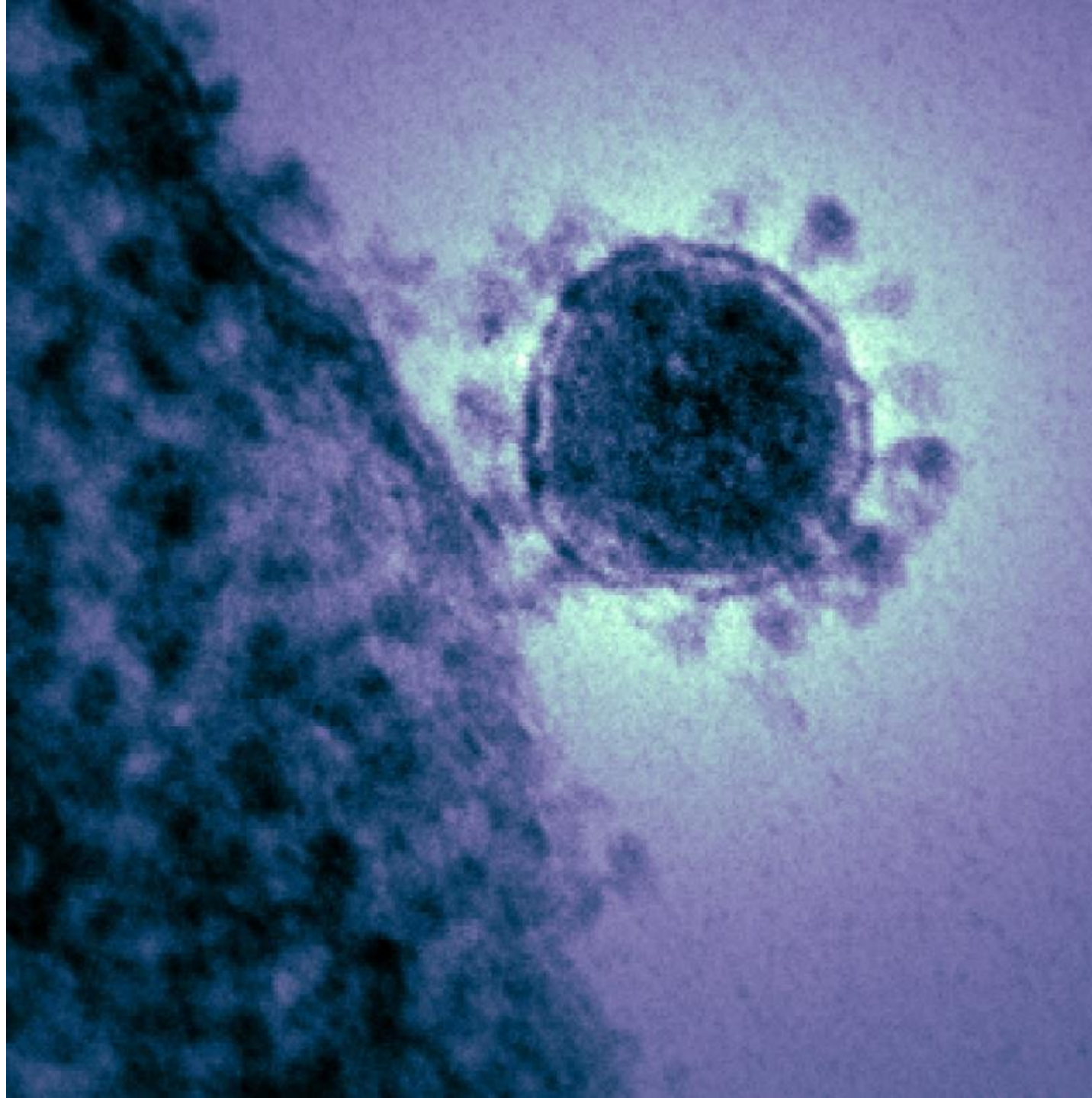


COVID-19 & Utilitarianism

Jeremy Bentham (1748-1832)

- Rational decision-making based on an understanding of the consequences of the decision
- General principle – seek the best possible outcome based on weighing all the factors
- An empiricist, fact-based approach





A coronavirus is shown in this colourized transmission electron micrograph. (U.S. National Institute for Allergy and Infectious Diseases)

