St Helena Government

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In this Bulletin: SARS-CoV-2/COVID-19 (Coronavirus) epidemiology and St Helena

This Statistical Bulletin presents estimates of epidemiological variables and demographic statistics that are relevant in the event of an outbreak of the coronavirus known as SARS-CoV-2/COVID-19 (COVID-19) on St Helena. COVID-19 is a new infectious disease that was declared a pandemic by the World Health Organization (WHO) on March 11, 2020.

The data in this Bulletin have been previously made available to the Incident Executive Group (IEG), which is the body of St Helena Government with decision-making oversight of St Helena's response to the COVID-19 pandemic. The Bulletin outlines what is known about the expected impact of the virus on St Helena if there is local transmission of the disease, provides estimates of the risk of fatality, and discusses some of the measurement difficulties. It also describes how mitigation measures, including those put in place on St Helena, work to prevent community transmission and to minimise spread and impact if community transmission occurs.

Important note on data quality

Although data are being collected by many countries and institutions around the world, there are many potential sources of error, and data quality is relatively weak – largely because COVID-19 is a new illness. For example, data on infections are not routinely published; instead, data usually relate to 'confirmed cases', and different countries have different strategies and testing capacities for confirming cases. Disease behaviour on St Helena may also differ from that observed in other countries because of the different conditions among the population, such as the degree of urbanisation, different population density, level of pre-existing health conditions, levels of prior exposure to similar illnesses, and demographic structure. Additionally, St Helena's population is small; models and estimates developed for larger countries may be less accurate when applied to small populations.

Measuring the transmission rate of COVID-19

One of the most important parameters in assessing the spread of any infectious disease is called the reproduction number, R. This is simply the expected number of people that an infectious person will infect. If R = 2, for instance, then on average every infected person will infect two other people. The starting point for any infectious disease, when the entire population is susceptible to it, is known as the basic reproduction number and is called R_0.

Reproduction numbers vary according to the disease and the method of transmission. Measles, mumps, and chicken pox all have basic reproduction numbers that are greater than 10. Regular influenza ('flu') is measured at around 1.3. As a new disease, estimates of the basic reproduction number (i.e. the reproduction rate without any measures in place to reduce the spread of the illness) for COVID-19 are relatively imprecise and vary due to a variety of factors. These include the setting of any outbreak (e.g. care homes, urban or rural settlements, etc.), and local factors, such as the degree of social mixing. According to WHO, the basic reproduction number varies between around

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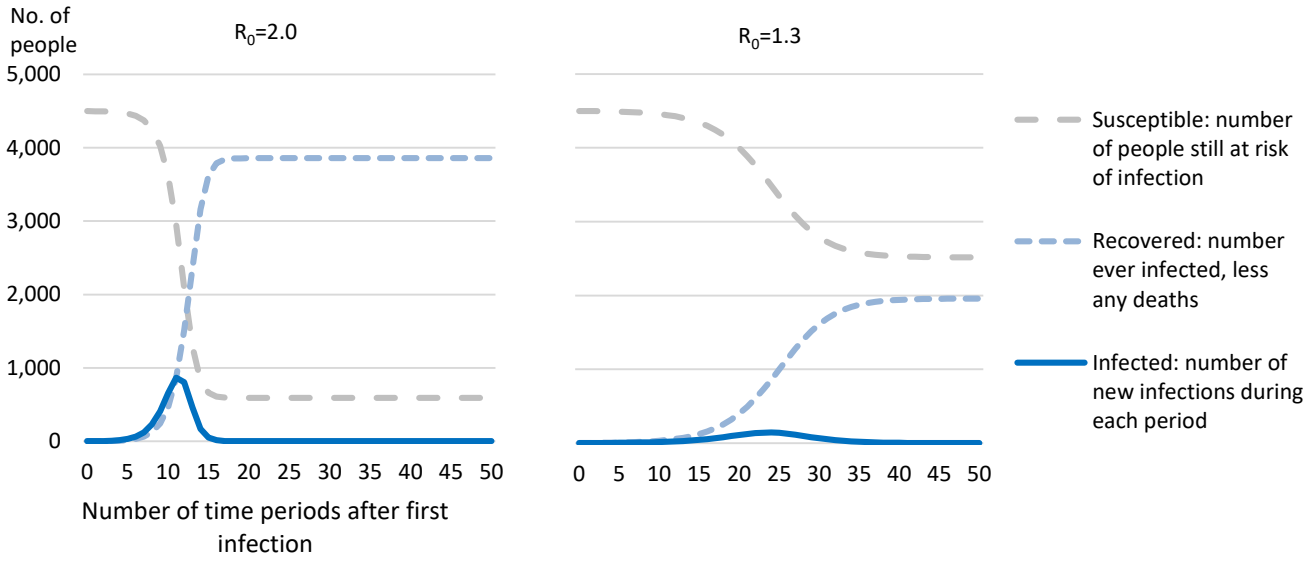
two and six.

