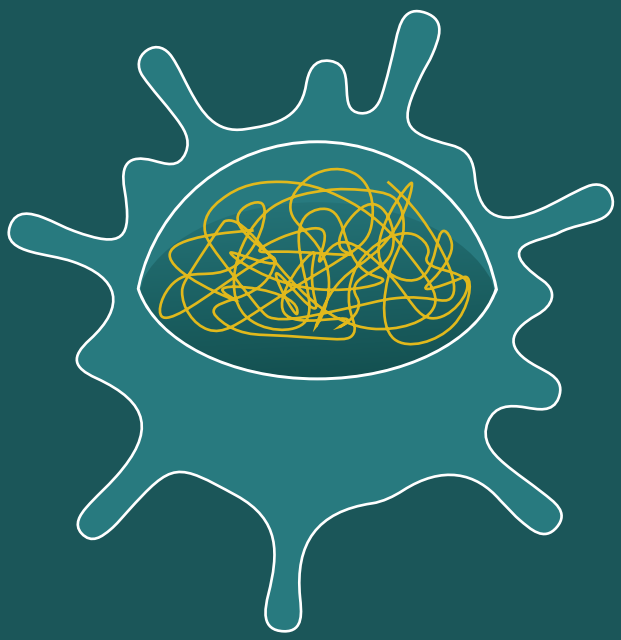
UNDERSTANDING COVID-19

Several terms have been used to describe the pandemic, examples include; 'Coronavirus', 'COVID-19' and 'Wuhan virus'. COVID-19 (an acronym of Coronavirus Disease 2019) is the most widely used name to describe the disease causing the pandemic. The name of the virus that causes COVID-19 is SARS-CoV-2.



'SARS-CoV-2' is an abbreviation of 'Severe Acute Respiratory Syndrome Coronavirus 2', an infection that targets both the upper and lower respiratory tract (i.e. the nose, throat and lungs). It is described as being 'novel', meaning this strain of virus, before the outbreak started, had not been previously identified in humans.

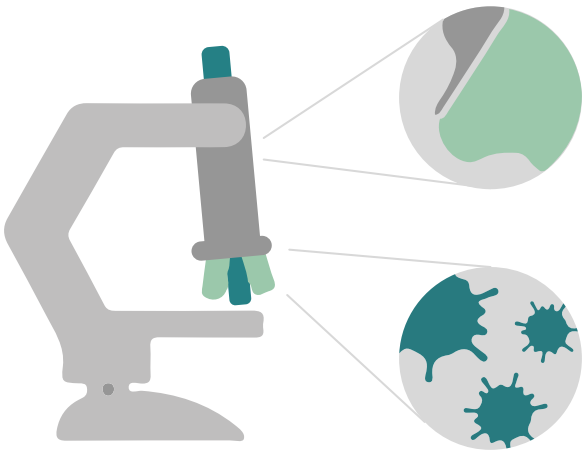
SARS-CoV-2 is a member of the Coronavirus group in the 'Coronaviridae' viral family. Coronaviruses are a group of related viruses distinguishable by their crown-shaped surface proteins. These viruses lead to respiratory tract infections in mammals and birds. Infections range from mild to life-threatening. The previous outbreaks of SARS and MERS are other examples of Coronaviruses.

Combined, these two viruses killed an estimated 1,600 people globally. SARS was discovered in the early 2000s and is described as being 'zoonotic', meaning the virus originated in animals and later mutated, allowing it to be transmitted to humans. COVID-19 is also zoonotic. The virus causing COVID-19 has been identified as genetically very similar to the virus that caused the SARS outbreak in 2003.

How viruses replicate

Viruses, unlike bacteria, cannot multiply on their own and instead require other 'host' cells to do so. The virus surface proteins allow it to enter the body's cells; once within the cell, the virus releases its genetic material which integrates with the host cell DNA, turning the cell into its own viral factory using the cells' internal machinery.

