



Scientific Research Monitoring on COVID-19

01 June 2020

For accessing the full series of published scientific reports please visit the following link:

<https://www.doh.gov.ae/ar/covid-19/Healthcare-Professionals/Scientific-Publication>

Summary on COVID19



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.
- Two strain have been identified for SARS-COV2 (L type (more aggressive) and S type .and 3 cluster groups.

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).

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.

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.
- Also more therapies are currently under investigation including immunomodulatory, antimalarial and others.
- Vaccination are under clinical trial stage in many countries around the world.

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) data from china



Today's Highlights

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

Scientific Research

- **Epidemiology:** India joined and is now among the top 7 countries in the number of COVID19 infected individuals.
- **Clinical Features:** first study on the characteristics of diabetic hospitalized patients with COVID19 found that 10% die in the 7th day of admission and increased BMI is independent risk factor for severe outcome.
- **Pathogenesis:** a study provides novel results on ACE2 gene expression in nasal epithelium and its relationship with age.(ACE2 gene expression increase with age)
- **Public Health response:** an article explain about compartment modelling in a simple way .



WHO Daily Report 31 May 2020

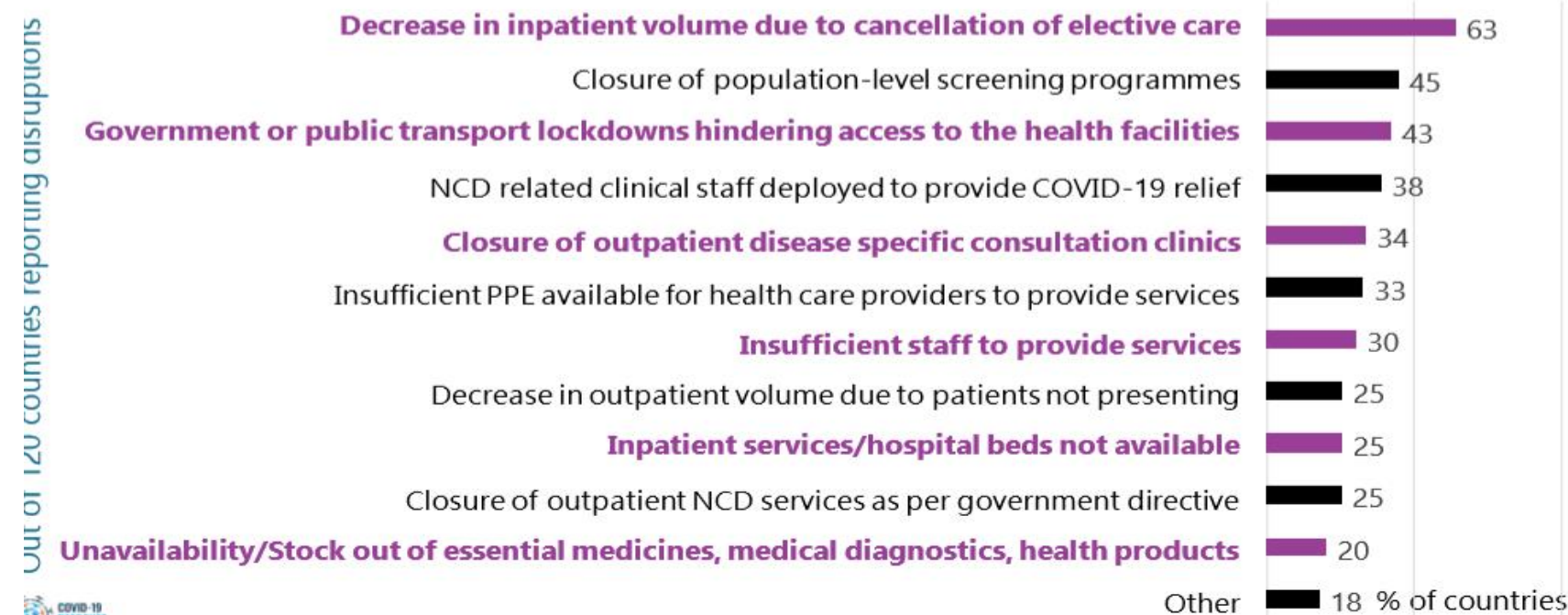
- The President of Costa Rica and WHO Director-General Dr Tedros launched the COVID-19 [Technology Access Pool](#), a policy initiative aimed at making vaccines, tests, treatments and other health technologies to fight COVID-19 accessible to all. The initiative has five priority areas.
 1. Public disclosure of gene sequences and data;
 2. Transparency around the publication of all clinical trial results;
 3. Governments and other funders are encouraged to include clauses in funding agreements with pharmaceutical companies and other innovators about equitable distribution, affordability and the publication of trial data;
 4. Licensing any potential treatment, diagnostic, vaccine or other health technology to the Medicines Patent Pool - a United Nations-backed public health body that works to increase access to, and facilitate the development of, life-saving medicines for low- and middle-income countries.
 5. Promotion of open innovation models and technology transfer that increase local manufacturing and supply capacity, including through joining the Open Covid Pledge and the Technology Access Partnership (TAP).
- Dr Hans Henri P. Kluge, WHO Regional Director for Europe, has released a statement analysing the COVID-19 pandemic in Europe and emphasizing that recovery must lead to a different economy, an economy of well-being.
- The WHO Regional Office for Africa has urged caution as countries ease lockdowns. WHO Regional Director Dr Moeti stressed that “Ending a lockdown is not an event, but a process...”



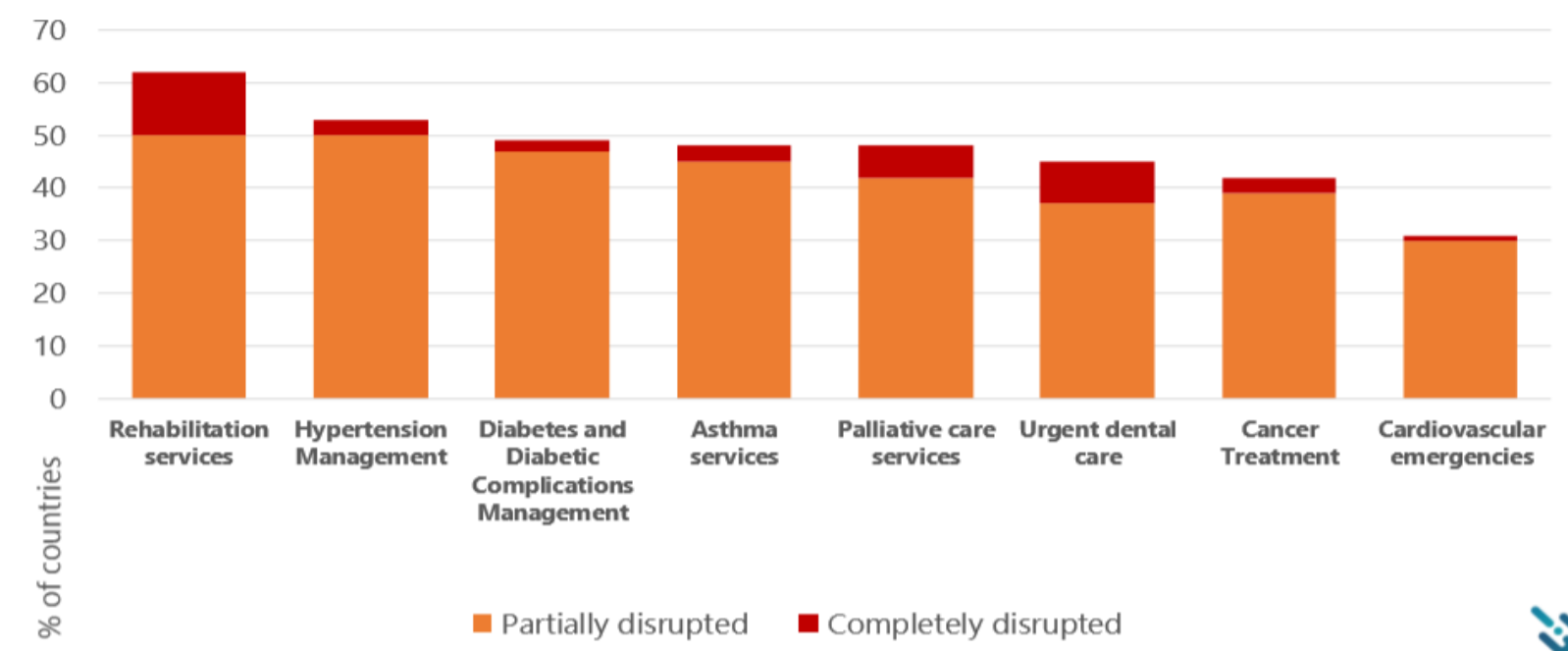
WHO Daily Report 31 May 2020

- People living with non-communicable diseases (NCDs) are more vulnerable to becoming severely ill or dying from COVID-19. The pandemic has also caused NCD service disruption according to [preliminary results of a rapid assessment](#), and WHO encourages governments to ‘build back better’.

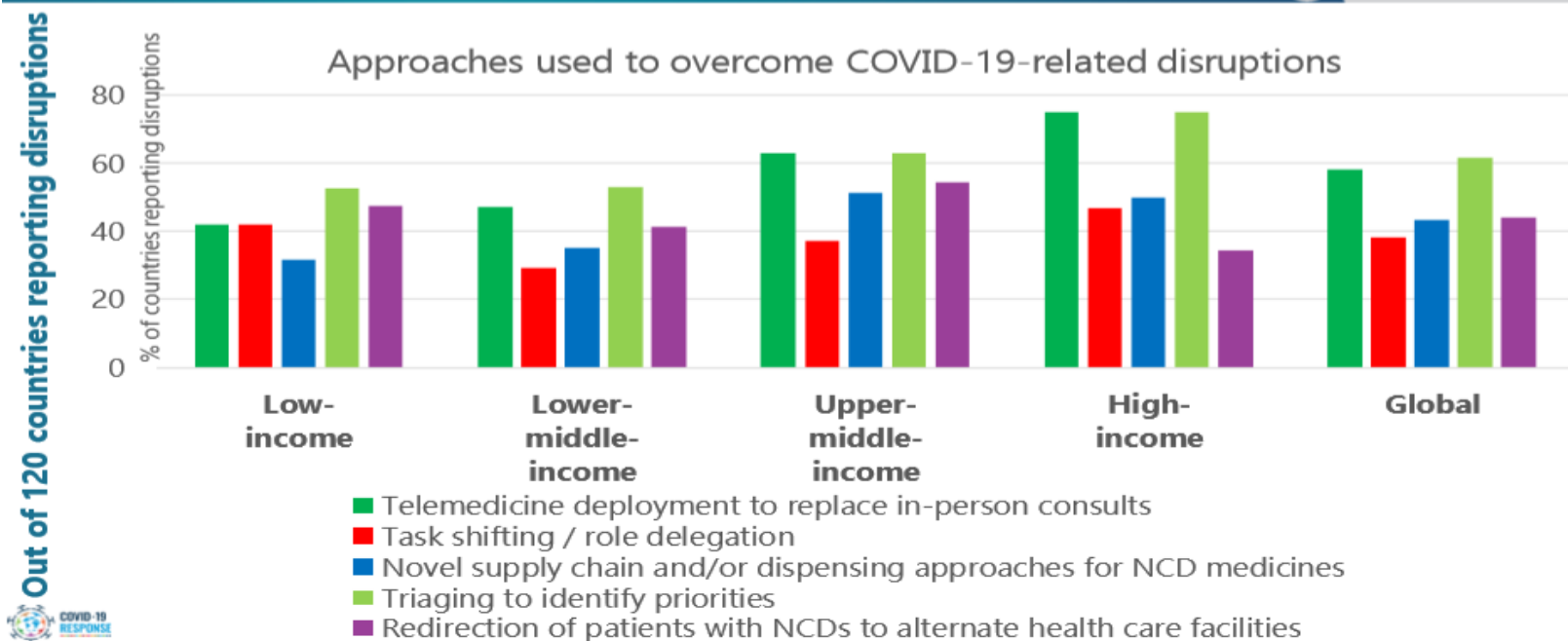
Main causes of NCD service disruption: 77% of countries reporting disruptions



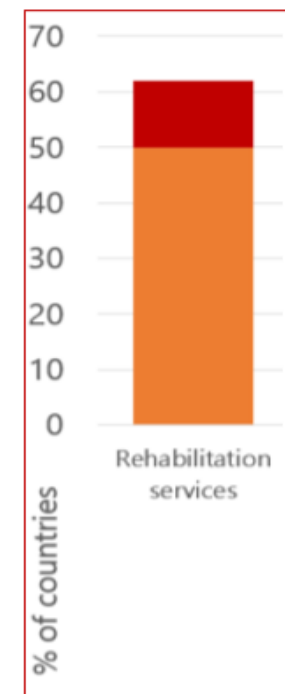
120 countries reported that NCD services are disrupted



Telemedicine and triaging are the mitigation strategies most often used to overcome disruptions



Rehabilitation is the most commonly disrupted service



Why: Rehabilitation continues being wrongly perceived as a non-essential health service for all patients when for many patients it is essential.