Chart 1 illustrates the impact of different basic reproduction numbers on the spread of an outbreak of COVID-19, using a very simple 'compartmental disease' epidemiology model. The model is designed to be illustrative only, and it estimates the number Susceptible to the disease, the number Infected, and the number who have Recovered or died. It shows the outbreak based on time-periods since the first infection, and it assumes that recovered cases do not become re-infected. It also assumes that the time-periods to become infectious, pass on an infection, and then recover are roughly the same – estimates based on UK data and analyses provided by Public Health England are that these time-periods are, on average, around five to six days.

Chart 1. Illustrative epidemiology models in the event of a COVID-19 outbreak on St Helena



Source: St Helena Statistics Office

'Flattening the curve': mitigation measures to reduce or prevent the spread of COVID-19

If an outbreak becomes established with a reproduction number that is greater than two, and there is nothing in place to reduce the spread, this can result in a rapid increase in cases. Measures such as regular hand washing, social distancing to decrease contact rates, testing and isolation of confirmed cases and tracking and tracing of contacts, and quarantine of new arrivals, are all designed to reduce the reproduction number, and therefore to reduce the spread of the disease or even to prevent it completely: this is often reported as 'flattening the curve'. A lower reproduction number extends the time of the pandemic, reducing peak demand on health services so that any hospitalised cases can be treated more effectively, even if the eventual number of people that become infected remains the same.

The second graph (on the right) in Chart 1, with a basic reproduction number of 1.3, shows this flattening in the dark line, the number of newly infected people in each period, compared to the graph on the left, which has a higher basic reproduction number of 2.0. When the curve is not flattened and

the basic reproduction number is around 2.0 or higher (roughly the same as SARS, another infectious respiratory illness), most of the population becomes infected and the peak is high. When the curve is flattened, then the peak is reduced and infections are spread over a longer period. When the reproduction number is below 1.0, the number of people infected with the disease will reduce and the outbreak will end.

Fatality rates: the risk of dying in a COVID-19 outbreak

One of the other reasons for the global concern about the COVID-19 pandemic is that it is potentially fatal for a small number of people who become infected. It is important to try to estimate this number, known as the 'Infection Fatality Rate' or IFR, usually expressed as a percentage of the number of infected people. The Infection Fatality Rate for seasonal flu is typically around 0.1%, or one death out of every thousand people infected.

Estimating the Infection Fatality Rate for COVID-19 is difficult because the number of infections may not be known accurately if mild cases or cases with no symptoms ('asymptomatic') are not identified. It is much easier to estimate the Case Fatality Rate, which is the rate at which confirmed cases die. The Case Fatality Rate is always higher than the Infection Fatality Rate, and it is more variable, due to the different strategies and capacities for confirming cases in different countries.

There are various estimates of Infection Fatality Rates, many derived from studies of the initial COVID-19 outbreaks in China and on cruise ships (ships are useful to epidemiologists because the entire population can be tested for infections, although they also represent closed 'close quarter' settings so transmission rates can vary). Table 1 includes estimates based on studies by Imperial College London and provided by epidemiologists from Public Health England, broken down by age group. The Infection Fatality Rates for older people are much higher than younger people; note that rates of 0.0 for younger age groups are rounded; there are very small probabilities of infection in these age groups. The table also provides the number of people in each of these age groups on St Helena at the time of the last Census 2016 (since 2016 the numbers in the older age categories have increased slightly).

