

Coronaviruses

WHAT ARE CORONAVIRUSES?

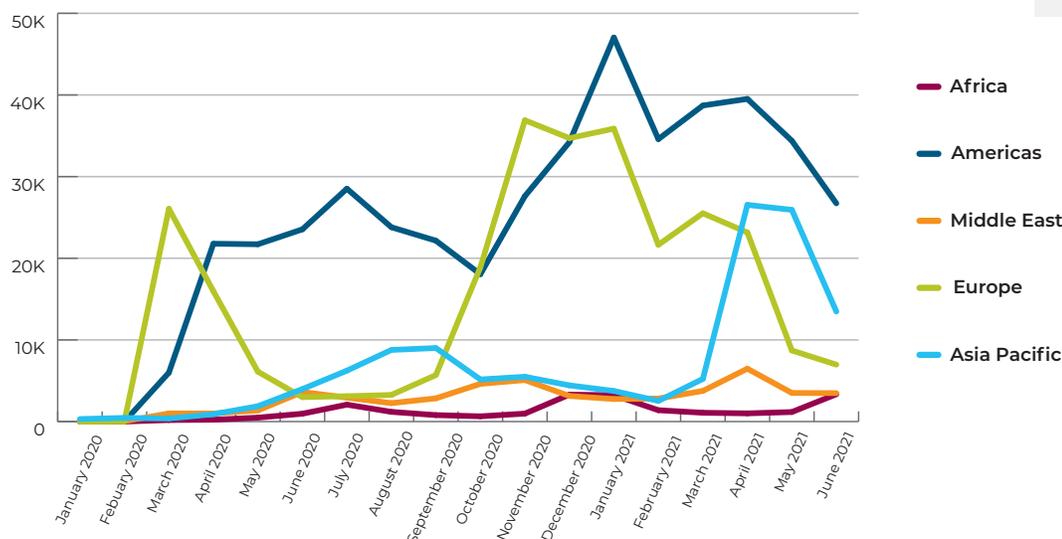
Discovered in the 1960s, coronaviruses (CoV) are a large group of RNA viruses in the family Coronaviridae that cause disease in humans and animal species. Human illness includes respiratory infections that range from the common cold to viral (direct) or bacterial (indirect) pneumonia and are especially serious in infants and at-risk adults.

There are seven known coronavirus types/strains. Continual circulation through the human population occurs with the common human strains: HCoV-229E, HCoV-NL63, HCoV-OC43 and HCoV-HKU1. More severe respiratory conditions are caused by severe acute respiratory syndrome (SARS)-CoV, Middle East respiratory syndrome (MERS)-CoV and 2019 novel coronavirus (COVID-19). SARS-CoV and COVID-19 share 70% genetic similarity.

SYMPTOMS, COMPLICATIONS AND FATALITY RATES

The common human coronaviruses usually cause mild to moderate upper respiratory tract complications. Symptoms include cough, sore throat, runny nose, fever, headache and fatigue. With the more serious coronaviruses, many cases progress to pneumonia resulting in a high case fatality rate. Similar to MERS-CoV, COVID-19 symptoms include fever, cough and shortness of breath. Studies have estimated that the median incubation period for COVID-19 is 4-5 days but can be as long as 14 days.¹⁻³

Number of COVID-19-related Deaths



Fatality rates

SARS-CoV: 10%

MERS-CoV: 35%

COVID-19: 0.1-19.7%*

* Based on currently available data from the WHO and CDC

Coronavirus outbreaks

2002: SARS-CoV in China

2012: MERS-CoV in Saudi Arabia

2019: COVID-19, which originated in China and is now a pandemic

Data current as of June 28, 2021

TRANSMISSION

Coronaviruses can be transmitted to humans from animal reservoirs (e.g., camels, bats) leading to rapid human-to-human transmission through close contact that includes touching and respiratory droplets.^{4,5} Initial sequences from COVID-19 in China match recent sequences in US patients, suggesting a common animal origin. Disease spread can also happen by touching the surfaces of contaminated objects, but fecal contamination is rare. Because it is highly contagious, COVID-19 transmission is efficient. As a result, the virus has spread rapidly—from a single city in China to 175 countries in approximately 3 months.

