ABU DHABI PUBLIC HEALTH CENTRE | مركز أبوظبي للصحة العامة

Scientific Research Monitoring on COVID-19

06 April 2020

Summary on COVID19

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SARS-COV2 virus

- The virus have been sequenced and found to be similar to MERS-CoV and SARS-CoV. Research revealed that the virus originated in a bat reservoir.
- New designation for the disease and the virus: COVID-19 and SARS-COV2.
- SARS-COV2 stay viable in aerosol for hours and in surface up to 3 days.
- Two strain have been identified for SARS-COV2 (L type (more aggressive) and S type .

Transmission

- Transmission from human to human has been confirmed. Incubation period ranges from 5 days and can reach up to 14 days.
- Suggested human-to-human transmission occurs through droplets, contact and fomites, similar to Severe Acute Respiratory Syndrome (SARS).
- Isolation is the best measure to control transmission.

Clinical features and outcome

- Non-specific and the disease presentation can range from no symptoms (asymptomatic) to severe pneumonia and death.
- Highest risk for severe disease and death include people aged over 60 years and those with underlying conditions
- Pregnant women infected with SARS-COV2 may experience symptoms similar to those of non-pregnant adults. No evidence suggests transmission from mother to newborn if infected late in pregnancy. No evidence of transmission through breast milk.

Therapies and vaccination

- Efforts currently in developing therapies for this virus focus on previously known medications and vaccination for MERS-CoV and SARS-CoV. In addition to other type of medication.
- WHO forum held 11-12 Feb 2020 to mobilize research on COVID19 vaccinations and therapies.

Summary on COVID19 (Cont.)

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COVID19 in figure

- 80% of laboratory confirmed patients have had mild to moderate disease
- 13.8% have severe disease.
- 6.1% are critical
- Children account for 2.4% of all reported cases.(less than 19 years)

Todays' Highlights

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All articles presented in this report represents the authors' views and not necessarily represents Abu Dhabi Public Health Center views or directions.

Scientific Research

- **Vaccine:** a new vaccine delivery strategies can facilitate expedited "design, production, and testing" of vaccines.
- **Treatment:** Ivermectin a well-known head lice medication is now showing promising results in vitro studies (in cell study not human).
- **Epidemiology:** a modelling study showed that school closures might have serious unintended downstream effects on the health-care system, and substantial uncertainty exists about the effectiveness of school closures

Due to abundant COVID19 information resources and given the urgent need to keep up with the updates .Below is a cluster of other academic articles for interested reviewer.
Listed articles may represent information that has been previously shared in the report and/or may target specific technical audience.

Others

1. Drugs and the renin-angiotensin system in covid-19
2. COVID-19 Pneumonia as a Cause of Acute Chest Syndrome in an Adult Sickle Cell Patient
3. Endonasal instrumentation and aerosolization risk in the era of COVID-19: simulation, literature review, and proposed mitigation strategies
4. Thinking Globally, Acting Locally — The U.S. Response to Covid-19

WHO daily report

- One new country/territory/area reported cases of COVID-19 in the past 24 hours: Falkland Islands (Malvinas).
- The Director of the Pan American Health Organization (PAHO), Dr Etienne, on Friday, called for the collaboration of the private sector with countries of Latin America and the Caribbean to tackle COVID-19.
- PAHO has launched a new searchable database that contains the latest guidance and research on the COVID-19 pandemic from the Americas and affected countries worldwide.
- As China emerges from a 2 month containment phase and moves into the mitigation stage, its experience is helping countries currently at the start of the COVID-19 cycle to plan their responses better. This is explored in an interview with WHO Representative to China, Dr Gauden Galea.

Epidemiology

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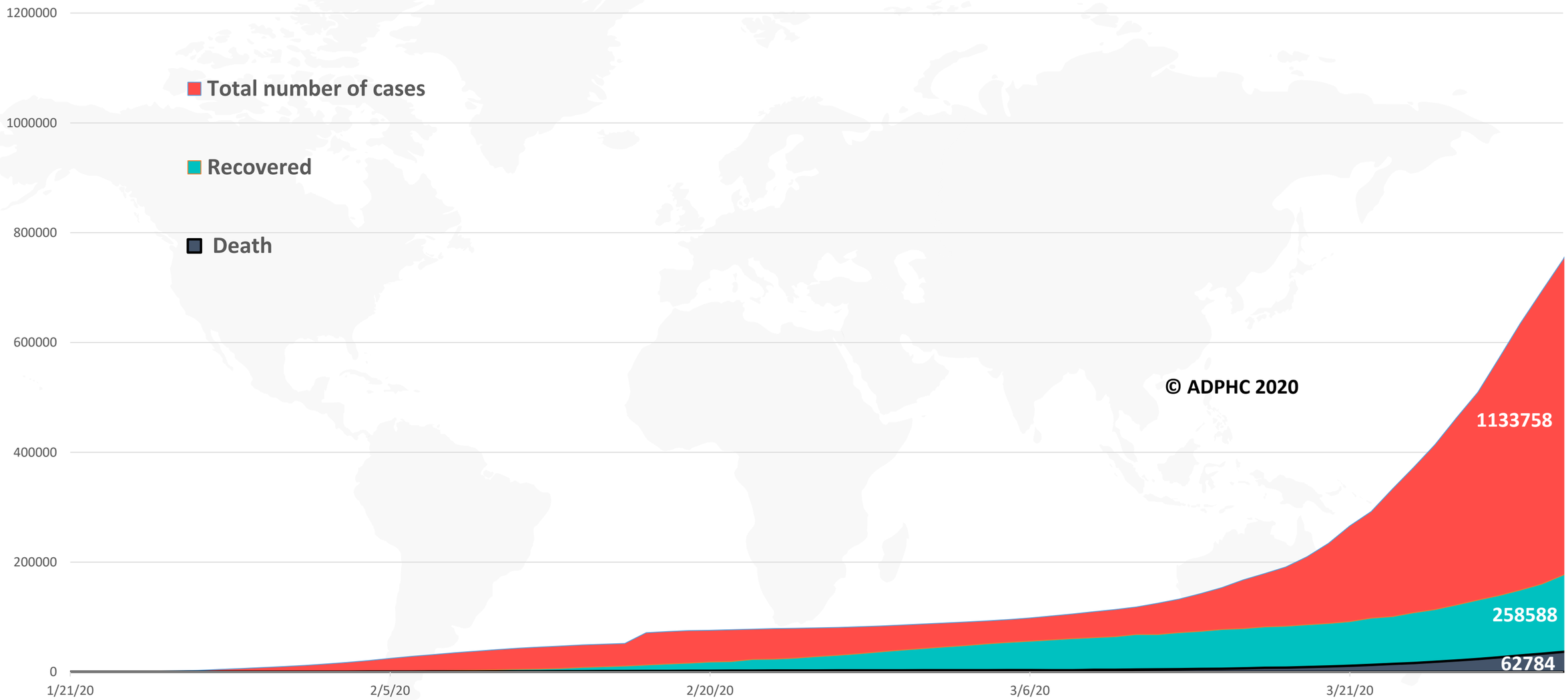
Figure 1: Total number of infected, recovered , and death cases (January 21st to April 5th , 2020)

