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Scientific Research Monitoring on COVID-19

13 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

- **Diagnosis :** Article mentions that reliable antibody testing for COVID19 is not yet available.
- **Clinical feature and transmission:** A study compares between blood type susceptibility to acquire infection in china showed a type A have higher risk while type O have a lower risk.
- **Treatment:** an article that discusses the regulator split on antimalarial drugs.
- **Treatment:** a new pathway discovered that clot formation in the lung attributed to the death of few cases in the US. These finding suggest a new treatment approach towards treating the clot formation process rather than the virus pathogen alone.

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. **Covid-19: the crisis of personal protective equipment in the US**
2. **The doctors navigating covid-19 with no internet**
3. **Delayed access or provision of care in Italy resulting from fear of COVID-19**

WHO daily report

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WHO daily report 12.April 2020

- No new country/territory/area reported cases of COVID-19 in the past 24 hours.
- The total global deaths from COVID-19 has surpassed 100 000.
- WHO has published a document ‘Target Product Profiles for COVID-19 Vaccines’. The document describes the preferred and minimally acceptable profiles for human vaccines for long term protection of persons at high risk of COVID-19 infection, such as healthcare workers; and for reactive use in outbreak settings.

Epidemiology

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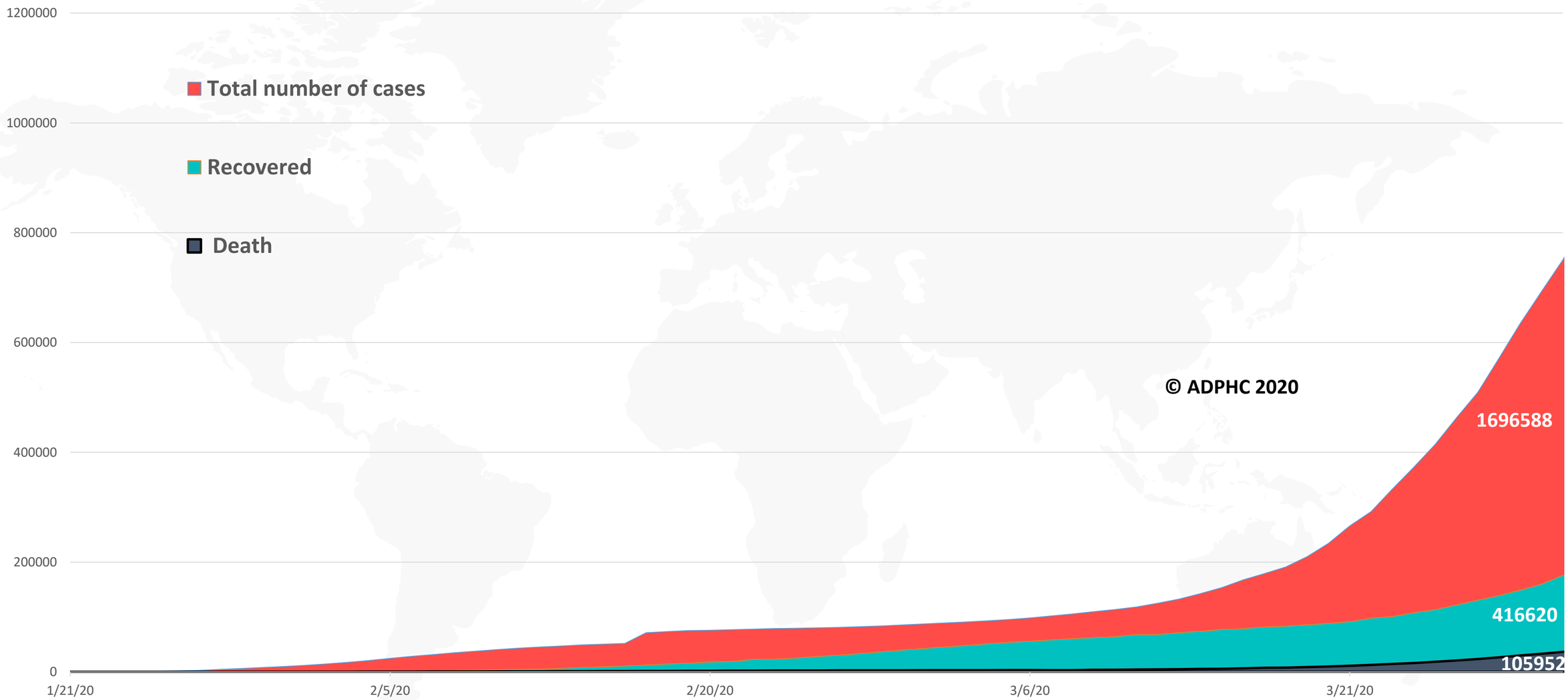
Figure 1: Total number of infected, recovered , and death cases (January 21st to April 12th , 2020)

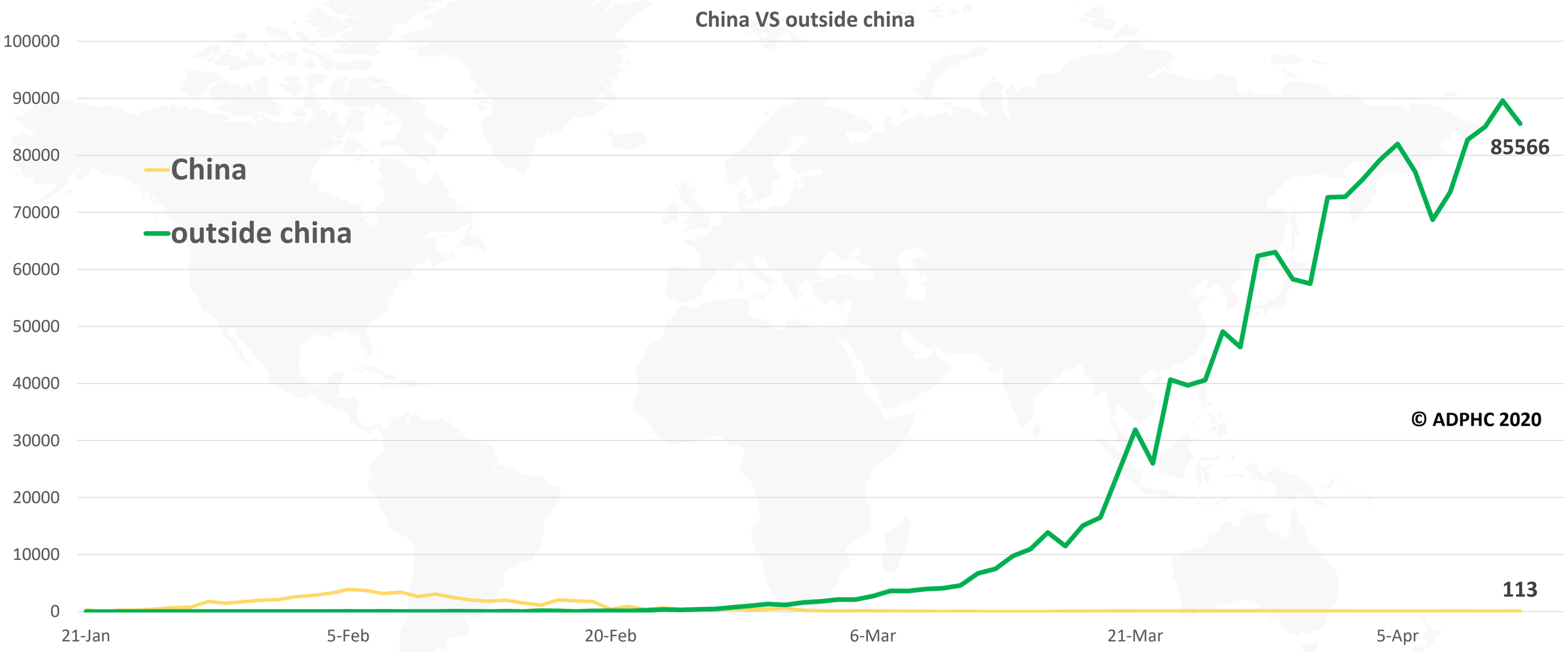


Line graph published by Abu Dhabi Public Health Center 2020.

