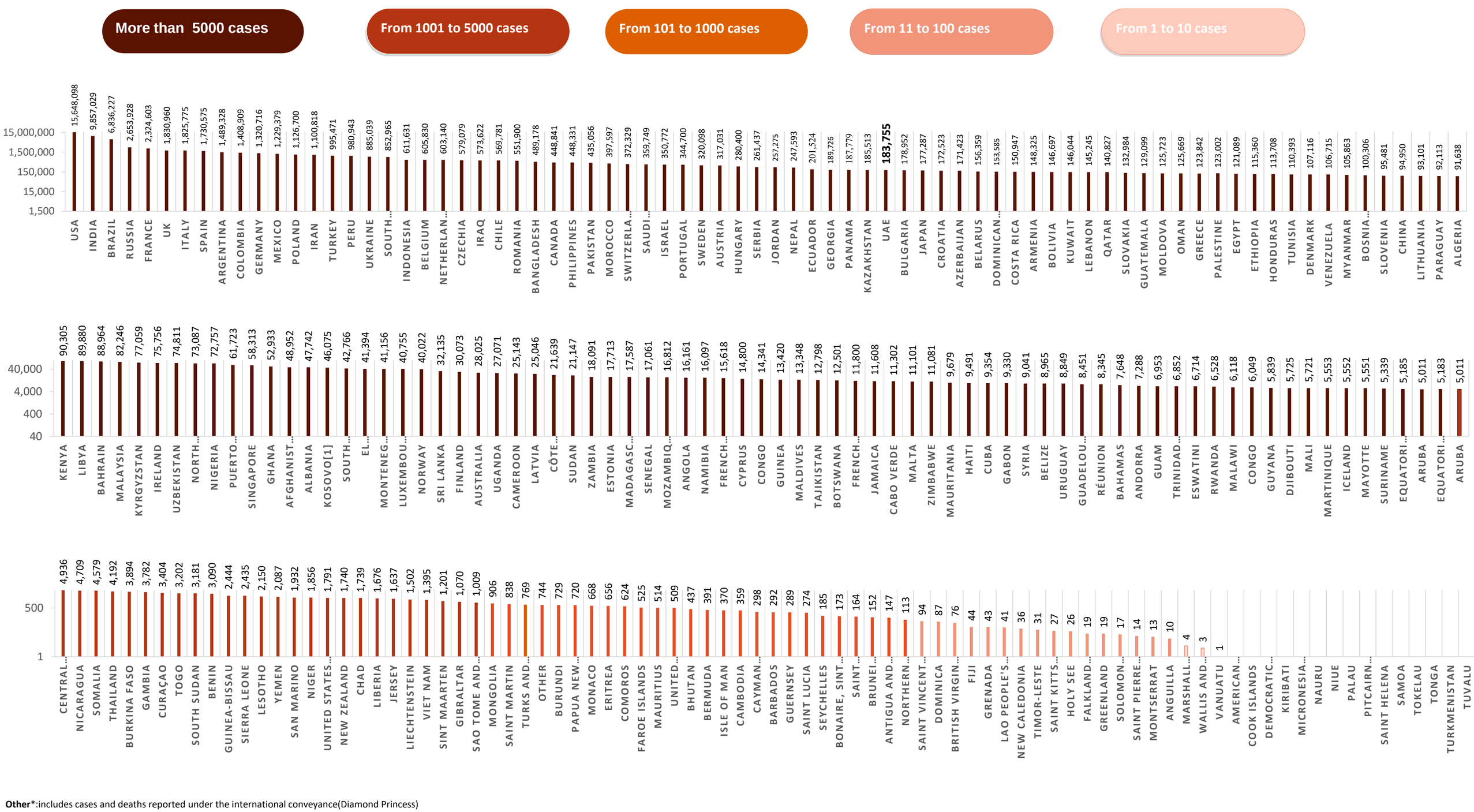
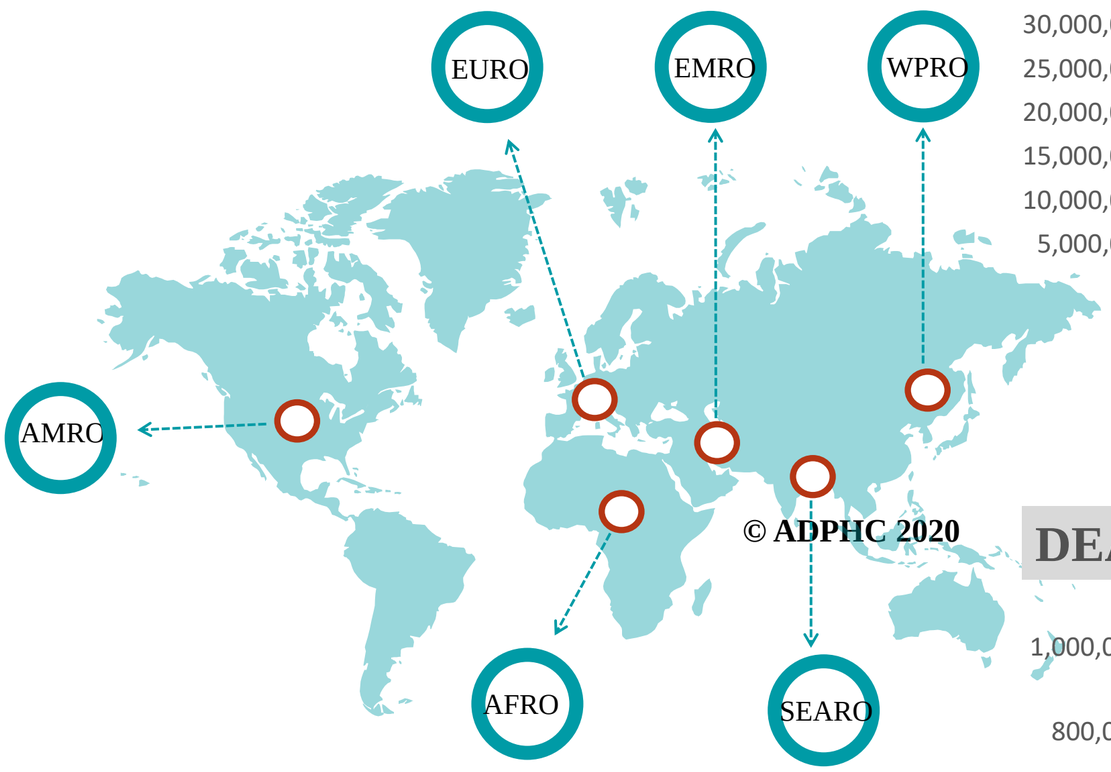
Figure 7B: Bar Chart Illustrates the Global Distribution of COVID19 Cases



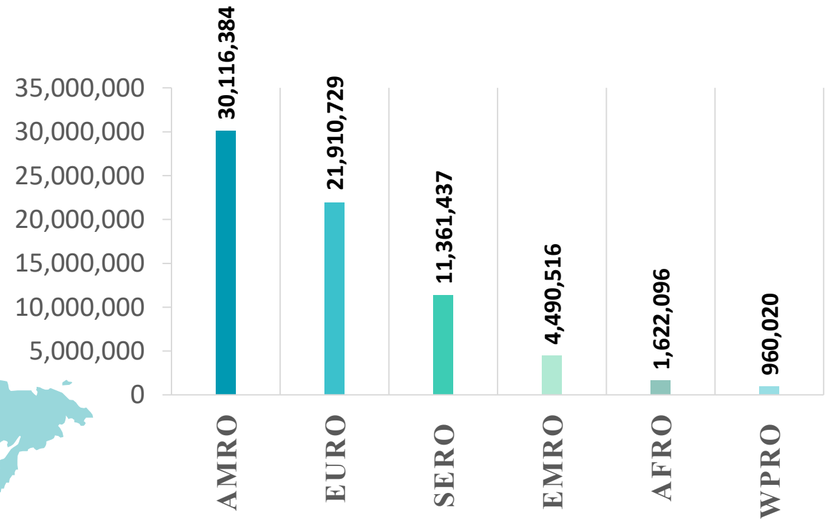
Other*:includes cases and deaths reported under the international conveyance(Diamond Princess)