What services are disrupted: Acute rehabilitation (premature discharge after COVID-19 but also e.g. after heart disease, stroke and surgery), post-acute rehabilitation (e.g. cardiovascular disease and amputations) and outpatient rehabilitation (e.g. people in need of physiotherapy).

Consequences: Compromised health outcomes, future increased need including longer inpatient stays, and preventable hospital admissions due to complications.

WHO's recommendations:

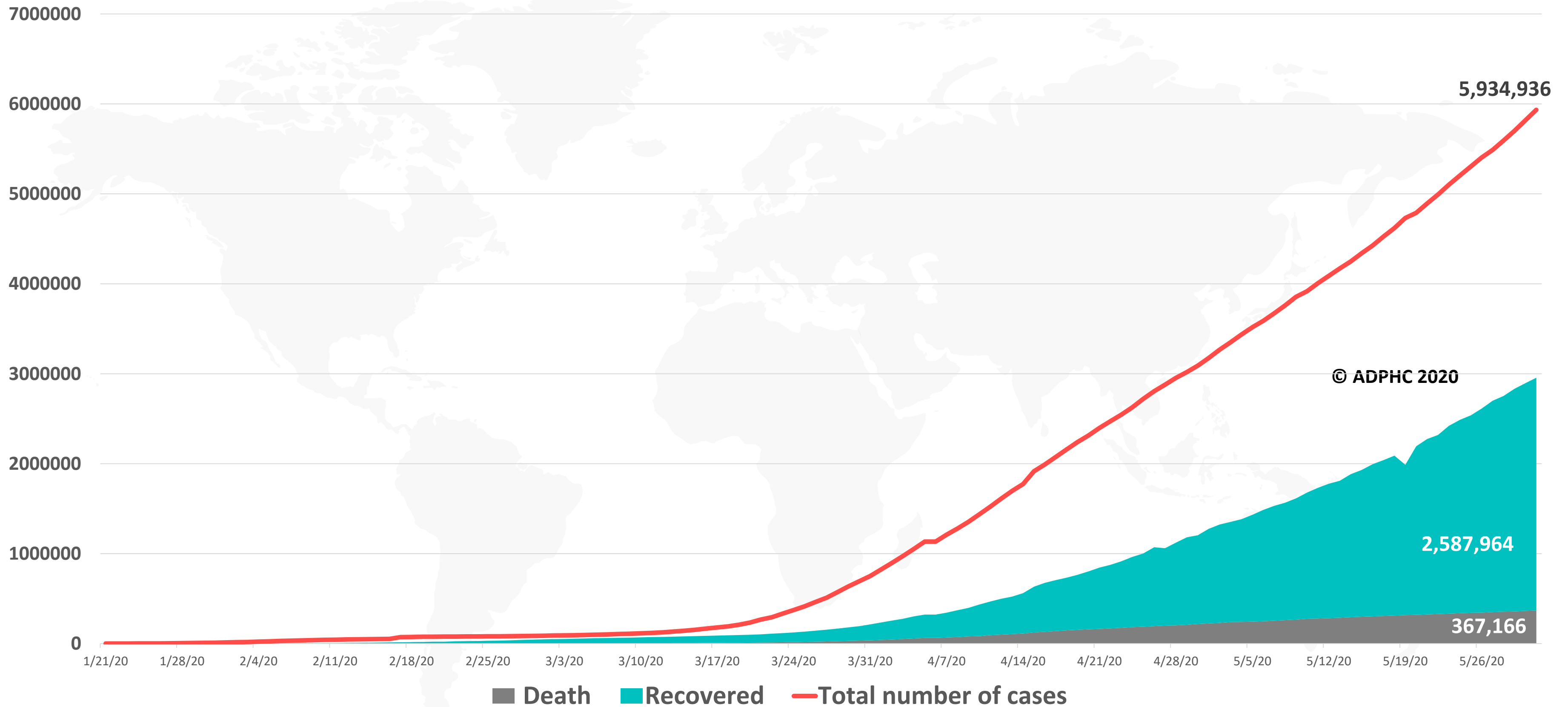
When rehabilitation services are temporarily ceased, decreased or diverted, clear guidance needs to be adopted to **identify priority patients who should continue rehabilitation** (e.g. surgery, stroke, cardiovascular emergencies and NCDs multimorbidity).

Wherever appropriate and feasible, **tele-rehabilitation services should be used.**

Epidemiology



Figure 1: Total number of infected, recovered, and death cases (January 21st to May 31, 2020)

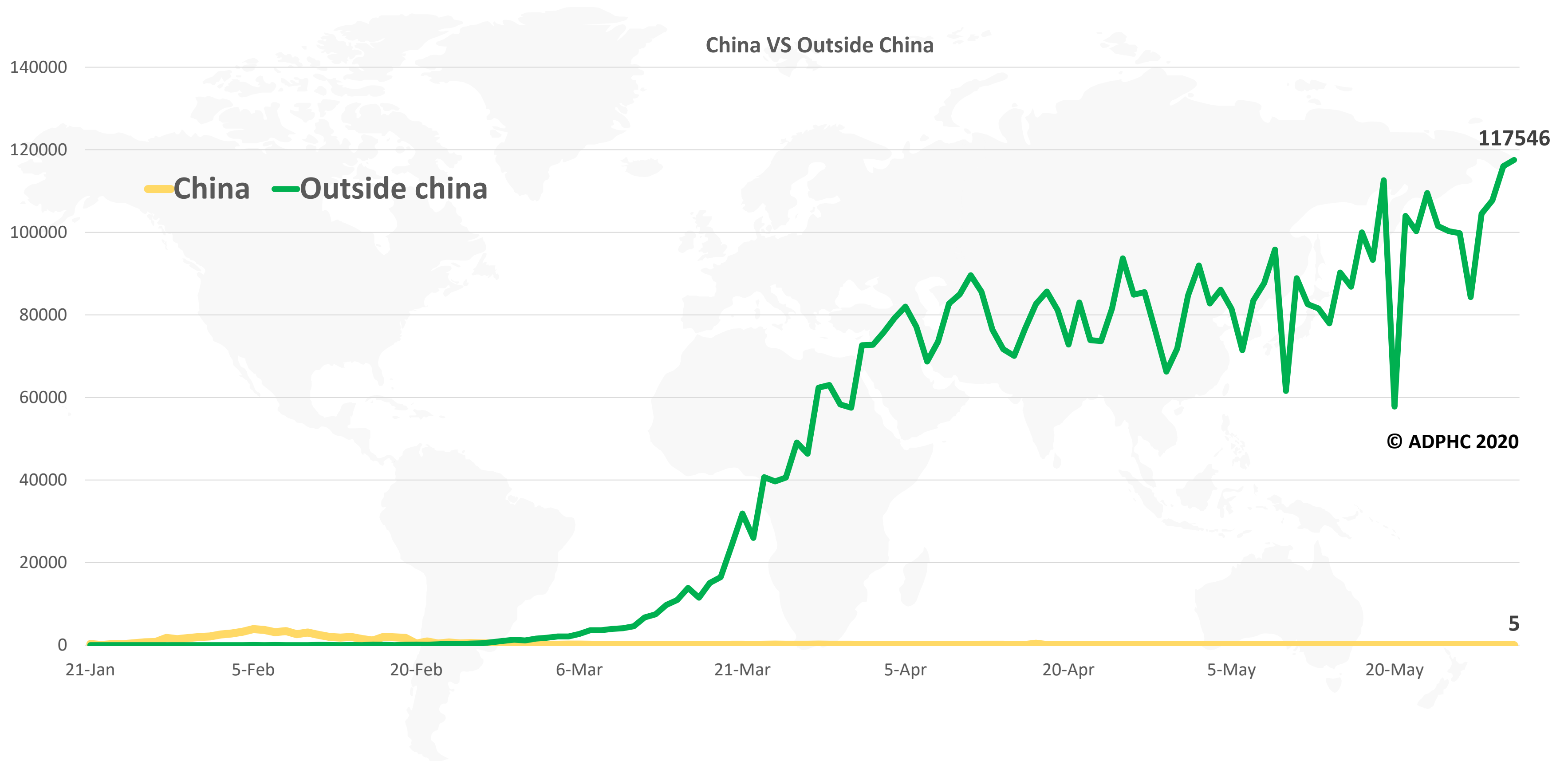


Line graph published by Abu Dhabi Public Health Center 2020.

Data resources: [WHO](#), [John Hopkins University](#)



Figure 2: Daily new infected COVID-19 cases reported between (January 21 to May 31, 2020).



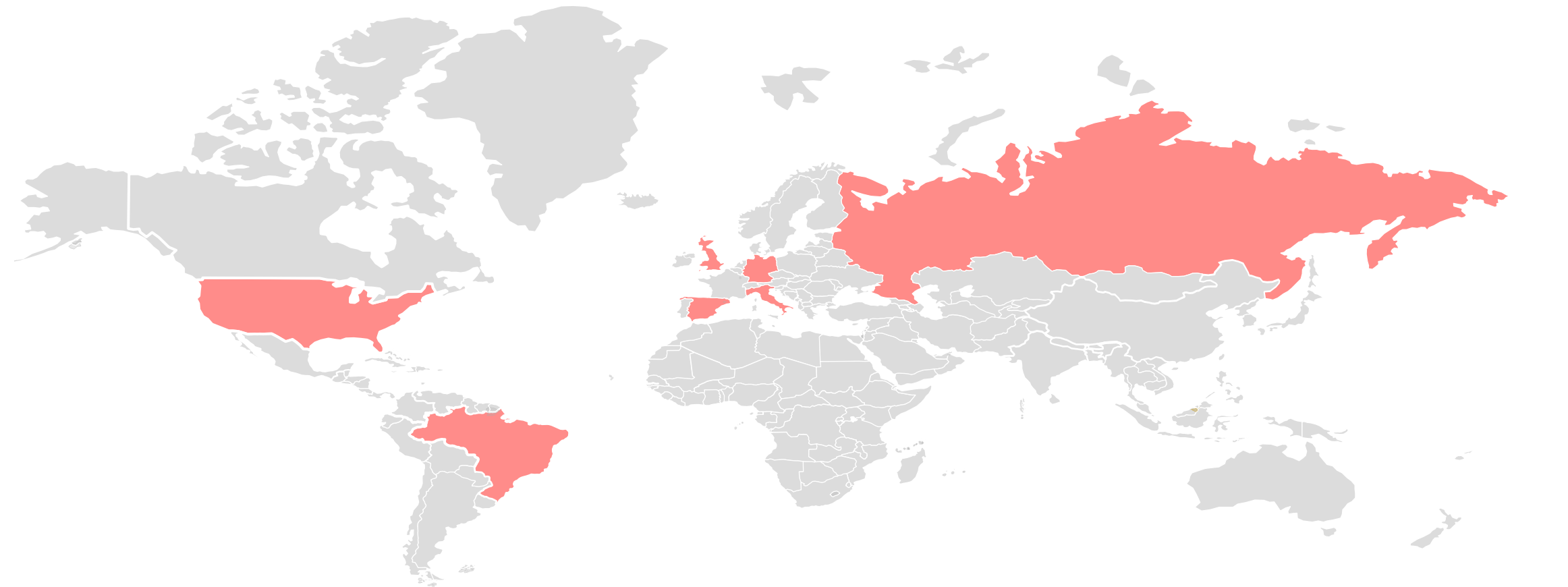
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Data resources: [WHO](#)