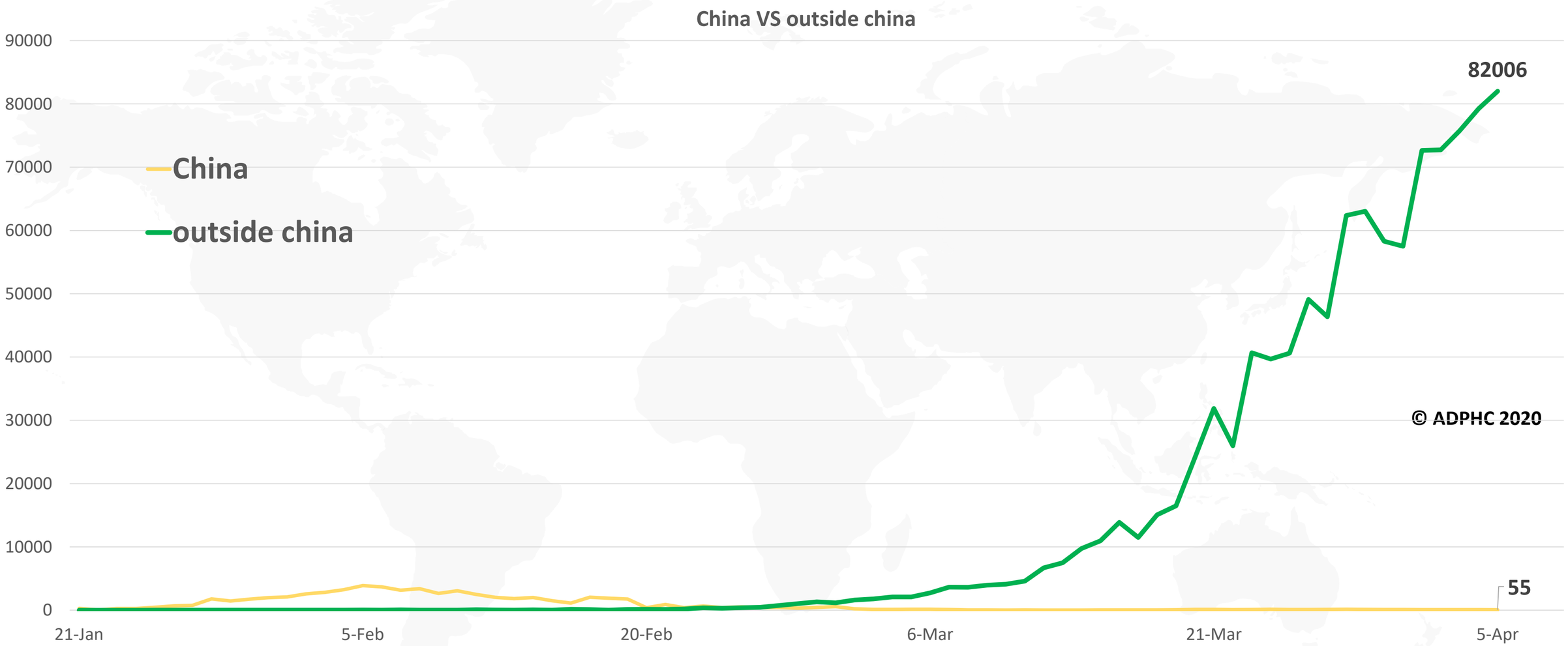


Line graph published by Abu Dhabi Public Health Center 2020.

Data resources: WHO, : John Hopkins University

Epidemiology

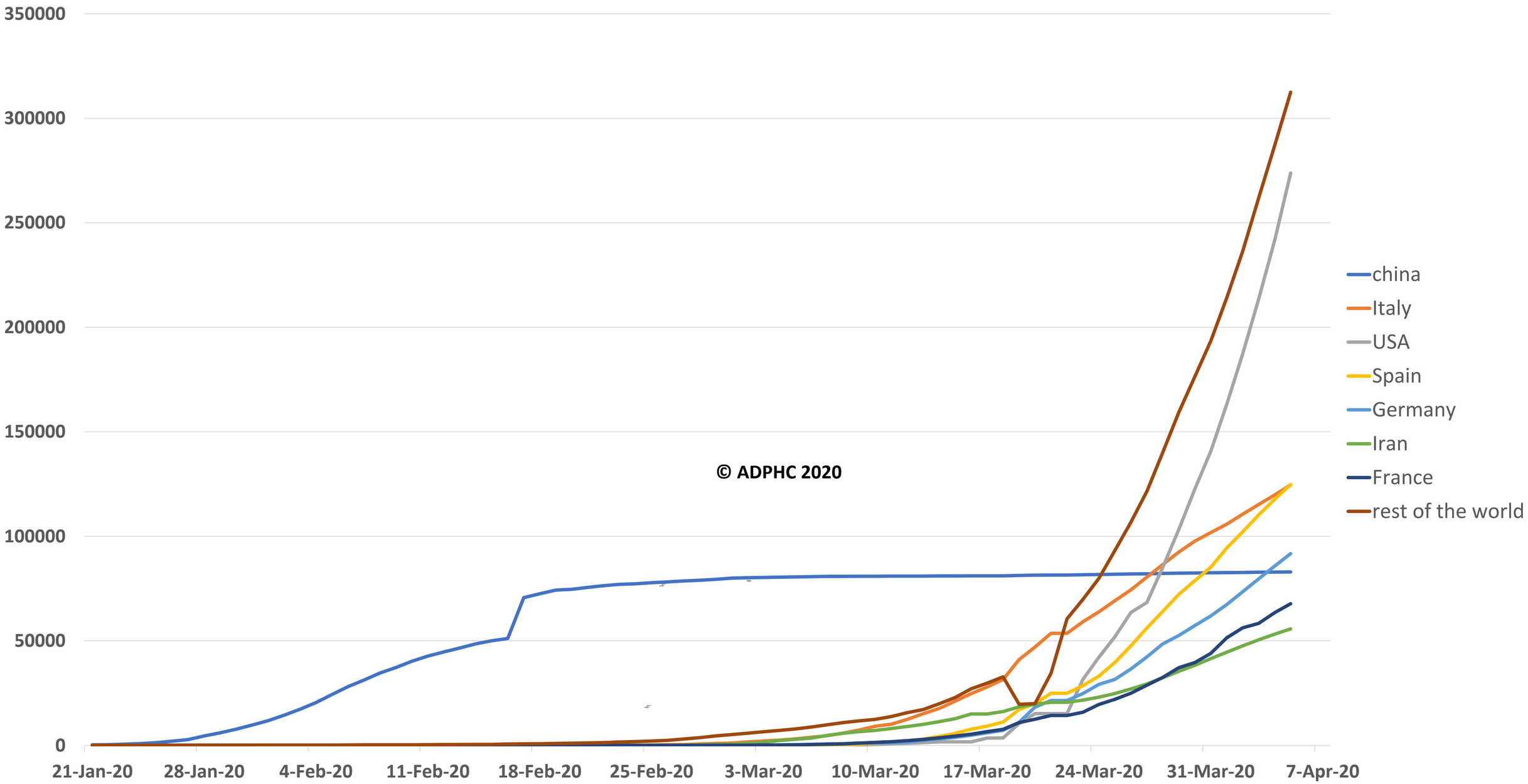
Figure 2: Daily new infected COVID-19 cases reported between (January 21 to April 5th, 2020).



Line graph published by Abu Dhabi Public Health Center 2020.
Data resources: WHO

Epidemiology

Figure 3 : Top 7 countries in the total number of cases due to COVID-19 (January 21 to April 5th, 2020).



Line graph published by Abu Dhabi Public Health Center 2020.

