September 9, 2020

Update on COVID-19

Since it began nine months ago, the COVID-19 pandemic and its resulting developments have been fast paced. The following provides an update on the progression of the pandemic and details four available areas of countermeasures: behavioural changes, testing, vaccines, and therapeutics.

COVID-19 Around the World

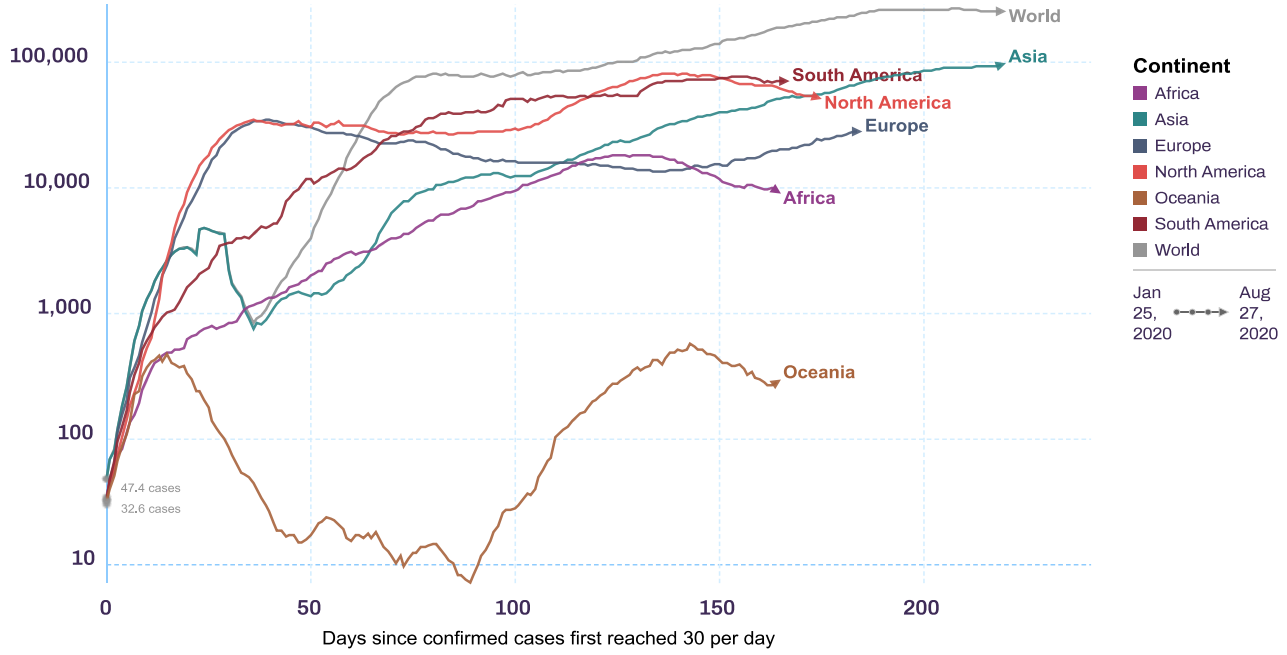
SARS-CoV-2, the virus which causes COVID-19, continues to spread across the globe (Chart 1). Most developed nations have contained the spread and brought down the reproductive rate (R) of the virus. However, a pickup in daily new confirmed cases is occurring in countries like Australia, France, Germany, and the U.K. Fortunately, with the exception of France, the share of daily positive tests in those countries is still low, between 0.4% and 0.9% (as of August 23rd). In contrast, France has seen this value increase to 3% as the daily spread of the virus has reached new highs, a situation which evidently needs to be brought back under control.

On the other hand, large countries, like the U.S., Brazil, and India, have struggled to control the virus. Daily new cases in the U.S. have decreased from a peak of nearly 70,000 to an average of 41,000, with the share of positive tests at 6.2%. There are signs of a plateau in Brazil, albeit at elevated levels of around 41,000. India is still seeing an acceleration with 75,000 new confirmed cases per day as of September 1st and 8% of tests which are positive. The situation in Canada is much better, with an average of just under 470 cases per day and a low and stable share of positive tests at 0.8%. On a normalized basis, Canada has around 13 new cases per day per million people compared to 125 for the U.S.

CHART 1

Daily new confirmed COVID-19 cases

Shown is the rolling 7-day average. The number of confirmed cases is lower than the number of actual cases; the main reason for that is limited testing.



Source: European CDC – Situation Update Worldwide – Last updated 27 August. Official data collated by Our World in Data

Looking ahead, the next several months will test the resolve of many populations, especially in the northern hemisphere. With students heading back to school, colder and shorter days setting in, and the temptations of indoor socialization, the environment will be more conducive to the transmission of the virus. In addition, the coming common cold and flu season will present additional challenges, given the similarities in symptoms with COVID-19. However, this period is temporary, and countermeasures continue to be developed rapidly on many fronts. Next spring should present the beginning of the end of the severe effects of this pandemic and we expect a return to normalcy by the end of 2021.

Four Measures to Help Curb the Pandemic

Rapid progress is being made on the development of countermeasures. There are four main ways to curb the virus, and all are improving quickly: changing behaviours, testing, vaccines, and therapeutics.

Behavioural changes are the first line of defence. Basic hygiene measures, like frequently disinfecting hands and surfaces, wearing a mask in public, and maintaining physical distance, are effective and increasingly adopted. They have had a clear impact in halting or slowing the acceleration of new cases per day early in the pandemic. While battle fatigue from such behavioural changes is to be expected, discipline can rapidly improve should there be a second (or more) wave of the virus's spread.

