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Scientific Research Monitoring on COVID-19

20 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

- **Diagnostic:** article mentions that the research after the pandamic should be shifted **toward decoding the human immune system** especially **for the vulnerable populations.**
- **Transmission:** explains how air droplet may linger in the air and advise of wearing mask , provide adequate ventilation in enclosed areas where infected patient have been.
- **Public Health response: A study** assessing the impact of non-pharmaceutical interventions against coronavirus disease 2019 and influenza in Hong Kong

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..

Others

Audio Interview: Caring for Patients with Covid-19
Guillain–Barré Syndrome Associated with SARS-CoV-2
How to Obtain a Nasopharyngeal Swab Specimen
Covid-19 and the Need for Health Care Reform

WHO daily report

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WHO daily report 19 April 2020

- No new country/territory/area reported cases of COVID-19 in the past 24 hours.
- WHO has provided over US$ 400 000 dollars of medical supplies and equipment to the Ministry of Health of the Kurdistan region of Iraq to support response efforts in fighting COVID-19.

Epidemiology

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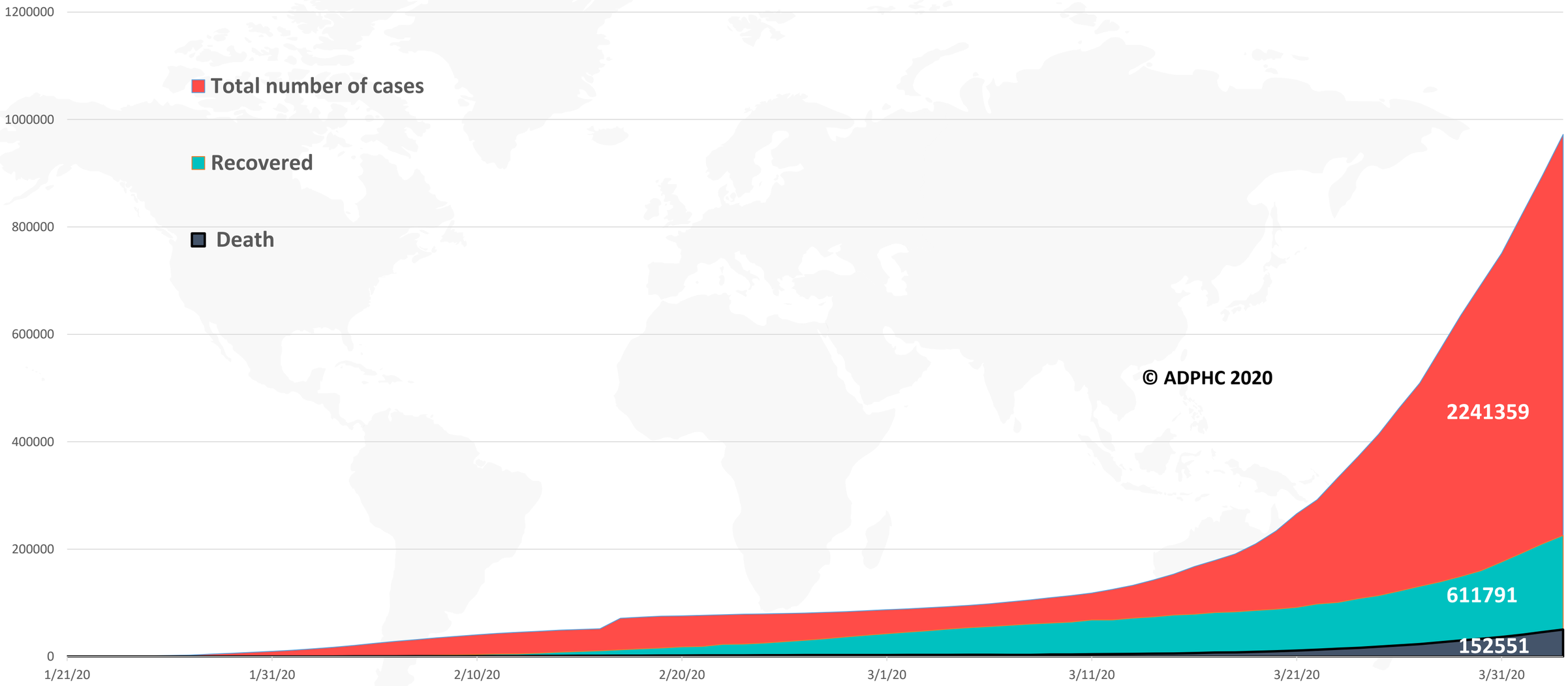
Figure 1: Total number of infected, recovered , and death cases (January 21st to April 19th , 2020)



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 19h, 2020).

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

Epidemiology

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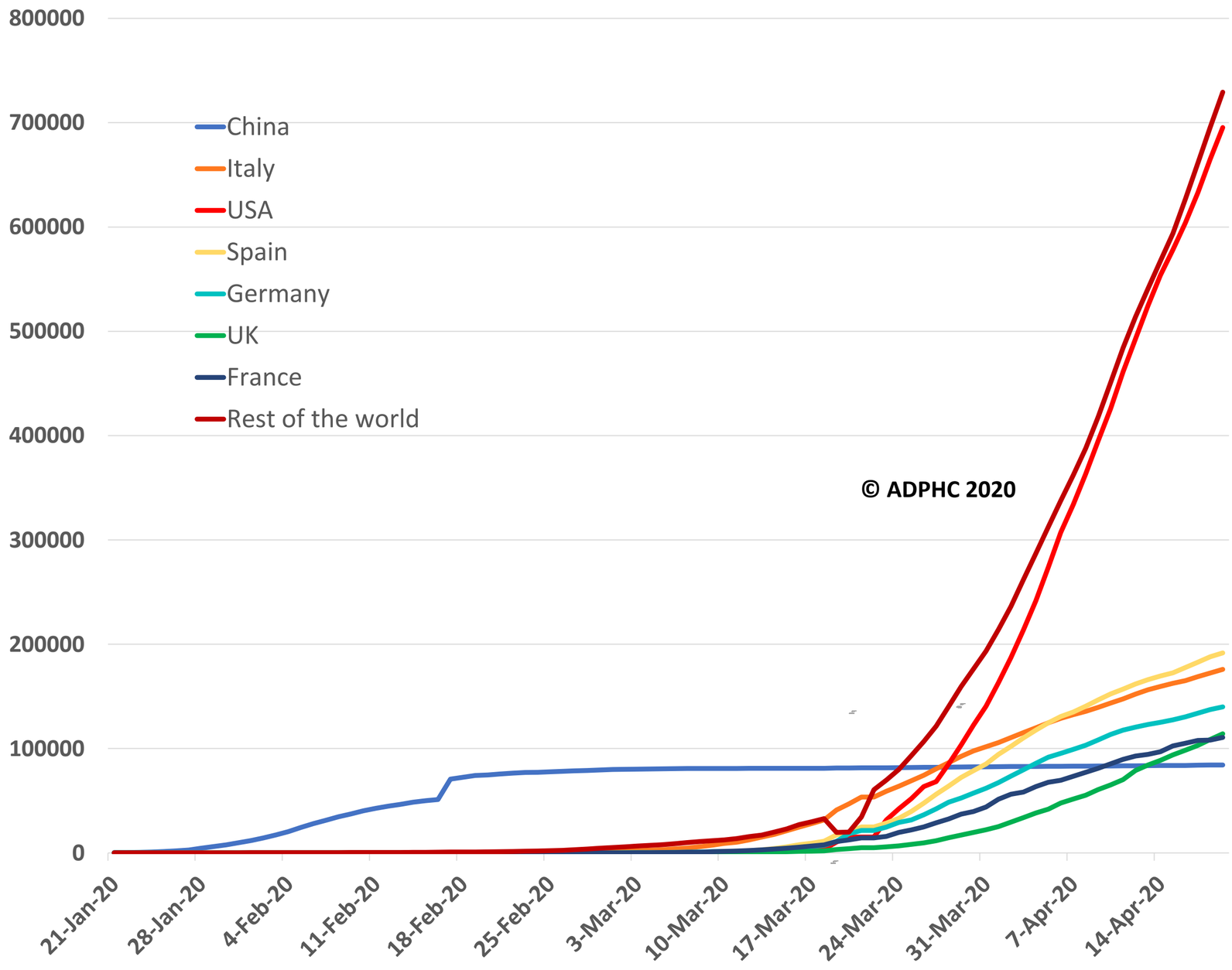
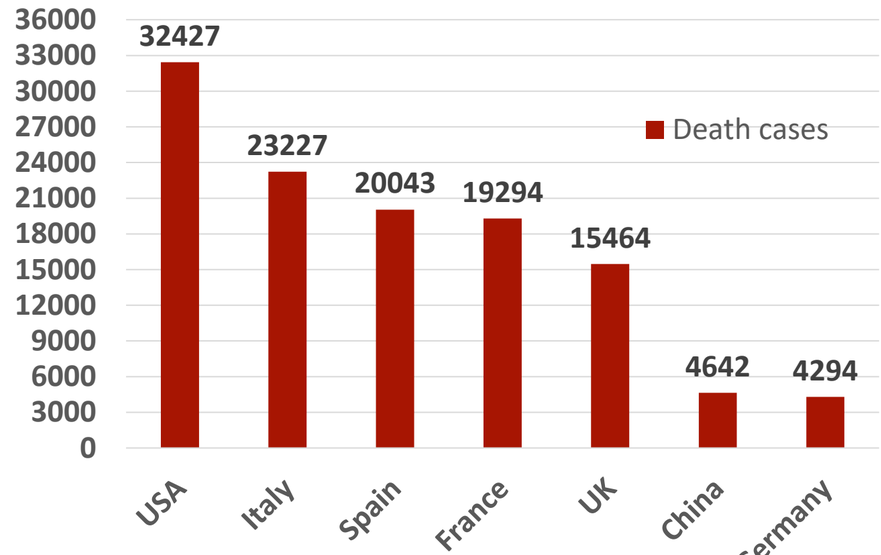
Figure 3 : Top 7 countries in the total number of cases due to COVID-19 (January 21 to April 19th, 2020).