<https://kitchener.ctvnews.ca/ontario-reports-new-covid-19-cases-one-day-after-region-s-first-case-confirmed-1.4840095> (14 March 2020)

COVID-19

- Named (ICTV): Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)
- Disease (WHO): COVID-19
- Genetically related to the coronavirus responsible for the SARS outbreak of 2003

Origin

- Probably Wuhan, Hubei province, China
- Live animal markets selling multiple species of wild and domestic animals in proximity to large populations of densely housed humans are thought to be the source of both SARS and COVID-19 outbreaks

[https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(20\)30129-8/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(20)30129-8/fulltext) (14 March 2020)

Symptoms

- Symptoms are similar to other colds and flus and include:
 - fever
 - cough
 - sore throat
 - fatigue
 - difficulty breathing
- Some people who are infected may not get sick at all, some will get mild symptoms from which they will recover easily, and others may become very ill

Incubation period

- Median incubation time of 5-6 days
- Almost all individuals who become symptomatic do so in 11 or 12 days after exposure

<https://www.jwatch.org/na51083/2020/03/13/covid-19-incubation-period-update> (14 March 2020)

Rapidity of spread: location

- Origin in a large city, Wuhan, with a population of more than 11 million
- The timing:
 - More than 5 million people had travelled from Wuhan because of the upcoming Spring Festival
 - A massive banquet with 40,000 guests took place just before the lockdown
- Initially, many patients were not hospitalised because of a shortage of hospital beds, thereby contributing to seeding in the community
- Wuhan is a major transport hub and centre for industry and commerce, home to the largest train station, biggest airport, and largest deep-water port in central China
- A doubling of international travel from China compared with 2003

Rapidity of spread: transmission

- Peak viral shedding of SARS (2003 outbreak) occurred after patients were already quite ill with respiratory symptoms and could be easily identified
- COVID-19 transmission during the early phase of illness seems to contribute to overall transmission
- The transmissibility might be higher for COVID-19 than for SARS
- More than 10% of individuals are asymptomatic upon diagnosis

[https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(20\)30129-8/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(20)30129-8/fulltext) (14 March 2020)

- Upwards of 50+% of individuals who are exposed to COVID-19 may test positive (e.g. experience from Diamond Princess cruise ship)

Rapidity of spread: internationally

- Wuhan – a few cases identified from November 2019; first fatality confirmed 11 January 2020
- By 24 January at least 10 countries reported cases, including countries in ASEAN, US & Europe (France & Germany)

<https://www.dw.com/en/coronavirus-timeline-of-the-global-spread-of-covid-19/g-52145412> (14 March 2020)

Slowing the spread of COVID-19

- Citizens with higher degrees of anxiety, better knowledge about SARS, and greater risk perceptions than average were more likely to take comprehensive precautionary measures against the infection

[https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(20\)30129-8/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(20)30129-8/fulltext) (14 March 2020)

- General approach to blocking transmission of SARS:
 - Isolation of known cases and contacts
 - Prohibition of large public gatherings
 - Prohibition of travel
 - Restrict all but essential movements of the population
 - Strict enforcement

Different from SARS

- SARS was effectively eradicated by implementing top-down draconian measures to halt human-to-human transmission, including active case detection, isolation, contact tracing and, social distancing, and community quarantine.
- Many more patients with COVID-19 have mild symptoms that contribute to spread because these patients are often missed and not isolated.
- COVID-19 has a higher transmissibility than SARS
- Because of the extent of community spread, traditional public health measures might not be able to halt all human-to-human transmission, and we need to consider moving from containment to mitigation.

How long are individuals infectious

- At peak shedding (~5 days), people with Covid-19 are emitting more than 1,000 times more virus than was emitted during peak shedding of SARS infection
- Based on cell culture, beyond day 10 of symptoms with less than 100,000 viral RNA copies per ml of sputum suggests that there is little residual risk of infectivity
- People who are infected begin to develop antibodies to the virus quickly, typically within six to 12 days; the rapid rise of antibodies may explain why about 80% of people infected with the virus do not develop severe disease

Who is most at risk?