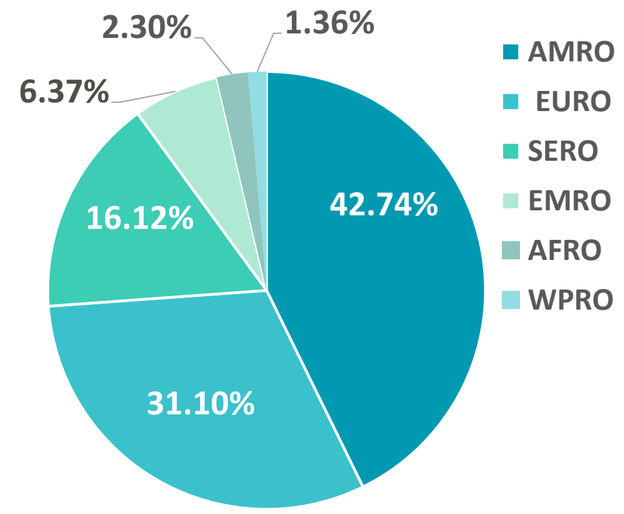
Graphs published by Abu Dhabi Public Health Center 2020 | Data resources: WHO

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

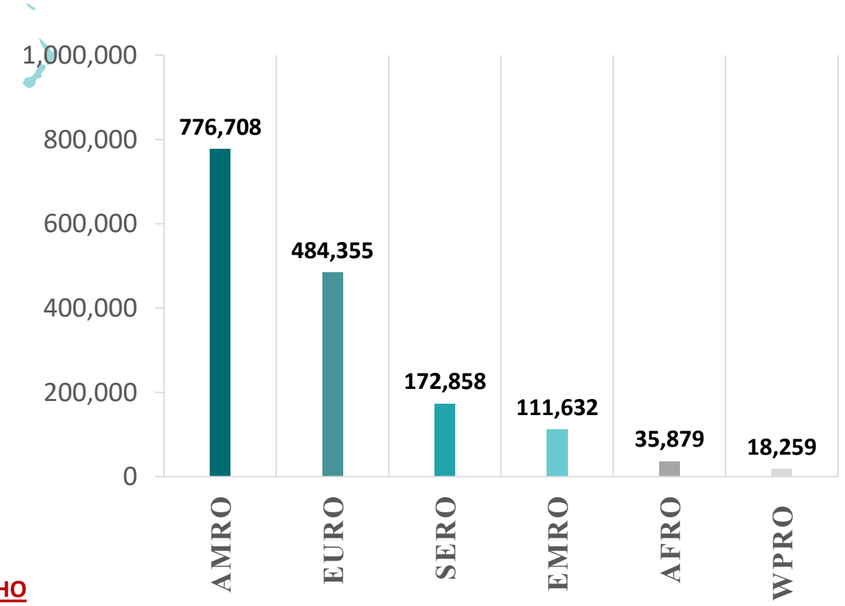


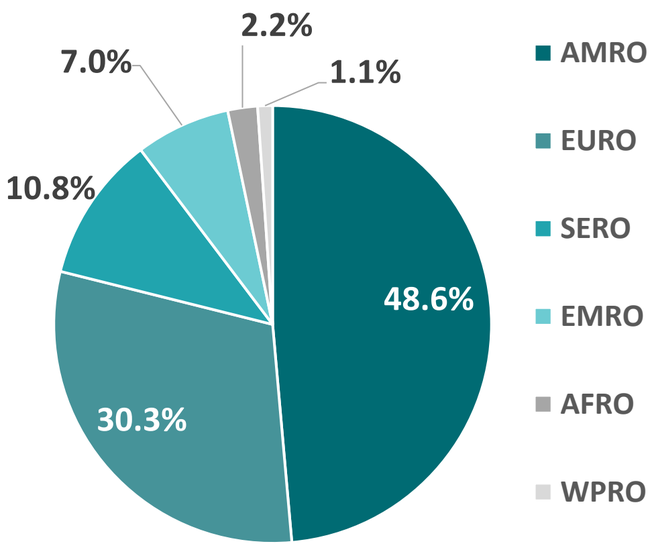
INFECTED





DEATHS





Graphs published by Abu Dhabi Public Health Center 2020 | Data resources: WHO

EPIDEMIOLOGY

Date: 13 DEC 2020

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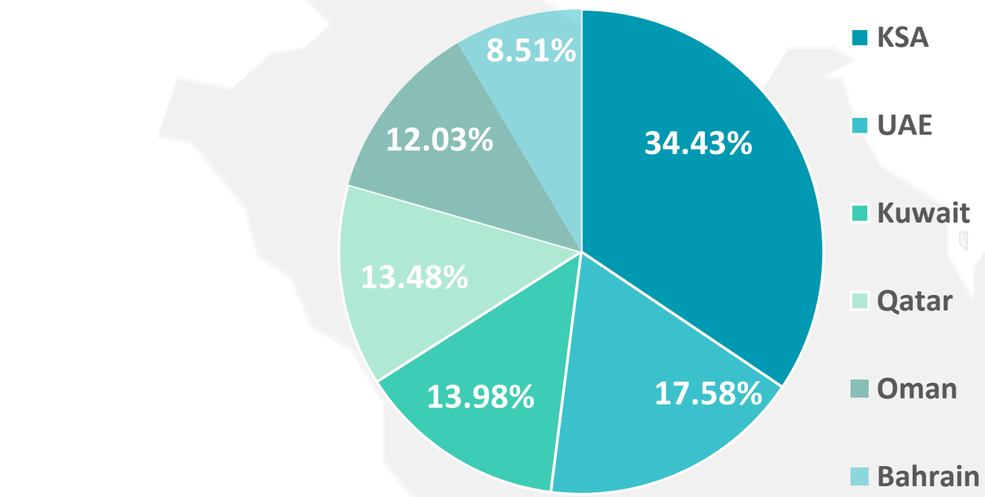
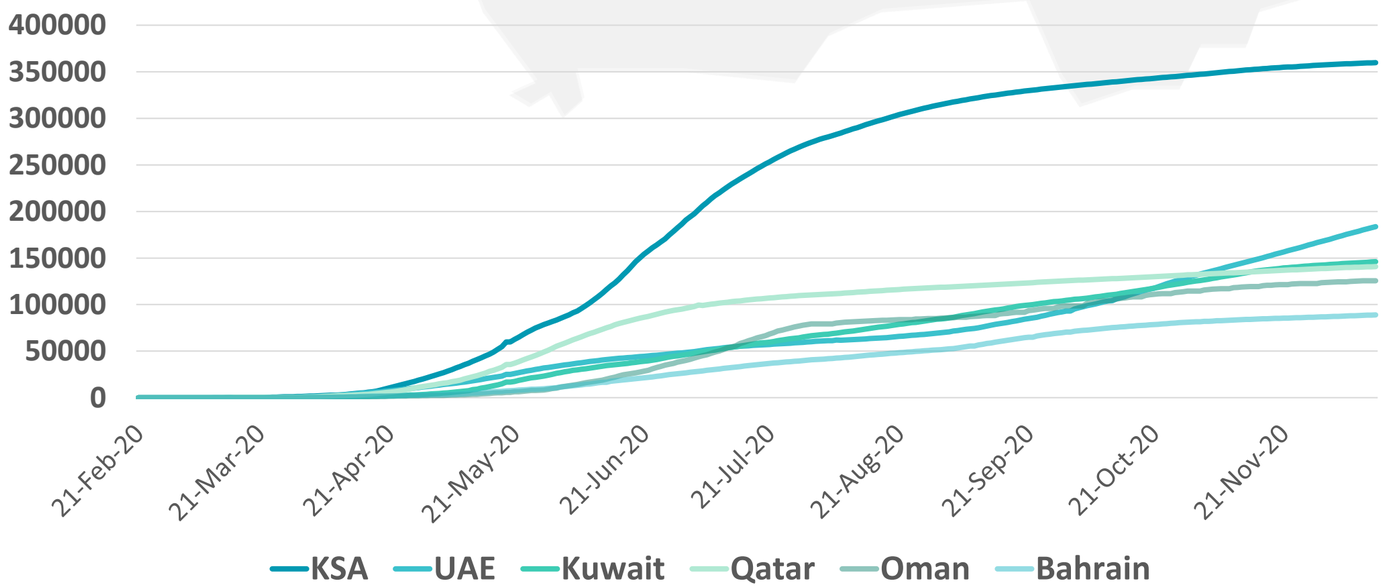
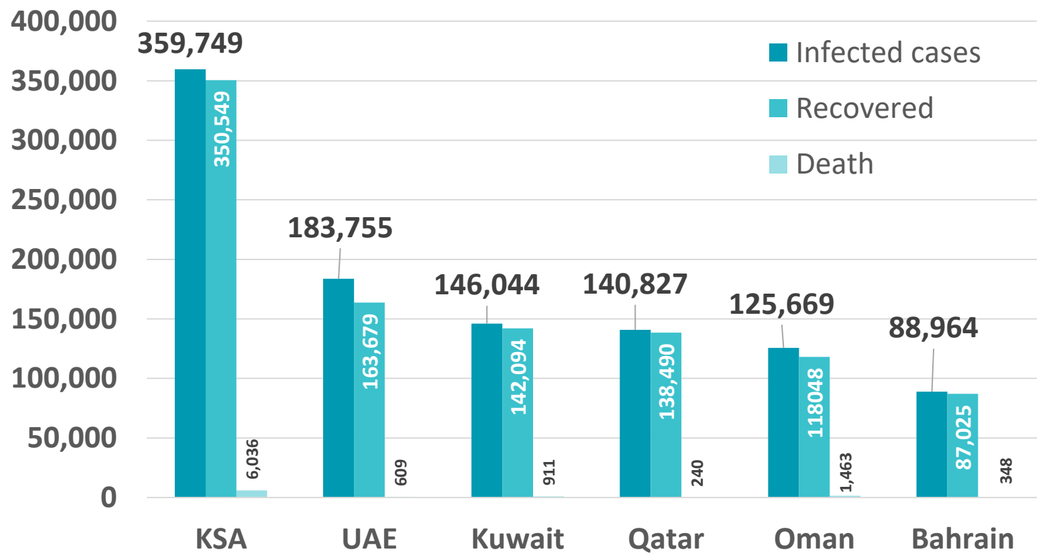
Figure 9: Comparative Analysis of the Distribution of COVID-19 Cases in GCC Countries

