

WEEK 1 WHAT IS KNOWN ABOUT THE OUTBREAK OF COVID-19?
STEP 1.9 HOW INFECTIOUS IS THE VIRUS?

Frequently asked questions

Question	Answer
<p>What are the issues with using numbers of confirmed cases to assess the burden of disease in each place?</p>	<p>To appear as a "confirmed case" you have to have been tested for COVID-19. This would mean having a PCR test done on a nose or throat swab and this test coming out positive. Who gets tested varies enormously from country to country and within countries. In some countries, particularly when the outbreak was first detected, only hospitalised patients were tested. So, anyone with mild disease who stayed at home would not be counted. In many countries there are very few tests, and very few places that can do tests. If you don't do any tests you don't have any confirmed cases. If, on the other hand, you do mass testing, including many people with no symptoms, you will detect a higher proportion of the infections in your population and likely increase your case numbers.</p> <p>Also not all reported cases are confirmed. At the height of the epidemic in Hubei province many cases were included in the statistics on the basis of the clinical picture and radiological findings, leading to a jump in the numbers recorded.</p>
<p>Are numbers of reported COVID-19 deaths correct?</p>	<p>In much of the world most deaths do not occur in hospital, there are no death certificates, and no routine reporting of deaths. There are many other causes of death from pneumonia (lung infection), and pneumonia is one of the commonest causes of death among old people. So without testing, or at least knowing someone is part of a localised outbreak, we cannot say if a death is associated with COVID-19.</p> <p>Even in countries where deaths are universally counted, COVID-19 deaths are missed. In China the number of deaths in Wuhan was revised upwards after review of likely causes of death of those not tested. Daily figures reported in the UK were initially only for hospital deaths and the large numbers of deaths in care homes were not included until the end of</p>

	<p>April. By contrast, in Belgium, deaths in care homes have been included, even those which are not confirmed.</p> <p>It is more informative to look at the deaths per 100,000 population as shown here https://coronavirus.jhu.edu/data/mortality - but this does not overcome the issue of differences in the ways deaths are reported - the unconfirmed care home deaths account for about half the COVID-19 deaths in Belgium in this report. So we are not comparing like with like, even among countries with good death registration.</p>
<p>What are the issues with comparing case fatality rates between countries?</p>	<p>The case fatality rate should be the proportion of people with COVID-19 who die from it. But what is commonly done is to take the number of deaths and divide it by the number of cases. This gives very unreliable results for several reasons as the way cases and deaths are counted differs between countries. If only cases requiring hospitalisation are tested, then the "case fatality rate" will be much higher than if mild cases are included. (It can also be difficult in some people with many underlying health problems to distinguish death due to COVID-19 from death with COVID-19.) Cases and deaths are also reported up to a certain date. As some of those cases will go on to die, the number of deaths lags behind the number of cases (at a given time point), because for many of the cases the outcome will still be unknown.</p>
<p>What do numbers of confirmed cases and deaths from COVID-19 tell us about what is happening?</p>	<p>It is clear that we cannot take numbers of confirmed case and deaths at face value. But within a country, if the testing and reporting remain constant, trends can be interpreted. And we can make estimates about what proportion of cases and infections that are missed.</p> <p>In countries with good death reporting, deaths from COVID-19 are the most reliable indicator. But the average time from infection to death may be more than 3 weeks. So deaths tell us about infections that happened several weeks before. Hospital admissions are also useful, if the criteria for admission remain constant.</p>
<p>What is the best way to get a full picture of the burden of disease and the spread of the virus in different parts of the world?</p>	<p>To really understand what is happening in terms of infections we need repeated population surveys in which people are tested for current infection (using PCR) or past infection (serological tests for antibodies).</p>

<p>What effects the rate of disease spread for after introduction of a virus into a susceptible population?</p>	<p>The rate of infection is based on a number of factors including the population of the community, the number of infections being reported per day and any cases being imported from other communities. From modelling studies, in a closed community, the virus will eventually reach a stage where there are not enough people who have not yet been infected to maintain viral transmission. This occurs because members of the community develop immunity to the infection and as humans are both the reservoir and the vector for COVID-19, the disease will not be able to survive. In Epidemiology, this is known as "herd immunity".</p>
<p>Can a person infected with SARS-CoV-2 be infectious before showing symptoms?</p>	<p>Infectiousness with SARS-CoV-2 can start before symptom onset. This is based on viral shedding and comparing the time between cases in chains of transmission (the serial interval) with the incubation period. There are also reports of people testing positive before symptoms. The viral load is high soon after illness onset and then decreases gradually, suggesting that it will also be high just before symptoms. Studies comparing the serial interval and the incubation period estimate infectiousness starts about 2-3 days before symptoms become apparent. Recent articles confirming this are here: http://dx.doi.org/10.1038/s41591-020-0869-5 and https://www.medrxiv.org/content/10.1101/2020.03.06.20031955v1 (not yet peer reviewed when accessed on 02.05.20).</p>
<p>What is the definition of latent period?</p>	<p>The latent period is the time between infection and onset of infectiousness. This is also sometimes called the pre-infectious period.</p>
<p>How do you calculate the herd immunity threshold?</p>	<p>The herd immunity threshold (the proportion of the population that needs to be immune to bring R down to 1) depends on R. In general, the herd immunity threshold = $(R-1)/R$. So if R is 2 it is half the population. If R is 3 it is two thirds of the population. If you are relying on vaccination to bring R down then you also need to remember that no vaccines protect 100%, so the proportion of the population you would need to vaccinate would increase, depending on the vaccine effectiveness.</p>