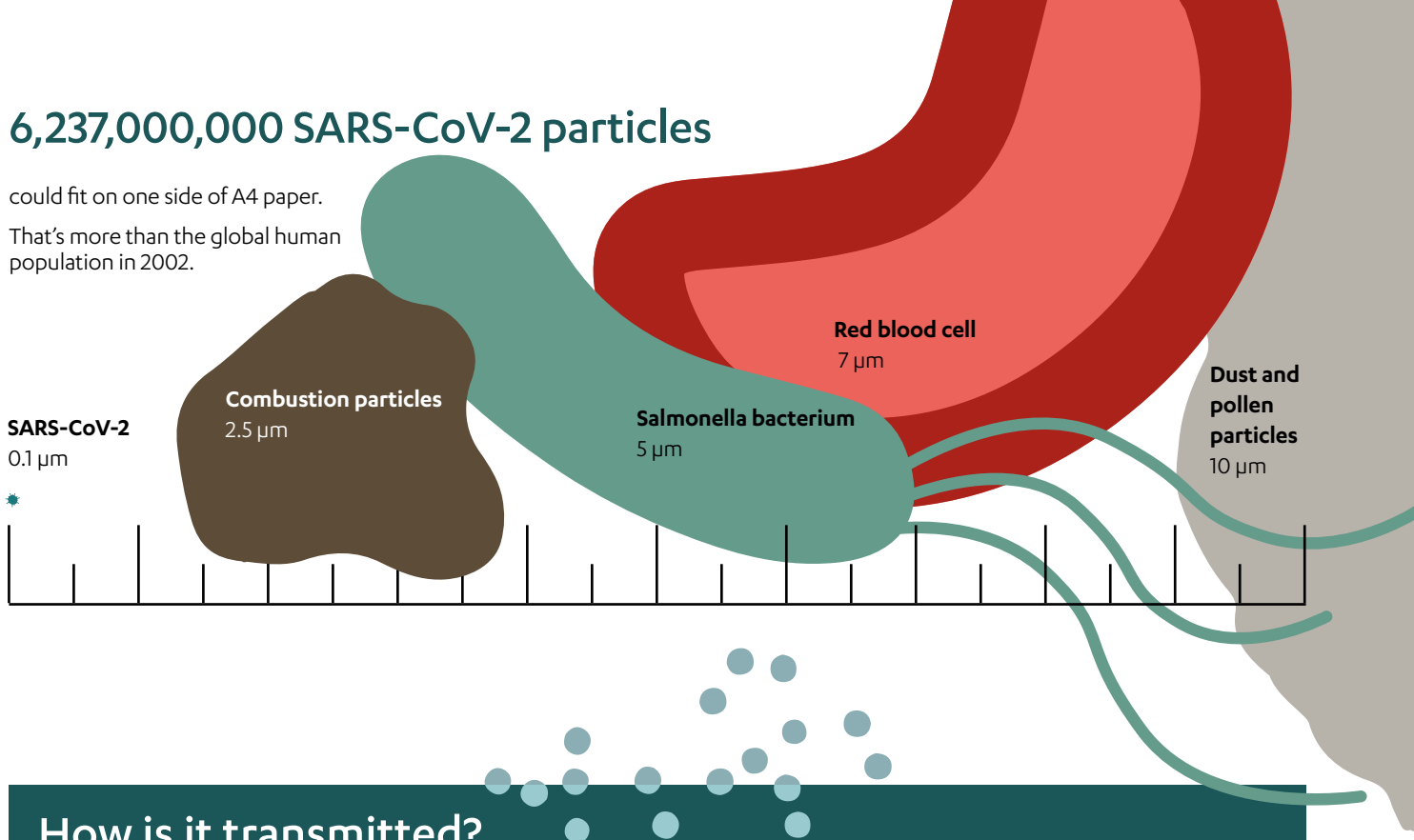
This leads to the creation of new identical viruses, which burst from the cell and then spread to cause further infection. The symptoms caused by a virus usually depend on the site of infection and what types of cells the virus predominantly attacks.