Data resources: WHO, : John Hopkins University

Epidemiology

Figure 2: Daily new infected COVID-19 cases reported between (January 21 to April 12th, 2020).



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

Epidemiology

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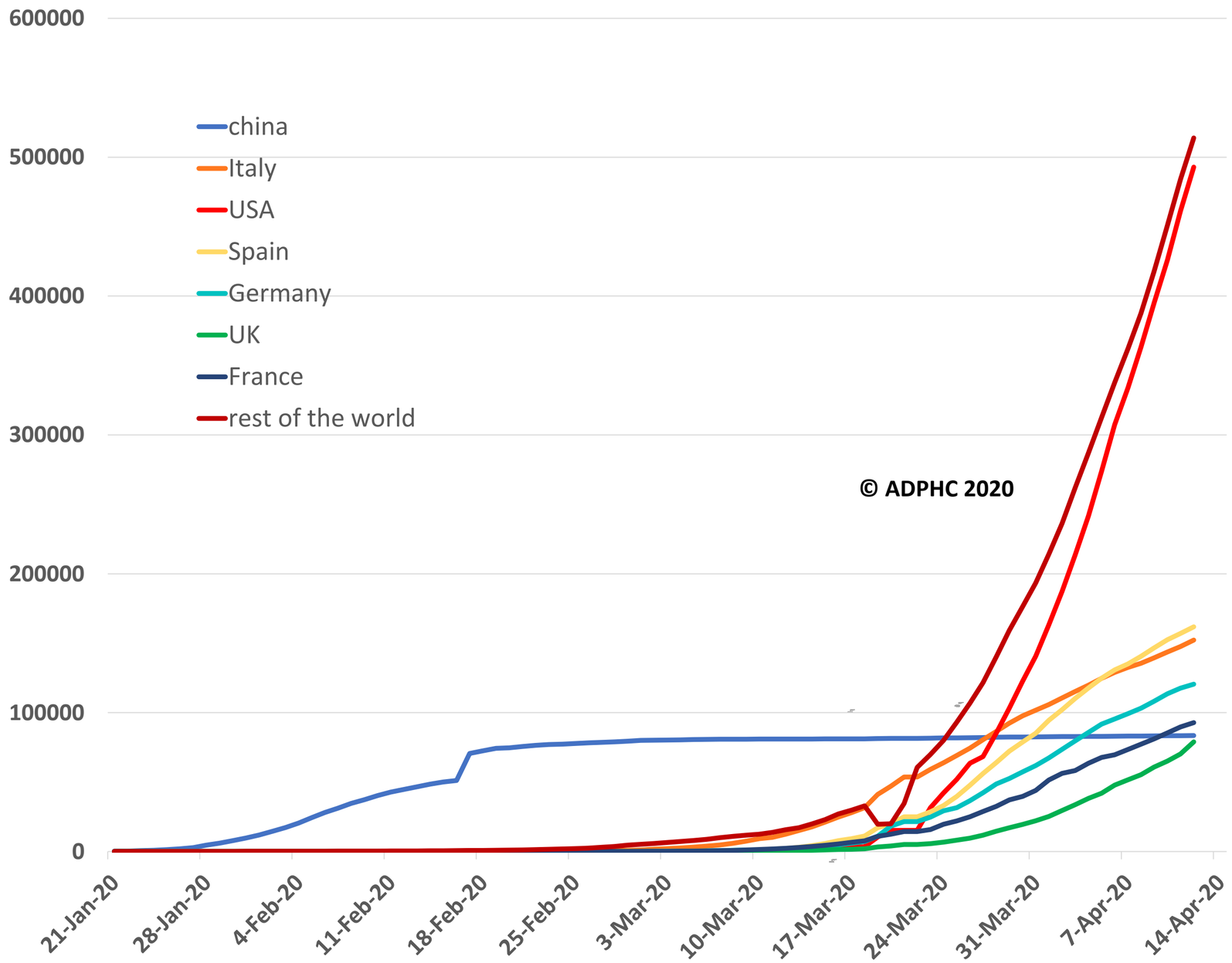
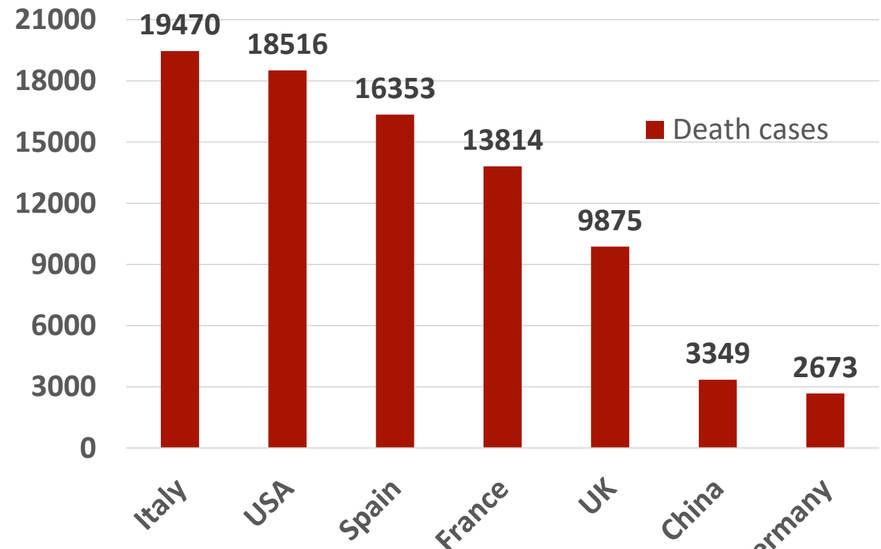
Figure 3 : Top 7 countries in the total number of cases due to COVID-19 (January 21 to April 12th, 2020).



