COVID-19 Global Trends and Analyses

Ongoing waves
Duration of Immunity
Serosurveys

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SUMMARY

COVID-19 GLOBAL TRENDS AND ANALYSES | 22 Aug – 7 Sept 2020

- The **global** total number of reported cases has surpassed 27 million with 880,000 deaths recorded up until 5 September 2020.
- In **Europe,** many countries are seeing an increase in cases. **Spain** is currently undergoing a second wave, with more infections per capita than anywhere in Europe. Spain's second wave is now approaching the peak seen in the first wave. Similarly, **France, Greece, Romania, Italy**, the **UK** and **Switzerland** are seeing a surge in cases.
- In the **United States,** the moving average of the daily new confirmed cases appears to be declining, although they are still reporting 1,000 deaths each day. While hotspots such as California, Florida and Texas have declined over the past week, states in the mid-west such as North and South Dakota, and Iowa have seen large increases.
- Similar to the US, **Brazil's** epidemic appears to be stabilising at a high level of daily cases. The number of reported cases has surpassed 4 million.
- **India's** epidemic has increased during the month of August, and currently has the world's highest 5-day moving average of daily new cases, hovering around 80,000. They represent around 15% of the world's distribution of cases. Like Brazil, India's total reported cases have surpassed 4 million and will overtake Brazil this week.
- **South Korea's** second wave is now fully established, as daily new cases have exceeded 100 every day since 14 August, with a peak of 441 cases announced on 27 August. South Korea's 7-day moving average is now hovering around 300.
- Both **Indonesia** and the **Philippines** are reporting around 3,000 daily cases. While the Philippines appears to be plateauing at this level, Indonesia has been steadily increasing since the beginning of the pandemic, still well and truly entrenched in their first wave.
- As of 5 September, there are 251 active cases in **Papua New Guinea**. In mid-August, Prime Minister Marape announced that lockdown would not be extended due to fear of "economic meltdown"[1].
- **Myanmar** has reported 1,319 cases, an increase of 85% in one week. A new all-time high of 116 cases was announced on 3 September.
- The **Victorian** situation appears to have improved significantly since the introduction of Stage 4 restrictions and mandatory face mask usage. From a peak 7-day average of 513 new cases recorded during early August, it had declined to 41 by 7 September. Victoria recorded double digit cases for all but one day between 31 August and 6 September. Stage 4 restrictions will be extended by a further two weeks with some modifications.
- **Sydney** is still handling smaller outbreaks and is continuing with its current levels of restrictions despite averaging about 10 cases a day in the past week. While some cases have been linked to hotel quarantine, others have been attributed to a cluster in the CBD. NSW has reported ten new cases of local transmission with unknown source over the past week.

Duration of Immunity

- Antibody responses to SARS-CoV-2 can be detected 10-15 days post symptom onset. One study looking at neutralising antibody titres post infection showed a decline at just 90 days post symptom onset. It was also found that there was a correlation between more severe disease symptoms and higher antibody titres.
- Functional immunity involving B and T cells may play a vital role in immunity and subsequent reinfection.
- Further vaccine research needs to be conducted to understand whether a vaccine will confer sterilising immunity or, if it instead, mainly prevents severe COVID-19.

Seroprevalence surveys

- The quality and validity of a seroprevalence survey is highly dependent on the quality of the antibody test used and the population tested. A high quality serosurvey should involve high-quality independent tests of the antibody tests used, and that reporting of all the methodological details such as sample size, sampling methods and test medium.
- Serosurveys from COVID-19 hotspots such as **Spain, New York** and **Wuhan** revealed a low prevalence of previous COVID-19 infection, suggesting that adoption of a 'herd immunity' approach to the pandemic will involve significantly more infections and deaths before the threshold is reached.
- To best inform policy decisions and research in a visual way, a **global seroprevalence dashboard** was created. This system integrates evidence through a live systematic review, with published articles and preprints providing seroprevalence estimates. To date, there have been 17 countries included in this dashboard, however estimates vary widely. For instance, the United States currently has regional estimates ranging from 0.26% to 29.20%.