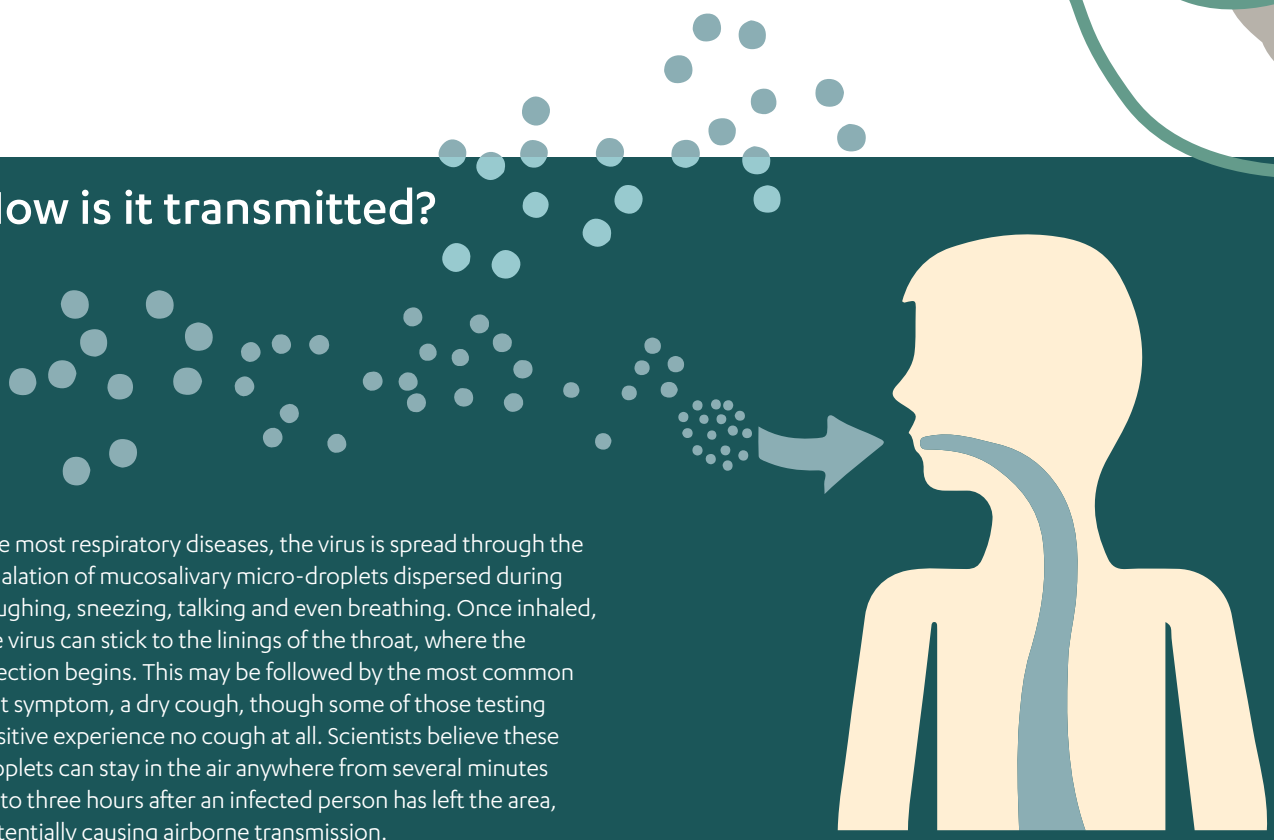
6,237,000,000 SARS-CoV-2 particles

could fit on one side of A4 paper.