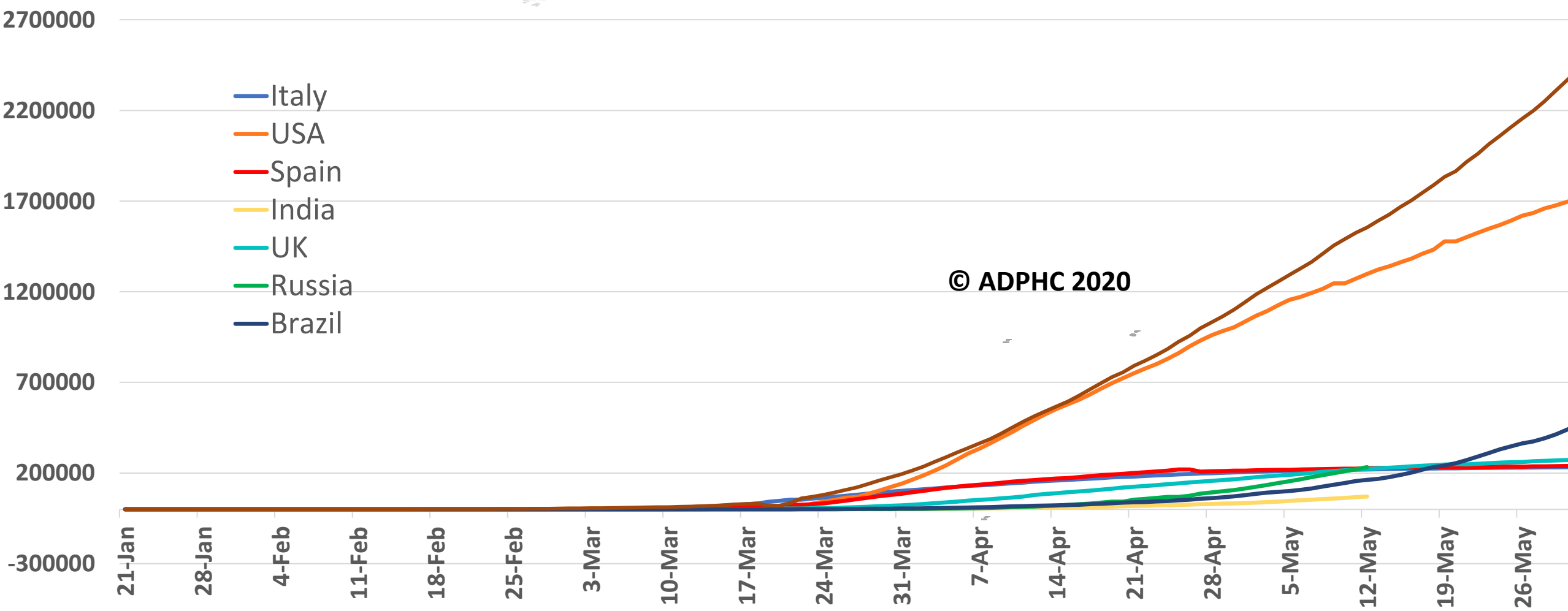
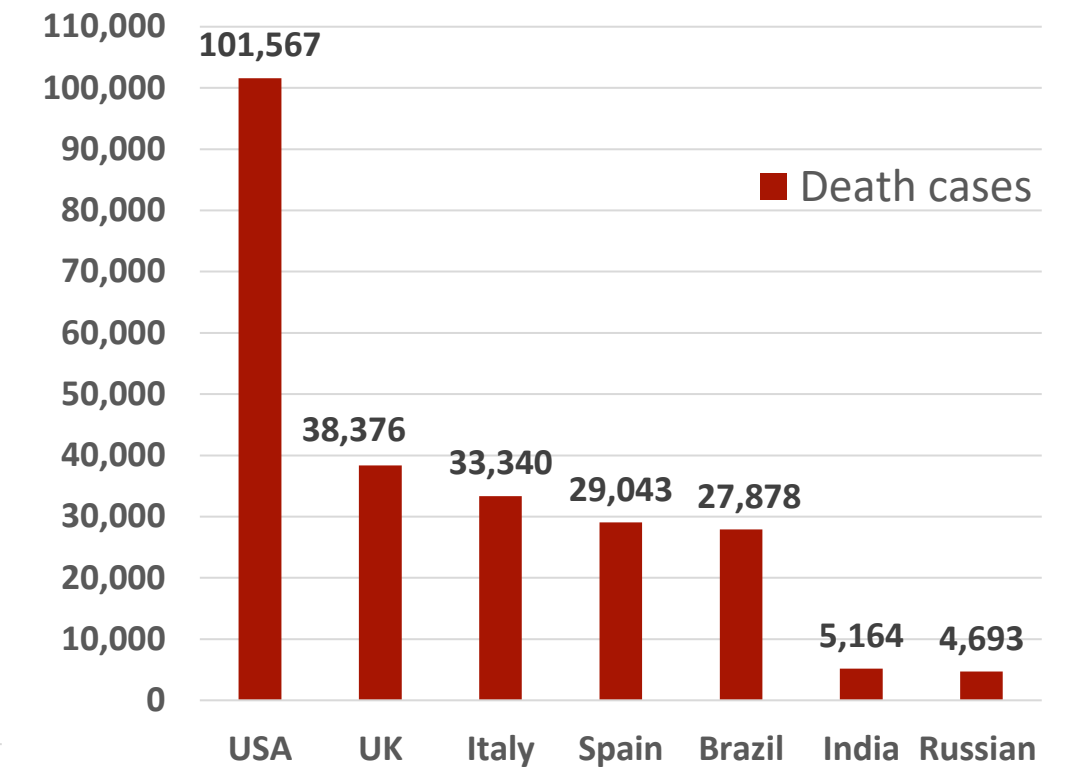
Epidemiology



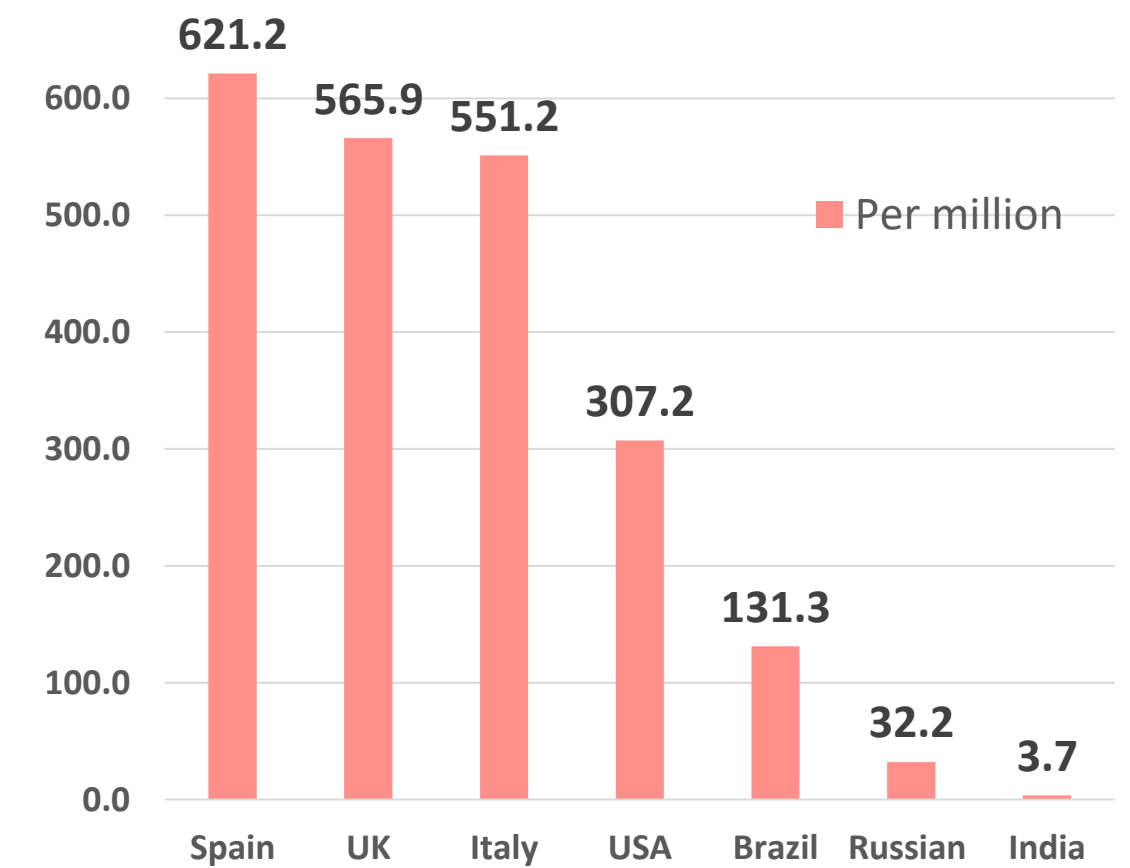
Figure 3 : Top 7 countries in the total number of cases due to COVID-19 (January 21 to May 31, 2020).



TOTAL DEATHS



DEATHS PER MILLION

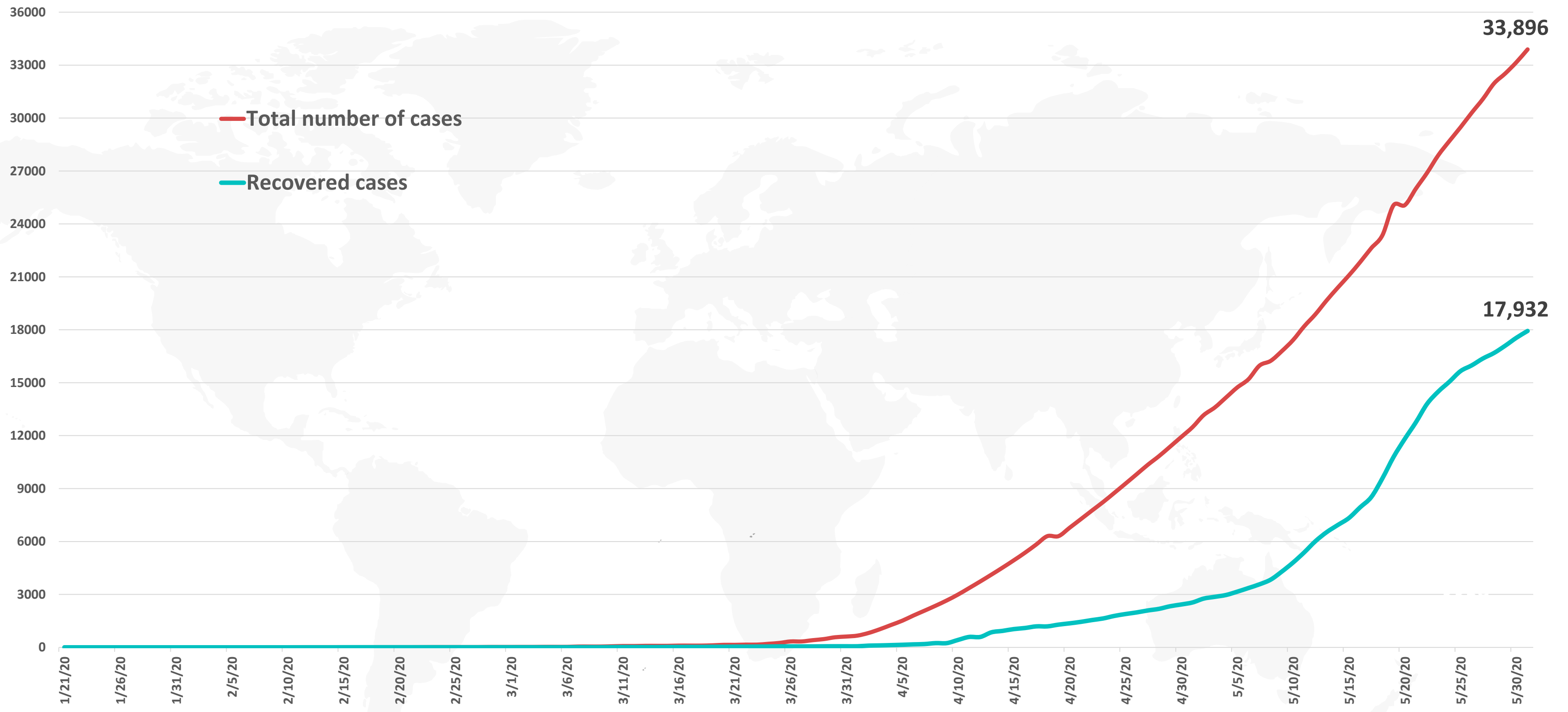


Line graph published by Abu Dhabi Public Health Center 2020.