Second, the volume and accessibility of testing continue to improve around the world. The number of U.S. daily tests increased from 261,000 on May 7th to 715,000 on August 7th, a growth of 174% in 3 months, contributing to lower the share of positive tests from 10.3% to 7.9%. In Canada, the volume of testing grew from 30,500 to 38,400, a 26% improvement during the same period. This, together with a slowdown in the spread of COVID-19, helped lower the share of positive tests from 5.6% to 1.0%.

New types of tests are also being developed. On August 26th, the U.S. Food and Drug Administration (FDA) gave Emergency Use Authorization to Abbott's BinaxNOW COVID-19 antigen test. This test costs $5 and provides results from a nasal swab in 15 minutes, without the need for an instrument. With manufacturing expected to reach 50 million tests per month as of October, this will nearly triple the testing capacity in the U.S. Other paper antigen tests which can be self-administered at home using a saliva sample may soon be available. They cost just over $1 and provide results in 15 minutes. They would facilitate screening large numbers of people frequently and help detect most of the infectious individuals, which could be used to significantly slow the spread of the virus. We can expect further developments and testing to become more widely available over the next several months.

Third, vaccine development continues to progress at record-breaking speeds. Developments to date are following the best-case scenario we laid out in our March 2020 update letter. It seems increasingly likely that a vaccine could become widely available in 2021. It should be noted that vaccine timelines have historically been counted in decade(s) not months, making the current development path truly remarkable. On January 10th, the genome of SARS-CoV-2 was identified and shared publicly online. Only 42 days later, Moderna completed its first batch of a vaccine candidate based on its newly developed mRNA vaccine platform. On March 16th, just over two months after the virus's genome was identified, the first participant was dosed with Moderna's mRNA-1273 vaccine candidate. Currently, eight vaccine candidates have started Phase 3 trials, 25 are in Phase 1/2 trials and 143 are in pre-clinical evaluation.

Published animal testing data is encouraging: the vaccines appear to protect against infection, but vaccines that work in animals do not always work in humans. Interim short-term data from Phase 1 trials of leading vaccine candidates is also promising. The Moderna, Pfizer-BioNTech partnership, and Oxford-AstraZeneca partnership vaccines triggered the generation of good levels of neutralizing antibodies and activation of T-Cells. The correlation between these biological measures and actual protection from infection will be determined through large Phase 3 trials which are underway. Additionally, the duration of response and how vaccines perform in older populations remains to be demonstrated. While early and incomplete, this data presents a best-case scenario from an efficacy standpoint.

Unfortunately, these first-generation vaccines present some challenges. It appears that at least two doses will be required, which effectively cuts manufacturing capacity by half in terms of individuals who can be vaccinated. In addition, mRNA vaccines like Moderna's and Pfizer-BioNTech's require cold storage conditions, which complicate

mass scale vaccination campaigns, especially in the developing world. Finally, while acceptable clinically, the vaccine's side effects could prove to be a deterrent to broad social acceptance.

One silver lining to COVID-19's continued rapid spread in countries like the U.S. is that a higher probability of exposure to the virus has likely accelerated the timeline for Phase 3 trials. Initial data from these trials are expected in Q4 2020 and could support emergency authorization for use in high-risk populations by the end of 2020 or early 2021. Approval for the population at large, which requires a longer follow-up of the Phase 3 trials, could enable large vaccination campaigns to ramp up in the second half of 2021. However, doses may be limited and need to be prioritized. In addition, the combination of effectiveness (50-75%, to be determined) and adoption (50%, estimated) of a vaccine means immunity in the herd could increase by 25 percentage points, not enough to reach herd immunity and halt the spread of the virus. Instead, the role of first generation vaccines in the next 12 to 18 months will be to protect individuals who are at the highest risk of exposure and those at the highest risk of complications and death. By prioritizing these groups early on, morbidity and mortality rates for COVID-19 could rapidly improve to levels similar to the seasonal flu or the common cold. This could enable society to go back to near-normal conditions by the second half of 2021.

Fourth, therapeutics can also help achieve a gradual return to normalcy, potentially even sooner. Remdesivir was the first drug authorized to treat COVID-19, but other repurposed drugs are also making a significant impact. In a study of 6,425 patients, dexamethasone (a cheap corticosteroid) reduced mortality by 20% to 35% in severe patients. In a study of 101 patients, Synairgen's SNG001 reduced the risk of developing a severe form of the disease by 79% and patients were more than twice as likely to fully recover. We have not yet started to see data from new COVID-specific drugs under development. Some have started human trials and results are expected in the coming months.

A return to pre-COVID life will be feasible once we significantly improve patient outcomes. The availability of these treatments, and the capacity to administer them, will have a large impact over the next 12-18 months. We believe there is a good chance that the measures to treat COVID-19 will be good enough over the next 12 months to bring the outcomes to a level like the flu or the common cold.

Looking Beyond the Pandemic

While the COVID-19 pandemic continues to spread across the world, countermeasures are developing at record speeds. Emergency authorizations of a first-generation vaccine for select individuals appears realistic in late 2020, less than 12 months since the identification of the virus. Approvals for the broader population could happen in the middle of 2021. In parallel, repurposed and new therapies continue to improve the outcomes of those infected, testing continues to improve, and the population at large is adapting to living with the virus. With all these countermeasures, we believe 2021 will signal the beginning of the end of this pandemic and hence a return to more normal conditions.