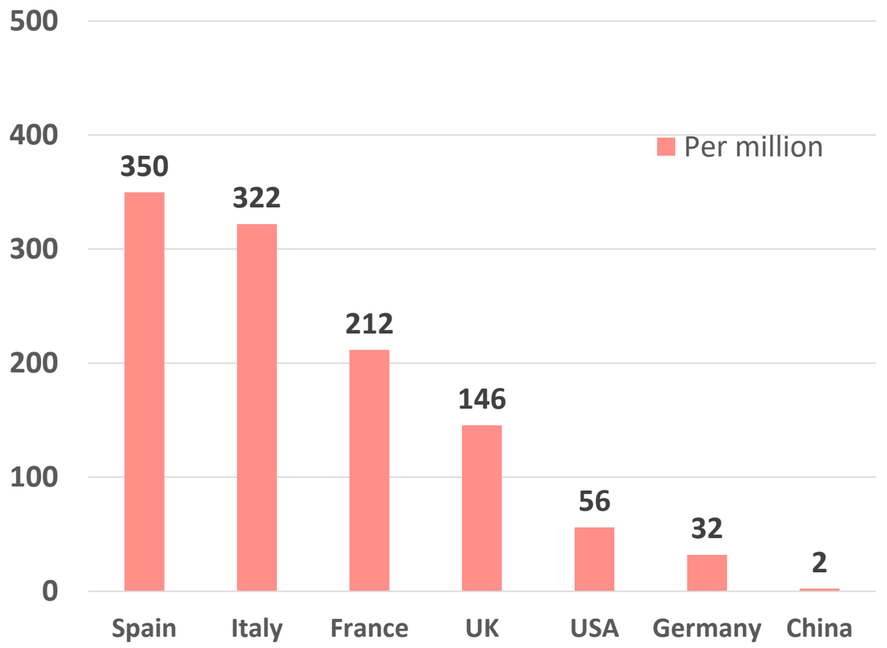
Line graph published by Abu Dhabi Public Health Center 2020.

Data resources: WHO

TOTAL DEATHS

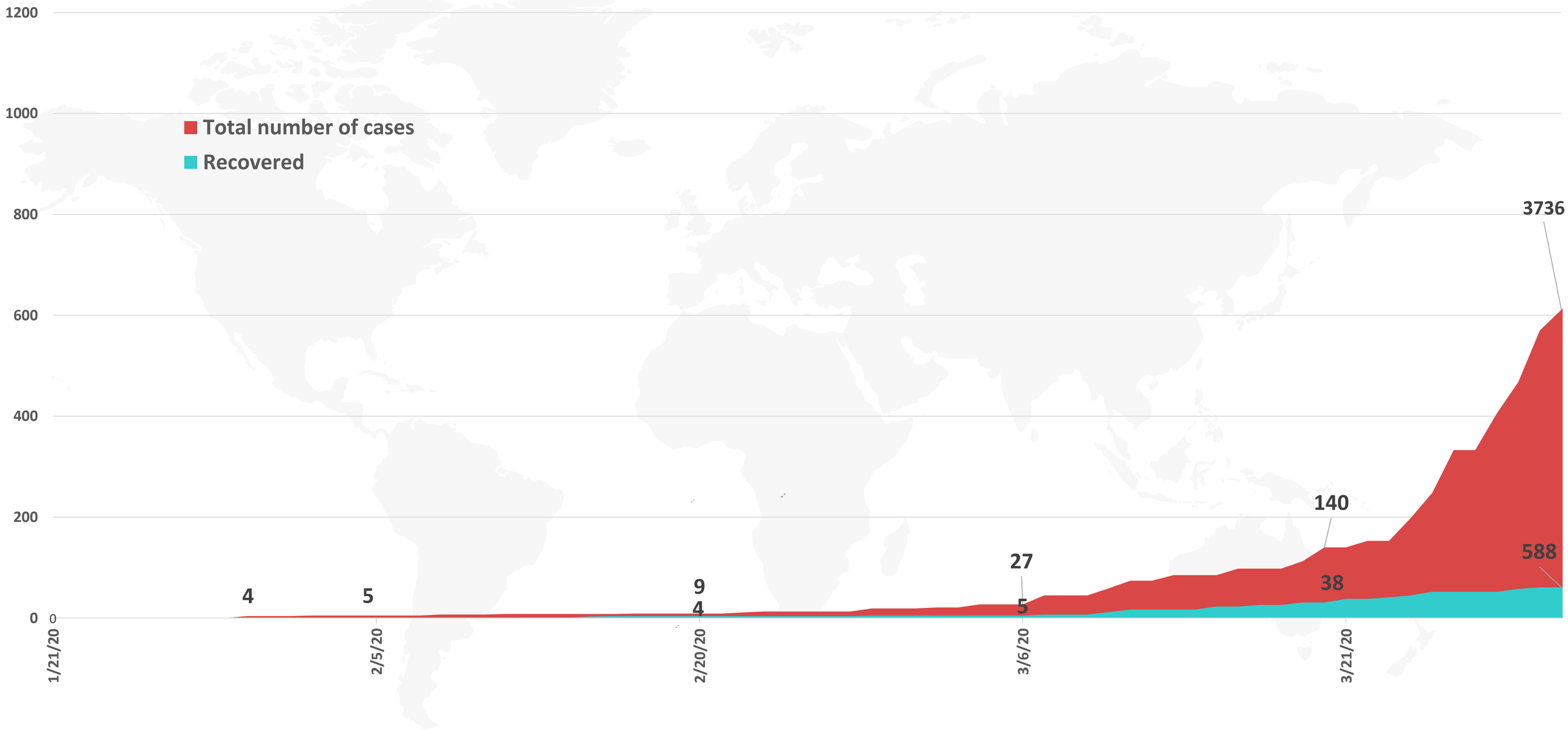


DEATHS PER MILLION



Epidemiology

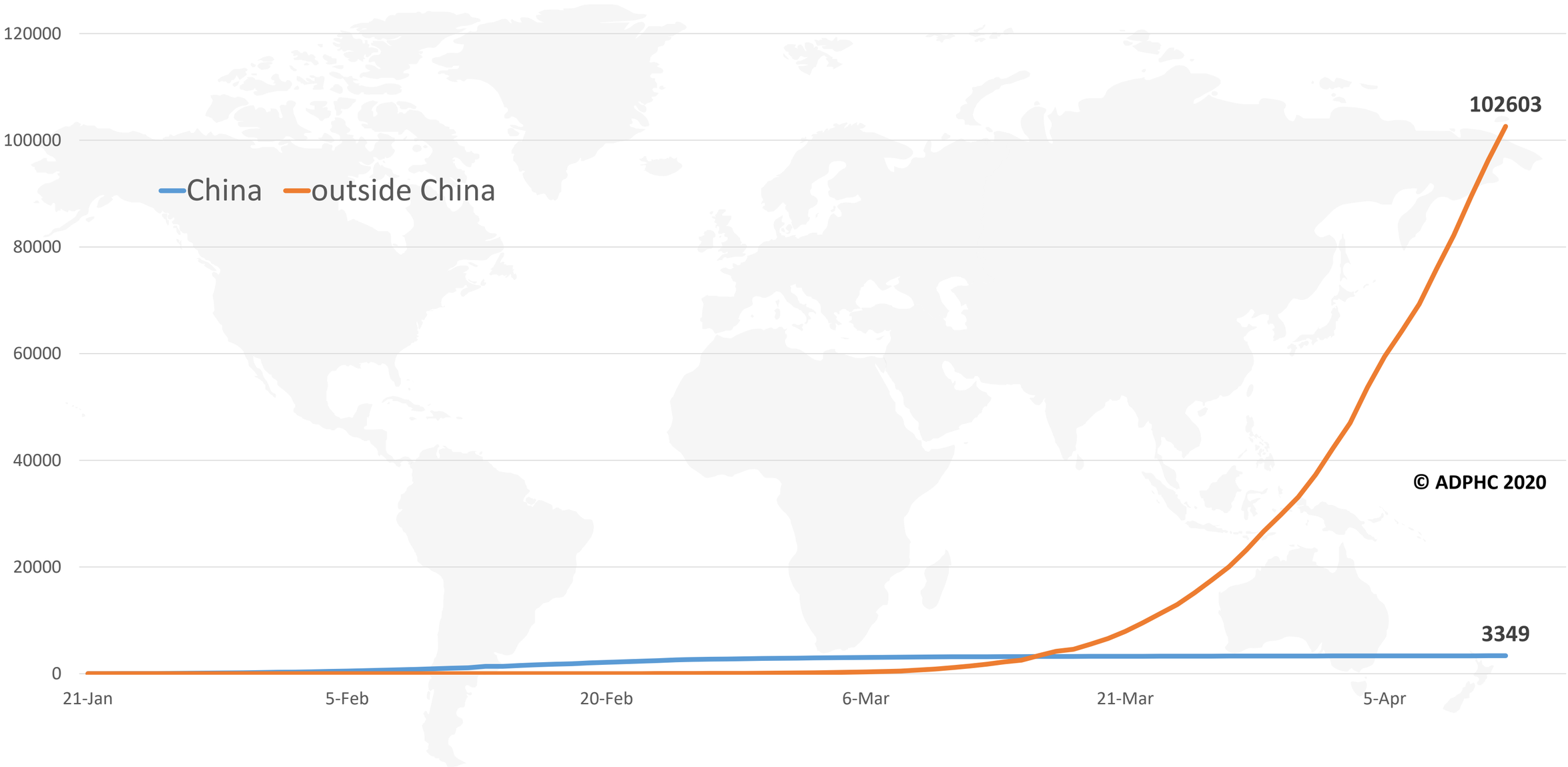
Figure 4: Total number of COVID-19 infected and recovered cases in UAE over time



