

# COVID-19: Nature<sup>†</sup> vs Man

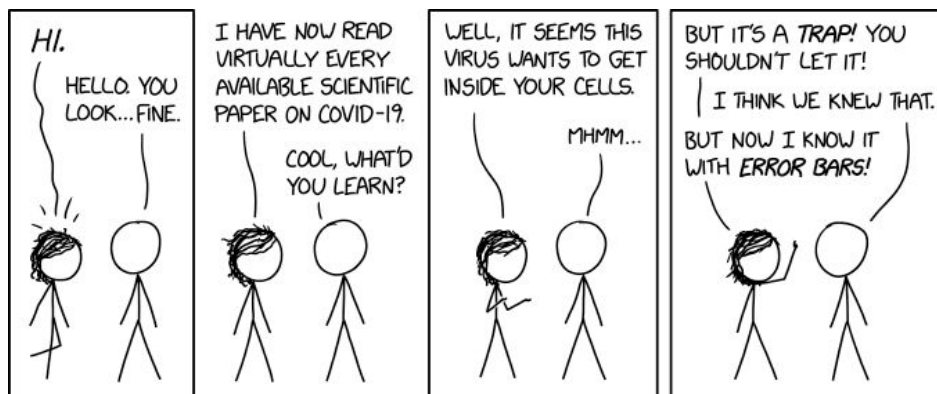
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Did I do anything wrong today, or has the world always been like this and I've been too wrapped up in myself to notice?

— Douglas Adams, *The Hitchhiker's Guide to the Galaxy*

On 31 December 2019, the World Health Organization was alerted of pneumonia of unknown cause detected in Wuhan, China.<sup>[1]</sup> Within a month, the infection had spread to over 20 countries worldwide, including the USA, the UK, India, the UAE and Australia.<sup>[2]</sup> By 11 March 2020, the outbreak was categorised as a pandemic.<sup>[3]</sup> As of 12 April, over 1.5 million cases have been recorded across 210 territories, with over 100,000 deaths.<sup>[4]</sup>

The pathogen responsible for wreaking such havoc is SARS-CoV-2, and the disease it causes is called COVID-19. It is a member of the family of viruses called *Coronaviridae* – single-stranded RNA viruses, which are mainly associated with respiratory tract infections in humans.<sup>[5]</sup> Some strains are endemic and belong to the group of 200 or so viruses which cause the common cold. Others, such as SARS-CoV-1 and MERS-CoV, are far more lethal, responsible for epidemics of their own in the past.<sup>[6,7]</sup> SARS-CoV-2 belongs to this second category. Some knowledge of virology and biochemistry is required to fully appreciate what we know. In short, peplomers, spike-like projections on the surface of the virus' lipid envelope, recognise and bind to ACE2 receptors on the surface of cells.<sup>[8]</sup> This allows the virus to enter and hijack the cell's machinery to produce copies of itself. In humans, this leads to the infection of lung tissue, inflammation and accumulation of fluid.