Data resources: [WHO](https://www.who.int)



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



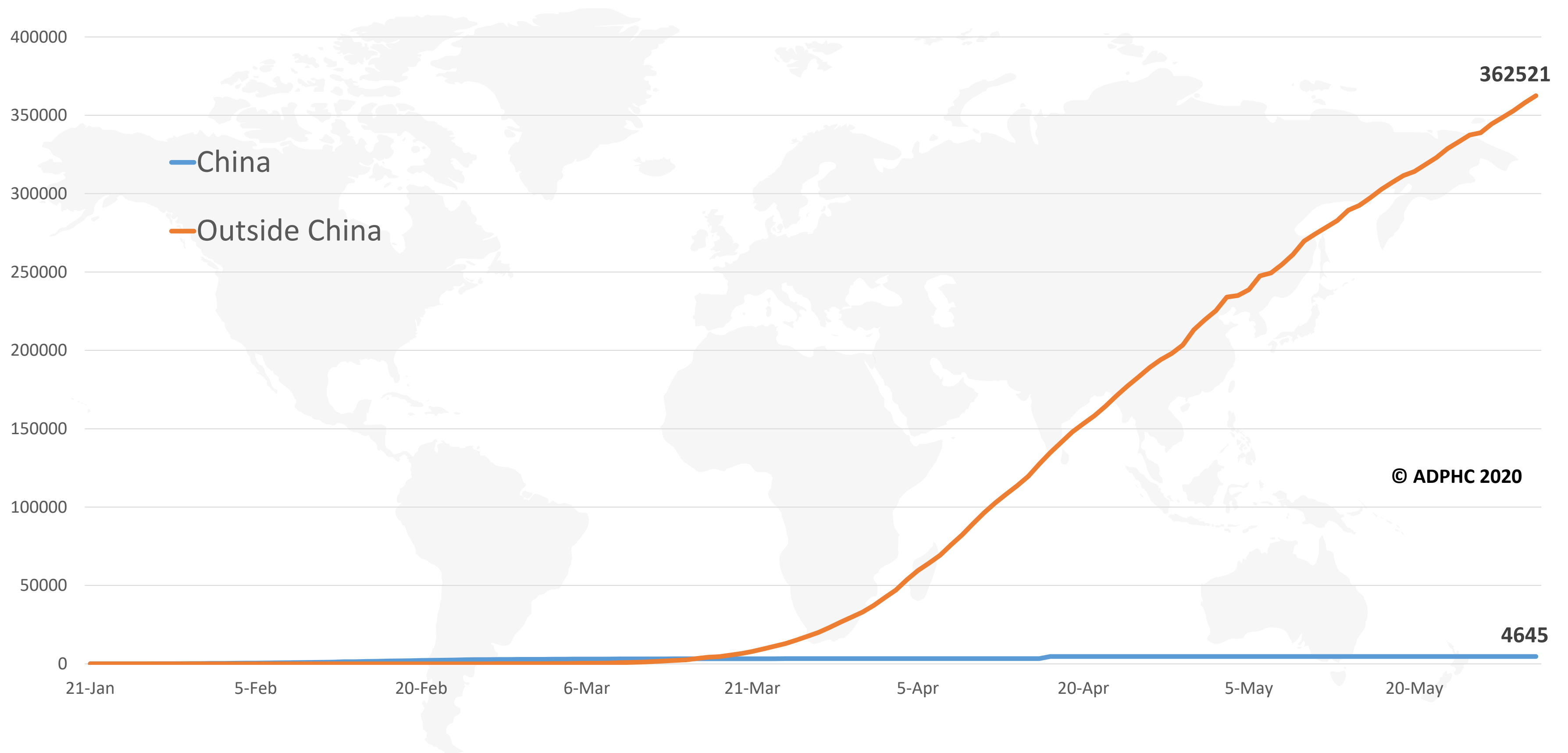
Line graph published by Abu Dhabi Public Health Center 2020.

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 22 to May 31, 2020).



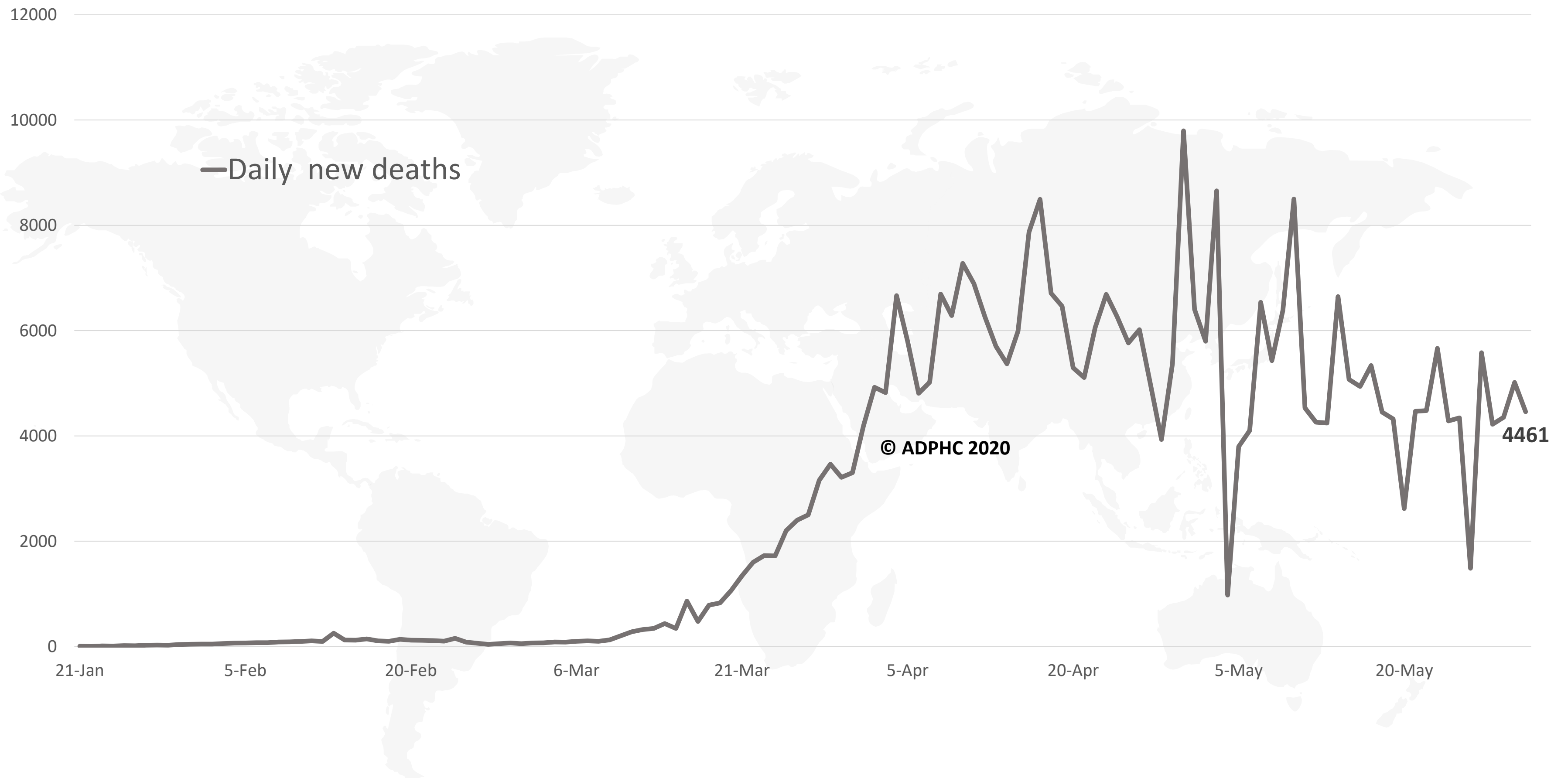
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Data resources: [WHO](https://www.who.int)



Figure 6: Global daily new deaths due to COVID-19 (January 22 to May 31, 2020).



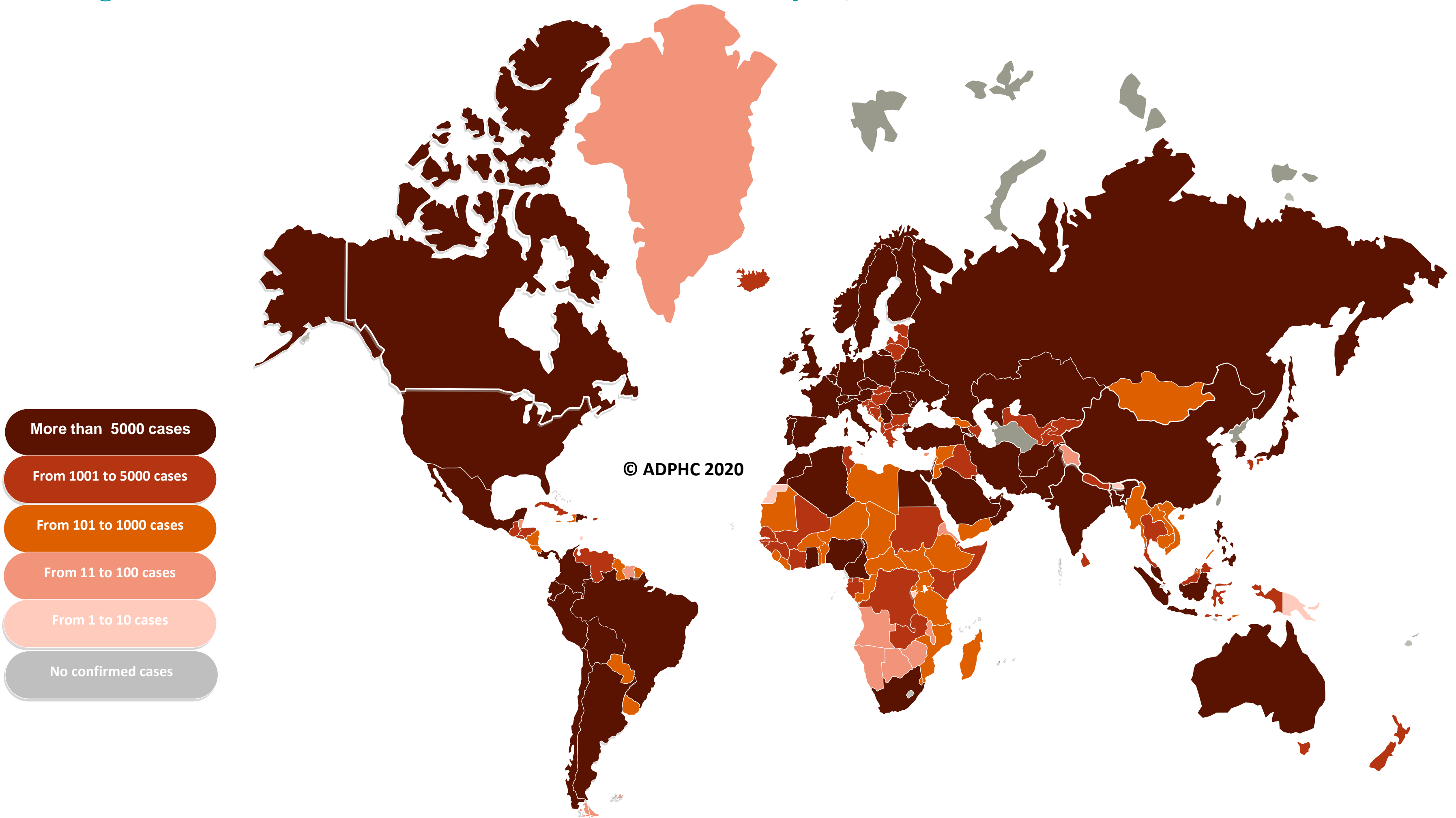
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Data resources: [WHO](https://www.who.int/)