GLOBAL EPIDEMIOLOGY AND TRENDS

- The **global** total number of reported cases has surpassed 27 million with 880,000 deaths recorded on 5 September.[1]
- In **Europe**, many countries are seeing an increase in cases. **Spain** is currently undergoing a second wave, with more infections per capita than anywhere in Europe. Spain's second wave is now approaching the peak seen in the first wave. To curb their surging new cases, nightclubs, and drinking in outdoor public areas have been banned[2]. Similarly, **France, Greece, Romania, Italy, the UK** and **Switzerland** are seeing a surge in cases. **Russia** continues to see a daily case average of about 5,000.
- The economic toll due to political sanctions and the effect of COVID-19 has led to the relaxed restrictions seen in **Iran**. By trying to balance COVID-19 cases with protecting the economy, Iran's second wave continues to rip through the country with an average of 2,000 cases a day since 21 May.
- In the **United States,** the moving average of the daily new confirmed cases appears to be declining, though they're still reporting 1,000 deaths each day. While hotspots such as California, Florida and Texas have declined over the past week, other states in the mid-west such as North and South Dakota have seen increases. The **University of South Carolina** has reported more than 1,000 students testing positive for the virus and are active cases. Alarmingly, figures released by the University revealed a nearly 28 percent positive test rate for students between 28 - 31 August[3].
- Similar to the US, **Brazil's** epidemic appears to be stabilising. With regards to distribution of cases, Brazil currently represents 15.3% of the world's cases. The number of reported cases has surpassed 4 million.
- **India's** epidemic has increased during the month of August, and currently has the highest 5-day moving average of daily new cases, hovering around 80,000. They represent around 15% of the world's distribution of cases. Like Brazil, India's total reported cases have surpassed 4 million. The National Statistical Office said that India's economic output between April and June was 23.9% lower than in the same period the year before, the largest decline since 1996 when such data have been available to the public[4].

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[1] https://www.worldometers.info/coronavirus/#countries

[2] https://www.abc.net.au/news/2020-08-15/coronavirus-update-august-15-spain-nightclubs-smoking/12561220

[3] https://www.nytimes.com/2020/09/02/world/coronavirus-covid-live.html#link-2669dce3

[4] https://www.economist.com/asia/2020/09/03/indias-economy-shrinks-by-a-quarter-as-covid-19-gathers-pace?utm_campaign=coronavirus-special-edition&utm_medium=newsletter&utm_source=salesforce-marketing-cloud&utm_term=2020-09-05&utm_content=article-link-1&etear=nl_special_1

- Many **African** countries such as South Africa, Ethiopia, Morocco and Egypt are seeing declining cases, as they are past the peak of their first waves.
- The Economist mortality tracker has indicated very high rates of excess mortality (compared with the same period last year) in pandemic hotspots[5]. For example, in **Mexico City**, there were more than 200% more deaths in May and more than 100% in June. In March and April excess deaths were greater than 100% in Spain (150%). Other countries that experienced more than 100% increases in deaths during April include Belgium, France and the UK. The highest number of excess deaths recorded by the tracker was 242% in **Ecuador** during April.

Asia Pacific-Region

- **South Korea's** second wave is now fully established, as daily new cases have exceeded 100 every day since 14 August, with a peak of 441 cases announced on 27 August. South Korea's 7-day moving average is now hovering around 300. New cases have been centred in the Seoul metropolitan area, and many outbreaks large and small have appeared in churches, leading to the government shutting down all church services. On 24 August, it was found that at least 739 out of 3,415 people tested, which were affiliated with the Sarang Jeil Church, were positive for COVID-19. These church clusters harken back to the first wave, where the Shincheonji Church of Jesus was a major source of COVID-19 cases.
- Asian countries that have successfully achieved zero community transmission include **Thailand** and **Taiwan**, where it has been 100 and 140 days without any community cases, respectively. Previously, **Vietnam** had achieved zero community transmission before an outbreak occurred in Da Nang. Since this resurgence, Vietnam's untarnished zero death record has increased to a total of 34.
- **Japan's** second wave is in decline, with active cases declining from 14,000 on 12 August to 9,000 on 1 September. A paper in the *BMJ* has cited multiple reasons for the resurgence in cases, such as inaction regarding the expansion of laboratory testing, a lack of transparency and accountability, as well as a lack of diversity of disciplines in an expert committee established by the government to provide COVID-19 related advice[6].
- Both **Indonesia** and the **Philippines** are facing around 3,000 daily cases. While the Philippines appears to be plateauing at this level, Indonesia has been steadily increasing since the beginning of the pandemic, still well and truly entrenched in their first wave.
- As of 5 September, there are 251 active cases in **Papua New Guinea**. In mid-August, Prime Minister Marape announced that lockdown would not be extended due to fear of "economic meltdown"[7].
- **Myanmar** has reported 1,319 cases, an increase of 85% in one week. A new all-time high of 116 cases was announced on 3 September.