Data resources: WHO

Epidemiology

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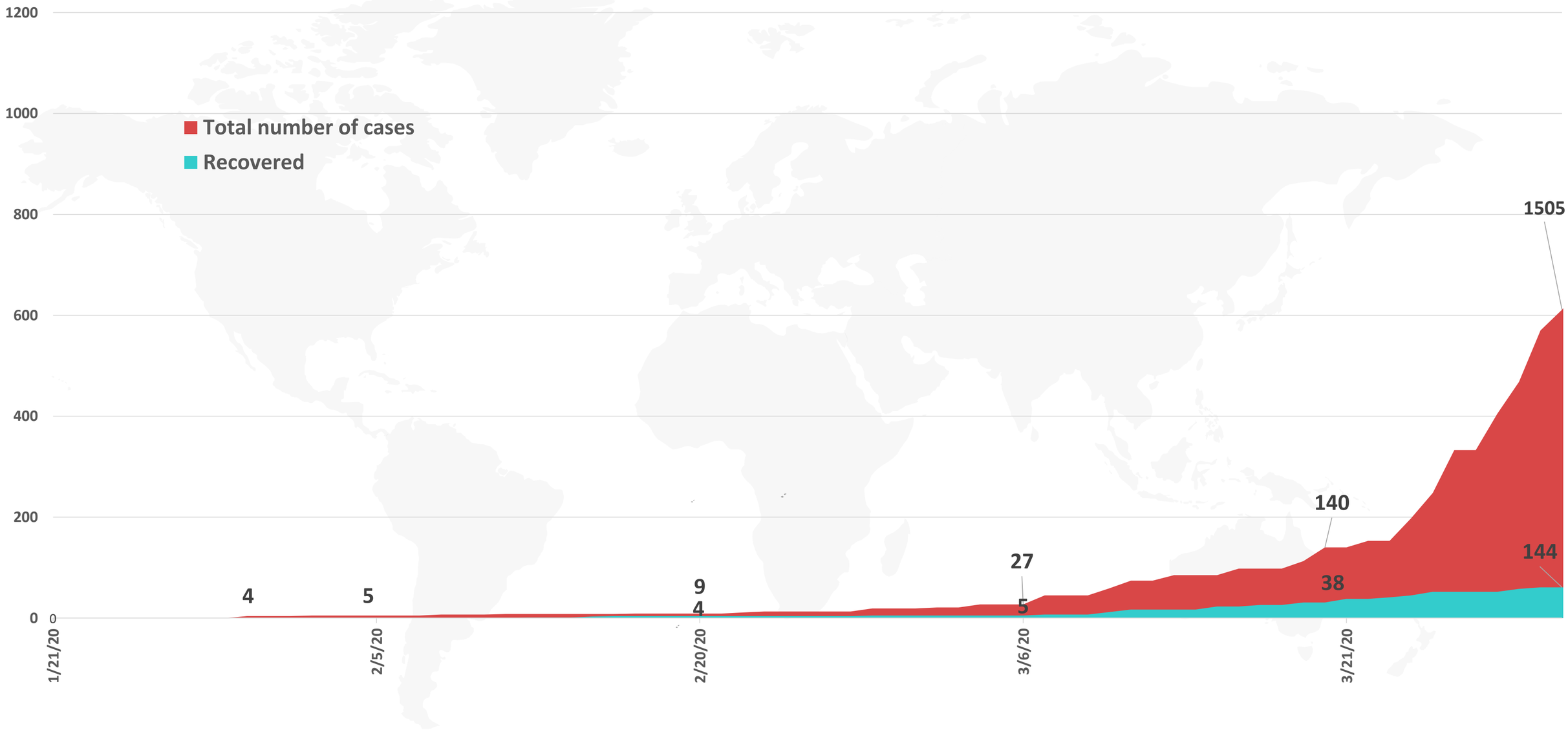
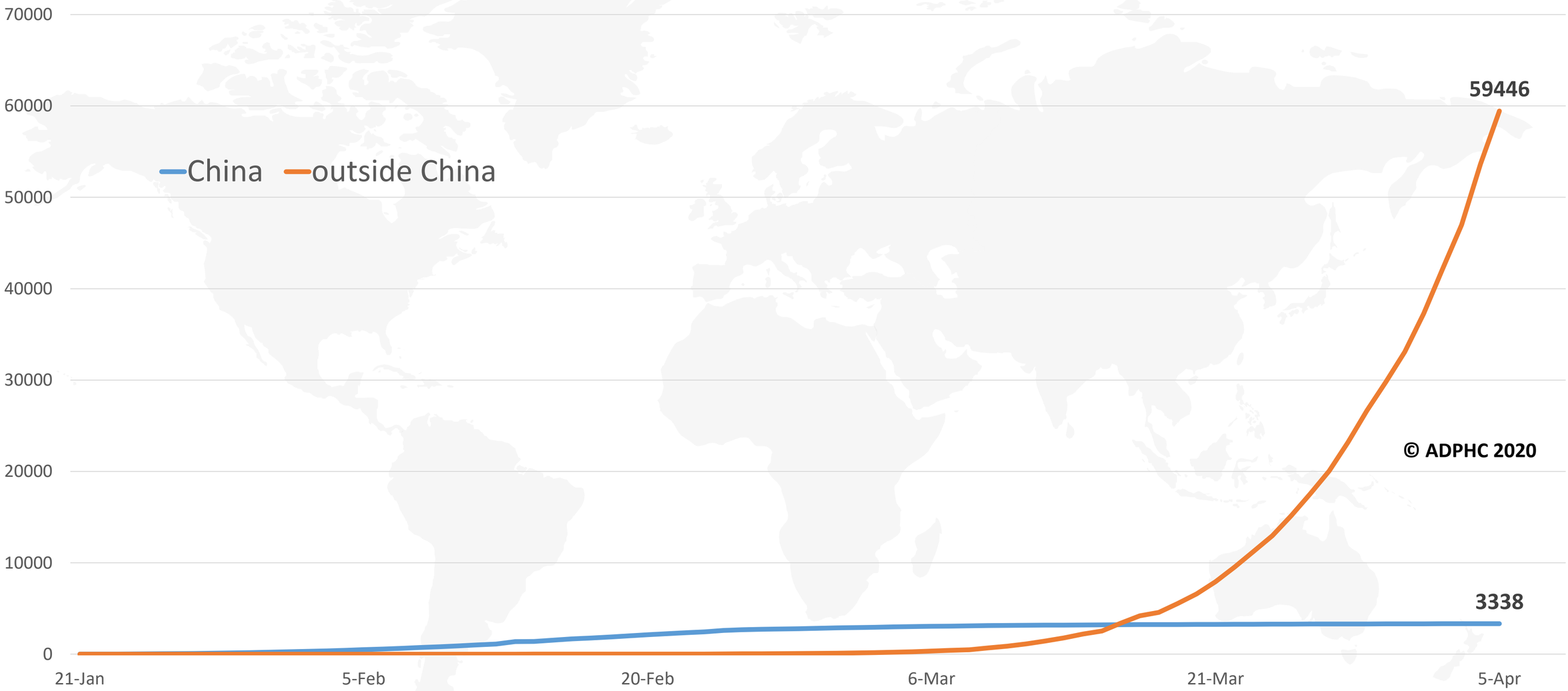
Figure 4: Total number of COVID-19 infected and recovered cases in UAE over time



Line graph published by Abu Dhabi Public Health Center 2020.
Data resources: WHO, : John Hopkins University