Epidemiology



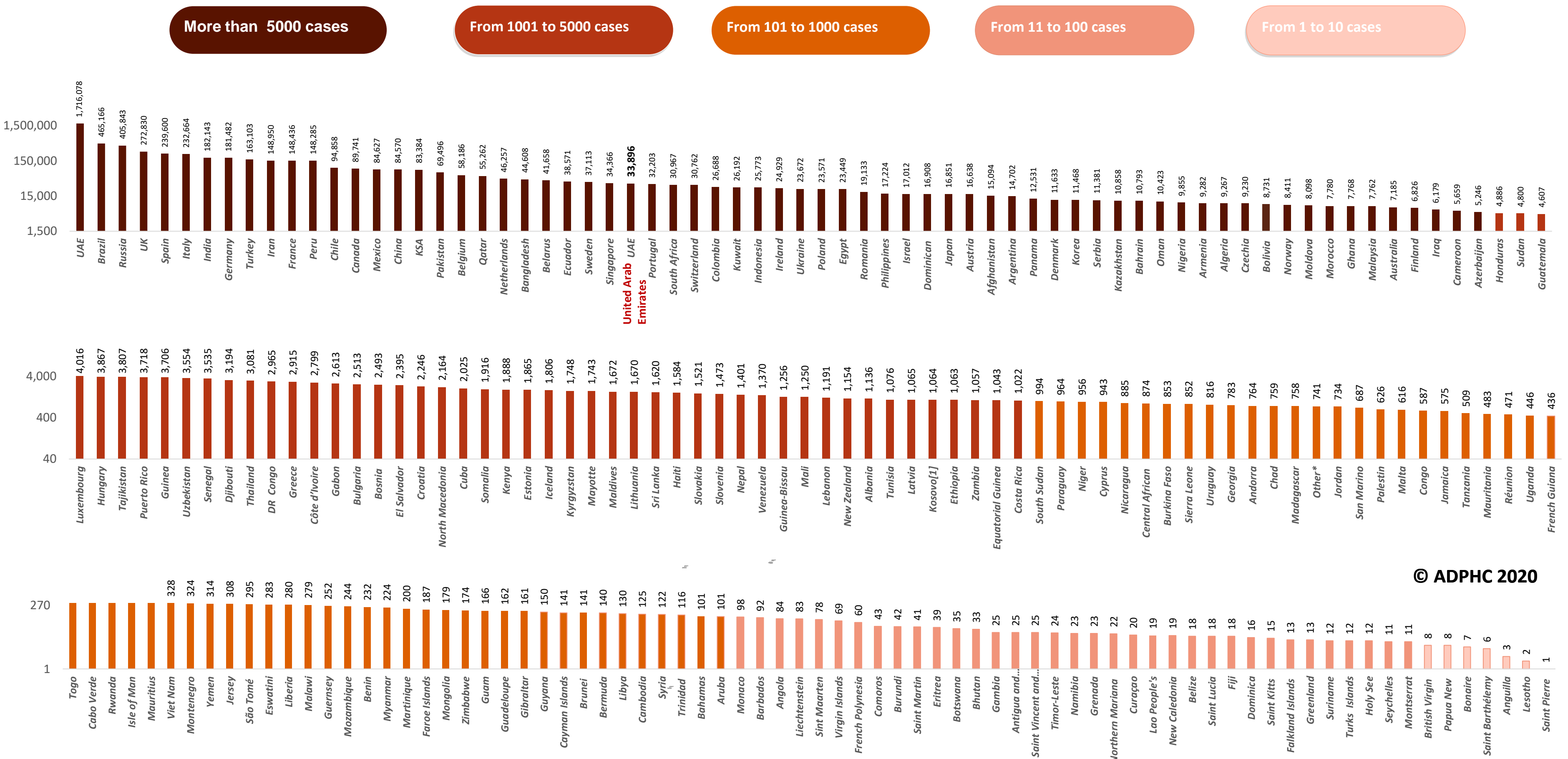
Figure 7a : Global distribution of COVID-19 cases (May 26, 2020).



Map chart published by Abu Dhabi Public Health Center 2020.



Figure 7B: Bar chart illustrate the global distribution of COVID19 cases (May 31, 2020)



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

Map chart published by Abu Dhabi Public Health Center 2020.

Data resources: [WHO](https://www.who.int/)