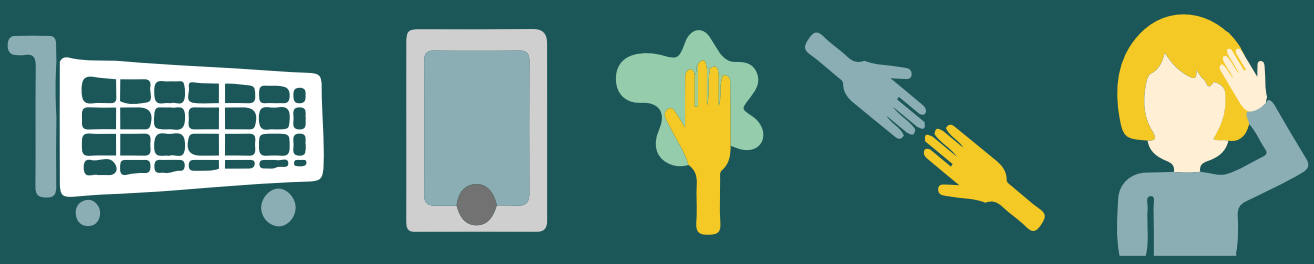
That's more than the global human population in 2002.



How is it transmitted?



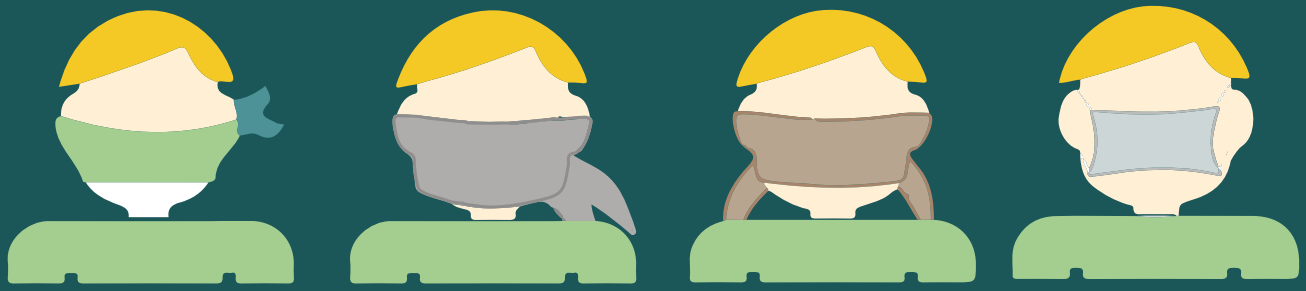
Like most respiratory diseases, the virus is spread through the inhalation of mucosalivary micro-droplets dispersed during coughing, sneezing, talking and even breathing. Once inhaled, the virus can stick to the linings of the throat, where the infection begins. This may be followed by the most common first symptom, a dry cough, though some of those testing positive experience no cough at all. Scientists believe these droplets can stay in the air anywhere from several minutes up to three hours after an infected person has left the area, potentially causing airborne transmission.



Additionally, the surfaces of objects such as mobile phones and supermarket trollies can harbour viral particles. These are known as "fomites". The virus can survive on some surfaces anywhere from several hours (e.g. copper and cardboard) up to a few days (e.g. plastic and stainless steel). The amount of the virus that can be transmitted declines over this time and may not always be present in high enough amounts to cause an infection. Differences in genetic makeup, not yet fully understood, may make certain people more susceptible to developing serious symptoms from the virus. Socio-economic factors and cultural differences, for example inter-generational households, could also play roles in increasing the rate of viral transmission.

How can transmission be reduced?

The most effective methods in reducing transmission centre around physical distancing and improvements to hygiene, including regular handwashing and surface cleaning. Studies have concluded homemade masks can, to varying degrees depending on the material, reduce the risk of the wearer transmitting the disease, but are far less effective in protecting the wearer from contracting COVID-19. Surgical masks offer greater protection, but are not effective PPE on their own.



