SARS-CoV-2 and COVID-19

Overview

What is SARS-CoV-2?

 SARS-CoV-2 is a zoonotic (animal-to-human) virus thought to have originated from a seafood and wildlife market in Wuhan, Hubei province, central China. The reservoir and host animals remain unidentified and subject to scientific debate.

The coronavirus family includes six viruses already known to cause disease among humans, including the common cold (HCoV-229E and HCoV-OC43), the Middle Eastern Respiratory Syndrome (MERS-CoV), and the Severe Acute Respiratory Syndrome (SARS-CoV). Most of these viruses have bats as a reservoir animal, and while they are documented to have caused human infection for centuries there is no recorded history of a coronavirus pandemic.

How is SARS-CoV-2 transmitted?

Respiratory transmission through droplets is believed to be the main transmission route for SARS-CoV-2. Coronaviruses can also survive on contaminated surfaces for up to nine days (Kampf et al., 2020) in the absence of adequate disinfection with alcohol, hydrogen peroxide, or sodium. These findings are consistent with SARS-CoV in 2003 and reinforce the role of personal hygiene and COVID-19 prevention.

What is the incubation period of COVID-19?

The incubation period – i.e., the average time between contracting the COVID-19 infection and the occurrence of symptoms – is estimated to be five days, with a range of 2–12 days (Li et al., 2020). The upper limit of the range explains the mandatory 14 days of quarantine that has been implemented by various governments.

How do age, preexisting conditions, and smoking impact those infected with COVID-19?

Various pathogens have different mortality and morbidity distributions dependent on age and preexisting conditions within a population. Based on observed data, mortality is higher in individuals aged 60 or over and is almost nonexistent in those under 20 years old. From studies of the epidemic in China, hypertension followed by diabetes and cardiovascular conditions head the list of conditions that put individuals most

at risk of death from COVID-19. COVID-19 affects the lungs, so if they are already damaged in an individual, the risk of fatality will be higher.

Smoking does appear to have a significant effect on morbidity. In China, more men smoke than women and the death rate is correlated, whereas smoking and death rates in Europe and North America are more even. For hypertension, the link is not so clear. One avenue of research is focused on potential increased risk linked to medicines used to treat hypertension.

COVID-19 Pandemic

What are the main non-pharmaceutical strategies to reduce a pandemic?

Suppression and mitigation are the two strategies deployed in the absence of effective pharmaceuticals or vaccines. Widely used in many countries, and the preferred World Health Organization (WHO) strategy, suppression aims to reduce the infection's spread through measures such as social distancing and sheltering at home. The recent SARS and MERS epidemics did benefit from suppression techniques. For success, in addition to social distancing, health authorities in each country must commit to mass testing and contact tracing to pinpoint those infected.

Mitigation involves building "herd immunity" through wide exposure to a virus. This strategy applies to influenza where a population will be within one of two groups: those who have developed some immunity through previous exposure, and those who have not been infected before. The immunity of one group prevents a large-scale spread of a virus.

But COVID-19 is different – there is no previous exposure to the virus causing it and most cases are mild or even asymptomatic. A mitigation strategy for COVID-19 would require vulnerable groups being shielded from the virus using isolation strategies, with the bulk of the population catching the virus. The risk is that the potential burden would be large, causing a high number of fatalities and overloading critical-care health resources.

What impact do non-pharmaceutical interventions have on the transmission of COVID-19?

If the virus is freely transmitted without suppression or any other measures in place, then there will likely be exponential growth. But as seen in countries such as South Korea or China, implementing suppression measures shows that it can be contained. Measures such as self-isolation when ill through to full lockdown can slow and control the spread.

What effect do suppression strategies have on health care systems in a country? Do they work?

Suppression helps to flatten the peak spread of infections, as a health-care system will have relatively fixed critical care resources to cope with severe cases. But as is being seen even with the most robust suppression measures, there is still a surge in demand for critical care, quickly overwhelming care systems. Also, as suppression reduces the spread, easing measures could see pressures on health care return.

As an illustration of this, the small Italian town of Vo (pop. approx. 3,300) was placed on a strict suppression lockdown after reporting the first COVID-19 death in Italy on February 21. No one could enter the town without government authorization. By February 29, 97 percent of the town had been tested for

COVID-19. At this time, 3 percent of the population were positive and mandated to confine at home while more serious cases were hospitalized. Non-confined residents could only visit the grocery store or drugstore. Repeating the test between March 6–8, only 1 percent was infected; by March 23, there were no new infections or further deaths.

How is RMS modeling COVID-19?

Modeling COVID-19 requires a balance between data and assumptions. The RMS® Infectious Diseases Model can be used to understand the impacts of COVID-19 and the likely progression as the event unfolds. However, enough observed data must be captured to sufficiently understand the observed trends to make appropriate selections of model parameters and explain the uncertainty around those parameters and outcomes.

How does RMS estimate the severity of COVID-19?

RMS models the virulence or severity of a pandemic using the case fatality rate and infection fatality rate. Currently for COVID-19, around 81 percent are mild cases that can be treated at home; 14 percent are rated as severe and requiring hospital care; and around 5 percent are deemed fatal, requiring intensive care.