In a 'worst-case scenario', where no measures are taken (or measures taken are ineffective) to prevent an outbreak (e.g. using quarantine) or to reduce the reproduction number once transmission within the community becomes established, epidemiologists at Public Health England estimate that up to 80% of a population may become infected. For St Helena, this would be around 3,600 people, and the expected overall Infection Fatality Rate (using the IFR estimates also provided by Public Health England) would be around 1.3% of those infected or around 46 people. St Helena did not record any cases of the well-known Spanish Flu pandemic in 1918/19, but the 1901 Population Census report mentions a serious epidemic of influenza on St Helena in 1900. By coincidence, the number of deaths recorded in the census due to influenza that year was also 46 (in 1901 the resident population, excluding the garrison and Boer prisoners of war, was around 3,400).

The worst-case scenario seems unlikely, however: St Helena has put in place mandatory quarantine measures for new arrivals to prevent infections within the community, and has strong suppression policies in place should any infections be detected within the community at large, including social

distancing and isolation of identified cases at Bradley's hospital facilities. For illustration purposes, if transmission within the community did occur, Table 1 assumes that mitigation measures reduce the number of infections to 20% of the population. With this assumption, the most likely number of deaths for St Helena would be 11. However, it should be noted that even this assumption is a relatively high estimate; in San Marino, the country with the highest number of confirmed cases per population in the world, the number of infections can be estimated at only 14% of the population, assuming an Infection Fatality Rate of 1%. In addition, two island economies of similar size, Montserrat and the Falkland Islands, have both identified confirmed cases (11 and 13 respectively, with one death in Montserrat) but have been able to limit the spread of the virus and currently have no active infections.

Table 1. Infection Fatality Rates, and expected infections and fatalities under different disease suppression assumptions

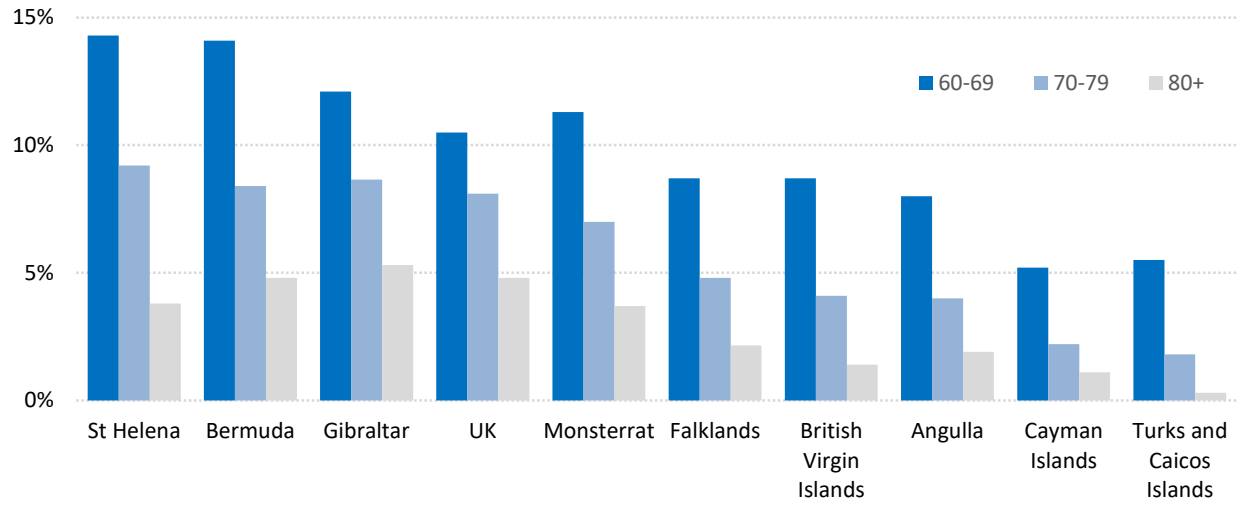
Age group:	00-09	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80+	Total
Infection Fatality Rate	0.0	0.0	0.0	0.1	0.2	0.6	2.2	5.1	9.3	**1.3**
Resident population (2016 Census)	422	427	438	537	737	722	657	421	173	**4,534**
Assuming no disease suppression policies and 80% of population infected (four in every five):										
Expected number of infections	338	342	350	430	590	578	526	337	138	**3,629**
Most likely expected fatalities	0	0	0	0	1	3	12	17	13	**46**
Assuming disease suppression policies reduce infections to 20% of the population (one in every five):										
Expected number of infections	84	85	88	107	147	144	131	84	35	**905**
Most likely expected fatalities	0	0	0	0	0	1	3	4	3	**11**