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[5] *https://www.economist.com/graphic-detail/2020/07/15/tracking-covid-19-excess-deaths-across-countries?utm_campaign=coronavirus-special-edition&utm_medium=newsletter&utm_source=salesforce-marketing-cloud&utm_term=2020-05-02&utm_content=cover_text_url_2?utm_campaign=coronavirus-special-edition&utm_medium=newsletter&utm_source=salesforce-marketing-cloud*

[6] *https://www.bmj.com/content/370/bmj.m3221*

[7] *https://www.abc.net.au/news/2020-08-12/png-abandons-lockdown-resolves-to-live-with-coronavirus/12545602*

New Zealand

- Despite going 100 days without community transmission, new cases appeared within the community in New Zealand. Jacinda Ardern stated that it is still unknown how the virus returned, but that it began "at the Americold worksite at Mount Wellington"[8].
- Following the announcement of a new case of community transmission, Auckland was put back into lockdown for 3 weeks. The cluster has seen 146 people infected as of 1 September, with single digit cases trickling in daily.

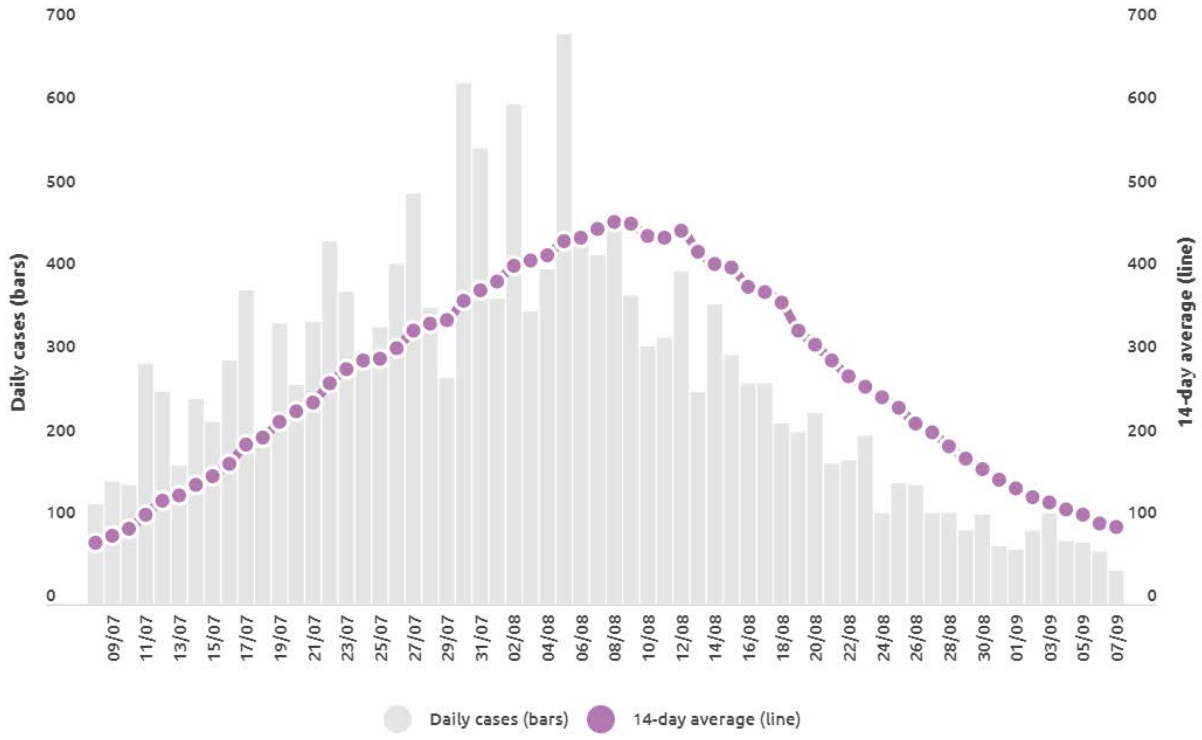
Australia

- Most of the states and territories (WA, SA, TAS, NT and ACT) in Australia have not reported a case of COVID-19 for at least 5 days.
- In the south-east of **Brisbane**, there has been an outbreak that has stemmed from a youth detention centre. They are seeing very small levels of community transmission resulting in an announcement that their border would remain closed for the entire month of September by Premier Palaszczuk.
- **Sydney** is still handling smaller outbreaks and is continuing with its current levels of restrictions despite averaging about 10 cases a day in the past week. While some cases have been linked to hotel quarantine, others have been attributed to a cluster in the CBD. The CBD outbreak was discovered after two passengers catching the same peak hour bus tested positive. NSW has reported ten new cases of local transmission with unknown source over the past week. Face masks are still heavily encouraged, but not mandatory in NSW.