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

Epidemiology

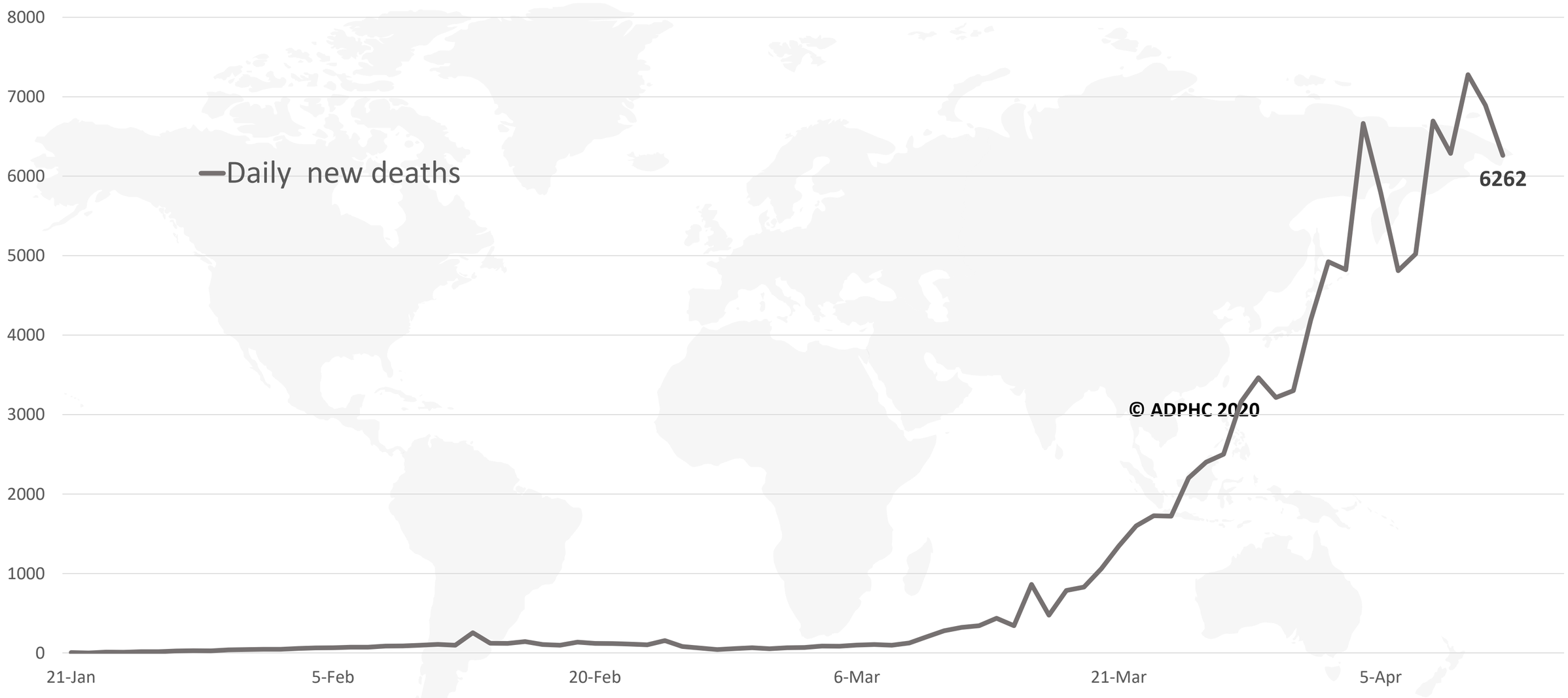
Figure 5: Total number of death due to COVID-19 reported by China and the rest of the world (January 21 to April 12th, 2020).