TOTAL NUMBER OF INFECTED CASES

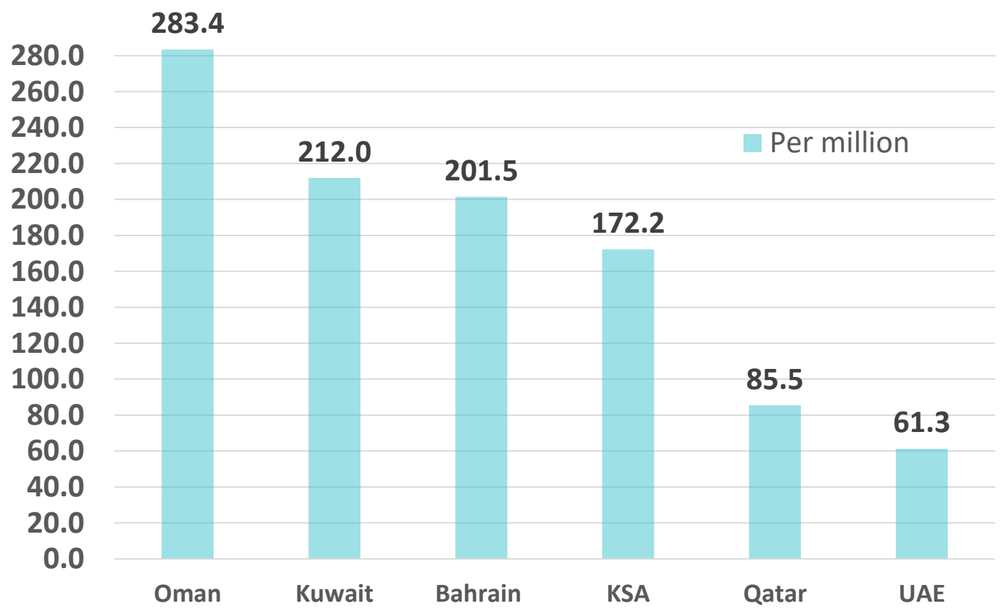




TOTAL NUMBER OF INFECTED, RECOVERED AND DEATHS

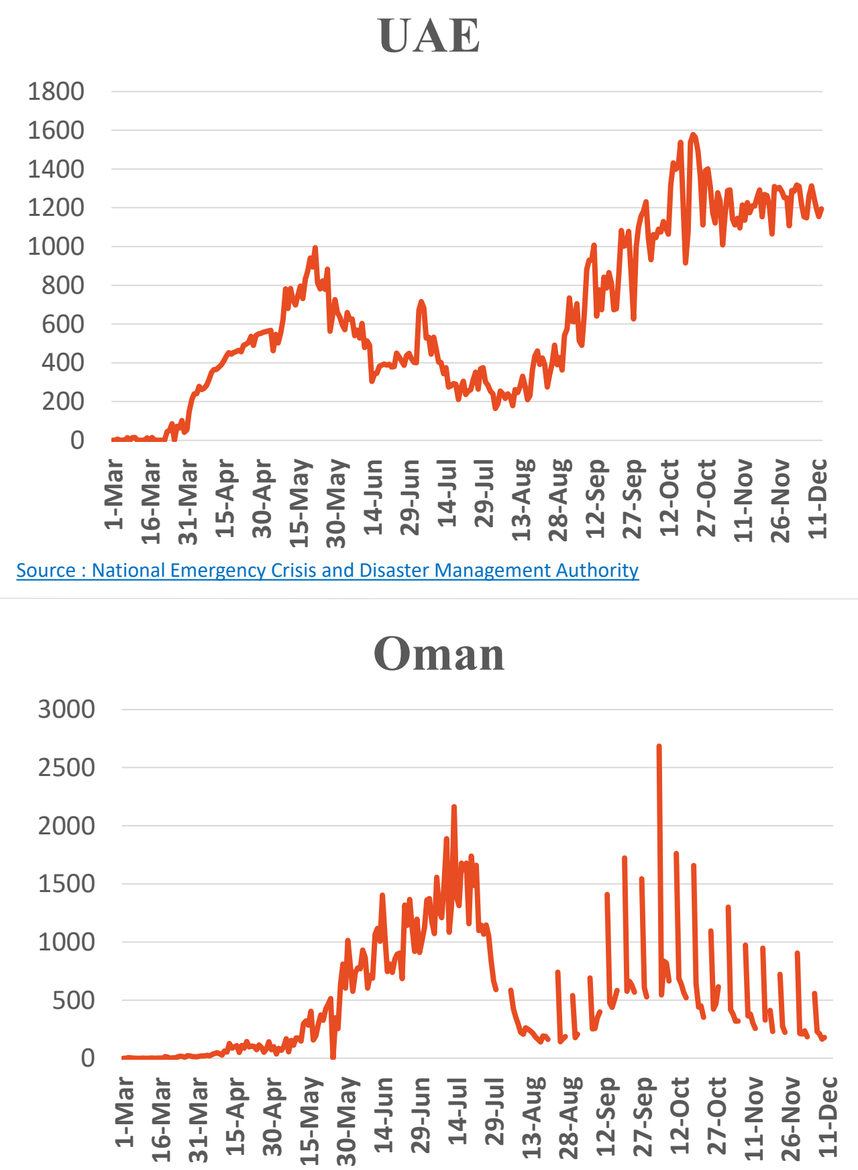


DEATHS PER MILLION

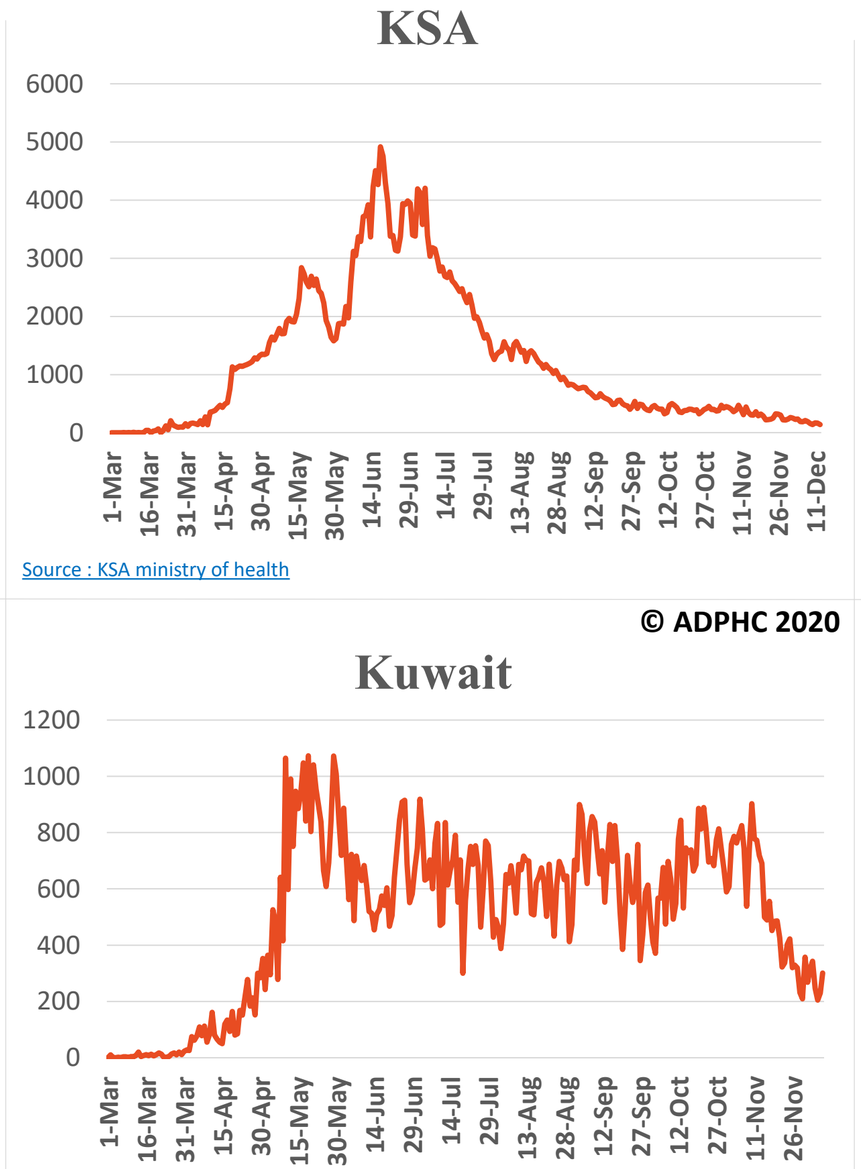


Graphs published by Abu Dhabi Public Health Center 2020 | Data resources: John Hopkins, WHO

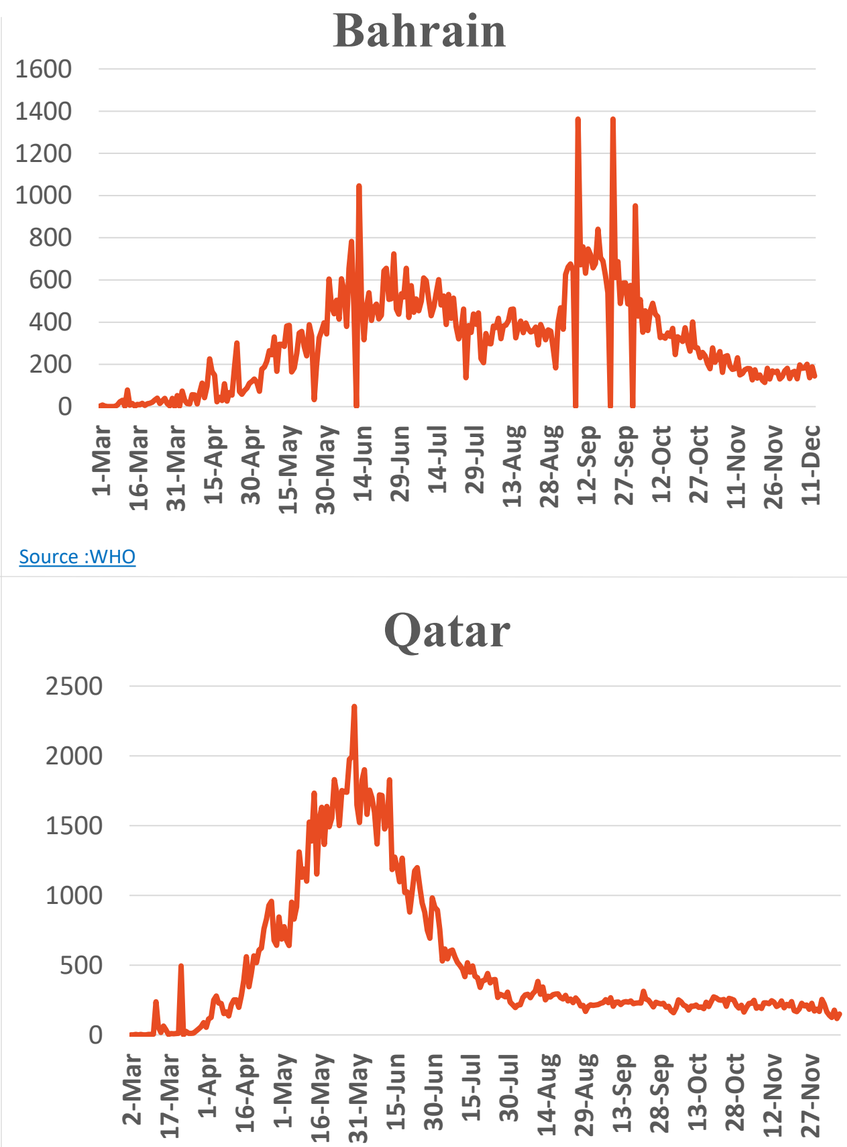
Figure 10: Comparative Analysis of the Distribution of COVID-19 New Cases in GCC Countries



Source : National Emergency Crisis and Disaster Management Authority



Source : KSA ministry of health