- The **Victorian** situation appears to have improved significantly since the introduction of Stage 4 restrictions and mandatory face mask usage. From a peak 7-day average of 513 new cases, recorded during early August, it had declined to 41 by 7 September. Victoria has recorded double digit cases for all but one day between 31 August and 6 September. On 6 September, the government announced that Stage 4 restrictions would be extended by two weeks until the end of September. There will be several amendments, including people living alone to have one visitor, pushing back the start of curfew by one hour to 9pm, and allowing two hours of outdoor exercise rather than one.
- As of 4 September, there were 2,415 active cases, of which 1,177 (49%) were residents of aged care facilities and 337 (14%) were health care workers. Since the beginning of the pandemic in Victoria, of the 19,090 cumulative cases, 3,206 (17%) had been health care workers of which more than 90% were diagnosed since July. 1,839 (9.6%) were aged care residents. Of 650 deaths in Victoria, 497 (76%) were aged care residents.

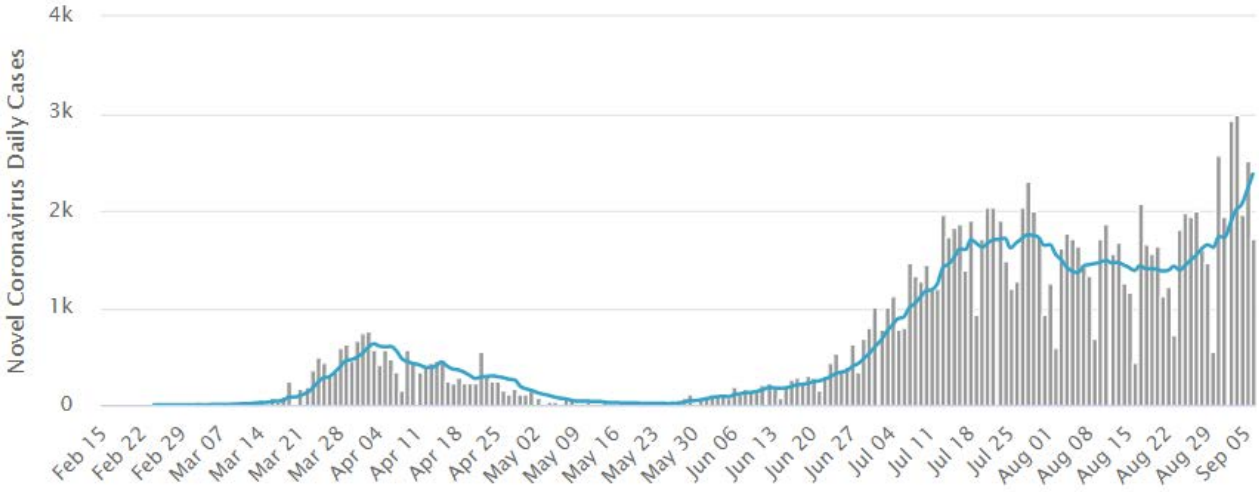
[8] *https://www.abc.net.au/news/2020-09-01/how-did-new-zealands-coronavirus-covid-19-outbreak-begin/12616632*

- A healthcare worker report released by the DHHS on 25 August revealed the origin of a majority of the cases within this group[9]. Among aged care workers, 84% of 924 cases had been investigated, and 90% of these were acquired by carers at work. Similar trends were seen among medical practitioners and nurses, with a total of at least 69 percent of all infections as likely to have been acquired at work. These statistics highlight the need for improved infection control measures within healthcare settings.