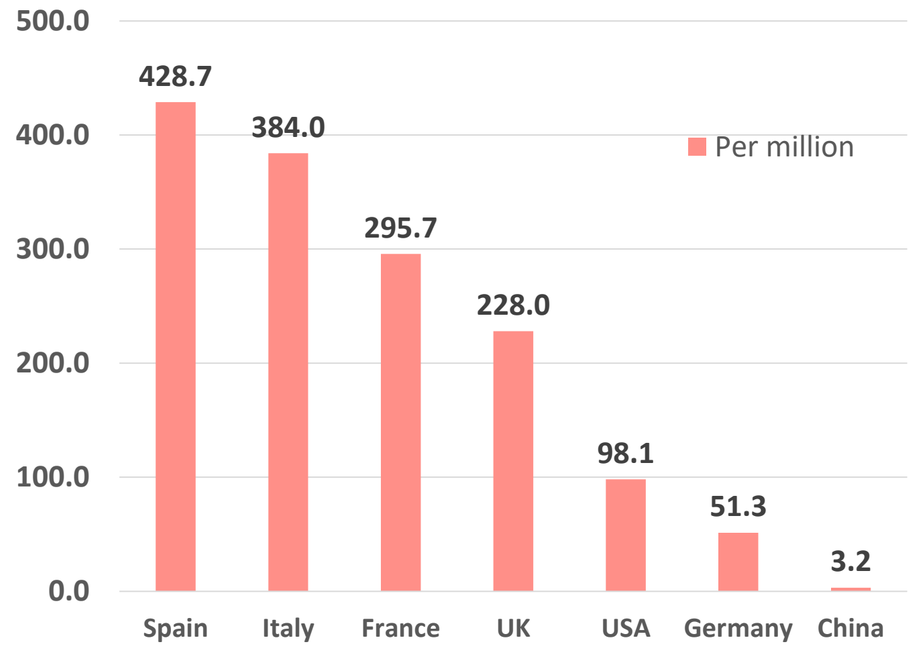
Line graph published by Abu Dhabi Public Health Center 2020.

Data resources: WHO

TOTAL DEATHS



DEATHS PER MILLION



Epidemiology

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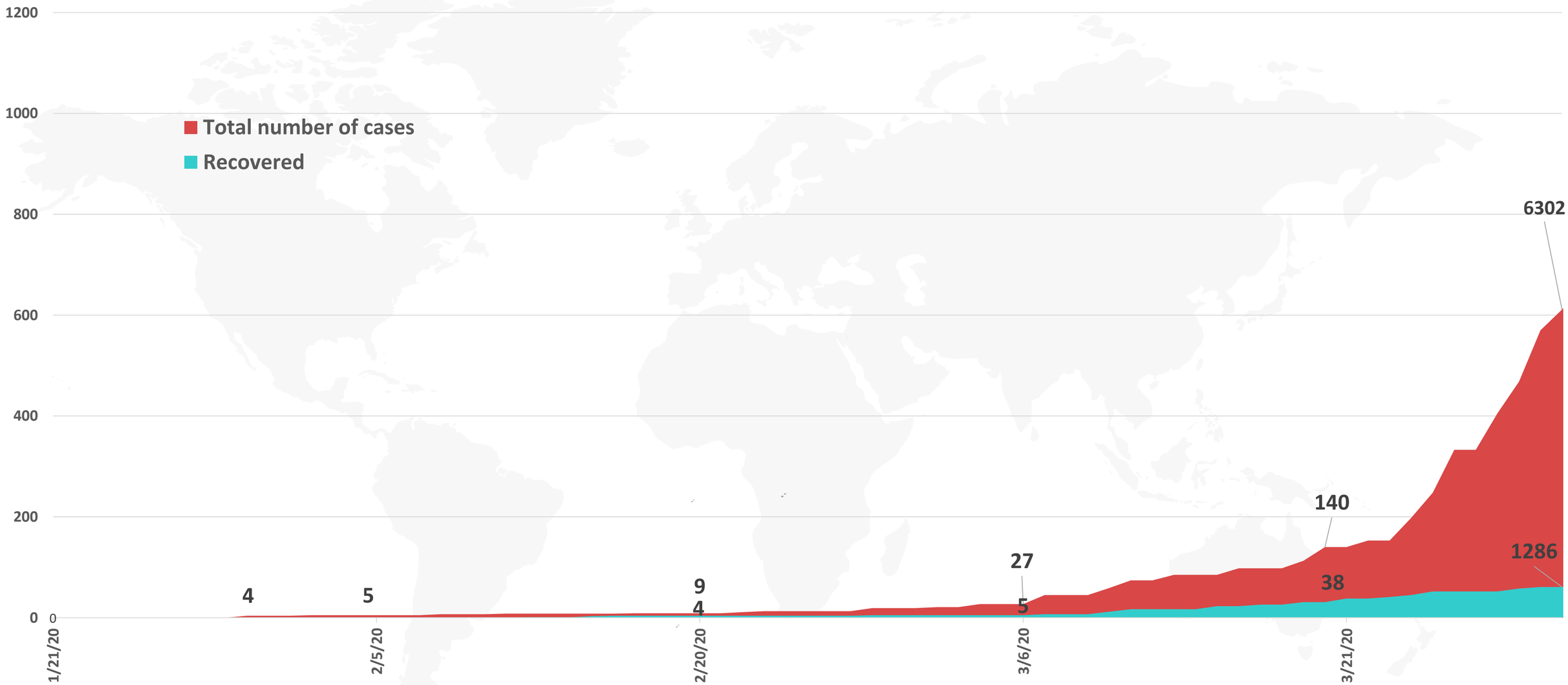
Figure 4: Total number of COVID-19 infected and recovered cases in UAE over time