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

Epidemiology

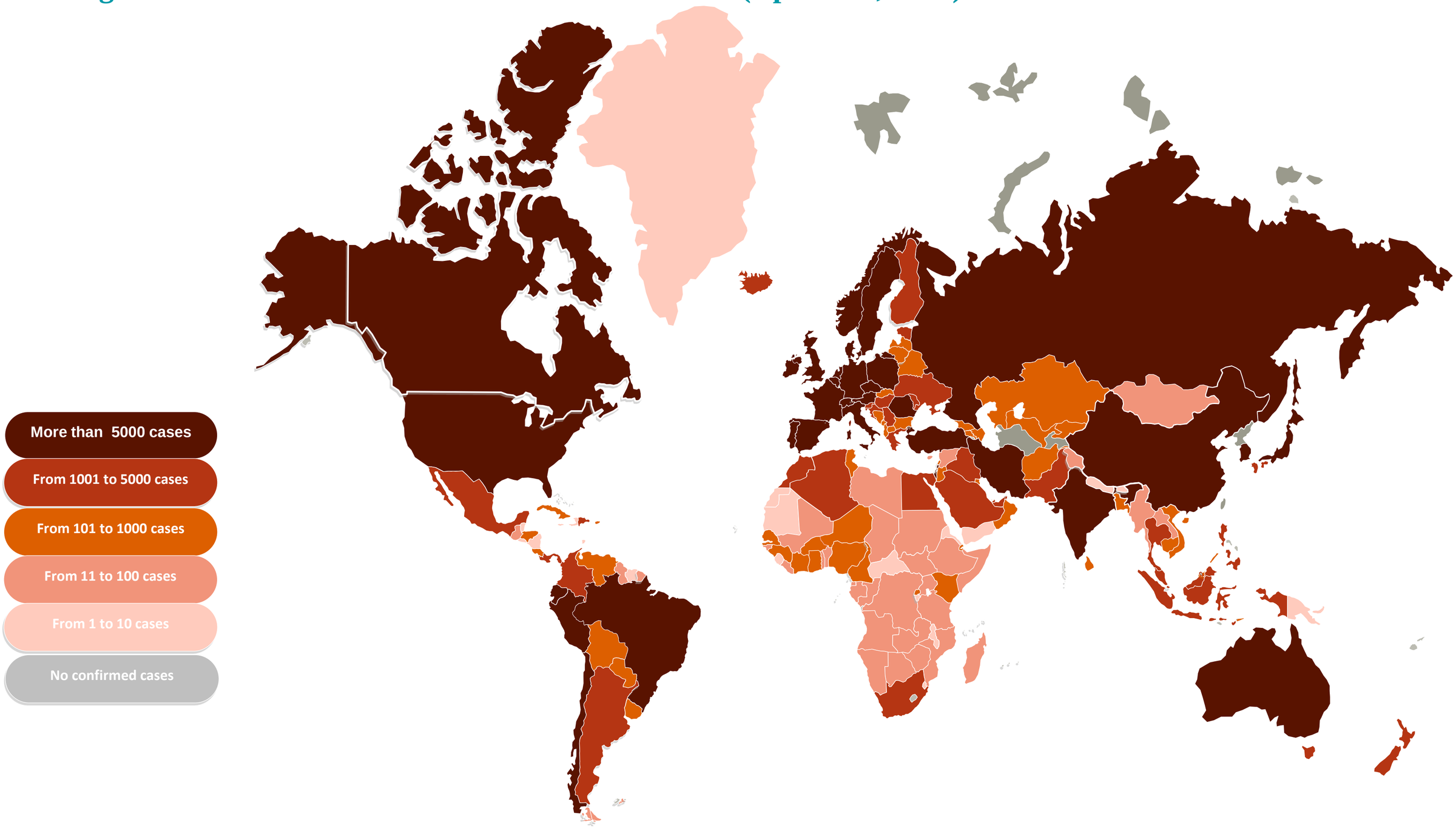
Figure 6: Global daily new deaths due to COVID-19 (January 21 to April 12th, 2020).



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

Epidemiology

Figure 7a : Global distribution of COVID-19 cases (April 12th, 2020).



Map chart published by Abu Dhabi Public Health Center 2020.

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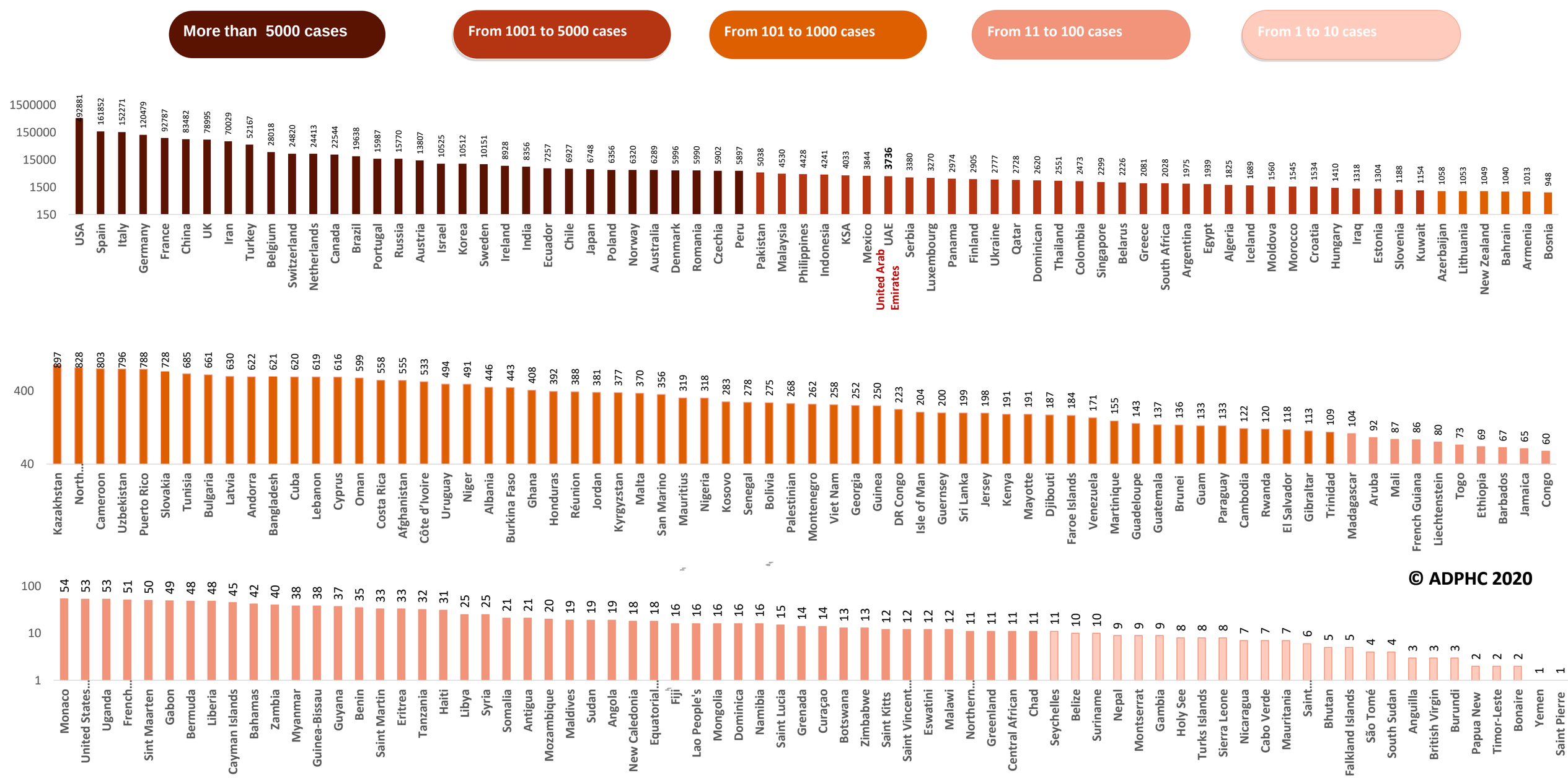
Figure 7B: Bar chart illustrate the global distribution of COVID19 cases April 12th, 2020)



Map chart published by Abu Dhabi Public Health Center 2020.