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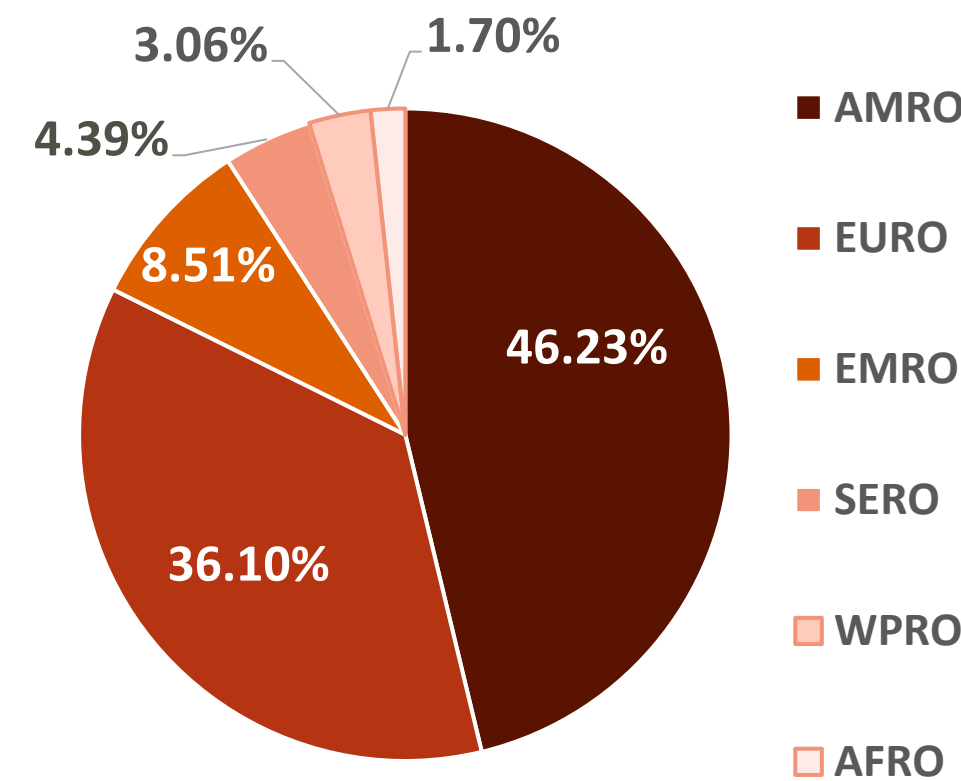
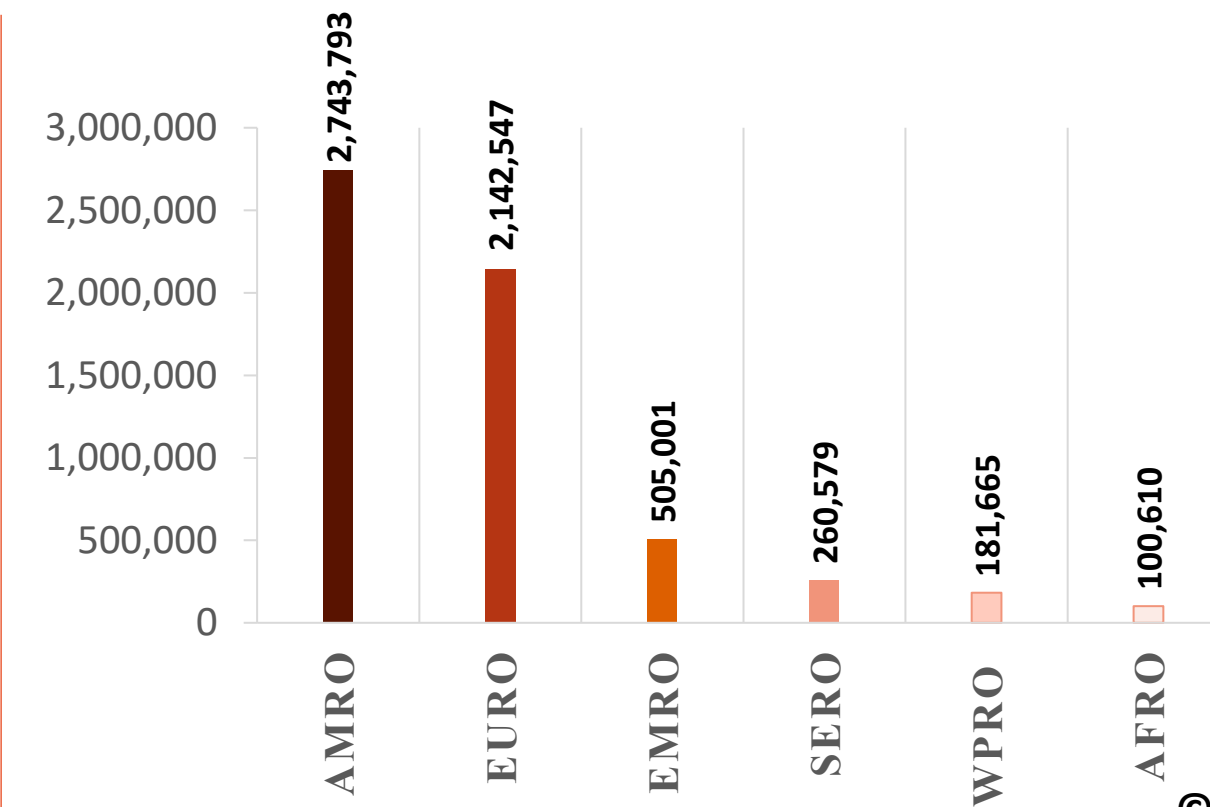
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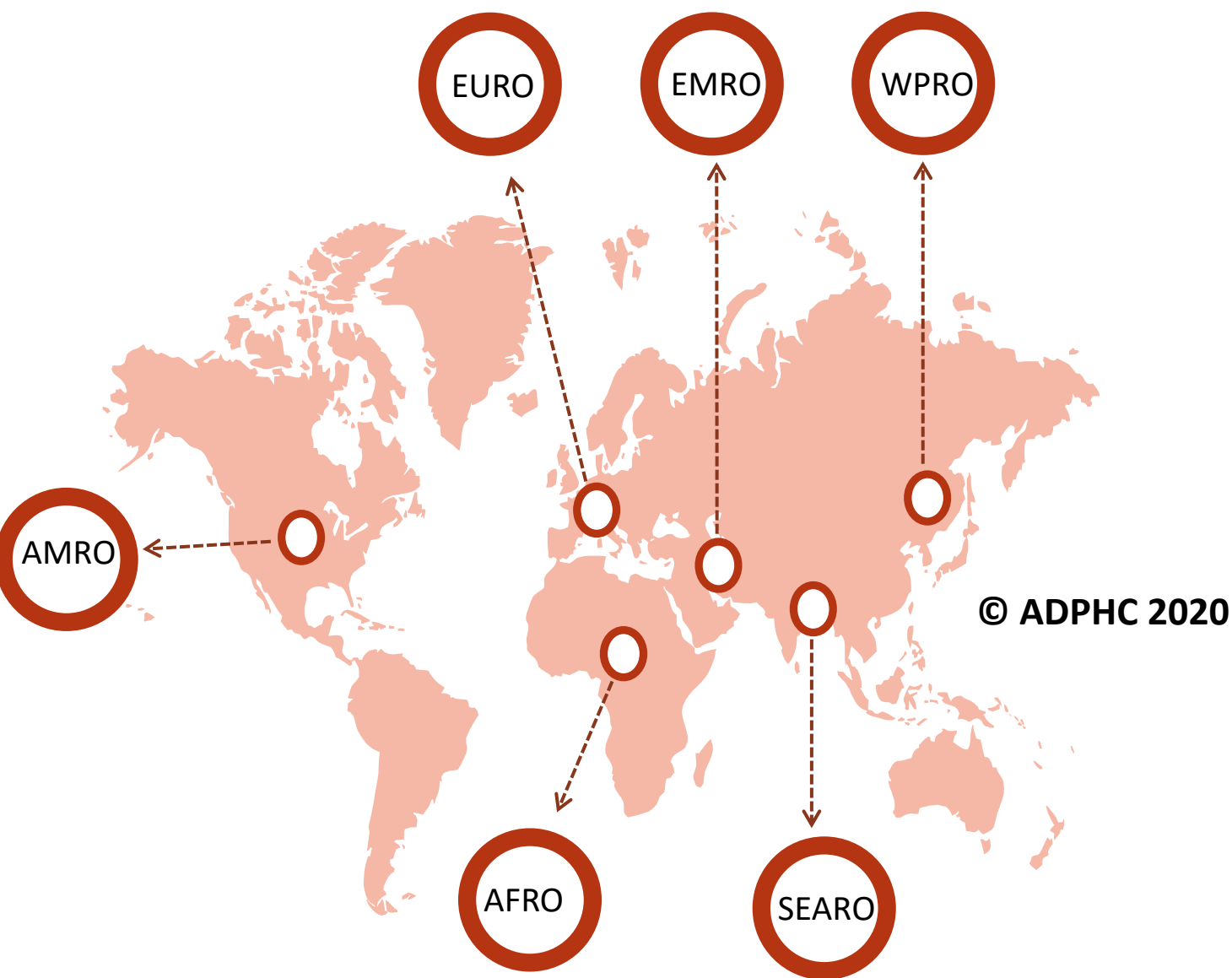
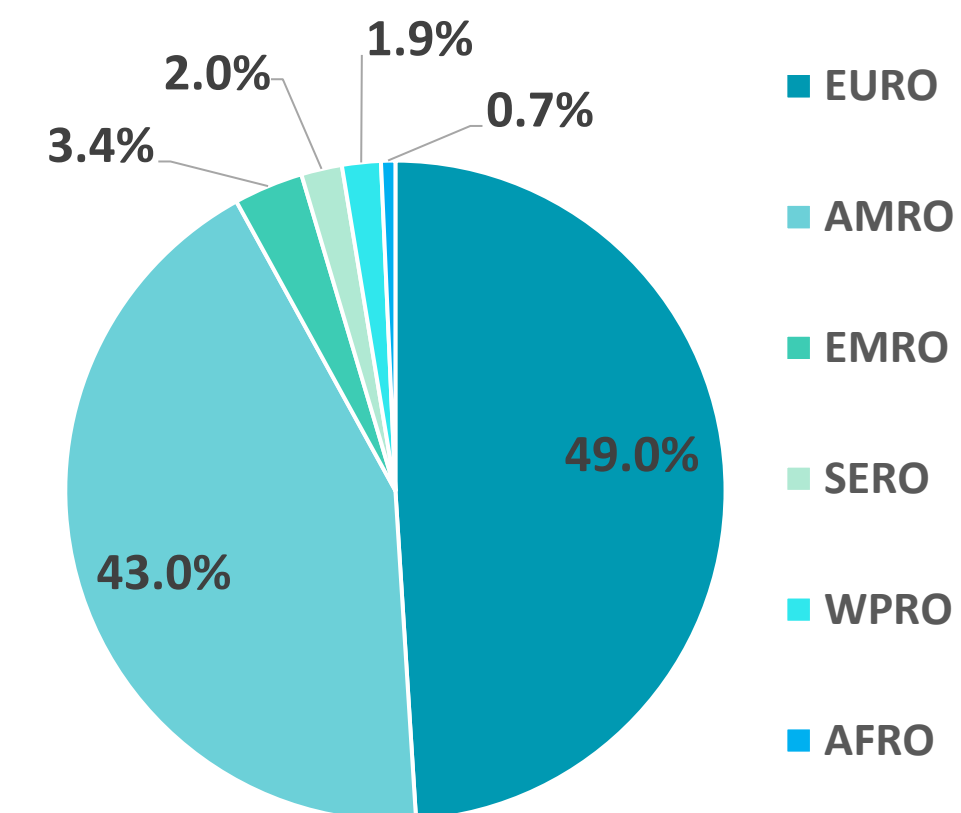
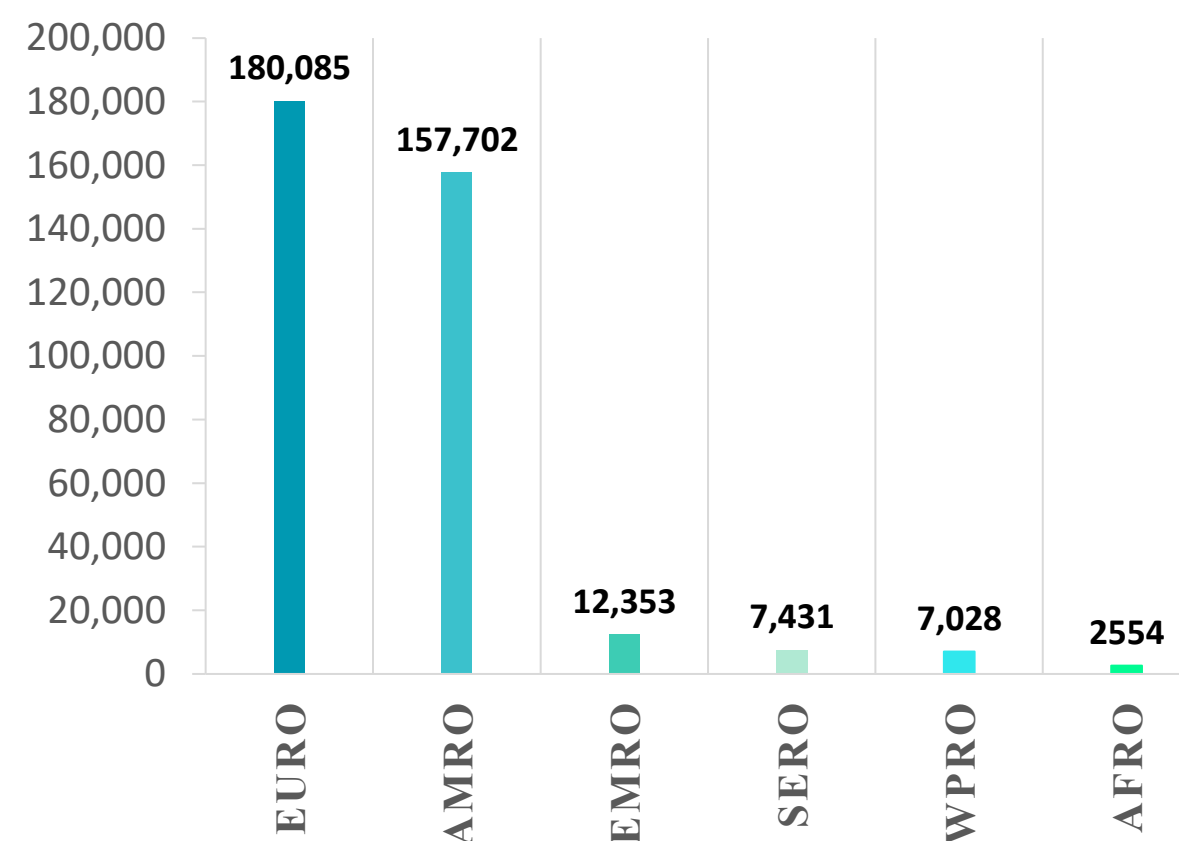
Figure 8: illustrate the Global distribution of COVID19 cases per region (May 31, 2020)

INFECTED



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DEATH



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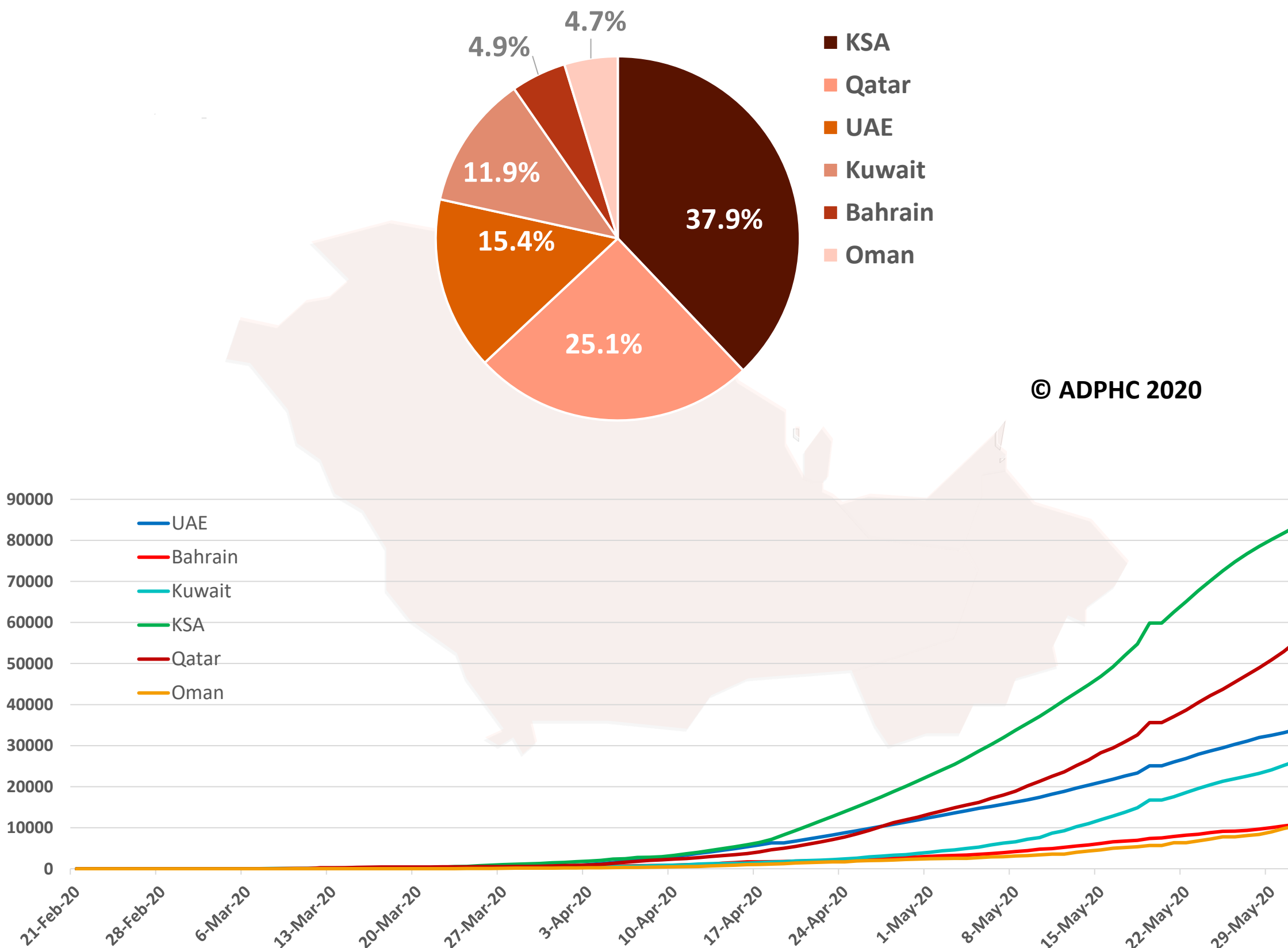
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Data resources: [WHO](http://www.who.int)