Cotton 51% | Silk 54% | Linen 62% | Surgical mask 90%

Effectiveness of materials in containing particles fives times smaller than SARS-CoV-2 coming from the wearer coughing

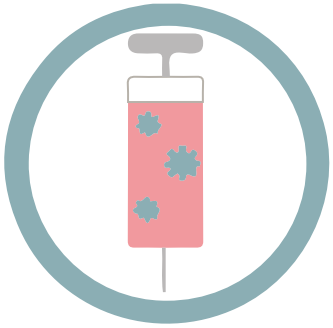
Davies, Anna, et al (2013)

Diagnosis and testing

Testing can be divided into two main categories; one detecting presence of the virus and therefore infection (Swab/PCR and antigen test); the other if you have previously had the virus and therefore have developed natural immunity (antibody test).

SWAB TEST

Also known as the Polymerase Chain Reaction (PCR) test, this detects if someone currently has the virus. A cotton bud swab is taken from the inside of the nose or throat. Viral genetic material, RNA, present in the sample is first converted to DNA. It is then copied many times over increasing the amount for detection. This amplification step is specific to the SARS-CoV-2 virus. The test is less effective during the early stages of infection where the swab may not collect enough viral particles for detection. This test is ineffective in determining if a person has already had the virus and has recovered from it.



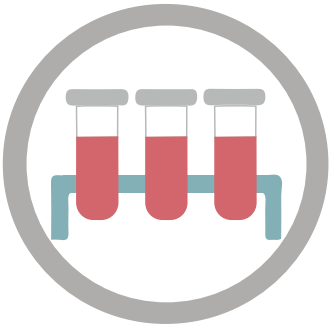
ANTIGEN TEST

This is sometimes confused with the Swab/PCR test. Antigens are molecular structures present on the virus that induce an immune response from the body. This test checks for these proteins usually through a synthetic antibody which can search for and identify its target antigen. The test offers a similar level of information to the swab/PCR test and cannot determine if the patient has started to develop an immune response. They are much less invasive and easier to get results from, however are also less sensitive.

ANTIBODY TEST

A type of blood test to detect if the body's immune system has already responded to the virus by checking for antibodies specific to SARS-CoV-2. It is these antibodies that could offer immunity to COVID-19, although it has not been determined how long any such immunity lasts.

Antibodies cannot be detected until sometime after infection (thought to be up to several weeks), so this test is more reliable in those during the later phases of infection. These tests can detect two types of antibodies (IgM and IgG) and can be performed using a small blood prick sample, the results of which can be developed in just a few minutes. Some formats of this test can even give results at home.



What treatments are being considered?

As of yet, no definitive treatment for COVID-19 has been developed. Current medical interventions are being utilised for managing symptoms and providing supportive care (e.g. oxygen therapy) as opposed to targeting the virus itself.
A number of drugs currently in use to treat other diseases, such as the anti-inflammatory Dexamethasone, are being trialled to fight the virus. Such 'repurposing' of drugs that are already approved to treat other conditions is an attractive alternative to developing new drugs. This greatly cuts down on the timeframe that years of formulation and regulatory approval of a new drug would require.