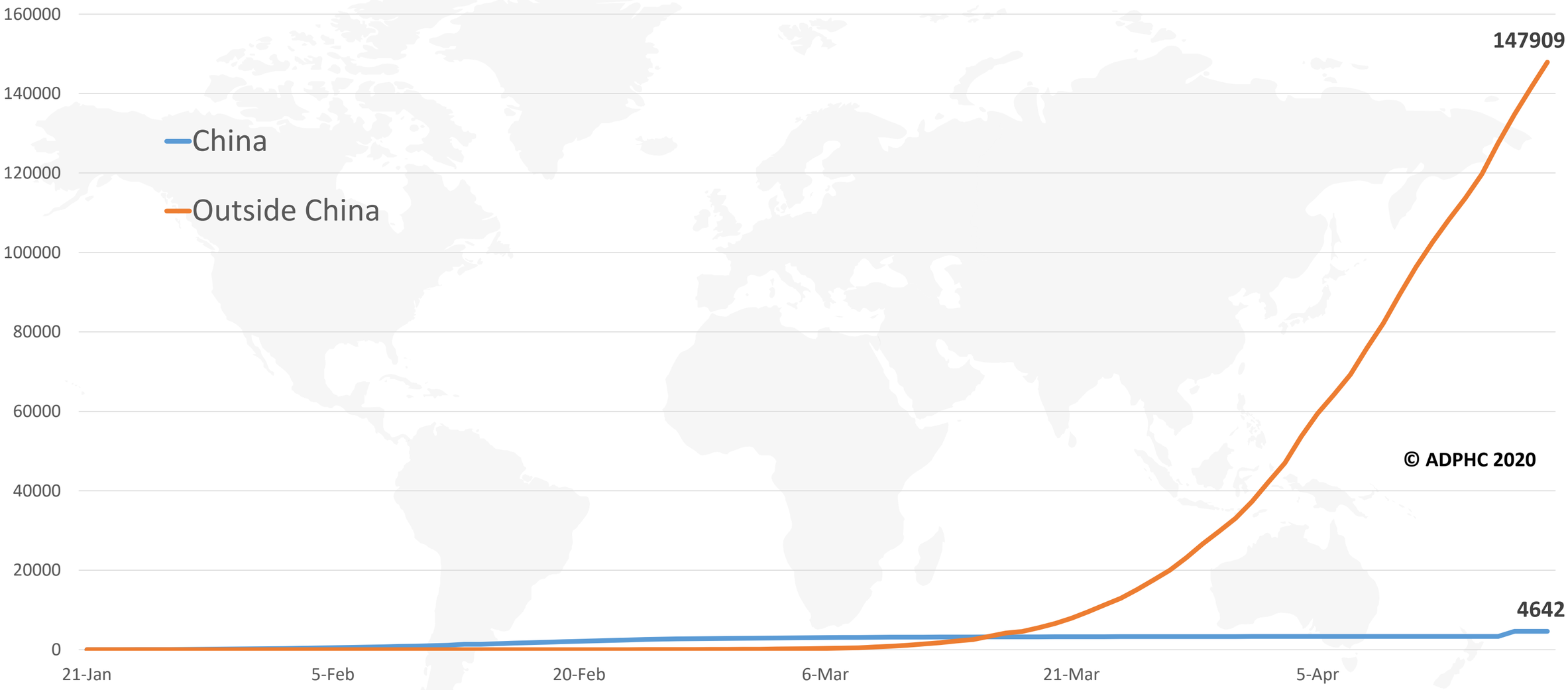


Line graph published by Abu Dhabi Public Health Center 2020.

Data resources: WHO, : John Hopkins University

Epidemiology

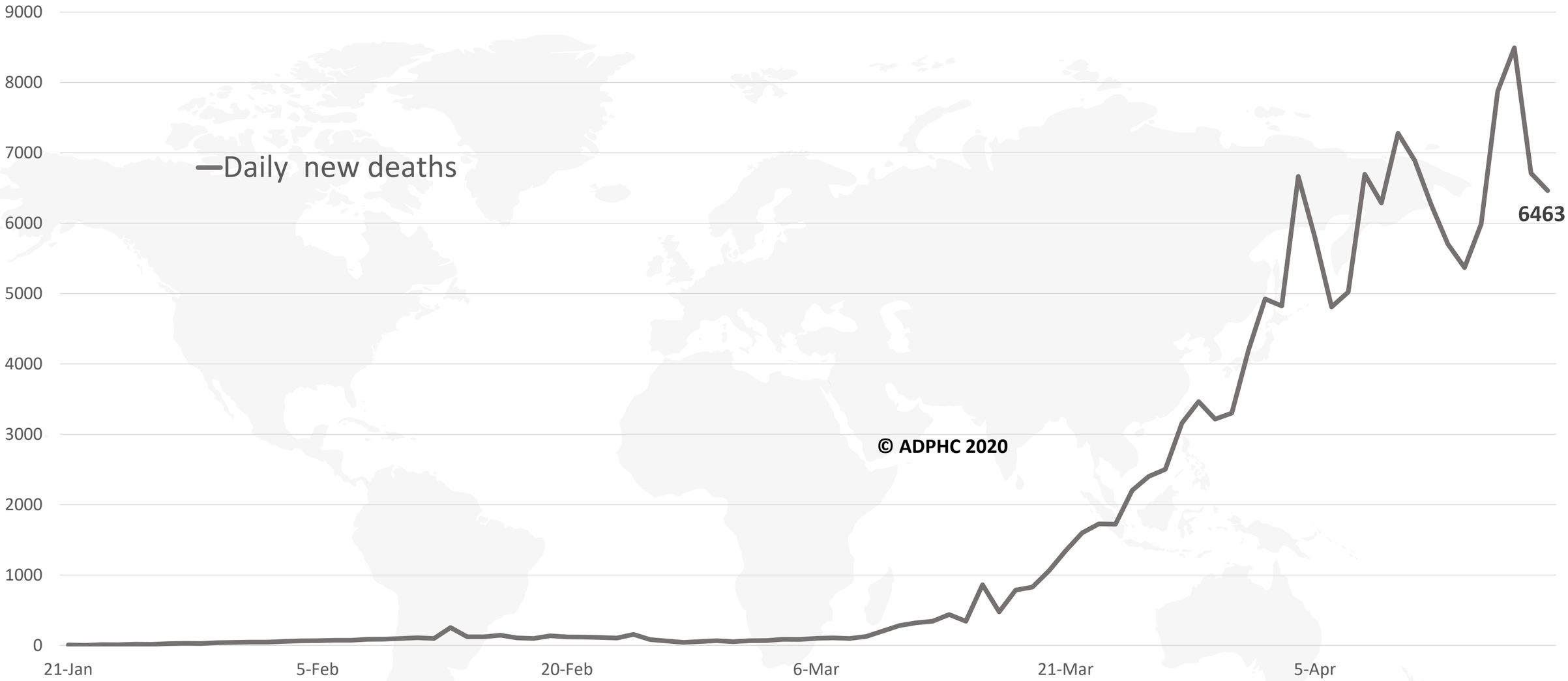
Figure 5: Total number of death due to COVID-19 reported by China and the rest of the world (January 21 to April 19th, 2020).