Source :WHO

Source :Oman ministry of health

*No announced statistic data from 31 JUL to 4 AUG, 21,23,28,30 AUG 2,4، 5,11,12,18,19,25 ,26,30 SEP,1,2,9,10,16,17,23,24,30,21 OCT, 6,7,13,14,17,20,21, 25,26,6 DEC

*No announced statistic data on weekends and official holidays.

Source : Kuwait ministry of health

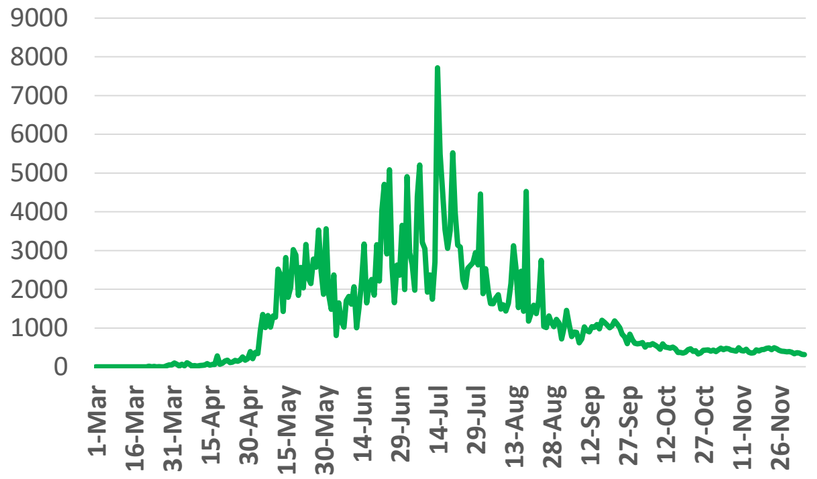
Source : Qatar ministry of health

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

UAE

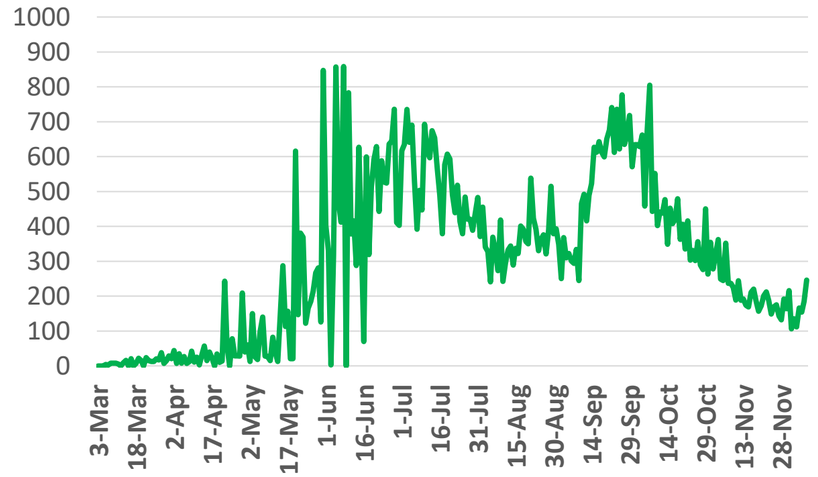
Source : National Emergency Crisis and Disaster Management Authority