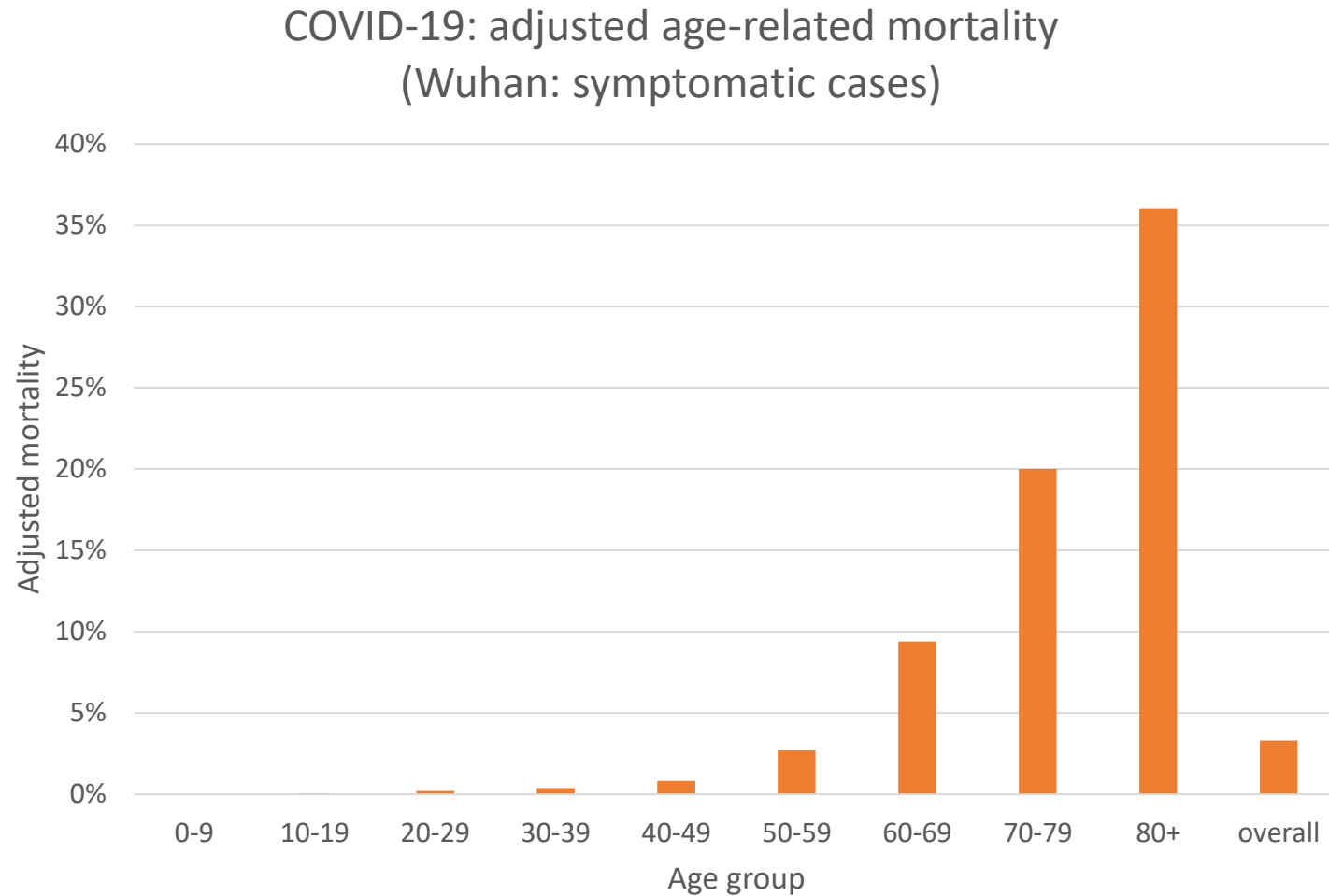
- Older people, and those with underlying medical problems like chronic bronchitis, emphysema, heart failure, or diabetes, are more likely to develop serious illness.

<https://www.health.harvard.edu/diseases-and-conditions/coronavirus-resource-center> (14 March 2020)

- Worse outcomes predicted for individuals with high risk conditions:
 - Hypertension
 - Diabetes
 - Coronary heart disease
 - Chronic obstructive lung disease

[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)30566-3/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30566-3/fulltext) (15 March 2020)

How worried should we be?