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

Epidemiology

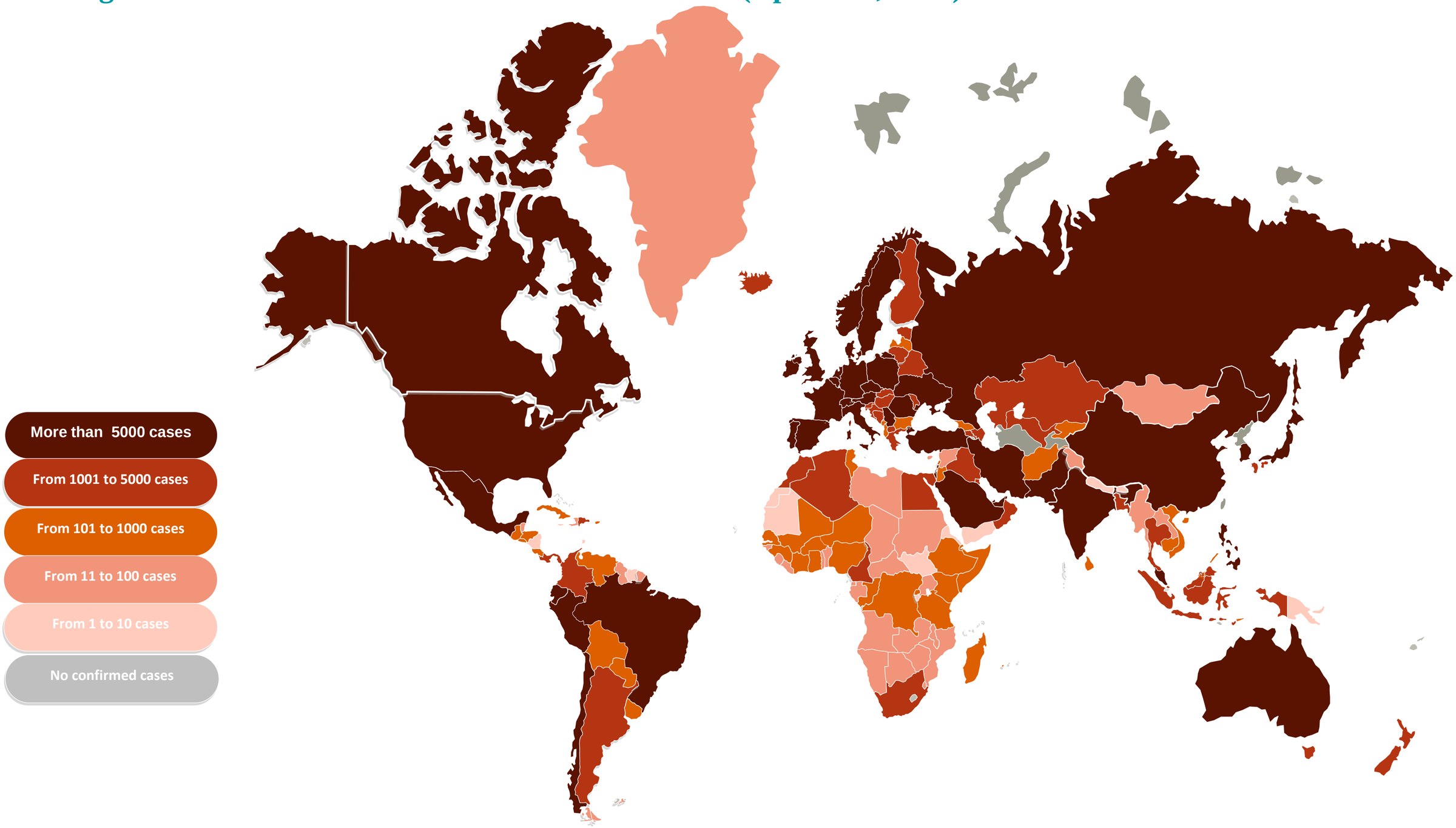
Figure 6: Global daily new deaths due to COVID-19 (January 21 to April 19th, 2020).



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

Epidemiology

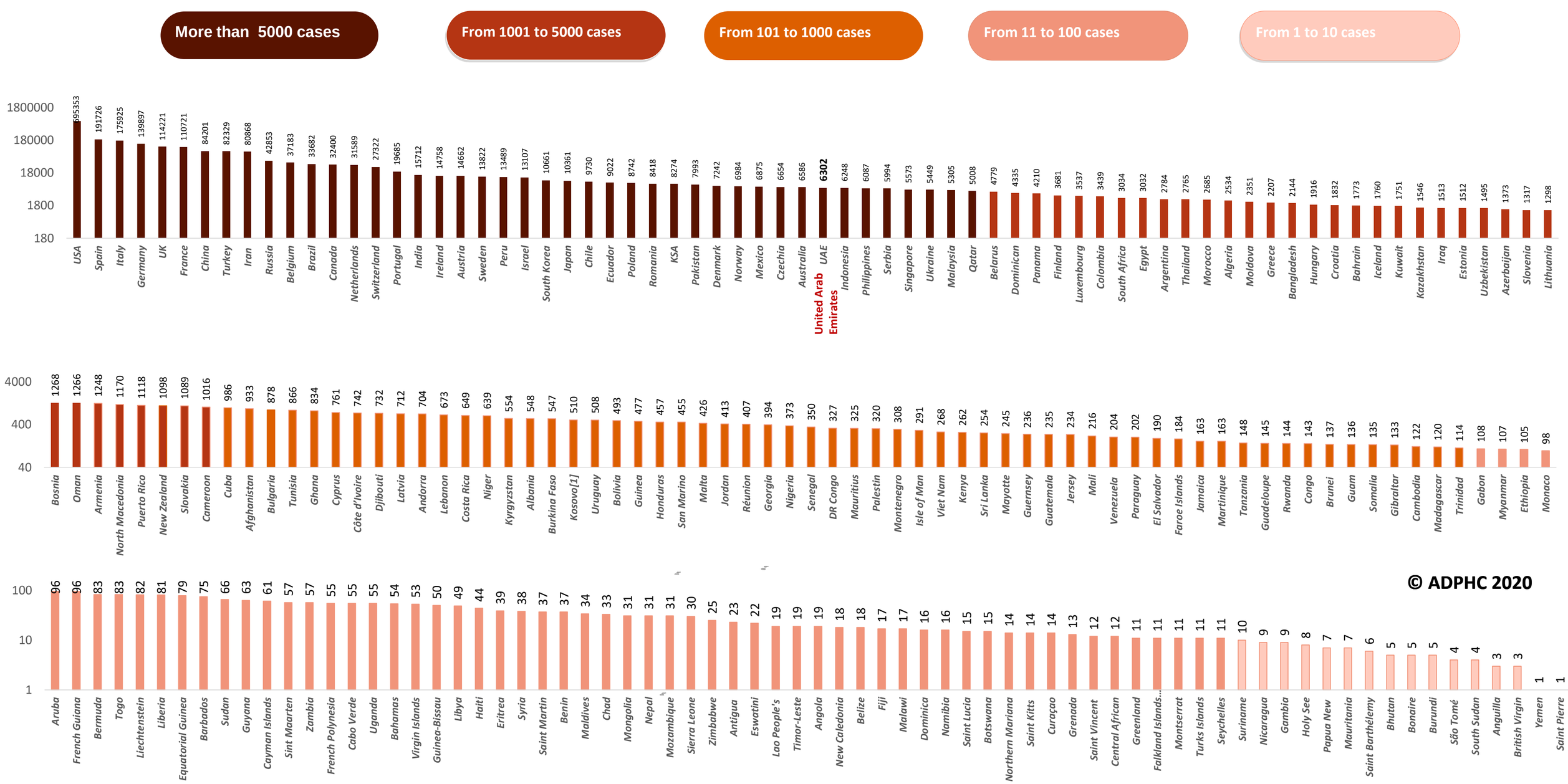
Figure 7a : Global distribution of COVID-19 cases (April 19th, 2020).



Map chart published by Abu Dhabi Public Health Center 2020.

Epidemiology

Figure 7B: Bar chart illustrate the global distribution of COVID19 cases April 19th, 2020)



Map chart published by Abu Dhabi Public Health Center 2020.