Data resources: WHO

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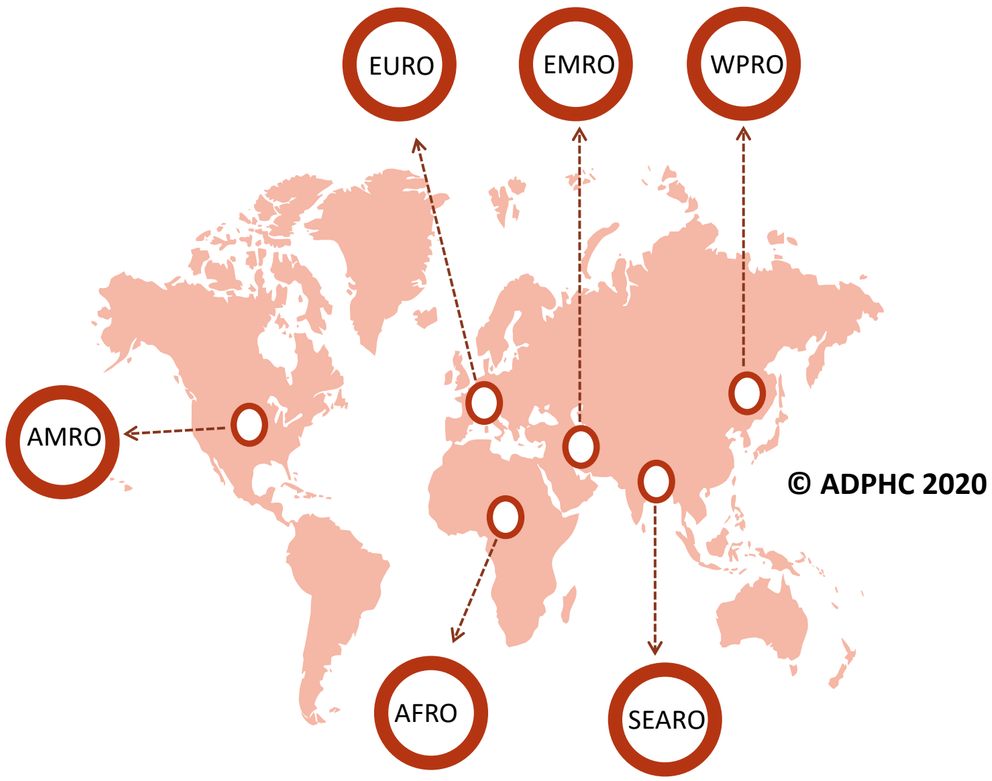
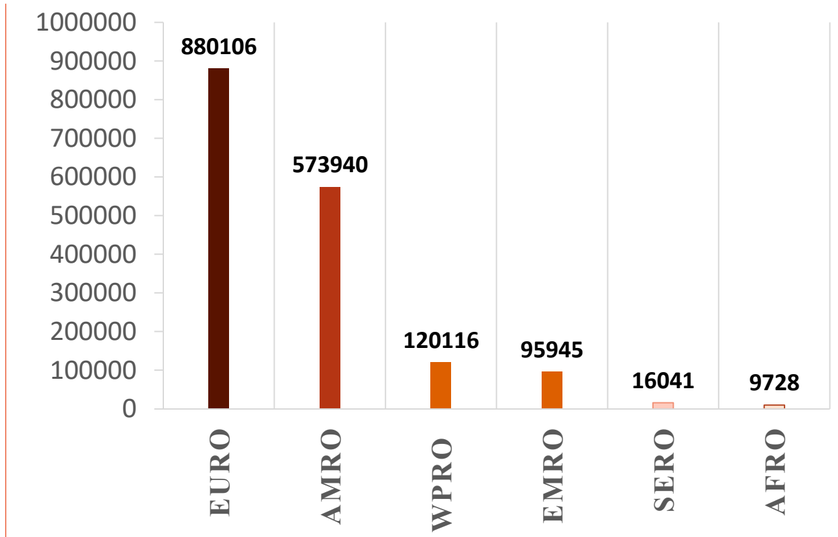
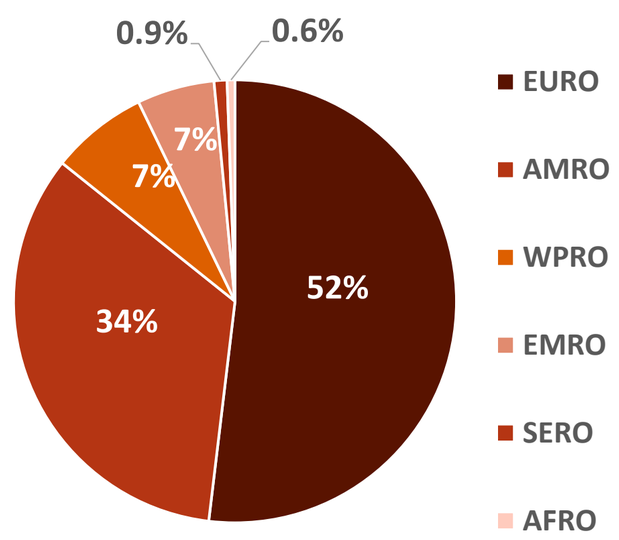
Figure 8: illustrate the Global distribution of COVID19 cases per region (April 12th, 2020)



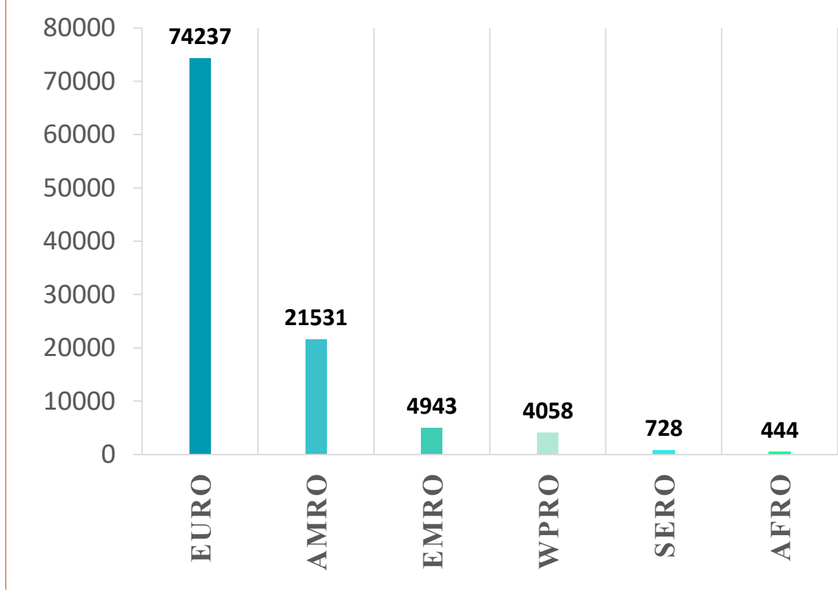
Map chart published by Abu Dhabi Public Health Center 2020.
Data resources: WHO