Epidemiology

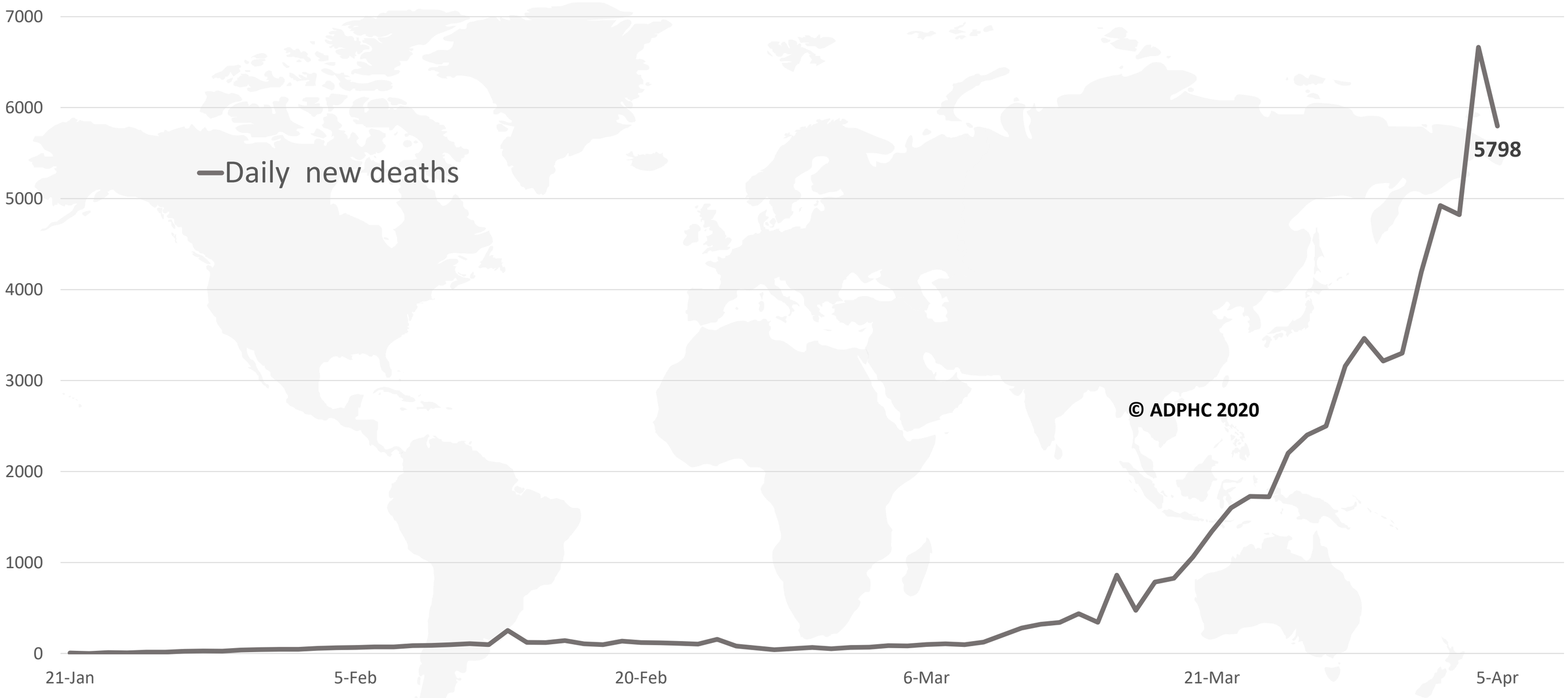
Figure 5: Total number of death due to COVID-19 reported by China and the rest of the world (January 21 to April 5th, 2020).



Line graph published by Abu Dhabi Public Health Center 2020.
Data resources: WHO

Epidemiology

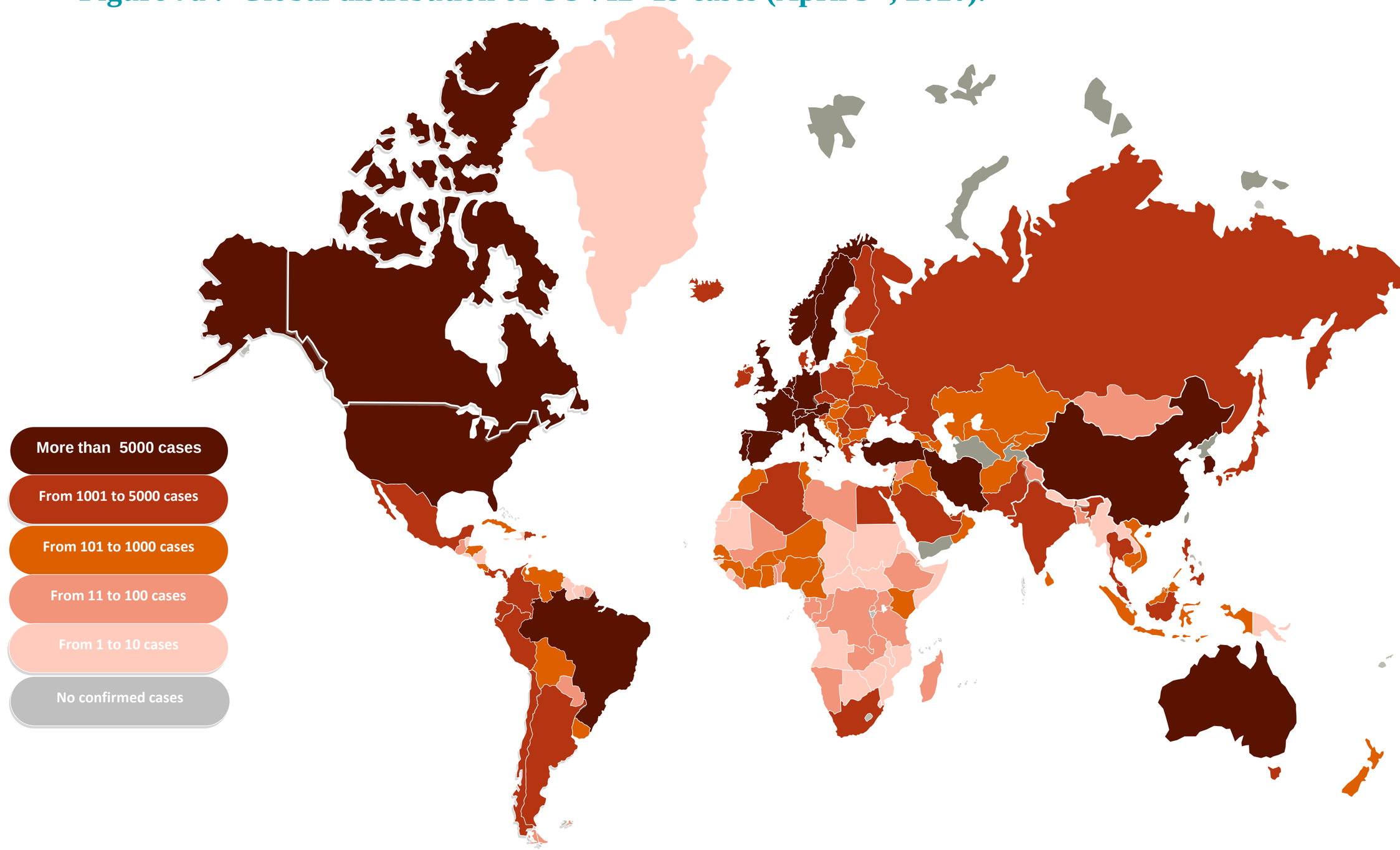
Figure 6: Global daily new deaths due to COVID-19 (January 21 to April 5th, 2020).