Data resources: WHO

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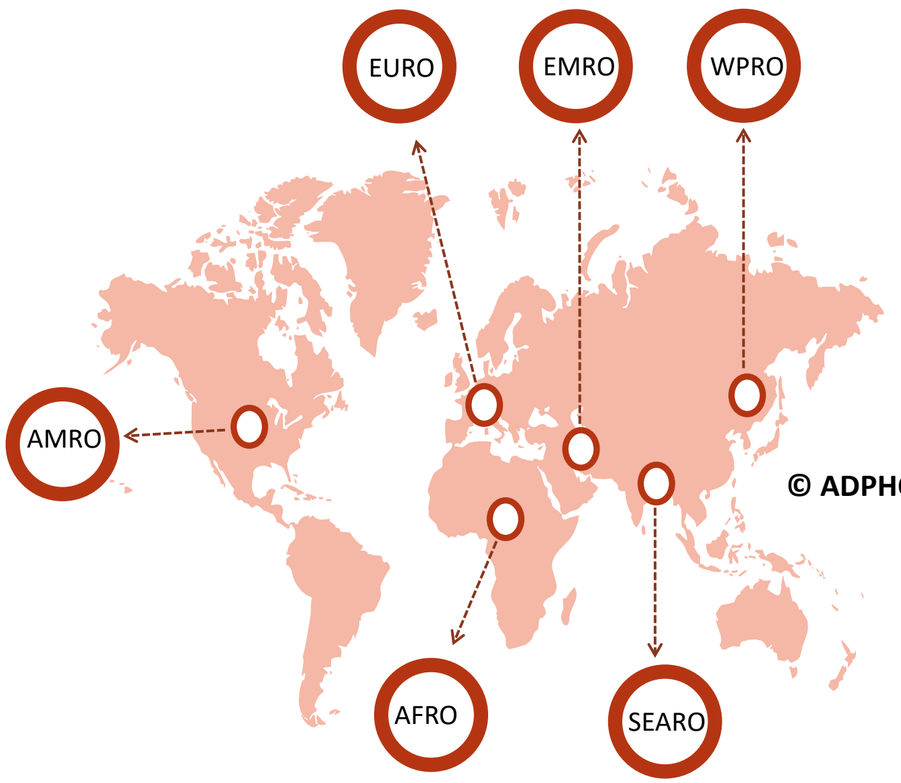
Figure 8: illustrate the Global distribution of COVID19 cases per region (April 19th, 2020)



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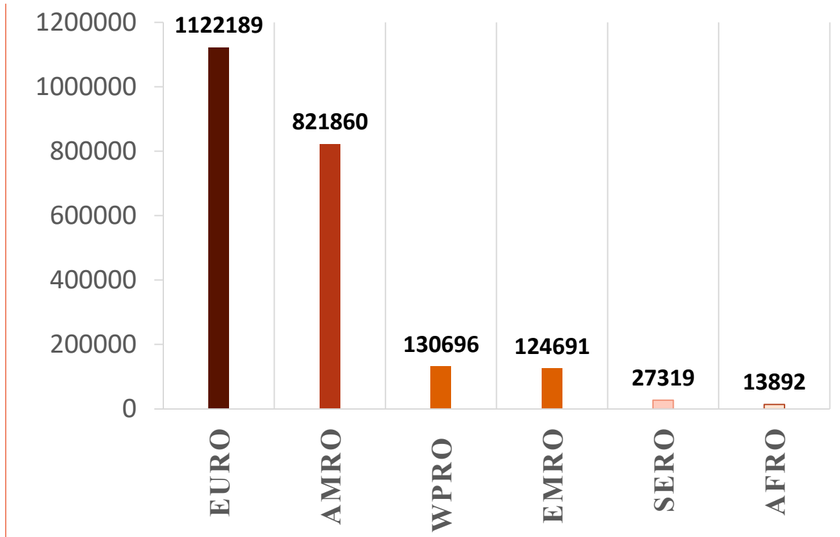
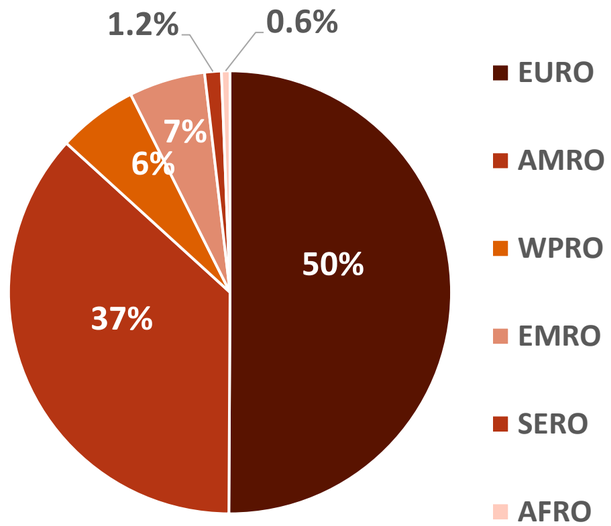
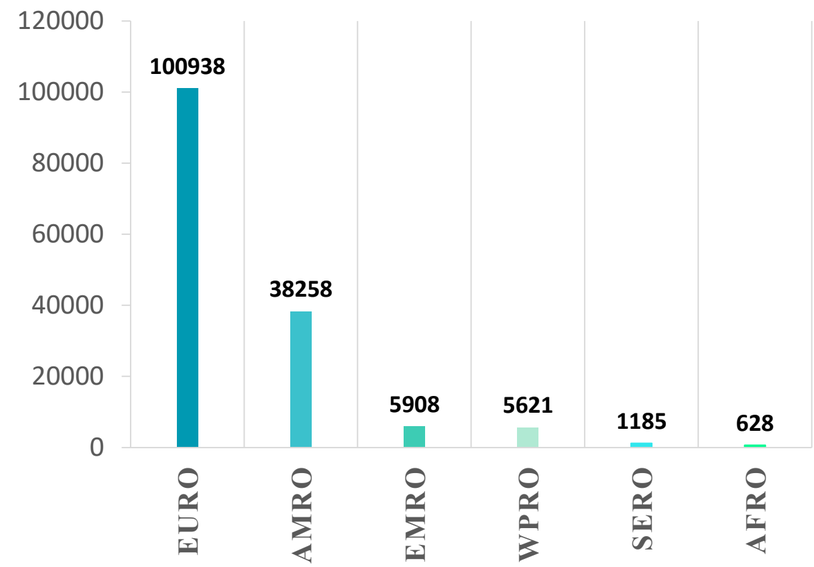
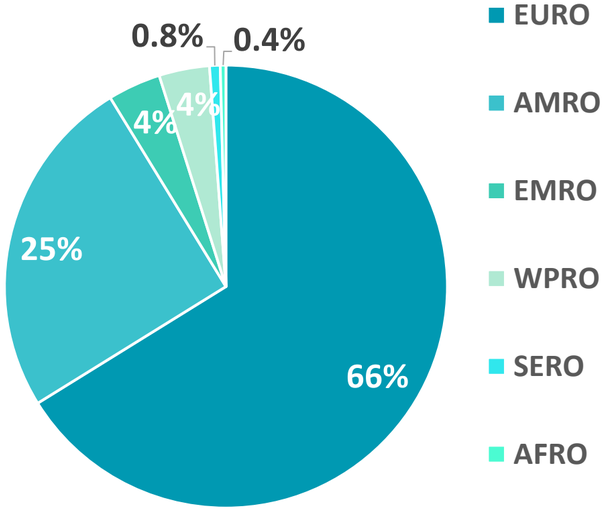
INFECTED