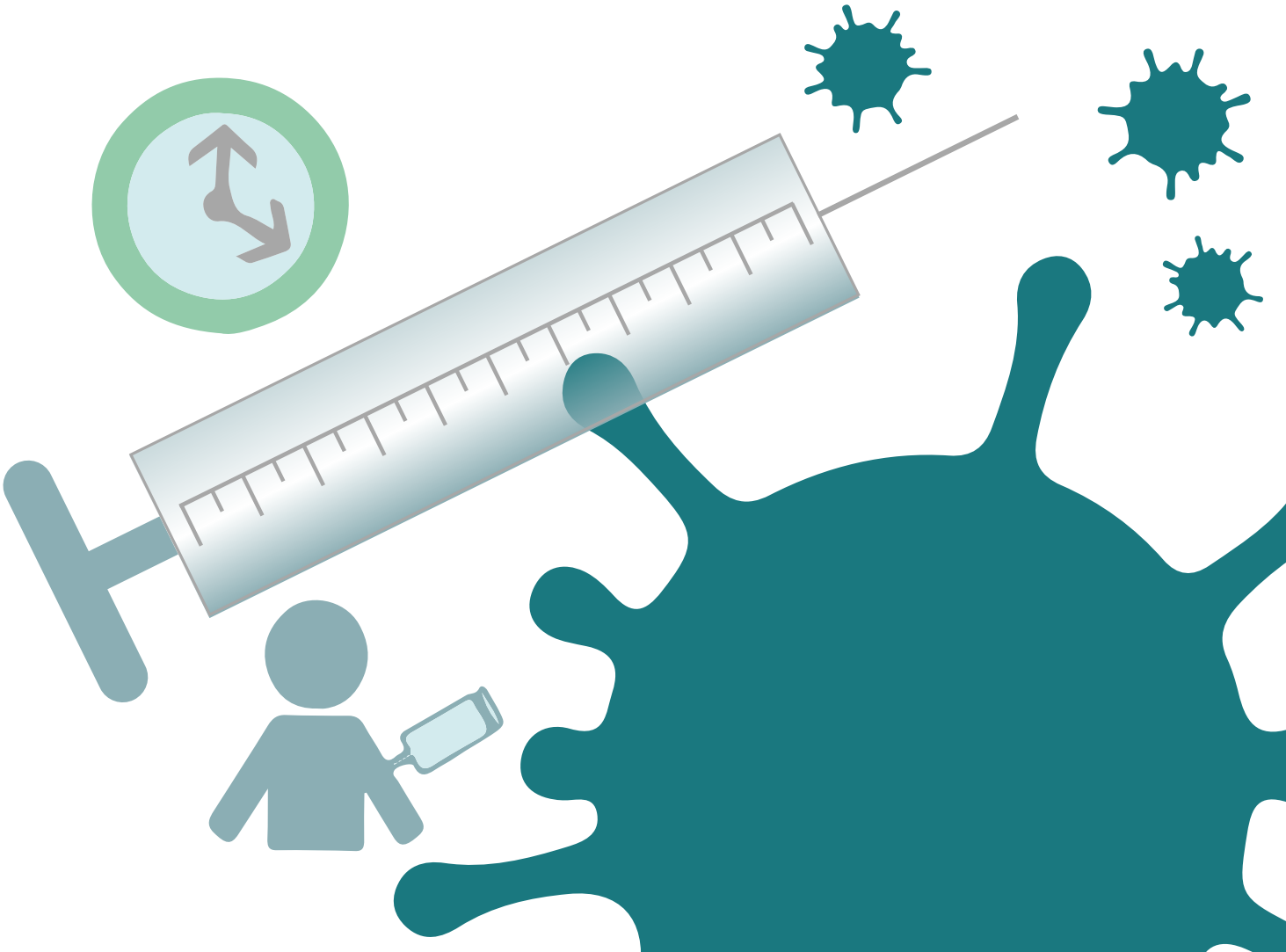
The road to vaccination

A vaccine works by introducing the body's immune system to an inactive form of the virus. The aim is to trigger an equivalent immune response to that produced by the active virus but without any risk to health. The body learns to identify these molecules as hostile and develops a response against them, producing antibodies specific to the virus. These can protect from a bona fide infection, remaining in the bloodstream, ready to attack and eliminate the virus before symptoms arise.

Vaccines can protect against infections but are not necessarily regarded as cures as they are ineffective if someone already has the disease and have a number of limitations, namely being less likely to work as intended in some groups, such as older people due to their weakened immune systems.

Producing a vaccine is a scientifically rigorous process that typically can take between five and ten years, although much is being done to speed this up. First of all, research must be done to determine the target antigen.

The next stage is the pre-clinical trial, which determines and eliminates potential side effects of the vaccine based on how the virus reacts with tissue cells. There are then three phases of human trials which the candidate vaccine must pass before it is approved for use and mass produced. Each phase increases the number of volunteers relative to the previous one ranging from a few dozen to several thousand, testing for safety, effectiveness and dosage.