Line graph published by Abu Dhabi Public Health Center 2020.
Data resources: WHO

Epidemiology

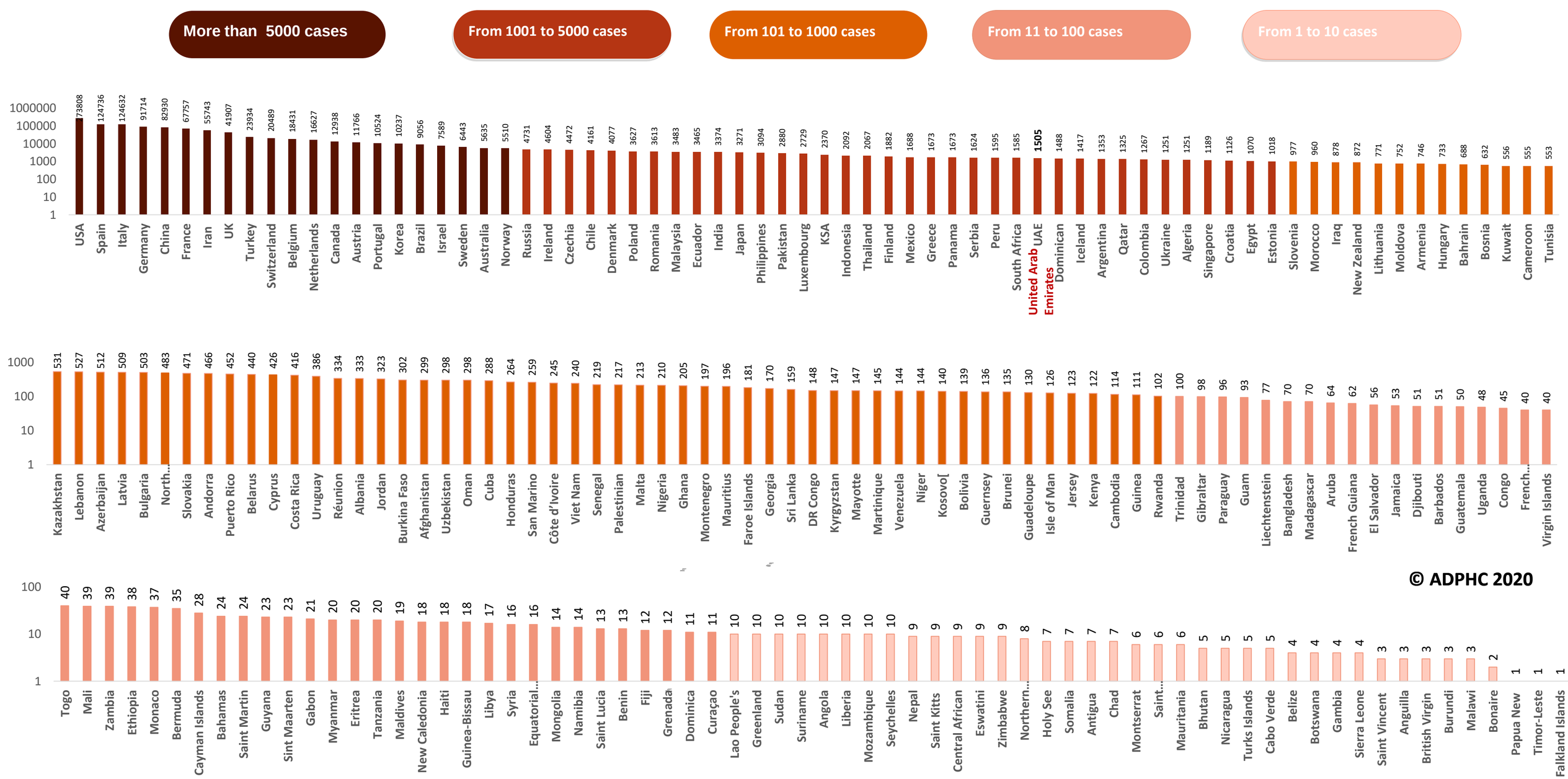
Figure 7a : Global distribution of COVID-19 cases (April 5th, 2020).



Map chart published by Abu Dhabi Public Health Center 2020.

Epidemiology

Figure 7B: Bar chart illustrate the global distribution of COVID19 cases April 5th, 2020)

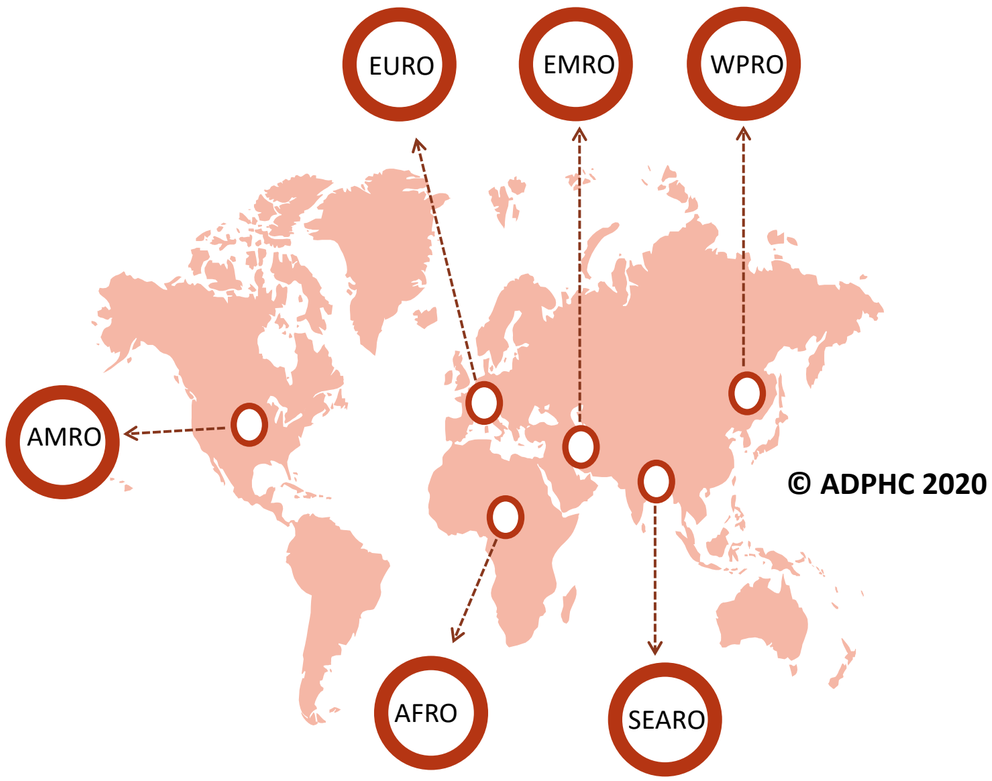


Map chart published by Abu Dhabi Public Health Center 2020.

Data resources: WHO

Epidemiology

Figure 8: illustrate the Global distribution of COVID19 cases per region (April 5th, 2020)