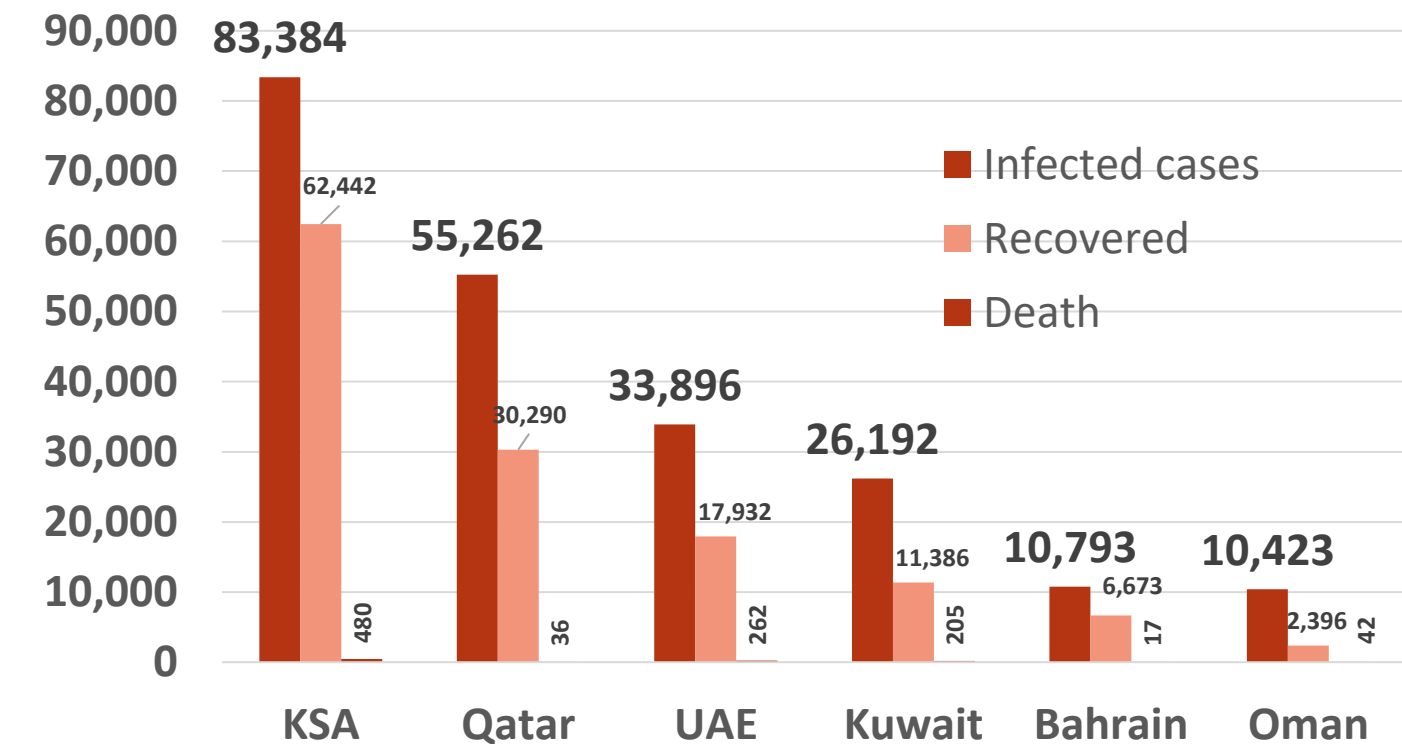


Figure 9: Comparative analysis of the distribution of COVID19 cases in GCC countries (May 31, 2020)

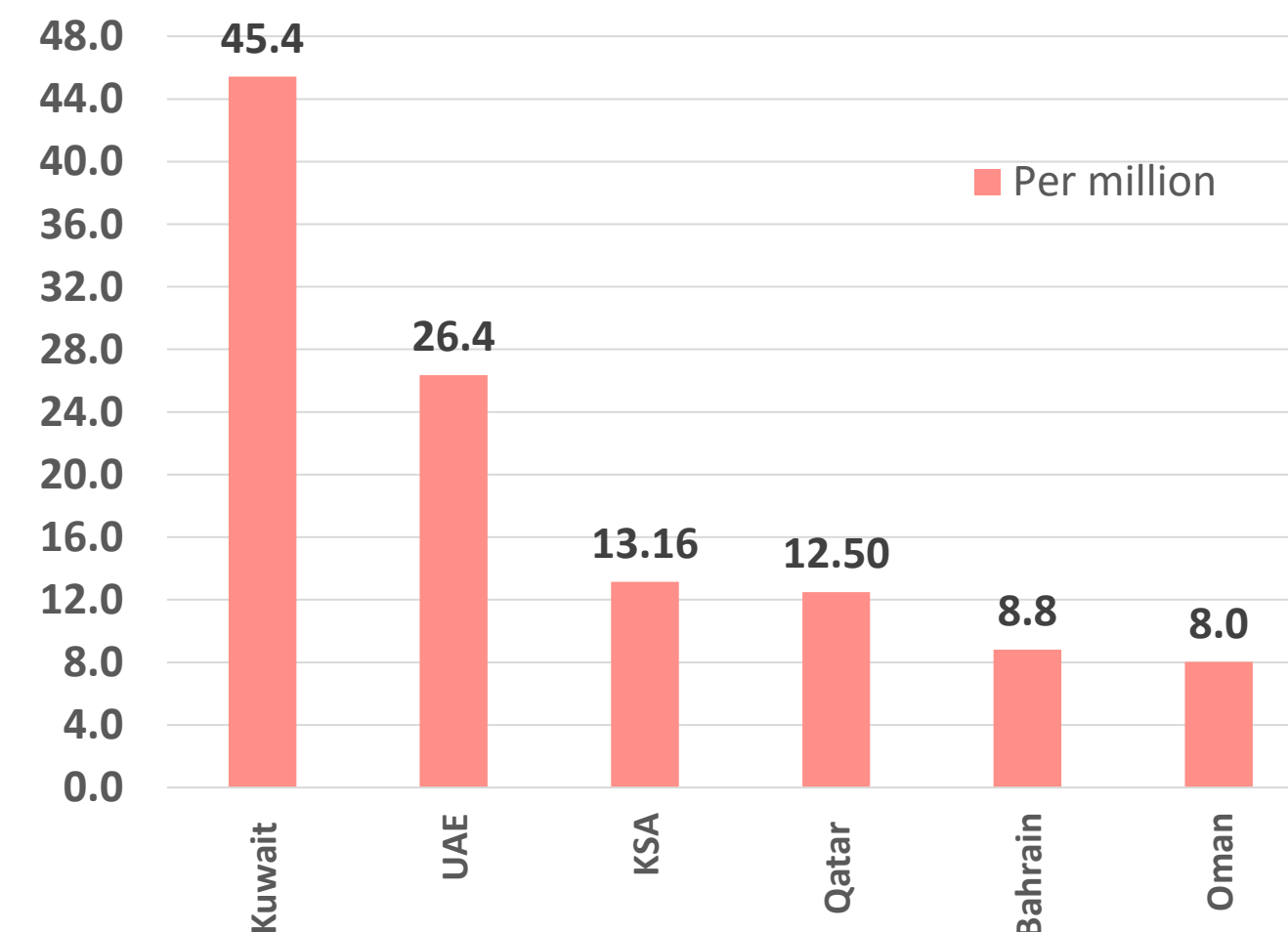
TOTAL NUMBER OF INFECTED CASES



Total number of infected, recovered and Deaths



Death per million



charts published by Abu Dhabi Public Health Center 2020.

Data resources: [WHO](https://www.who.int)

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Clinical Features

Article1 :Phenotypic characteristics and prognosis of inpatients with COVID-19 and diabetes: the CORONADO study

Published: May 29, 2020 in [Diabetologia](#)

Summary:

nationwide multicenter observational study in people with diabetes hospitalized for COVID-19 in 53 French centers in the period 10–31 March 2020. The primary outcome combined tracheal intubation for mechanical ventilation and/or death within 7 days of admission. Records of 1317 participants were analyzed.

Findings:

Participants : 64.9% men, mean age 69.8 ± 13.0 years, median BMI 28.4

The primary outcome was encountered in 29.0% of participants, while 10.6% (9.0, 12.4) died and 18.0% (16.0, 20.2) were discharged on day 7.

BMI was independently associated with severity with COVID19.

Neither long term glycemic control (assessed by HbA1c measurement) and routine therapies (including RAAS blocked DDP-4 inhibitor), were associated with COVID19 severity

Age , macrovascular, microvascular diabetic complication, treated obstructive sleep apnea, dyspnea (difficulty breathing) , some biological markers (increase AST , CRP, decrease eGFR and platelets count on admission) were independently associated with risk of early death in patient with diabetes hospitalized for COVID19.

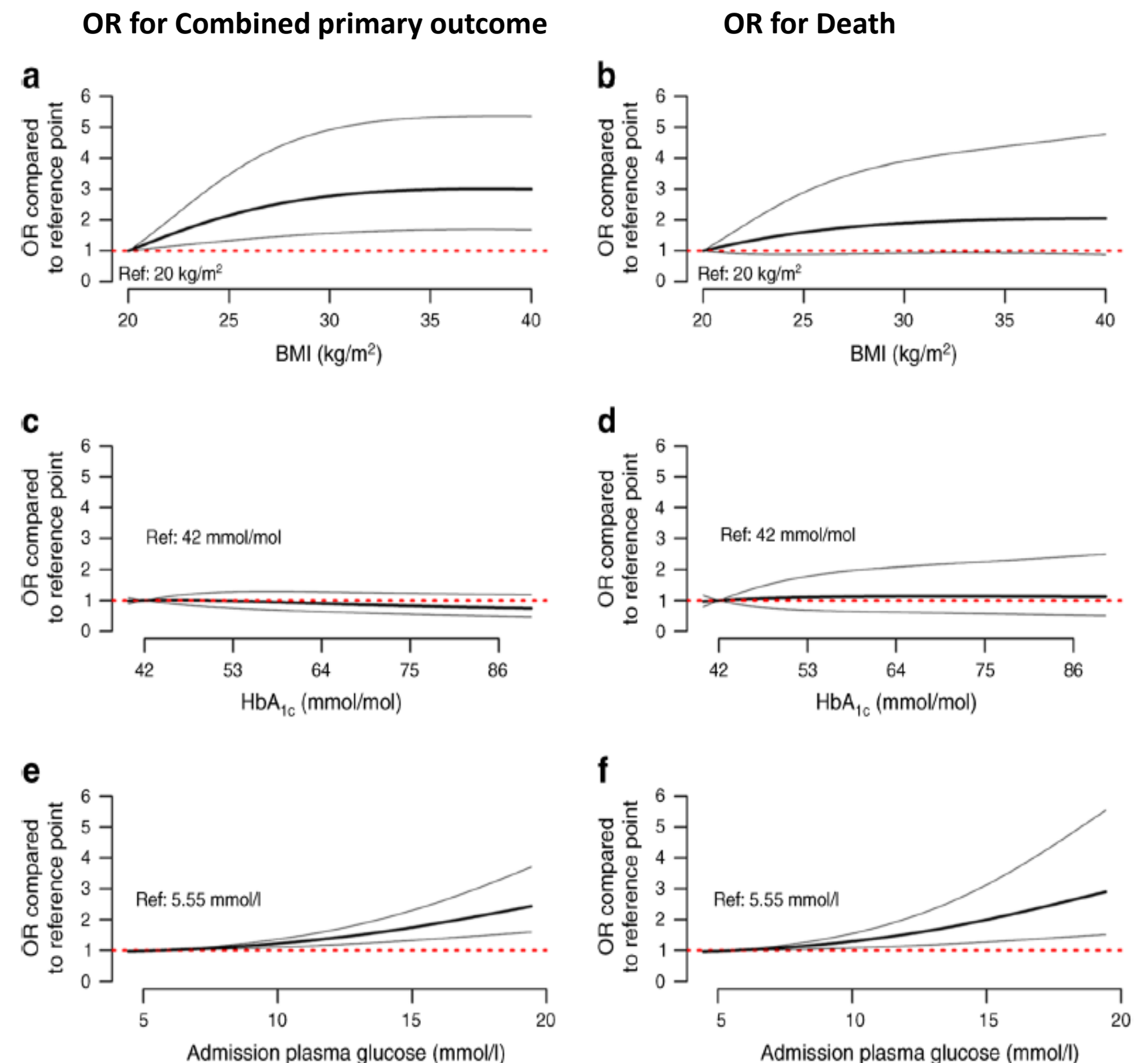


Figure1 : explore the OR for different factor the end point outcome.