DIAGNOSIS AND TREATMENT

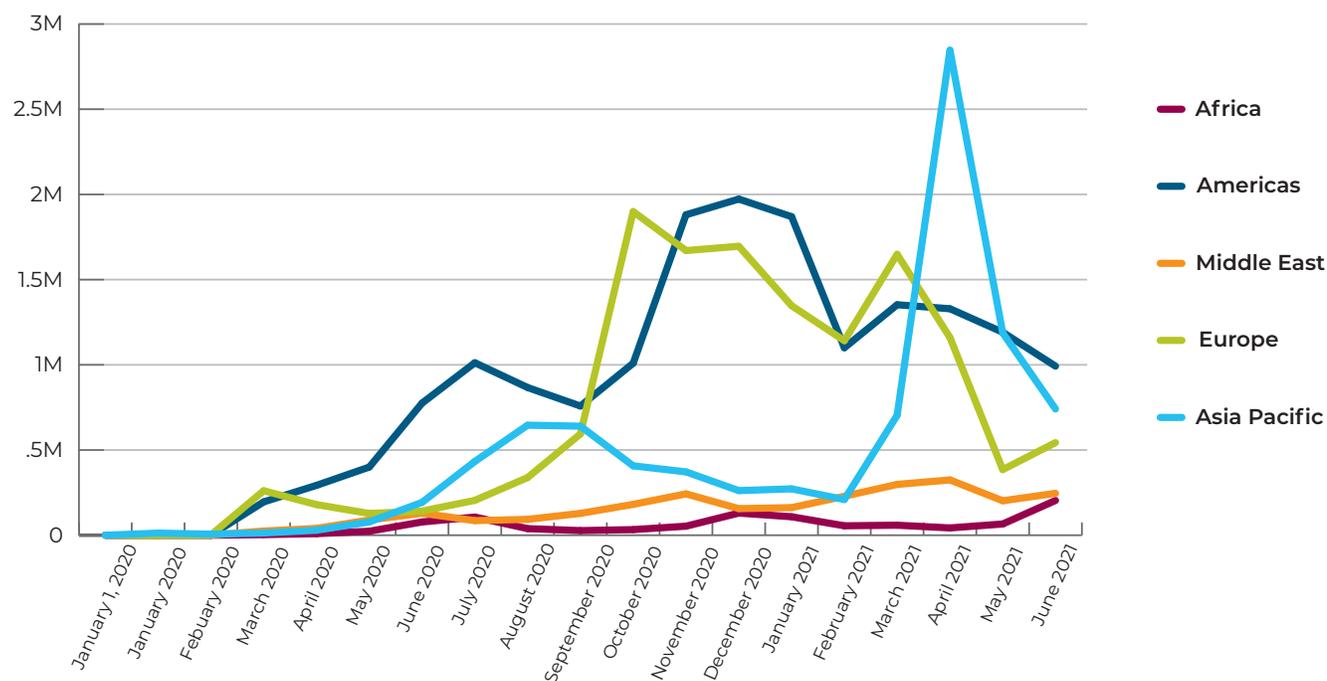
Diagnosis of CoV infections occurs through laboratory testing of respiratory specimens and serum via RT-PCR at public health laboratories. For SARS and MERS, there are no approved vaccines nor specific treatments. Instead, treatment typically includes supportive care for symptom relief such as antibiotics to treat the pneumonia-causing bacteria, antiviral medicines and high doses of steroids to reduce swelling in the lungs.

Multiple treatments, including Veklury and Actemra, have been granted emergency use authorizations (EUA) or conditional marketing authorisations (CMA) to treat COVID-19. There are more than 2500 studies for investigational therapies for COVID-19 registered in clinicaltrials.gov.

Companies with approved COVID-19 therapeutics (full or emergency use approval)

- Genentech: Actemra (tocilizumab)
- Gilead Sciences: Veklury (remdesivir)
- Gilead Sciences/Eli Lilly: Veklury (remdesivir) in combination with Olumiant (baricitinib)
- GlaxoSmithKline/Vir Biotechnology, Inc: sotrovimab
- Regeneron Pharmaceuticals: REGEN-COV (casirivimab and imdevimab, administered together)

Number of Confirmed COVID-19 Cases



Data current as of June 28, 2021

CURRENT SITUATION, EPIDEMIOLOGY AND WHAT'S NEXT

SARS-CoV has not been detected since 2004, while MERS-CoV continues to circulate in camels. Only eight weeks into the COVID-19 outbreak, the virus and genetic sequence were identified, and PCR and serological assay were available for use. The World Health Organization considered that unprecedented for a new disease. Since COVID-19 was declared a Public Health Emergency of International Concern on January 30, 2020 and a pandemic on March 11, 2020, health authorities across the world continue monitoring its progression, including the emergence of new variants, and implemented combative measures, while biopharma has worked to rapidly develop vaccines/treatments. As of June 28, 2021, more than 2.6M vaccine doses have been administered globally. As new variants spread and outbreaks continue to affect countries around the world, countries adjust accordingly with implementation of non-pharmaceutical interventions including travel bans and isolation policies to prevent transmission.

Companies with approved COVID-19 vaccines

- AstraZeneca/Oxford University (EU, India, UK)
- CanSino Biologics (China, Mexico)
- Gamaleya (Russia)
- Johnson & Johnson (EU, US)
- Moderna (Canada, EU, UK, US)
- Pfizer/BioNTech (Canada, EU, UK, US)
- Sinopharm (China)
- Sinovac Biotech (China)



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1 Lauer SA, et al. The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: Estimation and Application. *Ann Int Med*, 2020

2 Guan WJ, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. *N Engl J Med*, 2020

3 Li Q, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. *N Engl J Med*, 2020

4 Fehr, A. & Perlman, S., *Methods Mol Biol*, 1282, 2015, pp. 1-23

5 Alsolamy, S. & Arabi, Y. *Can J Respir Ther*, 51(4), 2015, pp. 102

Data current as of June 28, 2021