Daily new cases and 7-day average, Victoria



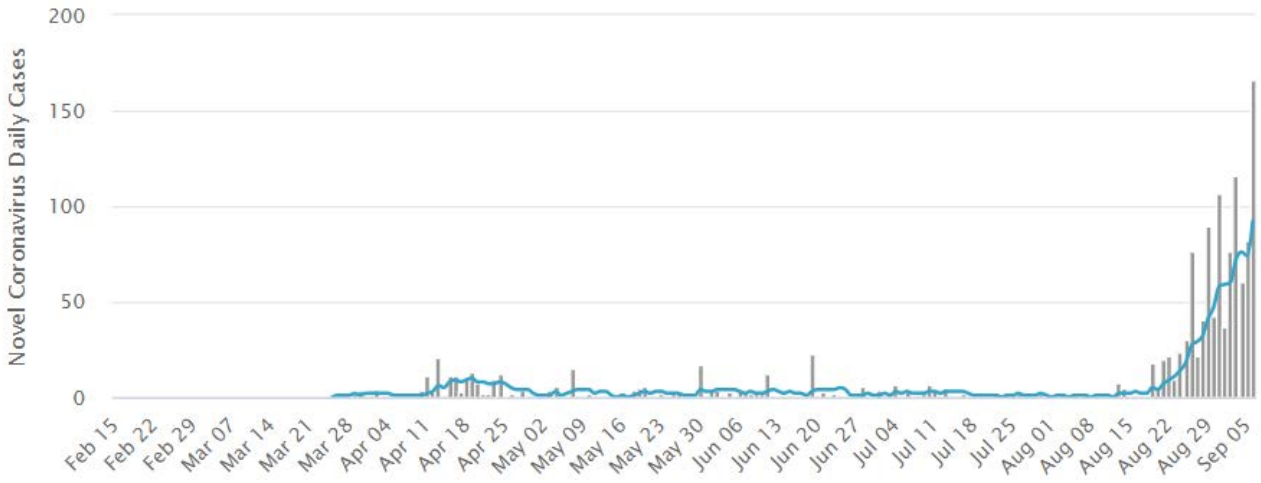
The following epidemic curve from **Israel** illustrates how Victoria's second wave might have evolved if Stage 4 restrictions and mandated face masks had not been implemented:



[9] https://www.dhhs.vic.gov.au/sites/default/files/documents/202008/2001628_COVID-19%20Protecting%20our%20healthcare%20workers_v9.pdf

GLOBAL PERSPECTIVE | MYANMAR

In **Myanmar**, the first case of COVID-19 was detected in late March. According to the updated data from Myanmar Ministry of Health and Sport (MoHS), 166,433 people have been tested in Myanmar with 1,464 confirmed cases. So far there have been 8 deaths[10]. On 3 September, the MoHS reported 116 new cases – the highest number of cases reported in a single day so far.



Rakhine state, situated in the western part of Myanmar bordering with India and Bangladesh, hosts the highest number of COVID-19 cases in Myanmar followed by **Yangon** region. In Rakhine state, 413 cases were reported (as of 1 September 2020) with most cases in Sittwe, the capital of the state. A total of 393 locally transmitted cases have been reported across Rakhine between 16 August and 1 September 2020. Among patients who have recently tested positive with COVID-19 in Rakhine, they include staff from United Nations agencies, funds and programs and from international non-governmental organisations.

Since August 26, the Government has introduced a state-wide "stay-at-home" order and other preventive measures to reduce local transmission in Rakhine state with an additional focus on promoting mask usage through punitive measures. Although state borders have been closed, a handful of flights are still running between Sittwe and Yangon[11].