DEATH



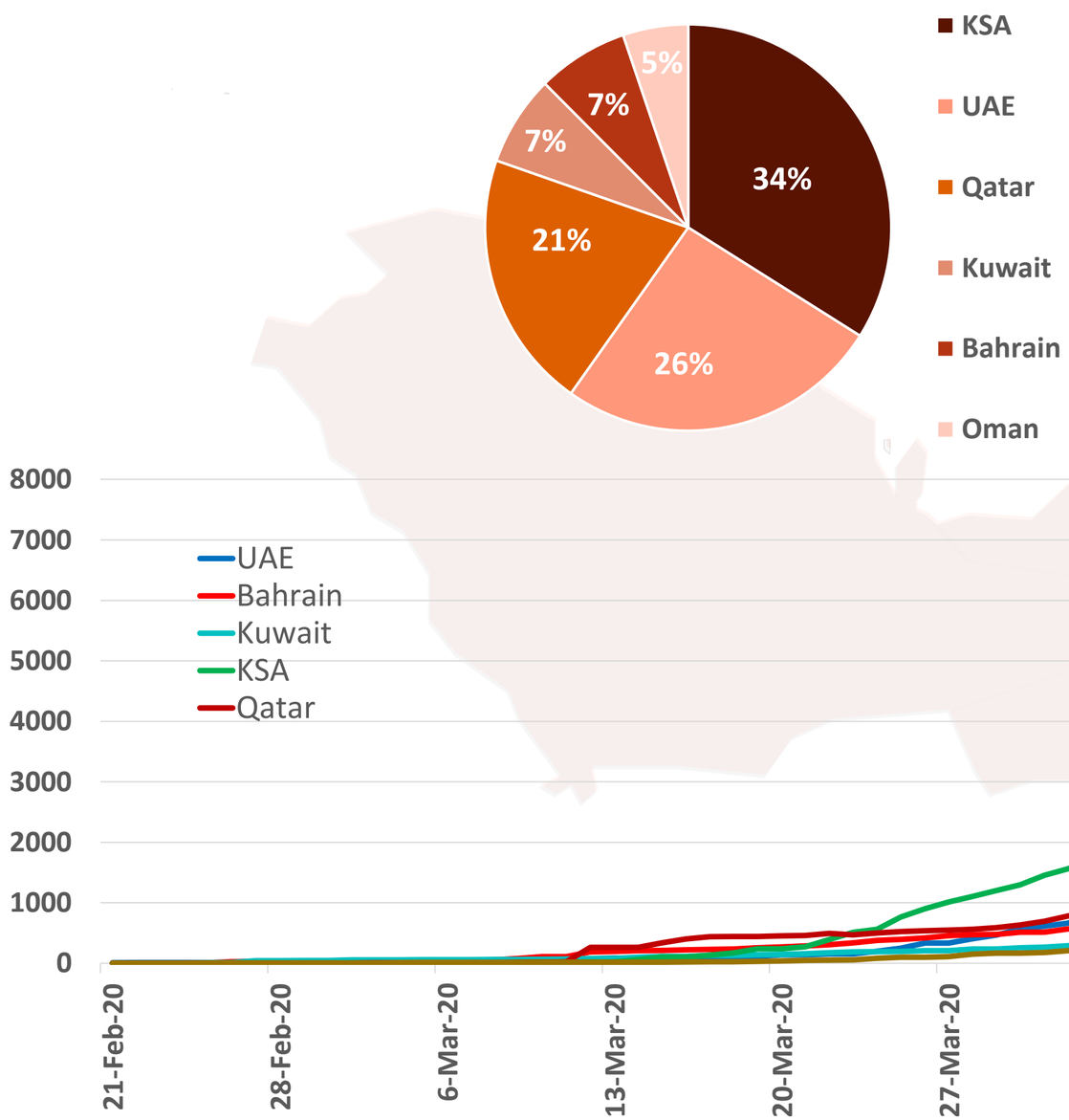


Map chart published by Abu Dhabi Public Health Center 2020.
Data resources: WHO

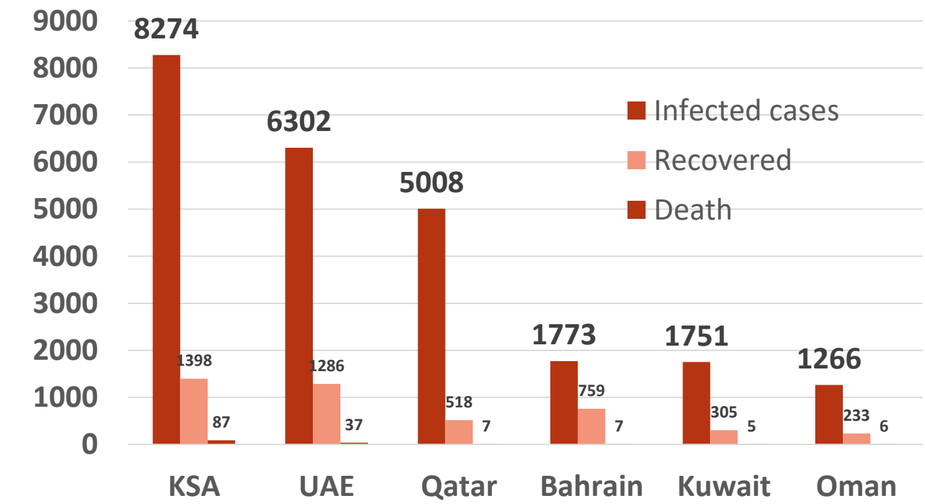
Epidemiology

Figure 9: Comparative analysis of the distribution of COVID19 cases in GCC countries (April 19th, 2020)

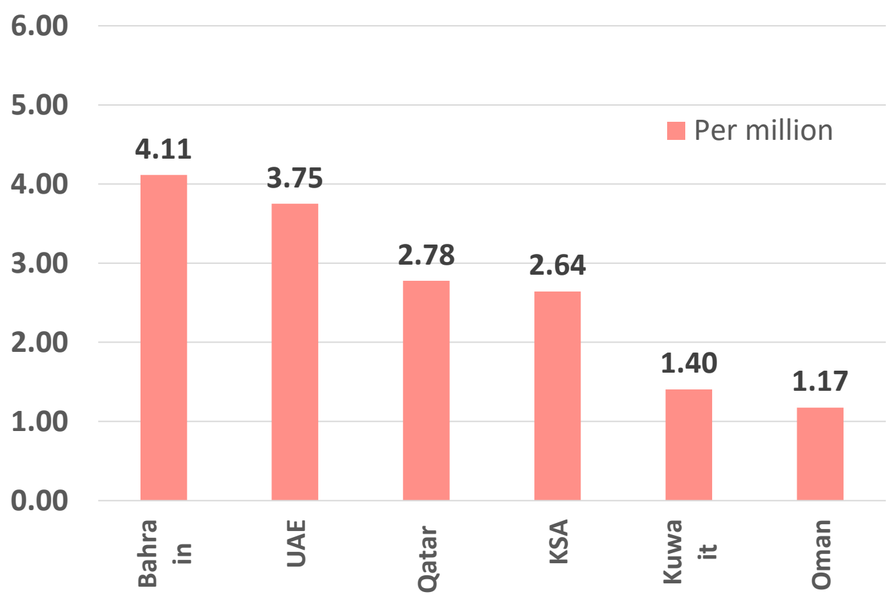
TOTAL NUMBER OF INFECTED CASES



Total number of infected, recovered and Deaths



Death per million



charts published by Abu Dhabi Public Health Center 2020.

Data resources: WHO

Diagnostic :

Article 1: Covid-19 and Immunity in Aging Populations - A New Research Agenda
Published: April 17, 2020 in NEMJ

Summary:

- The author discussed the importance of understanding the immune system especially for the aging population since they are the most vulnerable to infectious agents.
- There is a research need to investigate elderly people and examine their immune system with licensed vaccines to differentiate people with positive response from those without response and apply cutting-edge tools from systems biology and AI, it will be viable to identify biomarkers for effective immunity in those people. After that it could be applied to other vulnerable populations including those living in low and middle-income countries.
- Generating systems-biology data on an unprecedented scale should also enable computational scientists to begin to develop AI models of human immunity, which, if successful, could transform product development, enabling computer-generated simulation trials to facilitate faster and cheaper development, with a much greater probability of success.
- With the current situation , the Short-term efforts should be focus to quickly develop lifesaving vaccines and therapeutics are of the utmost importance.
- In the long term, research needs to be shifted from investing in disease-specific research to simultaneously targeting sufficient resources **toward decoding the human immune system** especially **for the vulnerable populations.** Such an effort could not only stimulate the development of new vaccines, diagnostics, and treatments for COVID-19 but also for future emerging pathogens. The research agenda will also need to include development of multidisciplinary scientists trained in biomedical, informatics, and computer sciences to entirely prepare for the next wave of emerging diseases.

Transmission

Article 2 : how liquid droplets exhaled during speech can linger in the air
Published: : 15 April 2020 in NEMJ.