The **thick black** line gives the OR compared with the reference point, the thin grey lines are the 95% CI, and the **red dotted red line** (OR = 1) corresponds to a similar risk-level as the reference point

Pathogenesis



Article 2: Nasal Gene Expression of Angiotensin-Converting Enzyme 2 in Children and Adults

Published: May 20, 2020 in the [JAMA](#)

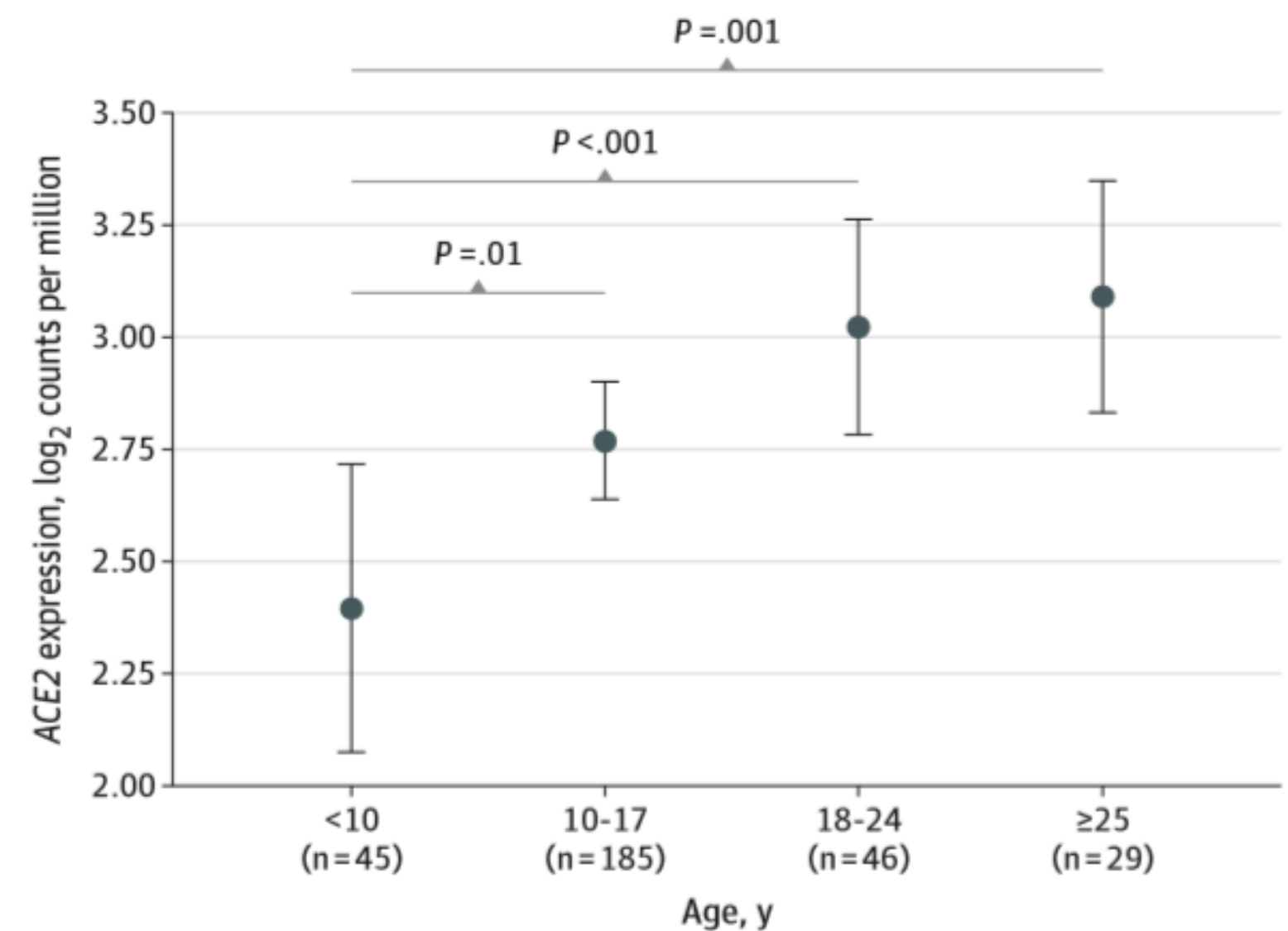
Summary:

- This study explore the hypothesis that the lower risk among children is due to differential expression of angiotensin-converting enzyme 2 (ACE2), the receptor that severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) uses for host entry.
- A cohort study collected a 305 individuals' nasal epithelial samples from patient aged 4 to 60 years for a previously planned study on asthmatic patient 2015-2018 .
- Nasal epithelium was collected using a cytology brush that was immediately placed in RNA stabilization fluid and stored at -80°C . then expression of ACE2 gene was studied on those samples.
- Analysis of gene expression was done based on the following Age categories: **younger children** (aged <10 years), **older children** (aged 10-17 years), **young adults** (aged 18-24 years), and **adults** (aged ≥ 25 years).

Findings:

ACE2 gene expression was significantly higher in older children and adults . Figure.

Figure. Nasal Gene Expression of ACE2 in Different Age Groups



Conclusion

- Lower ACE2 expression in children relative to adults may help explain why COVID-19 is less prevalent in children.
- Study limitation: The sample did not include individuals older than 60 years



Article 3: Modeling Epidemics With Compartmental Models

Published: 27 May 2020 in [the JAMA](#)

Link: [Summary](#):

Summarized by Subject matter expert

This article discusses the scope of using Susceptible-Infected-Recovered (SIR) model during an epidemic.

The SIR model consists of three compartments

- S = the number of susceptible individuals
- I = the number of infected individuals
- R = the number of recovered individuals

Each individual is considered to be in 1 compartment at a given time but can move from one compartment to another.

- All of a population begins in the susceptible compartment (Figure), which contains individuals who might become infected if exposed to the pathogen.
- The infected compartment is defined as individuals who have the ability to infect individuals in the susceptible compartment: includes both asymptomatic and symptomatic individuals.
- The term recovered in the SIR model can be misleading because it includes individuals who have **gained immunity to the disease and those who die of the disease.**

Two important parameters of SIR model

1. Effective contact rate (β), which affects moving from the susceptible compartment to the infected compartment
 2. Rate of recovery (or mortality; γ), which affects moving from the infected compartment to the recovered compartment.
- If $\beta > \gamma$, then there will be more number of infected people.
 - Basic reproduction number R_0 is the ratio between β and γ .

A decrease in the effective contact rate β through community mitigation strategies decreases R_0 , delaying and lowering the peak infection rate that occurs in the epidemic (ie, “flattening the curve”).

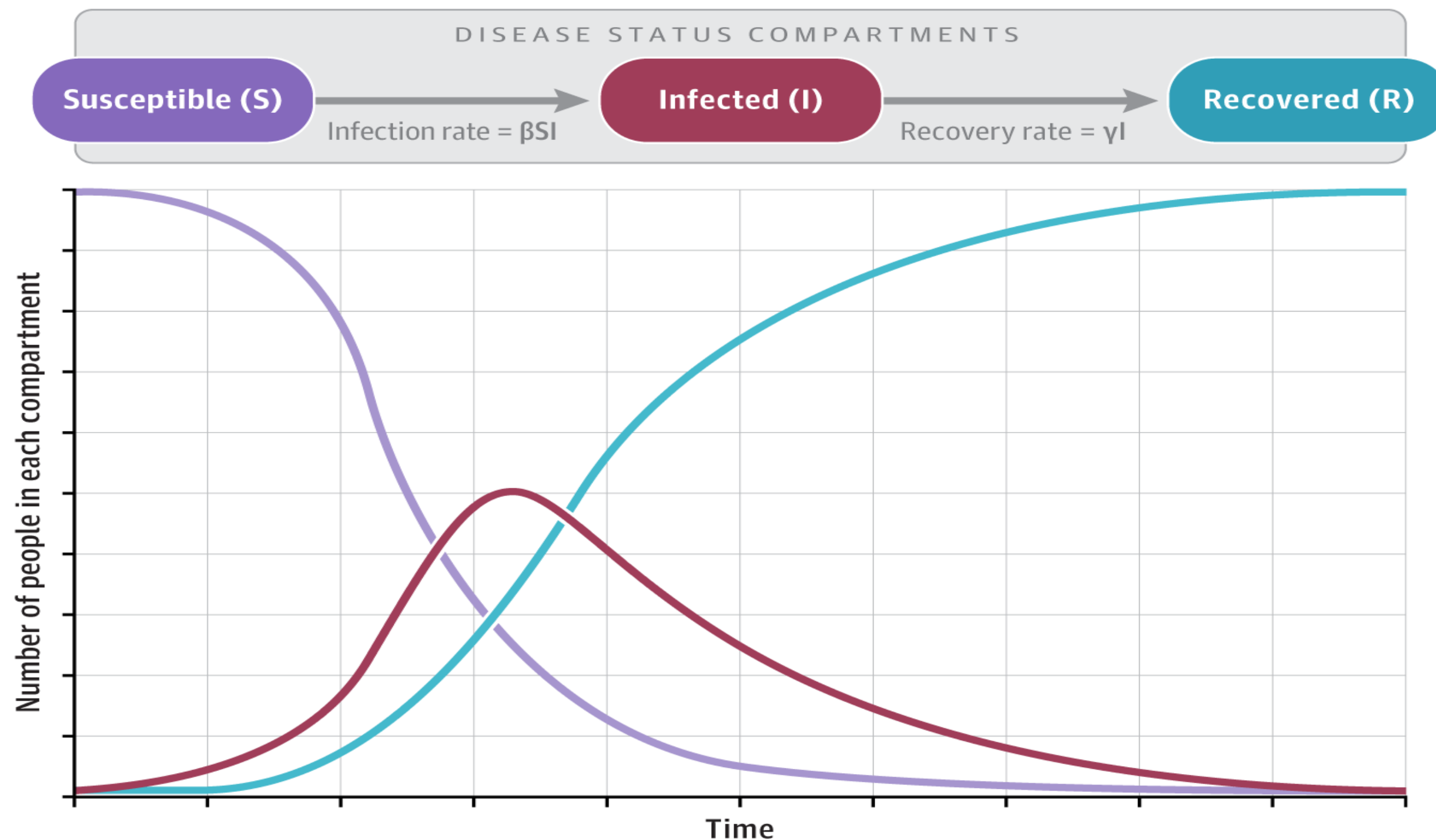
Model Limitations

- SIR is a simple model, but it likely oversimplifies complex disease processes.
- Does not incorporate the latent period between when an individual is exposed to a disease and when that individual becomes infected and contagious.
- Does not account for uncertainty in model parameters.

Public Health Response:



Article: cont.,
Summary:



This model is based on the rates over time of persons moving from the susceptible compartment to the infected compartment to the recovered compartment. The rate of infection is equal to β times the number of individuals in the susceptible and infected compartments, and the rate of recovery is equal to γ times the number of individuals in the infected compartment.