xkcd 2281: Coronavirus Research

<sup>†</sup> Warning: contains humans

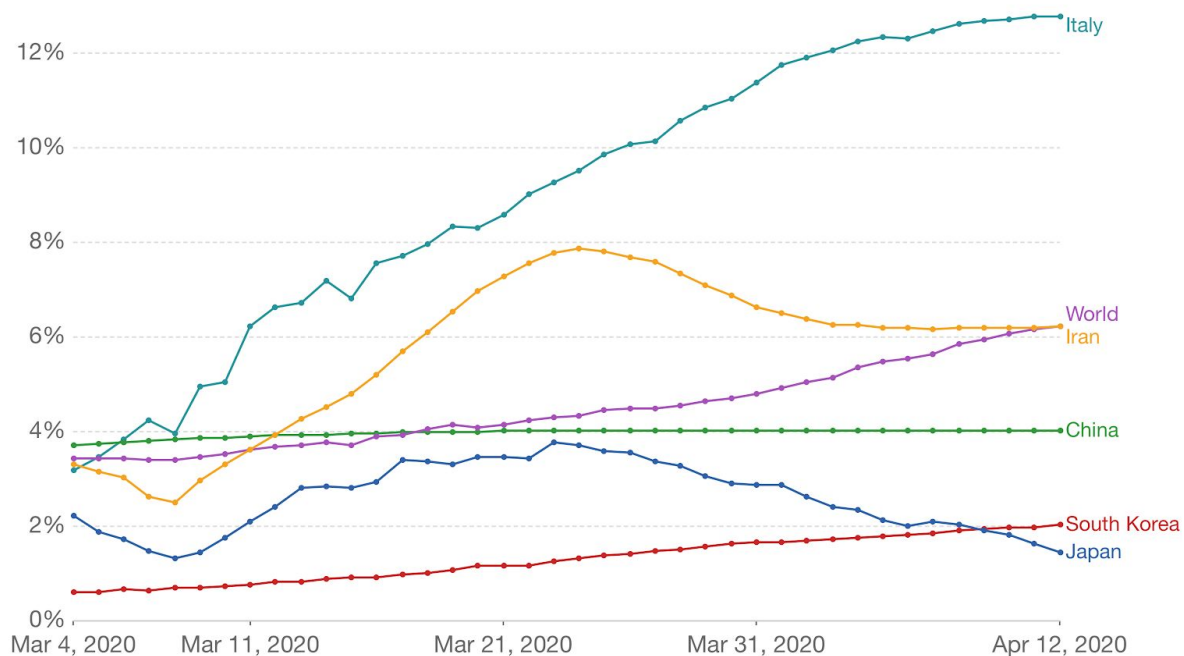
Infected individuals exhibit flu-like symptoms, including fever, cough, and shortness of breath.<sup>[9]</sup> Those with severe symptoms require mechanical ventilation. In a few cases, this may progress into pneumonia, multi-organ failure and death.<sup>[10]</sup> No specific antiviral treatment or vaccine is available today.<sup>[11]</sup>

The infectiousness of COVID-19 is striking.<sup>[11]</sup> It primarily spreads via close contact and droplets produced by coughing, sneezing and talking.<sup>[12]</sup> Its effectiveness is increased by the fact that a significant number of infected individuals are asymptomatic yet capable of spreading the virus.<sup>[13]</sup> This is further compounded by a relatively high rate of viral shedding in early stages and the role of modern international travel.<sup>[14]</sup>

## Case fatality rate of the ongoing COVID-19 pandemic

The Case Fatality Rate (CFR) is the ratio between confirmed deaths and confirmed cases. During an outbreak of a pandemic the CFR is a poor measure of the mortality risk of the disease. We explain this in detail at [OurWorldInData.org/Coronavirus](https://OurWorldInData.org/Coronavirus)

Our World  
in Data



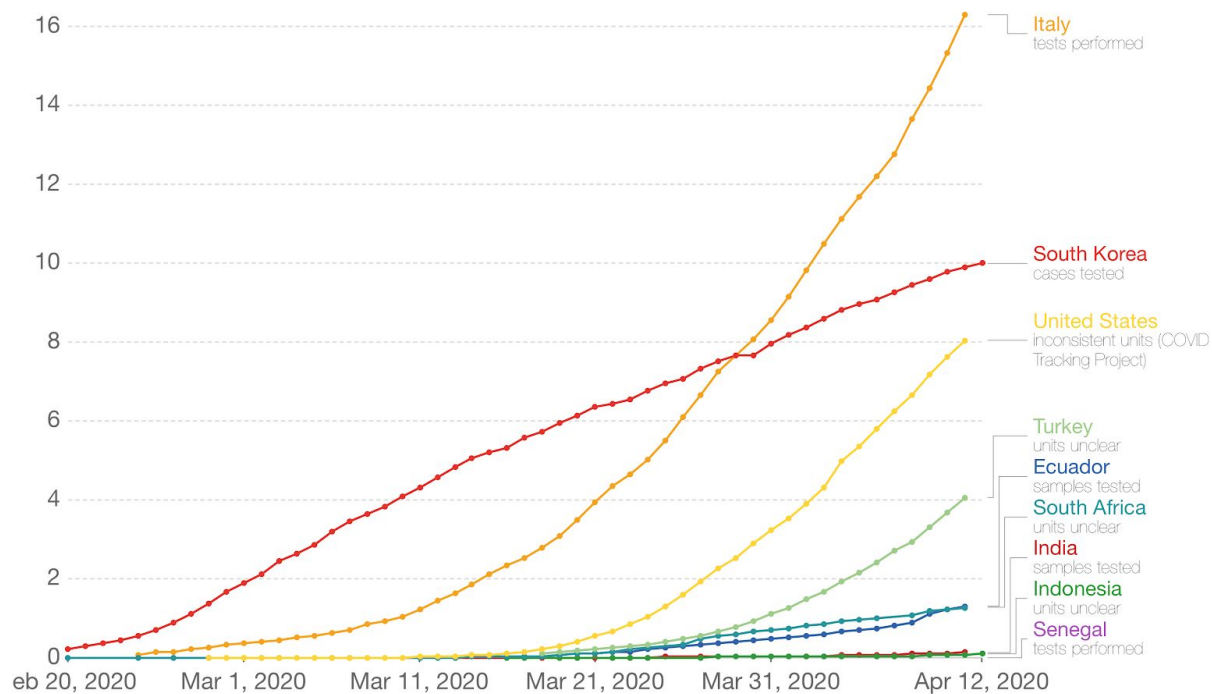
Source: European CDC – Situation Update Worldwide – Last updated 12th April, 10:30 (London time) [OurWorldInData.org/coronavirus](https://OurWorldInData.org/coronavirus) • CC BY  
Note: Only countries with more than 100 confirmed cases are included.