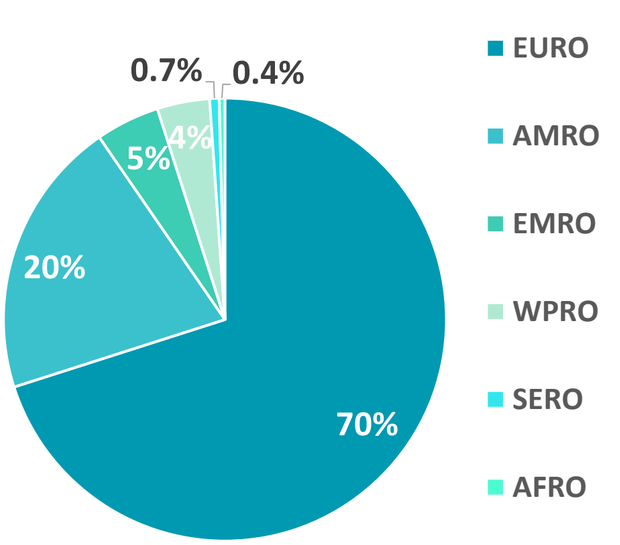
INFECTED





DEATH

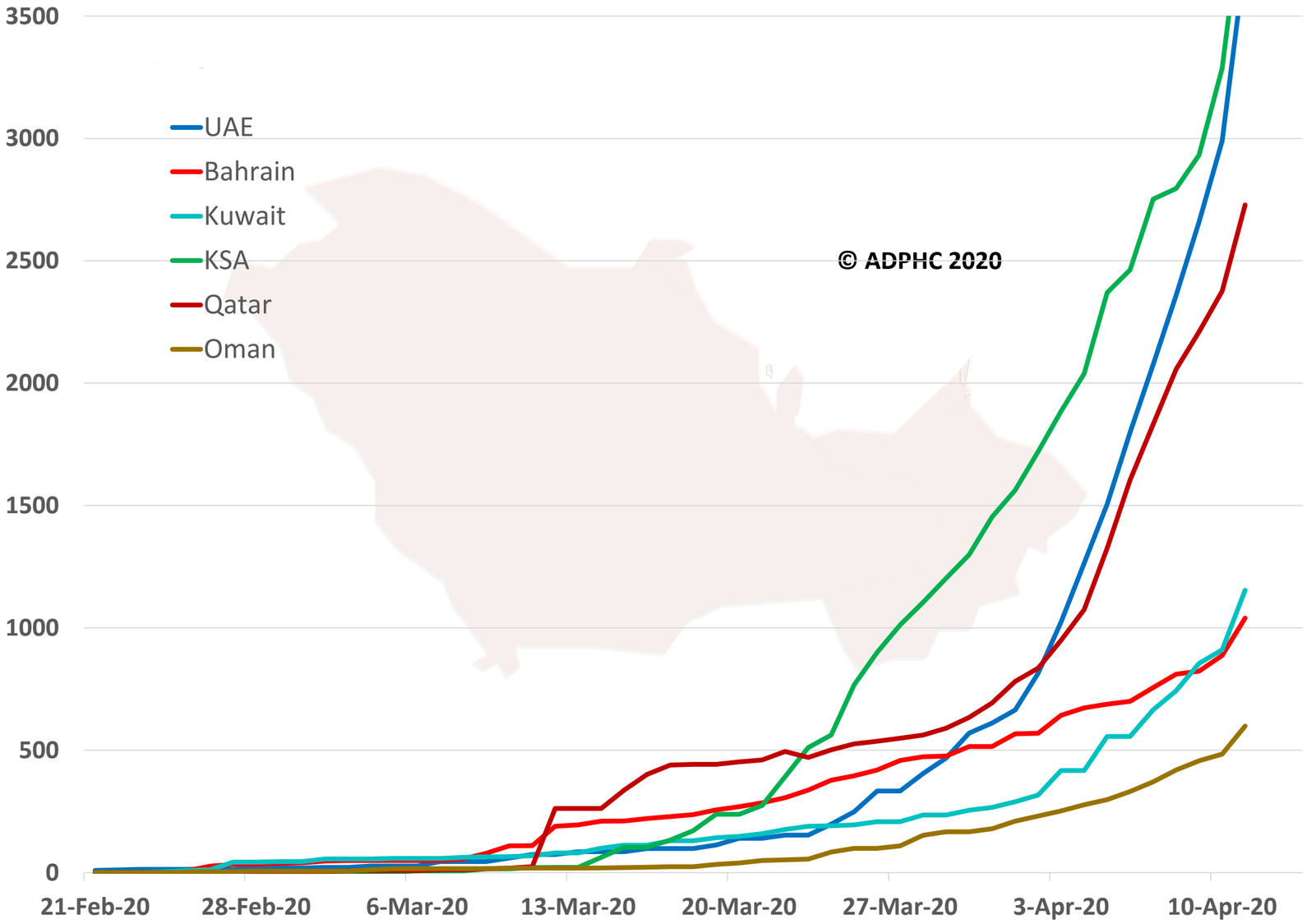


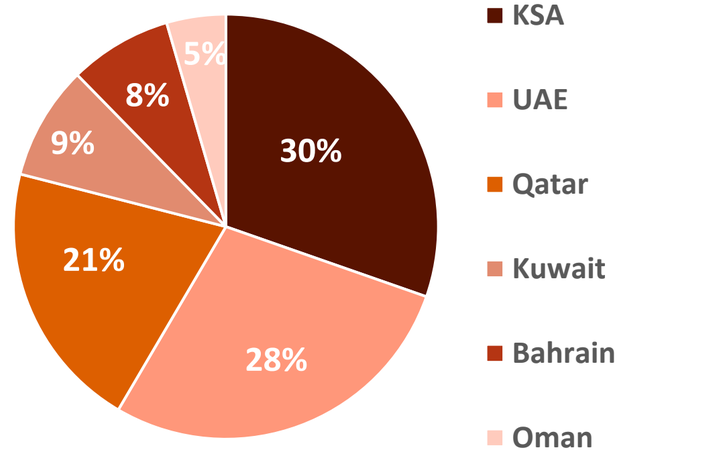


Epidemiology

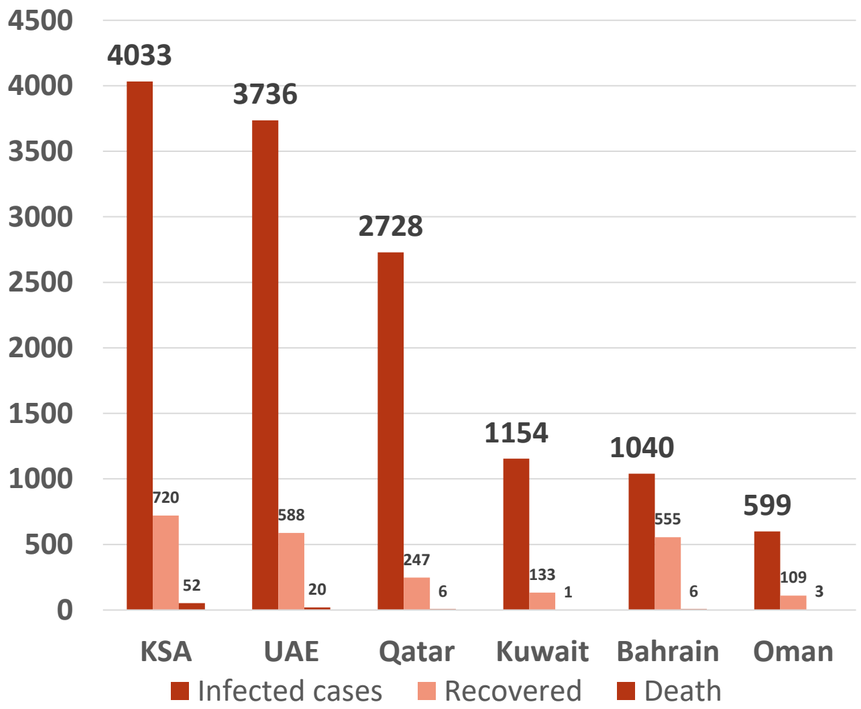
Figure 9: Comparative analysis of the distribution of COVID19 cases in GCC countries (April 12th, 2020)

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

Public Health Response:

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Article 1 : Covid-19: Antibody tests will not be rolled out in UK until at least May
Published: April 09 2020, The BMJ.
Link: Summary:

This is a commentary article and new on UK antibody testing

Background

- The UK government set itself a target to do 100,000 daily COVID-19 tests until end of April through
  - PCR: presence of virus
  - Serology: presence of antibodies

What is a serological (Antibody) test?