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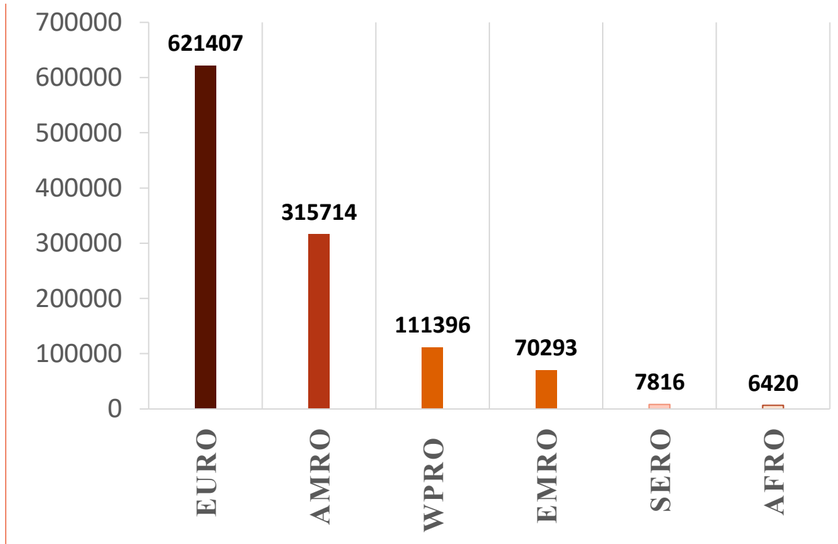
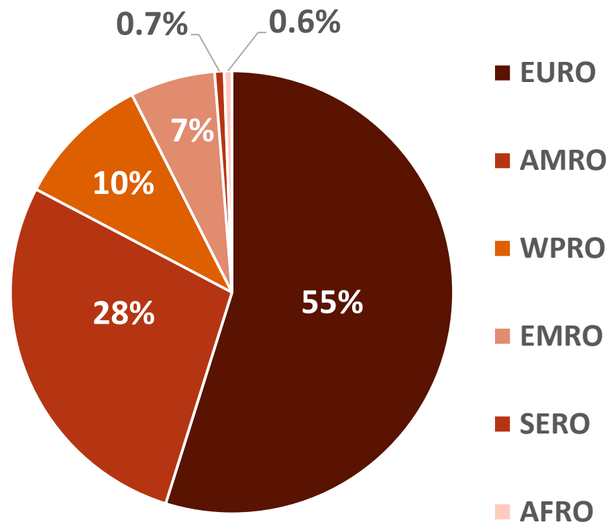
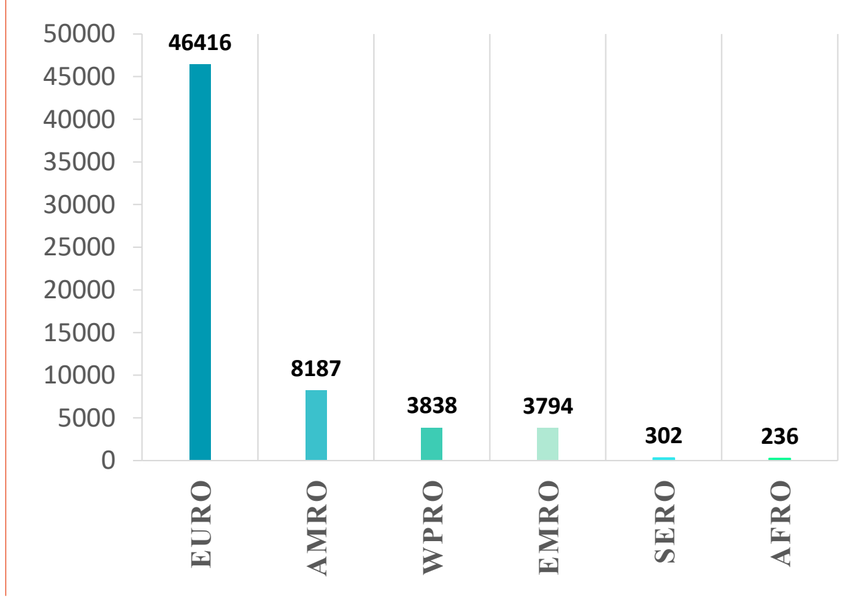
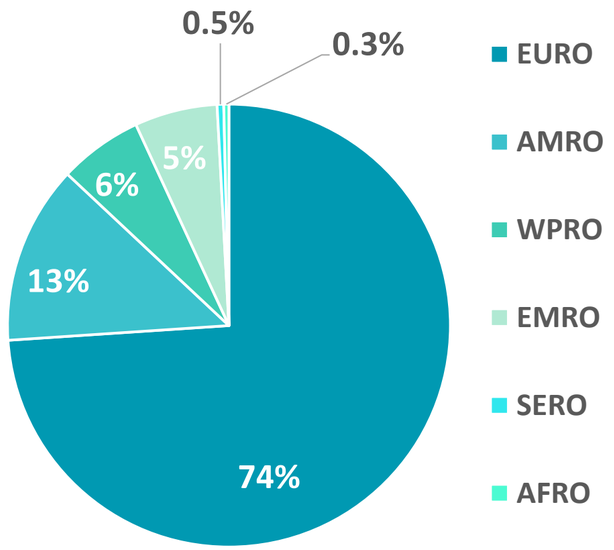
INFECTED