Summary:

Coughing and sneezing by covid-19 infected person produce large particles which pose a threat of infection if they are inhaled by persons close by. Breathing and talking also produce smaller and much more numerous particles, known as aerosol particles. Certain persons called “super spreaders” produce many more aerosol particles than other persons. These particles are too small to settle because of gravity, but they are carried by air.

Inhaled droplets and aerosol particles have different sites of deposition in the recipient. Inhaled droplets are deposited in the upper respiratory tract, while inhaled aerosolized particles can penetrate to the depths of the lungs, where they may be deposited in the alveoli.

A recent study, the results of which were also published in the Journal, showed that experimentally produced **aerosols containing SARS-CoV-2**. virions remained infectious in tissue-culture assays, with only a slight reduction in infectivity during a 3-hour period of observation. Aerosols from infected persons may therefore **pose an inhalation threat even at considerable distances and in enclosed spaces, particularly if there is poor ventilation**.

Conclusion:

- It is advisable to wear a suitable mask whenever it is thought that infected persons may be nearby providing adequate ventilation of enclosed spaces where such persons are known to be or **may recently have been.**

Public health response

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Article 3 : Impact assessment of non-pharmaceutical interventions against coronavirus disease 2019 and influenza in Hong Kong: an observational study

Published: April 17, 2020 **The Lancet**

Article Reviewed by Subject Matter Expert

Summary:

- The specific objective of this study was to quantify population behavioural changes in Hong Kong during the COVID-19 outbreak, and to describe the likely impact of the behavioural changes and public health measures on COVID-19 transmission and influenza transmission in the community.
- Methodology included analysis of laboratory confirmed cases of COVID-19, influenza surveillance data in outpatients of all ages, and hospital influenza hospitalization in children. Daily effective reproduction number (R_t) for COVID-19 and influenza A H1N1 was calculated to measure changes in transmissibility over time. Attitudes towards COVID-19 and changes in population behaviours were reviewed through three telephone surveys done from Jan 20 to March 13, 2020.

Findings:

- COVID-19 transmissibility measured by R_t remained at **approximately 1 for 8 weeks**. **Influenza transmission declined substantially (44%) after the implementation of social distancing measures** and changes in population behaviors in late January; reduction in transmissibility in the community, from an estimated R_t **of 1·28** before **the start of the school closures** to **0·72 during the closure weeks**. Similarly, a **33% reduction in transmissibility** was seen based on pediatric hospitalization rates, from an R_t of 1·10 before the start of the school closures to 0·73 after school closures. Among respondents to the surveys**, 74·5%, 97·5%, and 98·8% reported wearing masks** when going out, and **61·3%, 90·2%, and 85·1%** reported avoiding crowded places in surveys.

Public health response

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Article 2: Cont.,

Summary:

- It is concluded that non-pharmaceutical interventions in Hong Kong (including border restrictions, quarantine and isolation, distancing, and changes in population behavior) were associated with reduced transmission of COVID-19, and are also likely to have substantially reduced influenza transmission in early February. It is assumed that COVID-19 might share at least some characteristics with influenza virus transmission, as both viruses are **directly transmissible respiratory pathogens** with similar **viral shedding dynamics**. Authors also imply that measures implemented in **Hong Kong are less dras**tic than those in mainland China, and are **probably more feasible in many other locations worldwide with a similar effect.**
- Limitation of the study include: unable to identify which measure was potentially the most effective; surveys of population behaviors could have been affected by response bias a it was relied on self-reported data and choosing only working adults.

	Survey 1, Jan 20–23 (n=1008)	Survey 2, Feb 11–14 (n=1000)	Survey 3, March 10–13 (n=1005)
Risk perception of COVID-19			
Perceived susceptibility to COVID-19*	186 (18·9%; 16·0–21·9)	185 (17·4%; 14·8–20·1)	140 (15·2%; 12·6–17·8)
Perceived severity of COVID-19†	916 (89·6%; 85·8–93·3)	902 (90·5%; 86·4–94·7)	829 (82·0%; 78·6–85·4)
Worried about being infected with COVID-19‡	551 (52·5%; 48·7–56·3)	558 (53·9%; 49·9–57·9)	471 (46·5%; 42·9–50·0)
Risk perception of seasonal influenza			
Perceived susceptibility to seasonal influenza*	260 (25·1%; 22·0–28·3)	231 (22·5%; 19·4–25·6)	NA
Perceived severity of seasonal influenza†	406 (42·3%; 38·4–46·3)	311 (32·7%; 28·9–36·6)	NA
Worried about being infected with seasonal influenza‡	370 (36·5%; 32·9–40·0)	283 (30·3%; 26·6–33·9)	NA
Attitudes towards COVID-19§			
I'm confident that I can take measures to protect myself against COVID-19	518 (50·5%; 46·6–54·4)	594 (59·2%; 54·9–63·5)	679 (68·0%; 64·3–71·7)
I believe that the Hong Kong Government can take effective measures to control the spread of COVID-19 in Hong Kong	338 (33·5%; 29·9–37·1)	271 (31·8%; 27·8–35·8)	336 (35·8%; 32·2–39·3)
I believe that the Central Chinese Government can take effective measures to control COVID-19	308 (31·7%; 28·1–35·3)	352 (39·0%; 34·8–43·2)	NA
I believe that complete border closure is an effective measure to prevent COVID-19 spreading from mainland China to Hong Kong	NA	784 (76·4%; 72·3–80·5)	NA
Complete border closure will seriously affect the life of citizens	NA	298 (33·2%; 29·2–37·1)	NA
I worry about medical supplies, such as face masks, in Hong Kong	NA	860 (84·1%; 80·0–88·2)	NA
I worry about the living supplies in Hong Kong due to border closure	NA	244 (27·7%; 24·0–31·4)	NA
Preventive measures taken against COVID-19¶			
Avoided going to crowded places	627 (61·3%; 57·2–65·4)	920 (90·2%; 86·2–94·2)	860 (85·1%; 81·7–88·4)
Avoided visiting mainland China	800 (78·1%; 73·9–82·2)	NA	NA
Avoided contact with people with respiratory symptoms	687 (66·8%; 62·7–70·9)	834 (80·0%; 76·0–84·0)	806 (78·7%; 75·3–82·1)
Used face masks	778 (74·5%; 70·4–78·6)	976 (97·5%; 93·5–100·0)	992 (98·8%; 96·0–100·0)
Washed hands more often (including using hand sanitiser)	726 (71·1%; 67·0–75·2)	938 (92·5%; 88·6–96·5)	941 (93·0%; 90·0–96·0)
Avoided touching public objects or used protective measures when touching public objects (eg, use tissue)	387 (36·4%; 32·3–40·5)	767 (73·8%; 69·8–77·9)	746 (73·1%; 69·6–76·7)
House disinfection	NA	897 (89·3%; 85·2–93·4)	899 (89·6%; 86·4–92·8)
Used serving utensils when eating	NA	686 (66·0%; 61·9–70·1)	692 (67·7%; 64·1–71·3)
Stayed at home as much as possible	NA	894 (88·0%; 83·9–92·1)	868 (83·8%; 80·5–87·1)
Avoided going to health-care facilities	NA	832 (81·0%; 77·0–85·1)	759 (74·7%; 71·1–78·3)

Data are n (%; 95% CI). Proportions were weighted by age and sex to the adult population in Hong Kong. All dates are in 2020. NA=not applicable (question was not asked in the survey). COVID-19=coronavirus disease 2019. *Numbers and proportions represent respondents that answered likely, very likely, or certain, rather than never, very unlikely, unlikely, or even chance. †Numbers and proportions represent respondents that answered serious or very serious, rather than very mild, mild, or moderate. ‡Numbers and proportions represent respondents that answered moderately worried or very worried, rather than not at all worried or slightly worried. §Numbers and proportions represent respondents that answered agree or strongly agree to these statements, rather than strongly disagree, disagree, or neutral. ¶Numbers and proportions represent respondents who had taken the measure in the previous 7 days to prevent contracting COVID-19.