There are significant concerns about a case appearing in camps and sites for internally displaced persons (IDP) in Rakhine State. "Camp residents are more vulnerable than the general population...because they have limited

[10] *https://mohs.gov.mm/Main/content/publication/2019-ncov*

[11] *https://www.frontiermyanmar.net/en/the-second-wave-has-started-covid-19-cases-skyrocket-in-rakhine/*

access to basic healthcare. It is not easy for them to come to the hospital" according to Dr Nay Lin Tun, a medical doctor volunteering at Sittwe General hospital.

To prevent transmission in this setting, the United Nations and its partners have conducted COVID-19 preparedness activities such as raising awareness for transmission risks and promoting preventive measures for infections[12]. Essential hygiene measures and personal protective equipment were also distributed. As of 1 September 2020, there had been no confirmed COVID-19 cases in camps or sites for IDPs situated in Rakhine state[13].

Myanmar's testing capacity has been expanded since the early stages of the pandemic, with a laboratory in Sittwe General Hospital operating with two 16-modules GeneXpert machines and one 2-module GeneXpert machine to aid in reaching a maximum capacity for testing of 100-110 tests per day. Seven laboratories, including National Health Lab (NHL), are operational in Yangon, Mandalay, Nay Pyi Taw, Mawlamyine and Kengtung cities, and testing capacity in Myanmar per day is between 1,100 and 2,000 specimens.

In Myanmar, all COVID-19 cases are admitted to hospital, and their primary and secondary contacts are put under facility quarantine. So far, 385 cases have recovered from COVID-19.

[12] *https://reliefweb.int/report/myanmar/statement-covid-19-outbreak-rakhine-state-enmy*

[13] *https://reliefweb.int/report/myanmar/myanmar-rakhine-state-covid-19-situation-report-no-08-1-september-2020*

SCIENCE AND RESEARCH UPDATES | DURATION OF IMMUNITY TO SARS-CoV-2

Considerable interest has been generated around what the duration of immunity to COVID-19 is following various reports of reinfection. In **Hong Kong**, there was a confirmed case of reinfection involving a 33-year old man who confirmed positive with the virus in both March and August[14]. People infected with SARS-CoV-2 can test positive for the virus for weeks or months following infections, though this may be due to leftover inactive RNA fragments. Therefore, genomic sequencing is required to look at whether a case is 'true reinfection'. In the case of the man in Hong Kong, the virus that he was infected with in August had some minor genomic differences when compared to the virus in March.

It is unlikely that immunity to COVID-19 is sterilising, where a person is unable to contract the virus again. Rather, the immunity to COVID-19 may be like immunity to influenza or other coronaviruses in which the second infection results in milder symptoms. With regards to the case of reinfection observed in Hong Kong, Professor Ivo Mueller at The Walter and Eliza Hall Institute in Melbourne states, "This isn't altogether unsurprising, as we know that immunity to seasonal coronaviruses – which are the cause of the common cold - isn't long lasting either...it is likely COVID-19 isn't a disease like measles where you develop life-long immunity"[15].

A study in pre-print looked at the duration of acquired immunity among the four seasonal human coronaviruses to better understand what immunity to SARS-CoV-2 would look like[16]. The authors found that there is a short duration of protective immunity to coronaviruses, with reinfections occurring at 12 months post-infection, with a substantial reduction in antibody levels as soon as 6-months post infection. Antibody responses to SARS-CoV-2 can be detected 10-15 days post symptom onset. One study looking at neutralising antibody (nAb) titres post infection showed a decline at just 90 days post symptom onset[17]. A correlation between more severe disease symptoms and higher antibody titres was observed, though the direction of the relationship between disease severity and generation of antibodies is still unclear.