DEATH



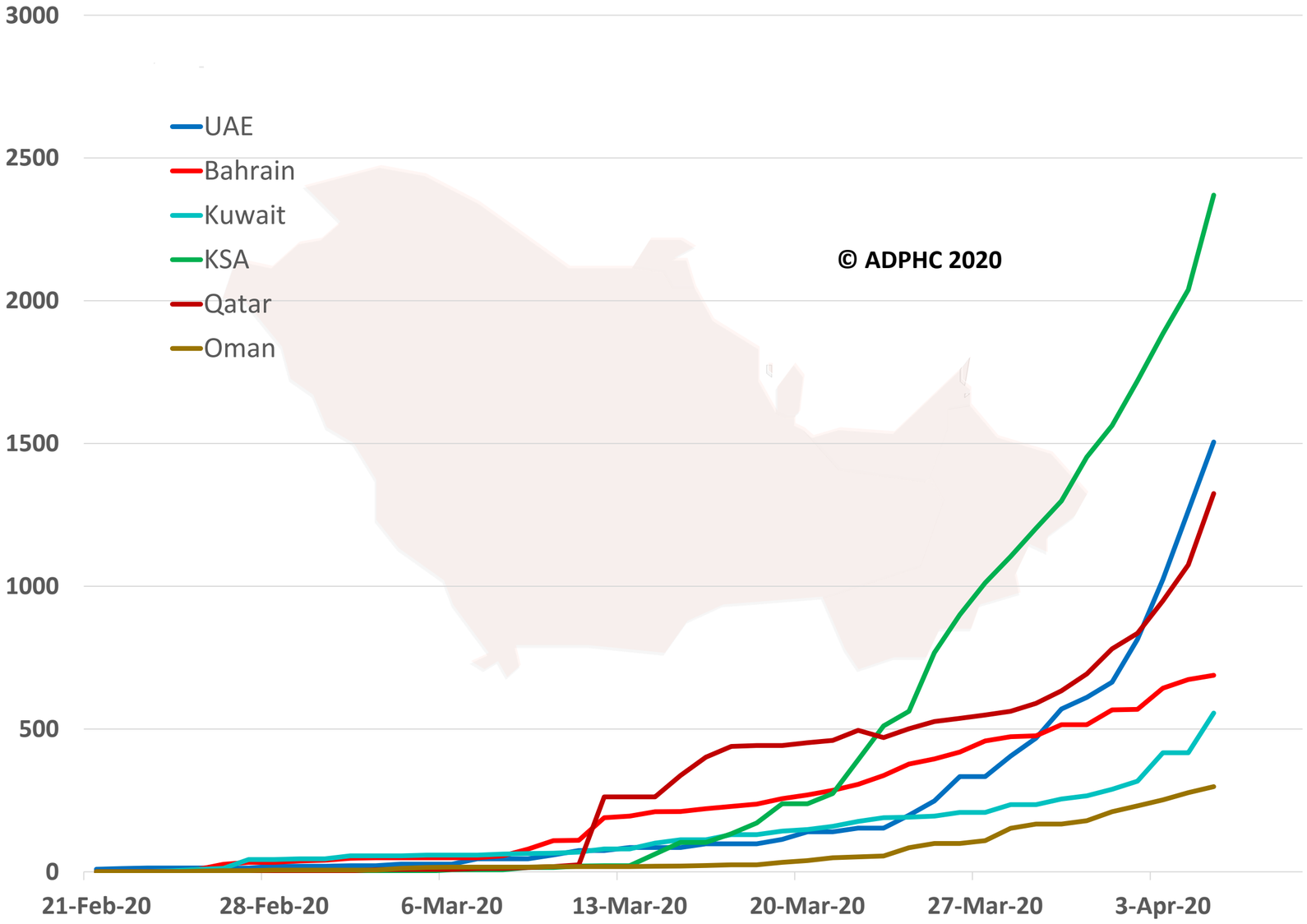


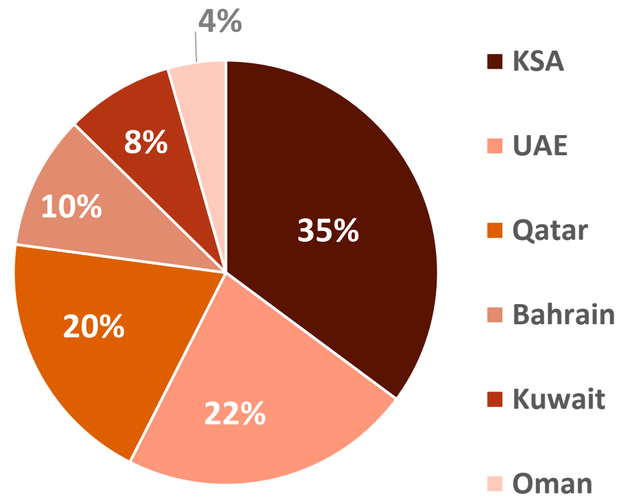
Map chart published by Abu Dhabi Public Health Center 2020.
Data resources: WHO

Epidemiology

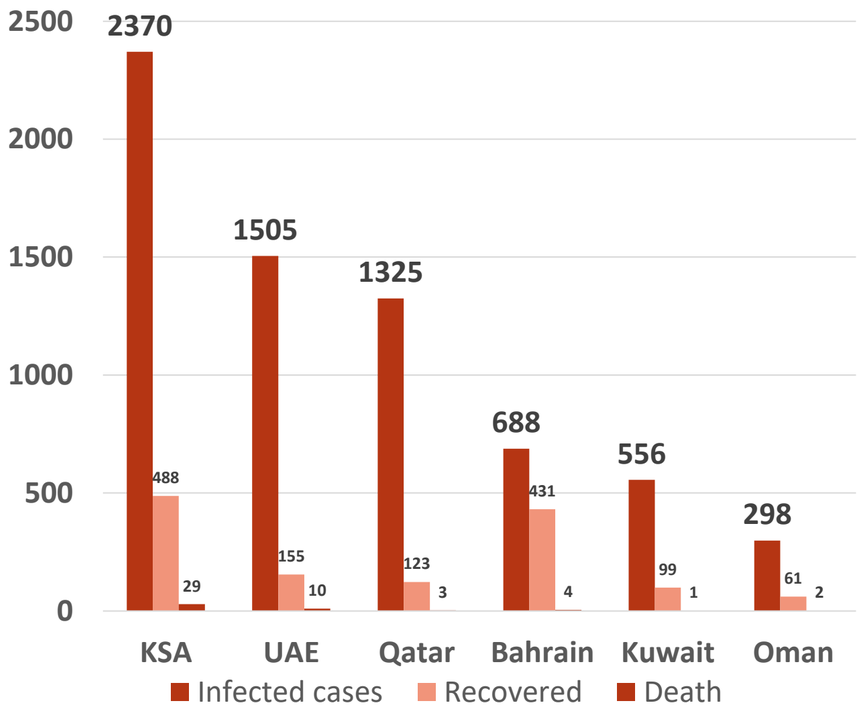
Figure 9: Comparative analysis of the distribution of COVID19 cases in GCC countries (April 5th, 2020)

TOTAL NUMBER OF INFECTED CASES





Total number of infected, recovered and Deaths



Map chart published by Abu Dhabi Public Health Center 2020.

Data resources: WHO

Vaccine :

Article 1: Microneedle array delivered recombinant coronavirus vaccines: Immunogenicity and rapid translational development

Published: April 2. 2020 by the Lancet

This article was summarized by subject matter expert

Summary:

This study reports the rapid development and efficacy of two adenoviral-based recombinant vaccines delivered using the novel dissolvable microneedle arrays (MNA) technology against two human coronaviruses for which currently no vaccine is available: the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The trimeric vaccine design in this study induced effective and enduring targeted immune responses in mice. Furthermore, compared to classical subcutaneous injections, the MNA-delivery of the vaccines generated better and more robust immune responses against both viruses, suggesting that MNA delivery is more effective than subcutaneous injections. MNAs are one of the most **promising transdermal drug delivery systems** developed and have the advantage of being minimally-invasive due to their intracutaneous nature and ability to bypass metabolism. The vaccine work by the authors against MERS-CoV was initiated much earlier, but the start of the COVID-19 pandemic prompted the authors to quickly adapt the technology to create a similar vaccine for SARS-CoV-2, within 4 weeks of the identification of SARS-CoV-2 S1 sequence. The Vaccine elicit antibody specific immunogenically response after two weeks from receiving immunization

Article 1 : Cont.,

Summary:

Conclusions:

Development of coronavirus vaccines based on the protein called spike protein subunit of the virus is a promising strategy that generates effective immune responses. The ongoing experience of the authors in the development of an MNA-based MERS-S1 subunit vaccine **was instrumental in facilitating rapid design and creation of an effective and potent vaccine** against SARS-CoV-2. Together, their work suggests that **MNA-delivered recombinant subunit vaccines** design should be **used not only for the development of vaccines** against SARS, MERS, COVID-19, **but also other emerging infectious diseases**. It also shows how advances in recombinant DNA technology and vaccine delivery strategies can **facilitate expedited "design, production, and testing" of vaccines** against emerging infections".

Treatment :

Article 2: The FDA-approved Drug Ivermectin inhibits the replication of SARS-CoV-2 *in vitro*
Published: April 3,2020 by Elsevier

Summary:

- **Ivermectin** is an FDA-approved broad spectrum anti-parasitic agent that in recent years, along with other groups, have shown to have anti-viral activity against a broad range of viruses *in vitro*.
- ***Invermectin is used to treat*** head lice, scabies and many other infection.
- **The researcher in this study** infected 57 cells with SARS-CoV-2 isolate, followed by the addition of 5 mM ivermectin. Then cells content were harvested at days 0-3 and analyzed by RT-PCR for the replication of SARS-CoV-2 RNA.

Findings:

- At 24 h, there was **a 93% reduction in viral RNA** present in the infected cells.
- By **48h this effect increased to an ~5000-fold reduction of viral RNA in IVERMECTIN**-treated compared to control samples, indicating that **IVERMECTIN TREATMENT RESULTED IN THE EFFECTIVE LOSS OF ESSENTIALLY ALL VIRAL MATERIAL BY 48 H.**
- No further reduction in viral RNA was observed at 72 h.
- **No toxicity of ivermectin was observed** at any of the time points tested

Conclusion:

- IVERMECTIN has antiviral action against the SARS-CoV-2 **clinical isolate *in vitro***, with a **single dose able** to control viral replication **within 24-48 h in our system**.
- Ultimately, development of an effective anti-viral for SARS-CoV-2, if given to patients early in infection, could **help to limit the viral load, prevent severe disease progression and limit person-person transmission**.
- The critical next step in further evaluation for possible benefit in COVID-19 patients will be to examine a multiple addition dosing regimen that mimics the current approved usage of ivermectin **in humans.**

Epidemiology :

Article 3: Impact of school closures for COVID-19 on the US health-care workforce and net mortality: a modelling study

Published: April 3, 2020 by the Lancet

Summary:

- This study aimed to estimate the child-care obligations induced by school closures on the United States (US) health-care labor force.
- **model estimates that if the infection mortality rate of COVID-19 increases from 2·00% to 2·35% when the health-care workforce declines by 15·0%, school closures could lead to a greater number of deaths than they prevent.**
- US health-care sector has some of the highest child-care obligations with **28.8% of the health-care workers need to provide care for children between 3 and 12 years.** A **15.0% of the health-care** workers would still be in need of child care during school closures. The highest proportion of health-care workers with **unmet child-care obligations** was estimated to be **among nurse practitioners** (22.3%), followed by **physician assistants** (20.5%) and **diagnostic-related technologists and technicians** (19.2%).