KSA



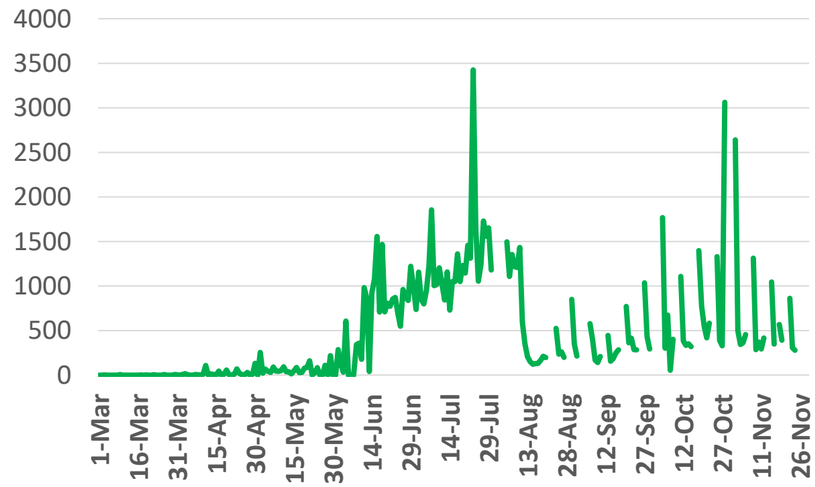
Source : KSA ministry of health

Bahrain



Source : Bahrain ministry of health

Oman

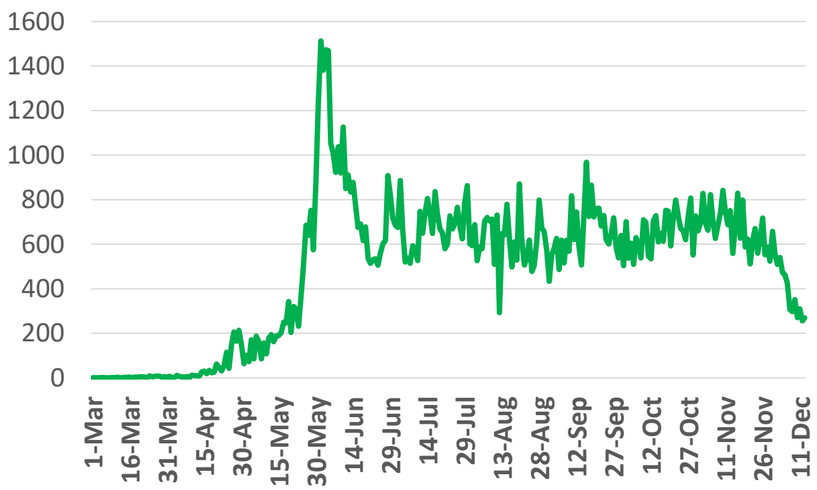


Source :Oman ministry of health

*No announced statistic data from 31 JUL 4 AUG, 21,23,28,30 AUG 2, 4، 5,11,12,18,19,25 ,26,30 SEP,1,2,9,10,16,17,23,24,30,21 OCT, 6,7,13,14,17,20,21, 25,26,6 DEC

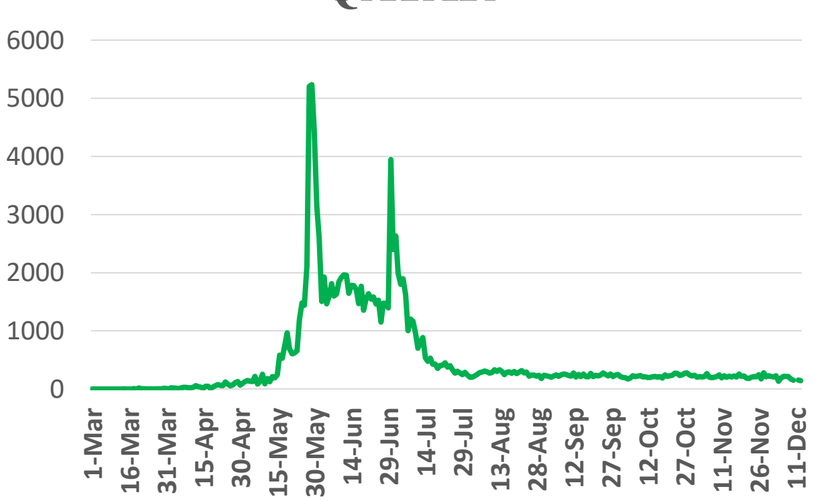
*No announced statistic data on weekends and official holidays.

Kuwait



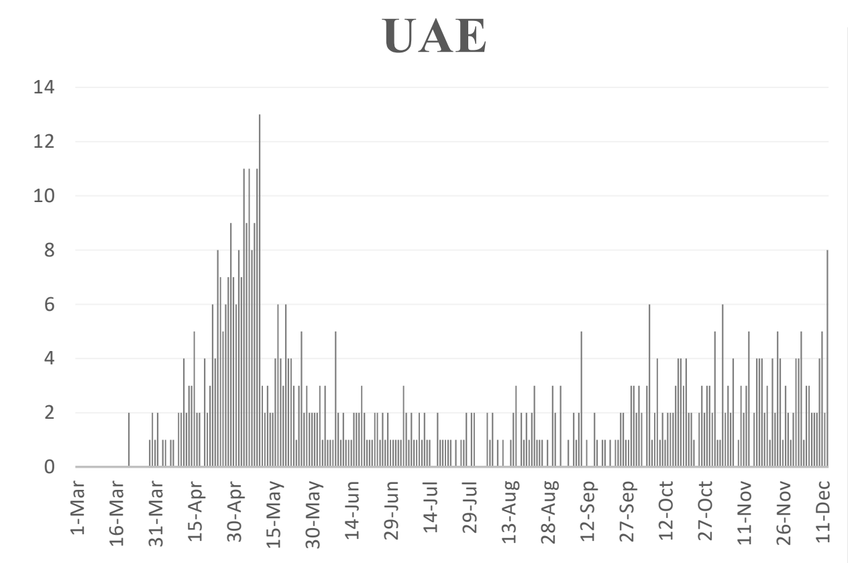
Source : Kuwait ministry of health

QATAR

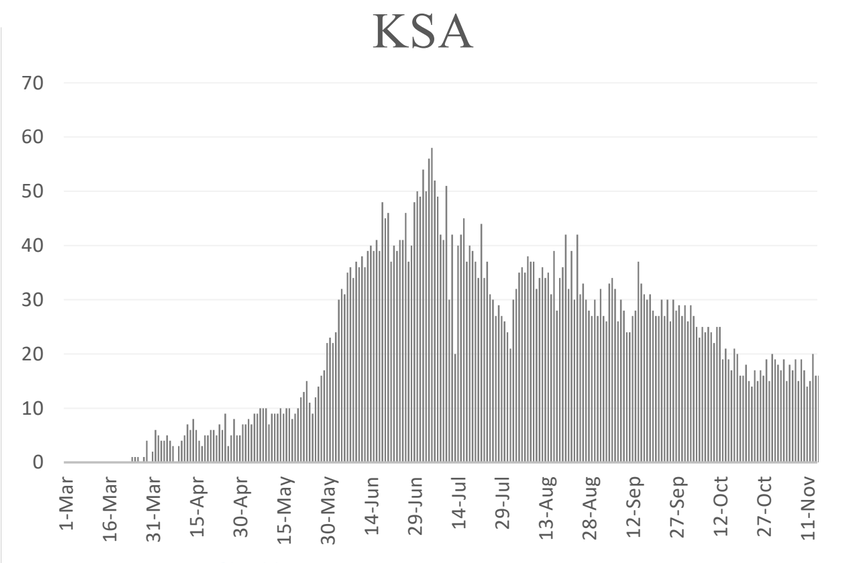


Source : Qatar ministry of health

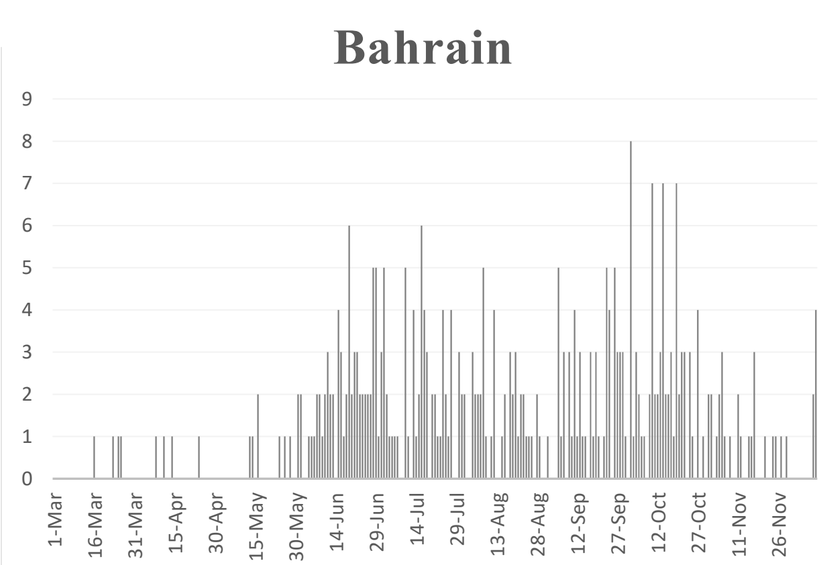
Figure 12: Comparative Analysis of the Distribution of COVID-19 New Death Cases in GCC Countries