RMS Event Response

How regularly will RMS communicate analysis, data, and information on COVID-19?

As RMS continues to learn more about COVID-19, information will be made available via the following channels:

- A "COVID-19 – What You Need to Know" client-only document is available on RMS Owl, with RMS Event Response providing regular updates on COVID-19 and the latest intelligence exclusive for clients
- A recent webinar on March 26, covering the latest COVID-19 information, reviewing lessons learned, and outlining our approach to infectious disease modeling. For questions about this webinar, clients should contact their client success managers
- A COVID-19 resource page on rms.com, providing a hub for the latest RMS commentary and news articles, webinar series updates, COVID-19 risk assessment reports, and more.

What is involved in producing an industry loss estimate for the pandemic?

RMS does not issue industry loss estimates to the market for events at their early stages or when an event is still ongoing, as the uncertainties typically remain significant. There is little visibility around the final scope of this very dynamic event, which is set to remain for the months ahead. Factors include significant uncertainties around the virus itself, testing, infection levels, and local spread. There are wide variations in the counter-response efforts and public health measurers per country, also in the adherence to recommended measures by the public. In our view, issuing loss estimates at this time is not useful for decision makers.

RMS LifeRisks and the RMS Infectious Diseases Model

How has the RMS Infectious Diseases Model evolved? What is it currently used for?

RMS pioneered the probabilistic quantification of the impacts of infectious disease with the release of an infectious diseases model in 2006. This model, originally focused on influenza, has expanded to cover new and emerging pandemic risks such as SARS-like viruses, including the virus causing COVID-19. The model has a wide range of uses such as stress tests, with scenarios including the 1918 Spanish Flu and recent SARS virus epidemics. The model is approved for Solvency II and is used in insurance structuring and pricing.

How many countries are covered in the RMS model?

The 2019 model covers 59 countries and has updated parameters, which include age distributions, underlying health of the country (such as the prevalence of preexisting conditions), health-care capacity, availability of critical-care beds and equipment, immunization and drug availability, and so forth.

What is the total event set included in the RMS model?

The RMS Infectious Diseases Model was built using fundamental principles of epidemiology to develop an event set containing 4,536 pandemics to capture the full scope of viral characteristics and potential interventions.

What parameters does the model use?

RMS measures the *transmissibility*, or the speed at which a pandemic spreads through the population, using a base reproductive number R0 to reflect the number of secondary infections from one case. *Virulence* is measured using the case-fatality rate, or the average deaths per case, which represents the ratio of deaths within a population over time.

The model captures the impact of age using *demographic profiles* and use of *pharmaceuticals* and *vaccines* to account for the reduction in mortality. It also considers the use of non-pharmaceutical interventions – including school and business closures, restrictions on travel and public gatherings, and the rapid testing of cases – that attempt to slow the introduction of disease and subsequent transmission throughout a population.

RMS accounts for differences within and between countries due to preexisting conditions within the population, health-care provision, and lifestyle/health status. Within a country, pandemic mortality can differ between the insured population and the general population due to these and other country-specific/portfolio-specific factors.

With regard to possible vaccines and/or treatments, does the RMS model account for the time it takes these drugs to roll out at country-level?

Yes, the model accounts for the vaccine production likelihood and testing/production of treatments, their efficacy, and the associated time that it takes to achieve these actions within different countries.

Implications for the Insurance Market

Which lines of business will be impacted by COVID-19?

Contingency event cancellation insurance will experience high claims levels from large events, such as the postponement of the 2020 Tokyo Olympics, though policies may have infectious disease exclusions. Property business interruption extensions may also be liable. For the life, accident, and health insurance sectors, COVID-19 mortality disproportionately affects older people, but U.S. health-care insurers may see their anticipated level of claims reduce as federal and state governments step in to take on the funding of COVID-19 health care. Claims are expected for workers compensation and employer liability, and directors and officers covers, where potential negligence causes infection. Personal accident and travel insurance availability has already been affected, with travel insurers largely withdrawing from the market.

Non-damage business interruption covers – bought in the U.S., the U.K., and by global corporates – could see claims for loss of attraction, but these policies can contain exclusions. The Oceana Grill, a restaurant in New Orleans, has gone to court to see if state-imposed closure should result in its insurance policy paying out for lost revenue.

The final industry exposure will be dictated by individual policy terms, conditions, and exclusions. Government action, such as the declaration of notifiable events, could also trigger policy coverage or exclusions. Through our regular market reports, RMS will detail and identify all potential lines of business affected by this event and provide commentary regarding impacts and uncertainties – read our recent blog.

What are the potential implications for the insurance industry as a result of COVID-19?

Ratings agencies are already looking to conduct balance-sheet checks examining risk-adjusted capital levels and investment portfolios – looking at both claims impact and falling stock values. Pressure for businesses to take out pandemic-related coverage could come from governments reluctant to fund furloughed businesses in the future. In terms of reference events for the life sector, regulators could include this pandemic as a benchmark, alongside well-used scenarios such as the 1918 pandemic, with implications on how excess mortality is calculated.

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