Although nAb levels may decline after 90 days, this does not indicate complete susceptibility to COVID-19. Functional immunity involving B and T cells may play a vital role in immunity and subsequent reinfection. When exposed to the virus a second time, the adaptive immune response may be the primary driver of immunity. David Altmann, Professor of Immunology at Imperial College London says the virus is "very stimulatory to T cells, that

[14] https://www.bbc.com/news/health-53889823

[15] https://www.scimex.org/newsfeed/expert-reaction-first-reported-case-of-covid-19-reinfection

[16] https://www.medrxiv.org/content/10.1101/2020.05.11.20086439v2.full.pdf

[17] https://www.medrxiv.org/content/10.1101/2020.07.09.20148429v1.full.pdf

most people have very good T cell responses to it, they are very activated...[T cells] look rather durable, and they seem to be getting made in virtually all exposed people"[18].

Ultimately, the full picture of the duration of immunity to SARS-CoV-2 is incomplete. When looking at potential vaccines to SARS-CoV-2, some can prevent the virus getting deep into the lungs, such as the Oxford and University of Queensland vaccines, although this points to the prevention of severe disease rather than complete disease prevention. As development of promising vaccine candidates continues, to the extent and type of protection they can offer will become clearer.

[18] https://www.bmj.com/content/370/bmj.m3096

SEROLOGICAL SURVEYS

Serological surveys are employed to learn more about what proportion of the population has previously been exposed to the virus. While diagnostic antigen tests look at whether an individual is positive at one point in time, serological surveys provide an insight as to whether an individual **has ever** been exposed to the virus. Following infection with SARS-CoV-2, antibodies are generated to try and combat the virus, resulting in varying levels of different antibody isotypes in plasma. The levels of antibodies in plasma vary over time, with antibody levels of IgG lasting longer than IgA or IgM.

Solely relying on epidemiological data may not reveal the 'true' level of COVID-19 among the population. Such data focus on confirmed positive cases that sought out testing and may miss asymptomatic individuals or those with mild infections. Further research is required into what extent a seropositive individual is 'immune' to the virus (see above), so that serosurveys can provide valuable insight to policy makers. It is not yet known the length of protection that antibodies confer, or whether they can prevent reinfection.

An early rapid systematic review of SARS-CoV-2 serosurveys found that the prevalence estimates in most of the studies were heterogeneous, and it was suggested that the urgency to examine seroprevalence may have compromised methodological rigour[19]. A factor in determining the value of a serosurvey is the quality of the antibody test. For an accurate assessment of prevalence, an assay must be sensitive enough to reliably detect antibody responses to mild infection and specific enough to reject all negative cases across different post-exposure scenarios[20]. The systematic review highlighted the need for future serosurveys to undergo high-quality independent tests of the antibody tests used, and that all reports include the methodological details such as sample size, sampling methods and test medium.

Spain | Serological data in COVID-19 hotspots

Spain has been one of the hardest hit countries in Europe and is currently undergoing a second wave of infections. During the first lockdown period, a serological survey was conducted, with 61,075 participants[21]. Two serological tests were done: a point-of-care rapid test that required a fingerprint and a chemiluminescent microparticle immunoassay that required venepuncture.

The findings from the nationwide study indicated a prevalence of 5% for IgG antibodies against SARS-CoV-2. One strength of this study was that it was able to obtain a representative sample of the population and was therefore able to observe regional differences between the centre of Spain and the outskirts. The prevalence in hotspots such as Madrid was five times higher than those observed in low risk regions across the country.

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[19] *https://www.medrxiv.org/content/10.1101/2020.05.10.20097451v1*