*COVID-19 has alarmingly high, yet inconsistent, case fatality rates.*<sup>[15]</sup>

It is apparent that case numbers are severely underreported due to sampling bias and limiting testing.<sup>[16]</sup> The importance of widespread testing cannot be emphasised enough. In the words of the Director-General of the WHO, "You can't fight a virus if you don't know where it is."<sup>[17]</sup> In practice, however, it is impossible to test everyone. The polymerase chain reaction test is relatively slow and expensive, putting tremendous pressure on laboratory staff. The reliability of rapid test kits leaves much to be desired, with numerous reports of flawed, inaccurate, and unusable products.<sup>[18,19,20]</sup>

## Total tests for COVID-19 per 1,000 people

Our World  
in Data



Source: Official sources collated by Our World in Data

OurWorldInData.org/coronavirus • CC BY

Note: There are substantial differences across countries in terms of the units, whether or not all labs are included, the extent to which negative and pending tests are included and other aspects. Details for each country can be found at [ourworldindata.org/covid-testing](https://ourworldindata.org/covid-testing).

*Most countries have low testing rates.<sup>[15]</sup>*

Given the paucity of data, drawing meaningful conclusions is difficult. For example, the estimated mortality rate of 3.4%<sup>[21]</sup> should not be taken at face value – the elderly are at higher risk than the young, and pre-existing medical conditions greatly amplify this.<sup>[15]</sup> We may argue that these figures are inflated since those exhibiting symptoms are more likely to be tested.<sup>[22]</sup> On the other hand, these calculations fail to take into account the incubation period following infection, which would mean that the figures are underestimated.<sup>[23]</sup>

By 12 January, the genetic sequence of SARS-CoV-2 had been mapped and shared by Chinese researchers.<sup>[24]</sup> Many online journals have made COVID-19 related content free and open to the public.<sup>[25]</sup> Since then, there has been a surge in coronavirus related academic papers and articles.<sup>[26]</sup> Although most of it is useful, there is too much to review in time, with a good number not meeting publication standards.<sup>[27]</sup> This is cause for concern since preprints often find their way into headlines before being peer reviewed, and the full context and nuance of a report may escape the general public. As it is, the world has been flooded with misinformation, conspiracy theories, and miracle cures.<sup>[28]</sup> These have serious consequences.<sup>[29,30,31]</sup> Flawed science only further fans the flames, either encouraging complacency or spreading panic.

Research is well on its way towards developing a vaccine against COVID-19.<sup>[32]</sup> However, one must not forget that vaccines typically take years to pass clinical trials and prove their efficacy. For example, it took over three years to develop a vaccine against SARS following its initial outbreak in 2003.<sup>[33]</sup> Naturally, questions have been raised regarding researchers skipping straight to human trials.<sup>[34]</sup> A balance between haste and urgency is essential in these trying times.

What the world needs is a coordinated global approach to pandemics that will work regardless of whether the next pandemic is a product of humans or of nature. Specifically, we need better tools, an early detection system, and a global response system.

— Bill Gates, *Innovation for Pandemics*<sup>[35]</sup>

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