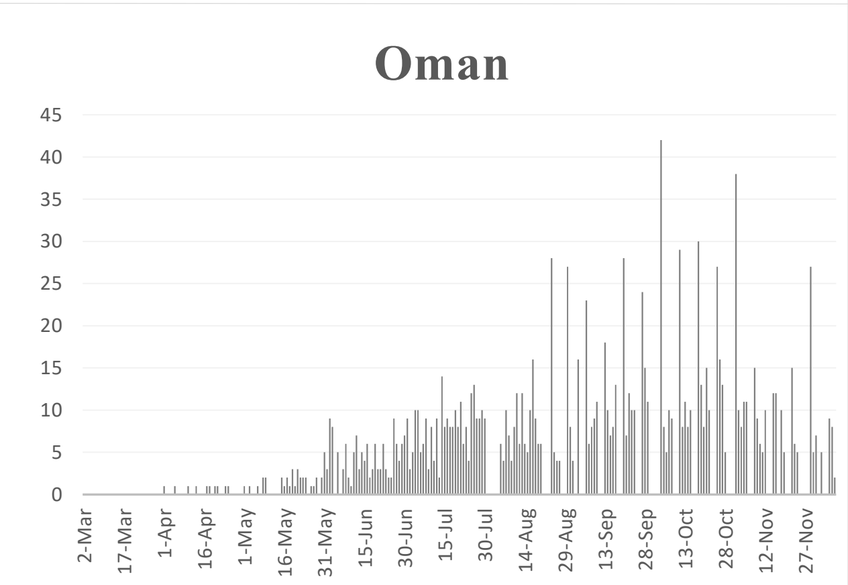
Source : National Emergency Crisis and Disaster Management Authority



Source : KSA ministry of health



Source :WHO



Source :Oman ministry of health

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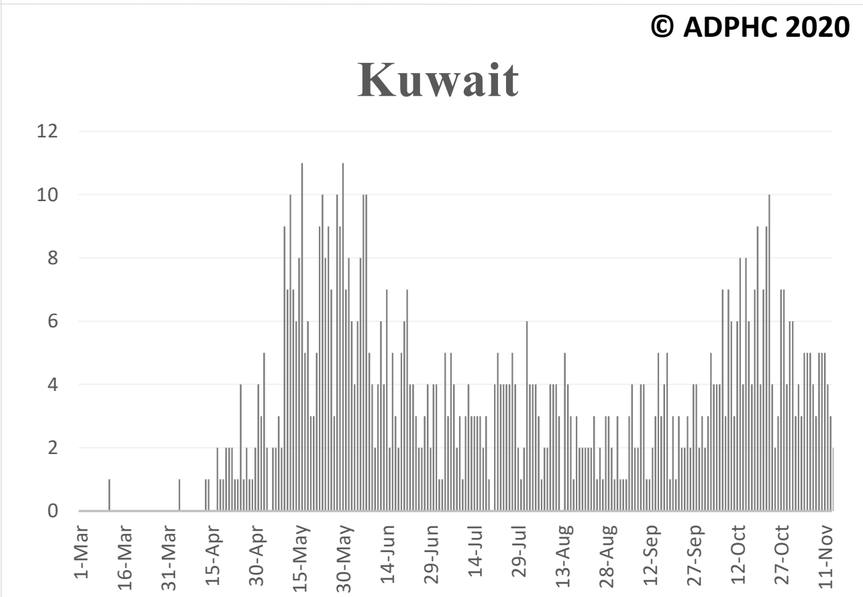
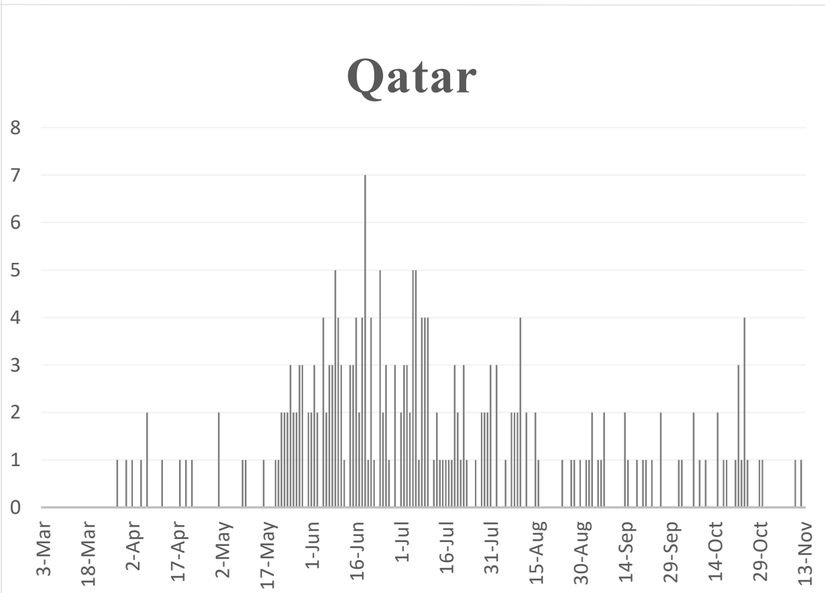
*No announced statistic data on weekends and official holidays.



Source : Kuwait ministry of health



Source : Qatar ministry of health

Article 1

Published

November 19, 2020, Pfizer website/ FDA

The Results Of Phase 3 Trial Of The Biontech / Pfizer Vaccine A Review Information From Press Release From The Company And FDA

Study Sponsor: BioNTech
Study Conducted By: Pfizer

- BioNTech (in Germany) has developed RNA based vaccine candidates using a platform approach that enables the rapid development of vaccines against SARS-CoV-2. The aim of this study is to explore the safety, immunogenicity, and efficacy of the prophylactic BNT162 vaccines against COVID-19.
- This is a multicenter, multinational, randomized, placebo-controlled, observer-blind, dose-finding, vaccine candidate selection, and efficacy study in healthy individuals. In phase 3, ≥12 years of age (stratified as 12-15, 16-55, or >55 years) has been selected. Vaccine candidate selected, BNT162b2 at a dose of 30 µg (2-doses separated by 21 days), comprised 21,999 vaccine recipients. The 12-15 year stratum comprised approximately 2,000 participants (1,000 vaccine recipients) enrolled at selected investigational sites. A minimum of 40% participants was in the >55 year stratum. An equal number of participants (n=21,999) received placebo (1:1 randomization active:placebo). Participants were expected to participate for follow-up approximately 26 months.

Results of Interim analysis

- at the time of the interim analysis, 32,279 participants overall (16,061 in the BNT162b2 group and 16,218 in the placebo groups) we included on the study.
- As of the time of the interim analysis, there were 4 confirmed COVID-19 cases in the BNT162b2 group and 90 confirmed COVID-19 cases in the placebo group. All evaluable cases were confirmed by tests conducted at the central laboratory.