Source: Public Health England

The average number of deaths per year from all causes during the last 20 years was 49, with a maximum of 62 and a minimum of 33. With the assumptions in Table 1, the expected number of deaths ranges from estimates of 11 to 46. Those deaths would likely occur over a two to three month period, and the equivalent annual death rate would be between around two and six times the usual annual death rate for St Helena.

It is emphasised again that it is difficult to make accurate predictions and estimates, especially when populations and COVID19 case numbers are small. Data suggests that small populations tend to have very few cases or they may be more vulnerable. If there are occasional sporadic cases that can be quickly managed and contacts followed up to ensure no further spread, this will help to minimise cases. If cases go undetected and an outbreak becomes established, prompt interventions to halt the spread and slow down transmission will likely result in a flattening of the curve and a peak not as high as the unmitigated peak.

Chart 2. Proportion of elderly population in selected British Overseas Territories and the United Kingdom



Source: Public Health England, based on latest available data published by national governments

St Helena's population is often referred to as 'ageing', meaning that the proportion of the population that are elderly is increasing. This is relevant when considering the likely impact of COVID-19 because Infection Fatality Rates are significantly higher amongst older groups (Table 1). Chart 2 shows the proportion of people who are over 60 in the larger British Overseas Territories and the United Kingdom, compared to St Helena, based on the latest available data collated by Public Health England. Overall, St Helena has the highest proportion of people over 60, although the UK, Gibraltar and Bermuda all have a higher proportion of people in the highest risk age group of 80+ (Tristan da Cunha is not shown on the chart but around 35% of the population there are over 60, a higher rate than St Helena).

Other risk factors

Public Health England has reported that the three most reported pre-existing conditions or comorbidities among those who have died of COVID-19 in the UK were diabetes, asthma requiring medication, and chronic heart disease. There is also some evidence that more males have died of COVID-19 than females, although in some communities men may have higher prevalence of other risk factors, such as smoking, and it should also be noted that average life expectancy of older men is lower than that of older women. Estimates collected by the Health Directorate indicate that the prevalence of diabetes on St Helena, in particular, may be around twice the UK rate (around 20% in St Helena compared to around 10% in the UK, with around 90% of cases on St Helena among those over 50). The St Helena prevalence rates of the other main comorbidities observed in the UK (chronic heart disease and asthma requiring medication) are either similar to the UK rates or lower.

However, caution is advised when interpreting these data and concluding that people with these pre-existing conditions are at a greater risk of death from COVID-19, in part because these conditions are also much more prevalent in elderly people. Better evidence to assess whether higher prevalence of

these pre-existing conditions cause higher COVID-19 fatality rates should emerge as scientists gain more experience and data from the disease outbreak.

Have questions or comments?

Please get in touch: we are Neil Fantom, Statistical Commissioner, Justine Joshua and Kelly Clingham, Senior Statistical Assistants, and Bertina Benjamin, Statistical Assistant. You can find us at the Statistics Office on the **first floor of the Castle**, Jamestown, at the back of the main courtyard. You can also contact us by telephone: our direct line is **22138** or via the Castle switchboard on 22470. If calling from overseas, the international dialling code for St Helena is +290. Our general office e-mail address is **statistics@sainthelena.gov.sh**, or you can email team members directly (the format is firstname.lastname@sainthelena.gov.sh).