MISCONCEPTIONS ABOUT COVID-19

CORONAVIRUSES ARE NEW TO US

In fact, seven human Coronaviruses have been identified (the first of these was in the 1960's). They are the second most prevalent cause of the common cold, with studies suggesting four of these seven account for 15-30% of common cold infections.

Mesel-Lemoine, Mariana, et al (2012)
Chilvers, M.A., et al (2001)

THE VIRUS CANNOT SURVIVE HOT WEATHER

Emerging evidence suggests the effect of weather on Covid-19 is minimal, with cold and dry conditions potentially facilitating the spread. This effect is yet to be confirmed and should not be taken to mean that the virus poses any less of threat in warmer climates.

The Centre for Evidence based Medicine (CEBM), University of Oxford (2020)

ONLY OLDER OR IMMUNO-COMPROMISED PEOPLE ARE AT RISK AND NEED TO FOLLOW RESTRICTIONS

While it is true that these groups are more at risk of requiring invasive medical intervention, people from all demographics can contract and die from the virus. Experts estimate 5-80% of cases testing positive are asymptomatic; these people are still infectious and pose a risk to others.

The Centre for Evidence based Medicine (CEBM), University of Oxford (2020)

THE INCUBATION PERIOD IS ALWAYS 14 DAYS

The incubation period is most commonly five days but ranges from 1-14 days after infection, during which time the person may still be contagious.

Lauer, Stephen A., et al (2020)

THE VIRUS ORIGINATED FROM SOMEONE EATING A BAT IN WUHAN, CHINA

It has been established that the virus most likely originated from a Horseshoe bat and was first transmitted to an intermediate host before mutating and being passed to a human. There is no evidence that suggests consumption of a bat by humans led to the outbreak.

COVID-19 Situation Report 94, World Health Organisation (WHO, 2020)

IF I WEAR A FACE MASK I DON'T NEED TO FOLLOW THE SOCIAL DISTANCING GUIDELINES

The effectiveness of the mask depends entirely on its specifications, some masks may offer a high degree of protection while others offer little or none. The virus is also able to adhere to clothes, skin and even the surfaces of eyes.

Davies, Anna, et al (2013)
Center for Infectious Disease Research and Practice (CIDRAP), University of Minnesota (2020)

WEARING GLOVES IN PUBLIC CAN HELP PREVENT THE SPREAD

These can be a cause of cross contamination when used unnecessarily, carrying viral particles that may be on one surface to another. Gloves are mostly recommended for those cleaning potentially infected surfaces and when caring someone who is ill.

US Centers for Disease Control & Prevention (CDC, 2020)

CORONAVIRUS IS BASICALLY THE SAME AS THE FLU

This is far from the truth. The European Centre for Disease Control (ECDC) estimates that around 0.1% of people who contract seasonal Influenza in the EU die prematurely each year, much lower than the COVID-19 mortality rate. Unlike Influenza, there is no vaccine, prior immunity or specific treatment for COVID-19 as of yet.

European Centre for Disease Prevention and Control (ECDC, 2020)

HERD IMMUNITY IS MORE EFFECTIVE THAN A LOCKDOWN

Many factors (including: the risk of overwhelming healthcare systems; the proportion of the population immunised; and how long immunity may last) prevent a concise response to this. However, allowing herd immunity to establish naturally, rather than through vaccination, would result in many avoidable deaths.

Bloomberg School of Public Health, John Hopkins University (2020)

5G IS THE CAUSE OF THE OUTBREAK

This rumour is thought to have started in January 2020 when a Belgian newspaper published an interview that claimed 5G may be linked to the virus. There is no scientific proof to back this up. 5G is non-ionizing meaning it is unable to cause cellular damage and therefore affect the immune system.

Ahmed, Wasim, et al (2020)