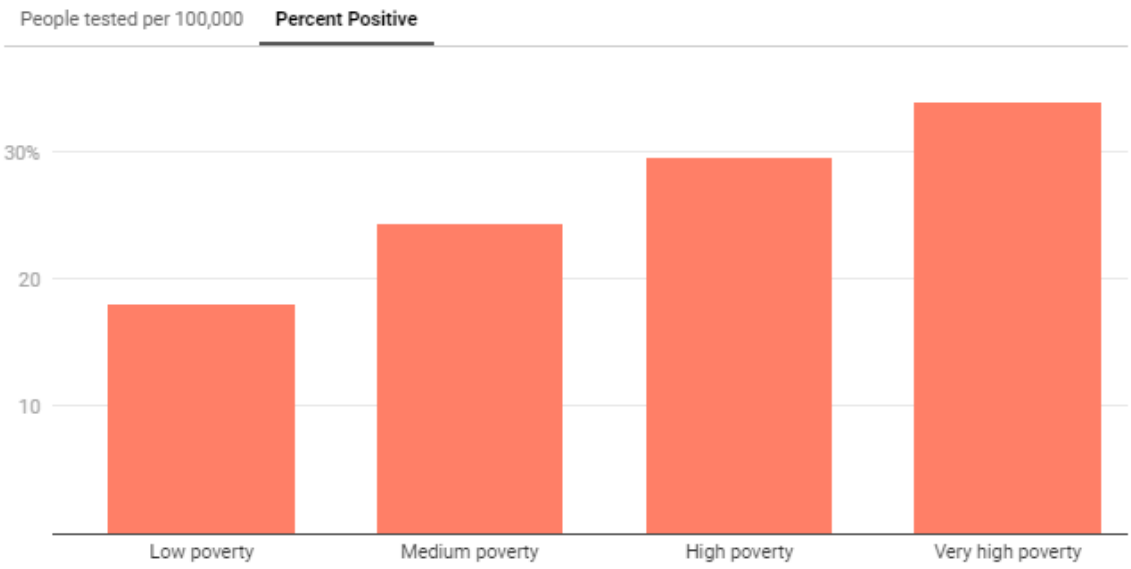
[20] *https://www.bmj.com/content/370/bmj.m3364*

[21] https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)31483-5/fulltext?dgcid=raven_jbs_etoc_email

This result of 5% prevalence in a country that was already largely impacted by the virus shows the level of susceptibility to the virus that we still have to live with around the globe, and stresses the urgent need for a vaccine to work alongside public health measures.

New York City, United States | Serological data in COVID-19 hotspots

On 19 August, **New York City** released the results of 1.146 million antibody tests[22]. In one area in Queens, it was found that more than 50% of people tested had antibodies. While these numbers may jump out, it should be noted that the population of New York City is around 8.3 million, so it remains unclear whether the city is anywhere near the threshold of herd immunity. In addition to this, the data released from New York was from individuals who sought out testing and was not a random sample.



Despite having the lowest positivity percentage, low poverty neighbourhoods had the highest amount of people tested per 100,000. Neighbourhoods with lower infection rates were more likely to seek antibody testing. This is congruent with a pre-print study that assessed COVID-19 in different ZIP codes across New York City[23]. It found that individuals living in wealthier ZIP codes may have found it easier to circumvent the initial testing guidelines on eligibility for a COVID-19 test, resulting in lower positivity rates, while those in less wealthy ZIP codes may not have received a test until clinically sick, therefore resulting in a higher likelihood of those tested being COVID-positive.

Wuhan, China | Serological data in COVID-19 hotspots

In the original epicentre for SARS-CoV-2, a serosurvey looking at the levels of IgG and IgM was conducted in 17,368 individuals between 30 March and 10 April 2020[24]. Internal validation of the serological assay was first

[22] https://www1.nyc.gov/site/doh/covid/covid-19-data-testing.page

[23] https://www.medrxiv.org/content/10.1101/2020.07.01.20144188v1

[24] https://www.nature.com/articles/s41591-020-0949-6

conducted using 447 samples that were collected from before the pandemic began in June 2019. Following validation, the serosurvey was performed in a cohort of 714 healthcare workers (3.8% Positive, 2.2–6.3%, 95% CI) and 346 hotel staff members (3.2% positive, 1.6–6.4%, 95% CI).

Serosurveys were also conducted in surrounding cities, with an estimated seroprevalence below 4%. A limitation of this study was that it may be subject to sampling bias, as the study population was not drawn by random sampling. Consistent with the serosurveys performed in other 'hotspot areas', estimated seroprevalence is quite low despite significant peaks of infection.

Using serological data to inform policy and decision-making

To best inform policy decisions and research in a visual way, a global seroprevalence dashboard was created. This system integrates evidence through a live systematic review, with published articles and preprints providing seroprevalence estimates[25]. To date, there have been 17 countries included in this dashboard, however estimates can vary widely. For instance, the United States currently has regional estimates ranging from 0.26% to 29.20%. As more studies are conducted and larger sample sizes are employed, global seroprevalence studies will be able to provide a clear view of the state of the pandemic.

[25] https://serotracker.com/Dashboard

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