- In response to a pathogen (e.g., novel coronavirus), there is a response from immune system by producing special proteins called “antibodies”.
- People who got sick and recovered from COVID-19 have these antibodies, as do those who had the virus without ever experiencing symptoms.
- Some antibody tests, which require a quick finger prick, can return results in as soon as 15 minutes.
- Antibody tests help health officials better understand how many people have been infected with COVID-19.
- The test helps to understand how widely the virus has spread in the population.

Potential use of antibody test

- The test will identify people with immunity to COVID-19.
- These people may potentially get an “Immunity Certificate” and go back to their work.

What these tests cannot do

Not helpful for diagnosing an early infection because antibodies appear in the system very late after the infection**.**

Potential challenges with COVID-19 antibody test

- In the UK, these tests are sensitive enough.
- Some of the tests may not be specific enough for COVID-19.

Current situation

Authorities around the world are working to find an accurate and reliable antibody test for COVID-19 with the hope to make it available as early as possible.

Epidemiology

Article 2 : Relationship between the ABO Blood Group and the COVID-19 Susceptibility
Published: : March 27, 2020 in Medrxiv

Article summarized by Subject Matter Expert

Summary:

- This a study compared the ABO blood group distribution in 2,173 patients with confirmed COVID-19 from three hospitals in Wuhan and Shenzhen, China with that in normal people from the corresponding regions.
- The results showed that blood group A was associated with a higher risk for acquiring COVID-19 compared with non-A blood groups, whereas blood group O was associated with a lower risk for the infection compared with non-O blood groups and lower severity. These findings are consistent with similar risk patterns of ABO blood groups for other coronavirus infection found in previous studies which found that **anti-A antibodies** inhibited SARS-CoV S protein binding to ACE2 receptor in non-A blood groups.
- However this is an early study with limitations. It would be premature to use this study to guide clinical practice at this time, but it should encourage further investigation. Limitation of this study are small number of patients, lack of information regarding sex, age and past history of comorbidities.

Conclusion:

- Possible recommendations:
- 1) People with blood group A might need particularly strengthened personal protection to reduce the chance of infection;
- 2) SARS-CoV-2-infected patients with blood group A might need to receive more vigilant surveillance and aggressive treatment;
- 3) It might be helpful to introduce ABO blood typing in the management of SARS-CoV-2 infection and COVID-19.

Public Health Response:

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Article 3 : Regulators split on antimalarials for COVID-19

Published: April 11, 2020 in the Lancet

Summary:

- **US and French authorities have authorized the use of chloroquine and hydroxychloroquine, but the EU regulator and WHO say the science doesn't support the decision.**
- However, both drugs are unproven and untested for COVID-19 and have rare but potentially deadly side-effects. The decision bypassed the usual drug approval process including double-blind, placebo-controlled clinical trials, stoking a worldwide debate about whether the drugs are appropriate for treating the disease.
- Below the authors shows the different statement and opinions in regard to these medication :

Name of the organization or countries	Positional statement or status in regard to antimalarial drugs treatment of COVID19
WHO	• Insufficient data to assess the efficacy of either of these medicines in treating patients with COVID-19, or in preventing them from contracting the coronavirus
US FDA's Chief Scientist & Author of the Emergency use Authorization	• chloroquine phosphate and hydroxychloroquine sulfate may be effective in treating COVID-19 without providing references to studies supporting that conclusion
France	• One of a few countries that also permit the drugs to be used for patients with COVID-19.
European Medicines Agency	• Hydroxychloroquine and chloroquine can be used **only in a hospital setting** to treat COVID-19 in adults and adolescents who weigh at least 50 kg and are not able to participate in a clinical trial • Must protect the supply for other patients who have relied on the drugs for years to control autoimmune diseases including lupus and rheumatoid arthritis. • studies have not yet documented that the drugs can effectively treat COVID-19
Elmhurst Hospital 545 Bed Capacity- US	• Hydroxychloroquine, which is more widely used for other diseases and is less toxic than chloroquine, has been administered to some patients with COVID-19 throughout the system, including several hundred at Elmhurst. The course of treatment runs 5 days and, so far, **the results have been mixed**.

Public Health Response:

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Article 4 : Trials of anti-tumor necrosis factor therapy for COVID-19 are urgently needed

Published: April 9, 2020 published in the lancet

Summary:

- Tumor necrosis factor (TNF) is present in blood and disease tissues of patients with COVID-19. It is important in nearly all acute inflammatory reactions and acts as an amplifier of inflammation. Blockade of TNF is clinically effective in many diseases. For this reason, a single infusion of anti-TNF antibody might reduce some inflammatory process in COVID-19, reducing TNF and other inflammatory mediators, cellularity, and exudate.
- In observational trial with rheumatoid arthritis patients and serious infections, the risk of sepsis and death was reduced among patients on anti-TNF therapy as compared to those on synthetic disease-modifying anti-rheumatic drugs (DMARDS).
- Previous research in patients with COVID-19 and inflammatory bowel disease (IBD) showed that among those patients (n=116) who had anti-TNF therapy alone, most of them (n=99) recovered without hospitalization and one patient died. In contrast, about half of the patients (n=71) on sulfasalazine/mesalamine recovered without hospitalization and six patients died. The results indicated that patients who were treated with anti-TNF therapy benefited than those with other drugs. However, there were no sufficient data to make conclusions about a better outcome.
- There was sufficient evidence to support clinical trials of anti-TNF therapy in patients with COVID-19.

Treatment

Article 5 : Pulmonary and Cardiac Pathology in Covid-19: The First Autopsy Series from New Orleans
Published: : April 10 ,2020 in medRxiv.

Summary:

- The study report here on the cardiopulmonary findings of the first 4 autopsies of a series of 12 performed on patients within the United States, with relevant implications for the treatment of severe cases. The 4 decedents included male and female patients, ages 44-76. All were African American, with controlled HTN on medication and obesity class 2-3. Three of the patients had insulin-dependent type II diabetes, two had known chronic kidney disease (stages 2 and 3), and one was taking methotrexate. they were Admitted to ICU due to worsening ARDS.
- CXR FINDINGS: bilateral ground-glass opacities.
- LAB FINDINGS: an increased neutrophil count with lymphopenia was noted near the time of death with markedly elevated D-dimer in two patients.
- LUNG FINDINGS in the autopsies: The dominant process in all cases was **diffuse alveolar (small airway) damage**, with notable CD4+ aggregates around **thrombosed small vessels in lung periphery**, and significant associated **alveolar hemorrhage.** This may have contributed to death include a **thrombotic microangiopathy** that was restricted to the lungs. This process may involve activation of marker of **clot formation.**
- CARDIAC FINDINGS in the autopsies: Showed a lack of viral myocarditis. Significant gross cardiomegaly and right ventricular dilatation was noted.

Conclusion:

- Based on this findings, we believe that effective therapy for these patients **should not only target the viral pathogen**, but also the **thrombotic and microangiopathic effects of the virus**, and possibly a maladaptive immune response to viral infection.