**Correcting observations data**

2 issues with recorded positive case data:

1. There is a lag between the time of a positive test result and the time of infection
2. Tests do not pick up all positive cases

Can correct this by:

1. Shifting positive test results back in time (based on data on lag between infection and positive result)
2. Using a multiplier on the number of positive cases (based on data on the proportion of positive case results being picked up by tests)

This would assume:

1. Individuals go for a test on the day that symptoms develops; and that all of those with positive test results went for a test due to developing symptoms (rather than e.g. exposure to a confirmed case)
2. Depends on what data used:
   1. Could use data on proportion of cases that are asymptomatic (which would assume that all positive test results are for symptomatic people, and that tests do not pick up any asymptomatic people)
   2. Alternatively use data on estimated detection rates, in which case any assumption made in this research will be carried over
3. **Lag between infection and positive test result (conclusion seems to be ~5/6 days?)**

Incubation period between person being infected with Covid-19 and showing symptoms is estimated to be between 1 and 14 days, and 5-6 days on average.

“*The incubation period of COVID-19: a global meta-analysis of 53 studies and a Chinese observation study of 11 545 patients*” (IDP Journal) -> concluded ”The pooled mean incubation period of COVID-19 was 6.0 days (95% confidence interval [CI] 5.6–6.5) globally, 6.5 days (95% CI 6.1–6.9) in the mainland of China, and 4.6 days (95% CI 4.1–5.1) outside the mainland of China”.

*“Distribution of incubation periods of COVID-19 in the Canadian context”* (Nature) -> The estimated mean incubation period we obtain is 6.74 days

*“Incubation period of COVID-19: a rapid systematic review and meta-analysis of observational research”* (BMJ) -> “The corresponding mean (95% CIs) was 5.8 (95% CI 5.0 to 6.7) days”

*“The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: Estimation and Application”* (ACP Journals) -> “The median incubation period was estimated to be 5.1 days (95% CI, 4.5 to 5.8 days)” (Study based in China)

*“Estimated Incubation Period of COVID-19”* (American College of Cardiology) -> “The median incubation period from infection with SARS-CoV-2 to onset of symptoms is approximately 5 days.” (Study based in China, I think)

1. **Proportion of positive cases picked up by testing**

Need to account for the underlying proportion of asymptomatic people who are not taking tests

The number of positive cases being picked up by testing will change over time as testing capacity develops

<https://www.addactis.com/advanced-sird-modelling-reprocessing-covid-19-data-issues/> - Start of pandemic it was thought that around 50-60% of cases were asymptomatic, recent studies suggest 20-40%.

*“Global Percentage of Asymptomatic SARS-CoV-2 Infections Among the Tested Population and Individuals With Confirmed COVID-19 Diagnosis: A Systematic Review and Meta-analysis”* (JAMA network) -> 40.5% of those with confirmed Covid cases are asymptomatic (Global study).

<https://ourworldindata.org/covid-models> - Work comparing estimates from 4 epidemiological models of daily cases in the US, against confirmed cases from data. In all cases, the four models predict infection numbers which far outnumber confirmed cases. But they disagree by how much.

*“Robust estimates of the true (population) infection rate for COVID-19: a backcasting approach”* (Royal Society) -> Applies a back casting approach to estimate a distribution for the true cumulative number of infections in 15 developed countries. This includes for the UK a graph of an estimated detection rate of Covid-19 for each month.

*“Estimation of the fraction of COVID-19 infected people in U.S. states and countries worldwide”* (PLOS one) -> Actual cumulative cases were estimated to be 5–20 times greater than the confirmed cases

*“Estimating the Prevalence of Asymptomatic COVID-19 Cases and Their Contribution in Transmission - Using Henan Province, China, as an Example”* (Frontiers in medicine) -> “A recent analysis of 21 retrieved reports by the Centre for Evidence-Based Medicine in Oxford found that estimates of asymptomatic COVID-19 cases ranged from 5 to 80% ([15](https://www.frontiersin.org/articles/10.3389/fmed.2021.591372/full#B15)).” This research used data from China in a model to show the proportion of asymptomatic cases among COVID-19 infected individuals was 42%