Article 2

Published

December 3, 2020, THE NEJM

"When Will We Have a Vaccine?" — Understanding Questions and Answers about Covid-19 Vaccination

- During the COVID-19 pandemic, people will have a vaccine when a candidate vaccine is demonstrated to be safe, effective, and available that can be determined by scientific data. Peoples' inquiry involve three concerns - a) when will the public be able to have confidence that available vaccines are safe and effective; b) when will a vaccine be available to people like them; and c) when will vaccine uptake be high enough to enable a return to prepandemic conditions.
- In the United States (US), guidelines from the Food and Drug Administration (FDA) on testing of COVID-19 vaccine candidates are scientifically sound and indicate that no compromises will be made in terms of evaluating safety and efficacy. Assurances regarding issue emergency use authorizations (EUA) expediting availability must make clear the ways in which clinical trials and the review processes used by federal agencies will objectively assess the safety and effectiveness of vaccines developed using new platforms.
- Data from antibody test suggested that approximately 90% of people are susceptible to COVID-19. Accepting that 60%-70% of the population would have to be immune either as a result of natural infection or vaccination to achieve community protection (herd immunity). It might take years to achieve the vaccination coverage necessary for everyone to be protected gives rise to difficult questions about priority groups and domestic and global access.
- High uptake of vaccines in prioritized groups should not be assumed. Having trusted people including public and entertainment figures; and political, religious and community leaders, endorse vaccination can be an effective way of persuading the portion of the public that is open to such a recommendation. Persuading people who have doubts or oppose a particular medical recommendation is difficult, requires commitment and engagement.

UAE RESEARCH

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Article 3

Published

November 28, 2020, RXIV

Clinical prediction system of complications among COVID-19 patients: a development and validation retrospective multicentre study

Authors

Ghadeer O. Ghosheh, Bana Alamad, Kai-Wen Yang, Faisil Syed, Nasir Hayat, Imran Iqbal, Fatima Al Kindi, Sara Al Junaibi, Maha Al Safi, Raghib Ali, Walid Zaher, Mariam Al Harbi, Farah E. Shamout

- A retrospective multi-centre study was conducted (from April 1 to April 30, 2020) with data collected from COVID-19 patient encounters (n=3,352) admitted to eighteen facilities in Abu Dhabi (AD), United Arab Emirates (UAE). Based on geographical proximity, the hospitals were split into - AD Middle region [A] and AD Western & Eastern regions [B].
- Anonymized data recorded within the first 24 hours of admission included patient baseline information and demographics, vital signs, and laboratory test results. The machine learning based prognostic system predicts the risk of developing seven complications included secondary bacterial infection (SBI), acute kidney injury (AKI), acute respiratory distress syndrome (ARDS), and elevated biomarkers linked to increased patient severity including d-dimer, interleukin-6, aminotransferases, and troponin. The performance of the system was assessed using the area under the receiver operating characteristic curve (AUROC).
- In test set A, the system achieved 0.90 AUROC for AKI and >0.80 AUROC for most of the other complications. In test set B, the system achieved ≥0.90 AUROC for AKI, elevated troponin, and elevated interleukin-6, and >0.80 AUROC for most of the other complications..
- **In the UAE, this is the first study for such complications and present the patient cohort, as most previous studies have focused on European or Chinese patients. These findings indicated that a data driven approach using machine learning can predict the risk of complications with high accuracy. This system can serve as a guide to anticipate the course of COVID-19 patients and to help initiate more targeted and complication specific decision making on treatment and triage.**

Continued

Table 2: Criteria used to define the occurrence of the complications that our system aims to predict.

Complication	Definition	Reference
Elevated Troponin	Troponin T $\geq$ 14 ng/L	[19]
Elevated D-Dimer	D-Dimer $\geq$ 500 ng/mL	[20]
Elevated Aminotransferases	AST $\geq$ 40 U/l **AND** ALT $\geq$ 40 U/l	*
Elevated Interleukin-6	Interleukin-6 $\geq$ 8.43 pg/mL	*
SBI	Positive blood, urine, throat or sputum cultures within 24 hours of sample collection	*
AKI	Based on the Kidney Disease Improving Global Guidelines (KDIGO) classification, increase in Serum Creatinine by $\geq$ 0.3mg/dl within 48 hours **OR** increase in Serum Creatinine by $\geq$ to 1.5 times **OR** Urine volume $<$ 0.5ml/kg/hr for 6 hours	[17]
ARDS	Based on the Berlin definition, presence of bilateral opacity in radiology reports **AND** Oxygenation: PaO_2/FiO_2 $\leq$300 mm Hg **AND** Timing: $\leq$ one week **AND** Origin: pulmonary	[18]

* Based on SEHA's clinical standards.

UAE RESEARCH

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Article 4

Published

October 19, 2020, Science of The Total Environment

Detection and quantification of SARS-CoV-2 RNA in wastewater and treated effluents: Surveillance of COVID-19 epidemic in the United Arab Emirates

Authors

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- In the United Arab Emirates (UAE), municipal wastewater samples were collected (in May and June, 2020) from different locations including influents and effluents of eleven wastewater treatment plants (WWTPs) as well as untreated wastewater from thirty eight various locations. Composite samples collected over twenty four hours were thermally deactivated for safety, followed by viral concentration using ultrafiltration, RNA extraction using commercially available kits, and viral quantification using RT-PCR.

- From the WWTPs, viral load in wastewater influents ranged from 7.50E + 02 to over 3.40E + 04 gene copies/L with some plants had no detectable viral RNA by RT-PCR. Furthermore, the virus was detected in 85% of untreated wastewater samples taken from different locations with viral loads ranged from 2.86E + 02 to over 2.90E + 04 gene copies/L. A correlation was observed between the number of reported COVID-19 diagnosed cases in the population and the viral load measured in the wastewater. None of the eleven treatment plants' effluents tested positive indicated that the treatment technologies were efficient in degrading SARS-CoV-2 and confirmed the safety of treated reused water.

- The study highlighted the potential of detecting SARS-CoV-2 in wastewater as an early warning and prediction tool for the spread of the disease. This monitoring can help authorities to take proper actions to contain any potential outbreak of COVID-19 in the communities.

UAE RESEARCH

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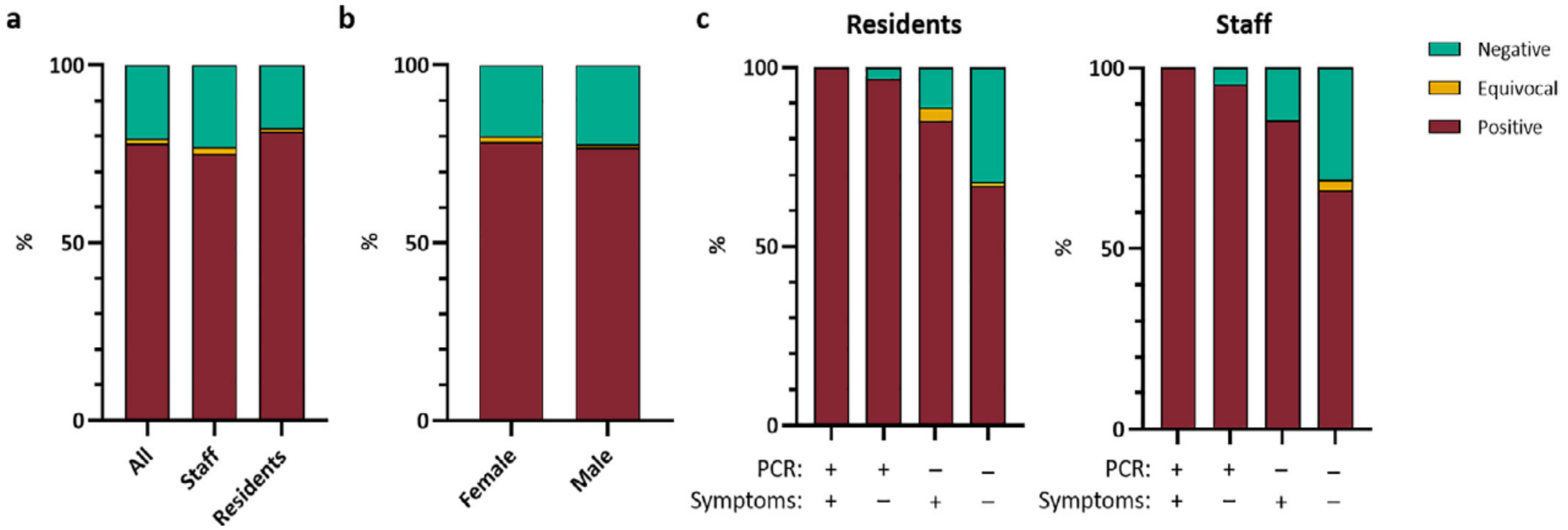

Article 5

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Safety and efficacy of the ChAdOx1 nCoV-19 vaccine (AZD1222) against SARS-CoV-2: an interim analysis of four randomised controlled trials in Brazil, South Africa, and the UK

This an analysis of the results of phase 3 trial of the OXFORD vaccines done across the UK, Brazil, and South Africa. Participants aged 18 years and older were randomly assigned (1:1) to ChAdOx1 nCoV-19 vaccine or control (meningococcal group vaccine or saline). Participants in the ChAdOx1 nCoV-19 group received two doses; a subset in the UK trial received a half dose as their first dose (low dose) and a standard dose as their second dose (LD/SD cohort). The primary efficacy analysis included symptomatic COVID-19 in PCR positive after 14 days of the second dose of vaccine. Study duration: Between April 23 and Nov 4, 2020

Results

A 23 848 participants were enrolled and 11 636 participants (7548 in the UK, 4088 in Brazil) were included in the interim analysis.