Table: **Public attitudes, risk perceptions, and behavioural responses towards COVID-19 and seasonal influenza in three telephone surveys in Hong Kong**

Public health response

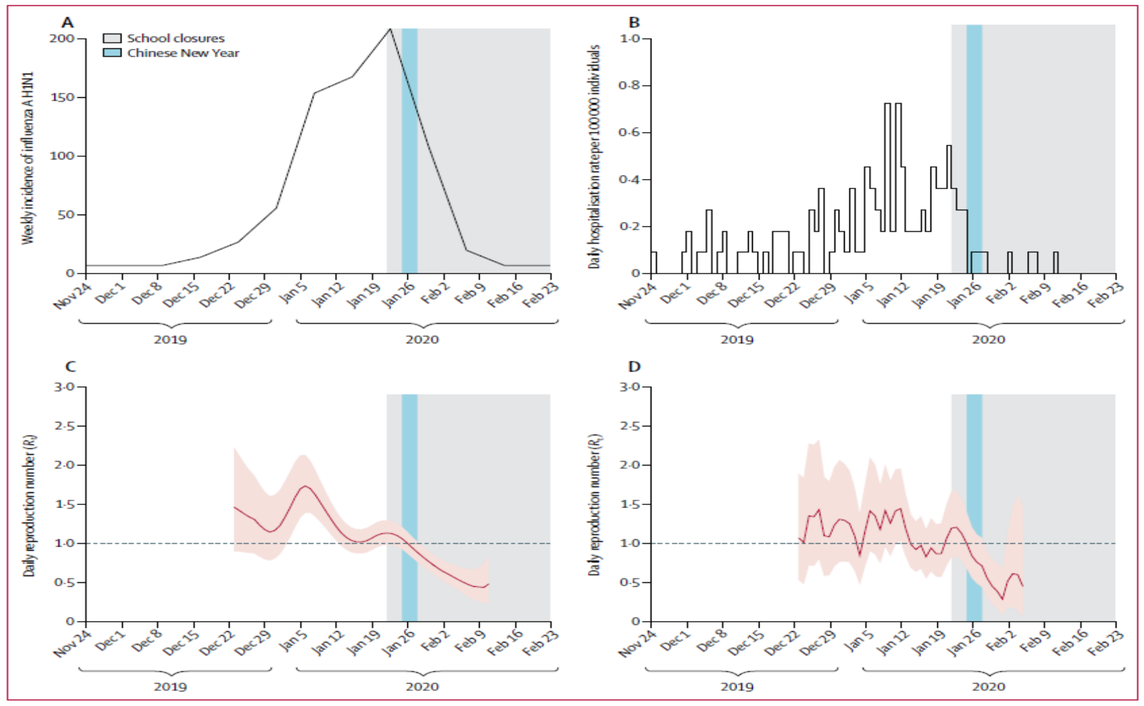

Figure 3: Incidence, hospitalisation rate, and R_t of influenza A (H1N1) in 2019–20

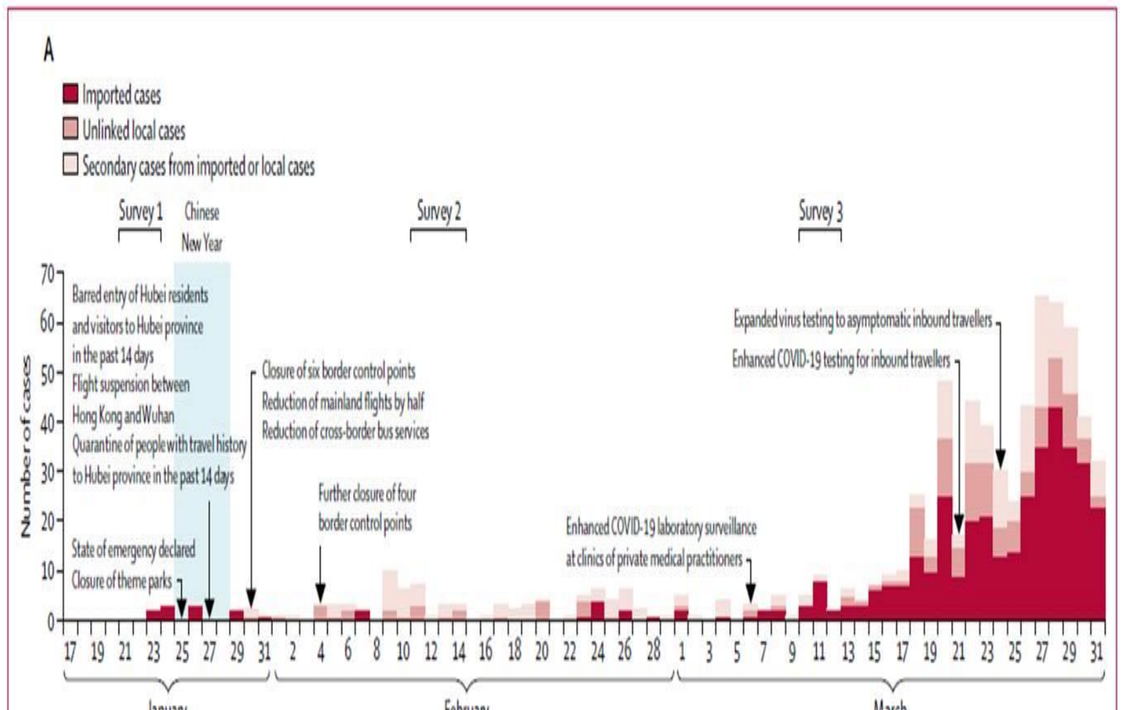

Figure1: showed that the Influenza peak in January and then decreased

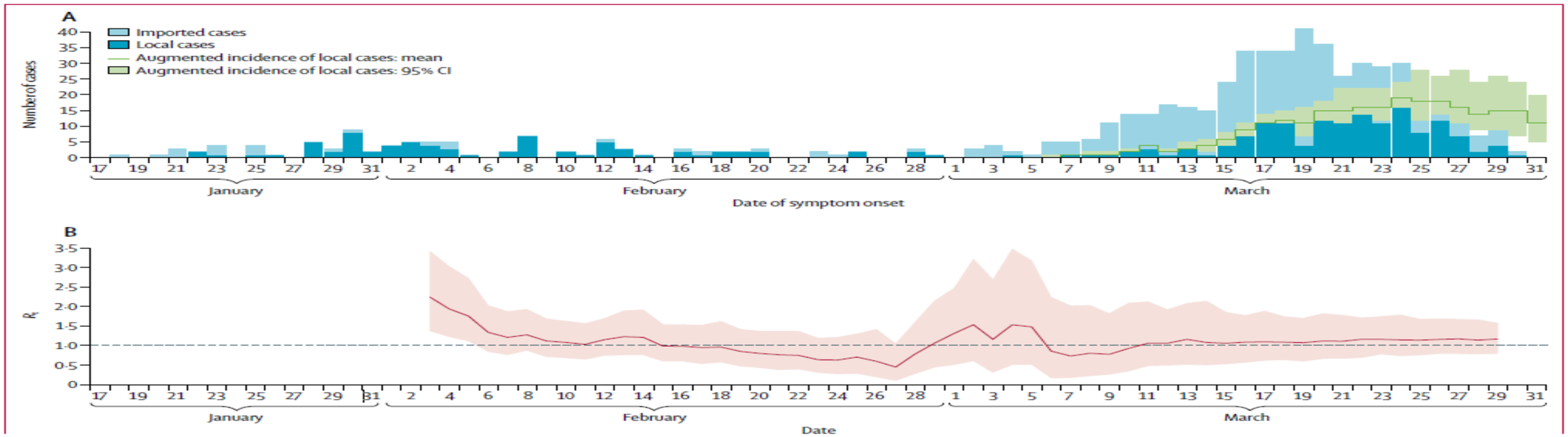

Figure 2 : Rt of COVID19