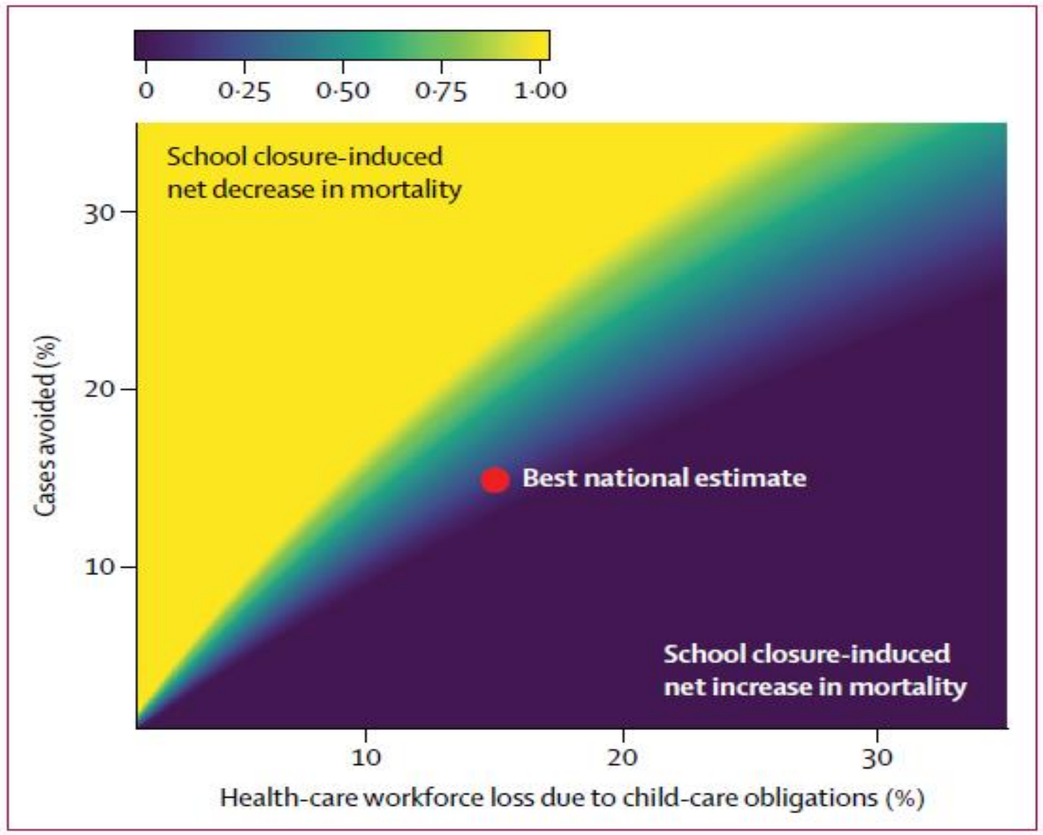


Figure 2: Critical level of life-saving effectiveness of health-care workers that would lead school closures to contribute to greater COVID-19 mortality

Epidemiology :

Article 3: **Cont.,**

Summary:

Conclusion:

- In some scenarios, closing schools is likely to be sensible. Policy makers and advisers need to understand that school closures might have serious unintended downstream effects on the health-care system, and substantial uncertainty exists about the effectiveness of school closures for preventing infection beyond schoolchildren.
- What we know about distancing policies is based largely on models of influenza in which children are a vulnerable group for morbidity. However , available studies in COVID19 emphasized that children do not appear to be a sensitive group to COVID-19, and preliminary data on COVID-19 suggest that children are a small fraction of cases and might be less vulnerable than older adults

	Sample size in CPS (number of records)	Workers with children aged 3–12 years	Workers unable to meet child-care obligations with non-working adult or older sibling	Single-parent workers	Number of workers (thousands)
Nurse practitioners	2165	32·6% (30·3–34·8)	22·3% (20·4–24·3)	2·4% (1·7–3·2)	220 (209–230)
Physician assistants	1154	29·9% (27·1–32·8)	20·5% (18·1–23·0)	3·2% (2·1–4·4)	133 (124–141)
Diagnostic-related technologists and technicians	3472	30·1% (28·3–31·8)	19·2% (17·7–20·7)	4·8% (4·0–5·7)	348 (335–362)
Nurse anaesthetists	322	35·4% (29·4–41·5)	18·9% (14·0–23·8)	2·9% (0·7–5·1)	29 (26–33)
Medical assistants	5176	35·2% (33·7–36·7)	17·8% (16·7–19·0)	10·6% (9·6–11·5)	578 (561–596)
Physicians and surgeons	9827	29·9% (28·9–30·9)	15·6% (14·8–16·5)	1·6% (1·3–1·9)	1018 (996–1040)
Registered nurses	31370	27·6% (27·1–28·2)	15·0% (14·6–15·5)	4·9% (4·6–5·2)	3154 (3120–3189)
Emergency medical technicians and paramedics	1810	23·7% (21·5–25·8)	14·6% (12·8–16·4)	4·6% (3·6–5·6)	198 (188–208)
Medical records and health information technicians	1747	26·8% (24·4–29·1)	13·9% (12·1–15·8)	6·1% (4·8–7·4)	170 (161–179)
Clinical laboratory technologists and technicians	3105	25·5% (23·8–27·3)	13·8% (12·4–15·2)	5·5% (4·5–6·4)	317 (305–330)
Licensed practical and licensed vocational nurses	6346	29·3% (28·1–30·6)	13·8% (12·8–14·8)	9·7% (8·9–10·6)	667 (648–685)
Other health-care practitioners and technical occupations	1328	27·0% (24·3–29·7)	13·6% (11·6–15·7)	3·0% (1·9–4·0)	137 (128–145)
Medical scientists	1634	26·0% (23·6–28·5)	13·4% (11·6–15·3)	2·4% (1·6–3·2)	168 (159–177)
Health diagnosing and treating practitioners, all other	341	23·9% (18·8–28·9)	12·8% (8·8–16·8)	4·2% (2·1–6·3)	35 (31–39)
Nursing, psychiatric, and home health-care aides	1885	31·6% (30·8–32·4)	12·8% (12·2–13·3)	14·7% (14·1–15·4)	1998 (1967–2029)
Medical and health services managers	6448	25·3% (24·1–26·5)	12·8% (11·9–13·7)	4·8% (4·2–5·5)	644 (627–662)
Health practitioner support technologists and technicians	6291	26·8% (25·6–28·1)	12·4% (11·5–13·4)	8·3% (7·6–9·1)	671 (653–690)
Respiratory therapists	990	27·2% (24·0–30·3)	12·2% (9·9–14·6)	4·3% (2·9–5·7)	108 (100–115)
Miscellaneous community and social service specialists, including health educators and community health workers	830	22·3% (19·0–25·6)	10·9% (8·6–13·3)	5·9% (4·2–7·7)	75 (69–81)
Recreational therapists	99	11·7% (4·7–18·8)	3·7% (0–7·8)	3·8% (0–8·1)	10 (8–12)

Data are % (95% CI) unless otherwise specified. CPS=US Current Population Survey.

Table: **Child-care obligations by health-care profession**