In participants who **received two standard doses**, vaccine efficacy was 62·1% of 4440 in the ChAdOx1 nCoV-19 group vs 1·6% of 4455 in the control group

 in participants **who received a low dose followed by a standard dose**, efficacy was 90·0% of 1367 vs 2·2% of 1374; Overall vaccine efficacy across both groups was 70·4% of 5807 vs 1·7% of 5829. From 21 days after the first dose, there were ten cases hospitalized for COVID-19, all in the control arm; two were classified as severe COVID-19, including one death.

There were 74 341 person-months of safety follow-up (median 3·4 months).

175 severe adverse events occurred in 168 participants, 84 events in the ChAdOx1 nCoV-19 group and 91 in the control group. Three events were classified as possibly related to a vaccine: one in the ChAdOx1 nCoV-19 group, one in the control group, and one in a participant who remains masked to group allocation.

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	COV002 (UK; LD/SD; N=2741)		COV002 (UK; SD/SD; N=4807)		COV003 (Brazil; all SD/SD; N=4088)	
	ChAdOx1 nCoV-19 (n=1367)	MenACWY (n=1374)	ChAdOx1 nCoV-19 (n=2377)	MenACWY (n=2430)	ChAdOx1 nCoV-19 (n=2063)	MenACWY plus saline (n=2025)
Age, years						
18–55	1367 (100·0%)	1374 (100·0%)	1879 (79·0%)	1922 (79·1%)	1843 (89·3%)	1833 (90·5%)
56–69	0	0	285 (12·0%)	293 (12·1%)	209 (10·1%)	187 (9·2%)
≥70	0	0	213 (9·0%)	215 (8·8%)	11 (0·5%)	5 (0·2%)
Sex						
Female	886 (64·8%)	927 (67·5%)	1378 (58·0%)	1437 (59·1%)	1261 (61·1%)	1156 (57·1%)
Male	481 (35·2%)	447 (32·5%)	999 (42·0%)	993 (40·9%)	802 (38·9%)	869 (42·9%)
BMI, kg/m²	25·2 (22·8–28·7)	25·3 (22·7–28·8)	25·4 (22·9–28·7)	25·5 (22·9–29·1)	25·6 (22·8–29·1)	25·6 (23·1–29·0)
Ethnicity						
White	1257 (92·0%)	1278 (93·0%)	2153 (90·6%)	2214 (91·1%)	1357 (65·8%)	1366 (67·5%)
Black	6 (0·4%)	2 (0·1%)	17 (0·7%)	14 (0·6%)	230 (11·1%)	210 (10·4%)
Asian	76 (5·6%)	59 (4·3%)	137 (5·8%)	138 (5·7%)	54 (2·6%)	53 (2·6%)
Mixed	19 (1·4%)	22 (1·6%)	48 (2·0%)	42 (1·7%)	410 (19·9%)	386 (19·1%)
Other	9 (0·7%)	13 (0·9%)	22 (0·9%)	22 (0·9%)	12 (0·6%)	10 (0·5%)
Health and social care setting workers	1236 (90·4%)	1253 (91·2%)	1441 (60·6%)	1513 (62·3%)	1833 (88·9%)	1775 (87·7%)
Comorbidities						
Cardiovascular disease	104 (7·6%)	92 (6·7%)	264 (11·1%)	266 (10·9%)	271 (13·1%)	244 (12·0%)
Respiratory disease	158 (11·6%)	176 (12·8%)	285 (12·0%)	316 (13·0%)	215 (10·4%)	210 (10·4%)
Diabetes	18 (1·3%)	15 (1·1%)	58 (2·4%)	60 (2·5%)	59 (2·9%)	60 (3·0%)

Data are n (%) or median (IQR). The primary efficacy population (LD/SD and SD/SD) includes randomly assigned participants who were seronegative at baseline and received LD/SD or SD/SD or were in the corresponding control group, and remained on study more than 14 days after their second dose without having had a previous virologically confirmed severe acute respiratory syndrome coronavirus 2 infection. In addition, for groups in COV002, only efficacy groups (ie, groups 4, 6, 9, and 10) are included. LD/SD=low-dose prime plus standard-dose boost. SD/SD=two standard-dose vaccines given. MenACWY=meningococcal group A, C, W, and Y conjugate vaccine. BMI=body-mass index.

Table 1: **Baseline characteristics of participants included in the primary efficacy population, by study and dosing strategy**

VACCINE

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	Total number of cases	ChAdOx1 nCoV-19		Control		Vaccine efficacy (CI*)
		n/N (%)	Incidence rate per 1000 person-years (person-days of follow-up)	n/N (%)	Incidence rate per 1000 person-years (person-days of follow-up)	
All LD/SD and SD/SD recipients	131	30/5807 (0·5%)	44·1 (248 299)	101/5829 (1·7%)	149·2 (247 228)	70·4% (54·8 to 80·6)†
COV002 (UK)	86	18/3744 (0·5%)	38·6 (170 369)	68/3804 (1·8%)	145·7 (170 448)	73·5% (55·5 to 84·2)
LD/SD recipients	33	3/1367 (0·2%)	14·9 (73 313)	30/1374 (2·2%)	150·2 (72 949)	90·0% (67·4 to 97·0)‡§
SD/SD recipients	53	15/2377 (0·6%)	56·4 (97 056)	38/2430 (1·6%)	142·4 (97 499)	60·3% (28·0 to 78·2)
COV003 (Brazil; all SD/SD)	45	12/2063 (0·6%)	56·2 (77 930)	33/2025 (1·6%)	157·0 (76 780)	64·2% (30·7 to 81·5)‡
All SD/SD recipients	98	27/4440 (0·6%)	56·4 (174 986)	71/4455 (1·6%)	148·8 (174 279)	62·1% (41·0 to 75·7)
Other non-primary symptomatic COVID-19 disease¶	18	7/5807 (0·1%)	10·3 (248 299)	11/5829 (0·2%)	16·3 (247 228)	36·4% (−63·8 to 75·3)‡
Any symptomatic COVID-19 disease	149	37/5807 (0·6%)	54·4 (248 299)	112/5829 (1·9%)	165·5 (247 228)	67·1% (52·3 to 77·3)
Asymptomatic or symptoms unknown (COV002)	69	29/3288 (0·9%)	69·8 (151 673)	40/3350 (1·2%)	96·0 (152 138)	27·3% (−17·2 to 54·9)
LD/SD recipients	24	7/1120 (0·6%)	41·4 (61 782)	17/1127 (1·5%)	100·6 (61 730)	58·9% (1·0 to 82·9)‡
SD/SD recipients	45	22/2168 (1·0%)	89·4 (89 891)	23/2223 (1·0%)	92·9 (90 408)	3·8% (−72·4 to 46·3)
Any NAAT-positive swab	221	68/5807 (1·2%)	100·0 (248 299)	153/5829 (2·6%)	226·0 (247 228)	55·7% (41·1 to 66·7)

- Efficacy of 90·0% seen in those who received a low dose as prime in the UK was intriguingly high compared with the other findings in the study. Although there is a possibility that chance might play a part in such divergent results, a similar contrast in efficacy between the LD/SD and SD/SD recipients with asymptomatic infections provides support for the observation .
- Use of a low dose for priming could provide substantially more vaccine for distribution at a time of constrained supply, and these data imply that this would not compromise protection.
- Similar results have been seen for other vaccines where a reduced number or type of priming dose in infancy can lead to higher responses to a booster vaccine.10 Further work is needed to determine the mechanism of the increased efficacy with a LD/SD regimen,

THANK YOU

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