How long will the pandemic last?

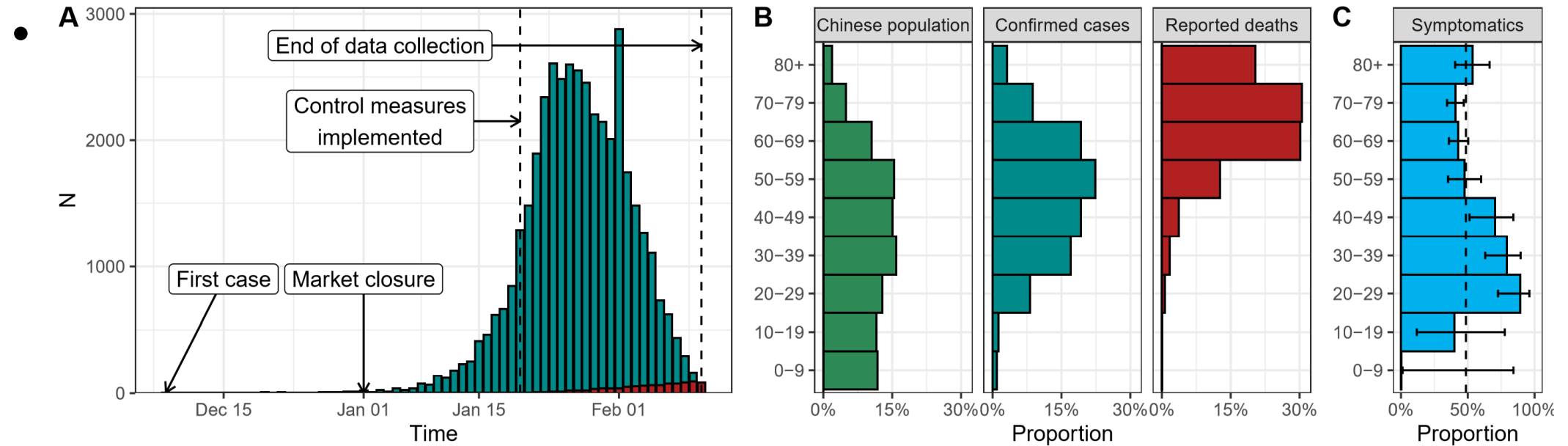


Figure 1: (A) Reported confirmed cases of COVID-19 in Hubei by date of disease onset (blue) and reported deaths (red) from 8 December, 2019 until 11 February, 2020. (B) Age distribution of the Chinese population compared to that of confirmed cases of and deaths due to COVID-19. (C) Proportion of individuals infected by COVID-19 showing symptoms among passengers of the Diamond Princess ship (with 95% credible interval).

If UK is the same...

- First case reported end January; becoming more widespread by mid-March (first cases reported in Worcester on 11 March)
- The pandemic could peak around mid- to late-April
- And could end around May-June

But this is entirely speculative!

How many will catch COVID-19?

- Hubei province (Wuhan):

- Confirmed cases 67,786 (at 13.03.20; few new cases)
- Population 59.17 million
- Incidence 0.11%

<https://www.statista.com/statistics/1090007/china-confirmed-and-suspected-wuhan-coronavirus-cases-region/> (15 March 2020)

- Lombardy region:

- Confirmed cases 8,725 (at 12.03.20; still increasing)
- Population 10.08 million
- Incidence 0.09%

<https://www.statista.com/statistics/1099375/coronavirus-cases-by-region-in-italy/>

<https://en.wikipedia.org/wiki/Lombardy>

(15 March 2020)

Projected number of COVID-19 cases in UK

- Assuming:
 - Based on Hubei province, an incidence of 0.1-0.12%,
 - A population of 66.5 million, and,
 - An even spread of cases, i.e. ignoring issues of population density
- Projected number of confirmed cases in the UK est. 65,000 – 80,000
- Could be many more, especially in densely populated areas and closed communities

Highly speculative – too many unknowns!!!

What's the problem?

- Economic impact, causes:
 - Preventative measures to control spread of disease
 - Public perception of threat
- Impact on social infrastructure
 - Rapidity of spread outruns healthcare facilities

Questions

- Will the development follow the same pattern as China?
- Do preventative measures reduce the total number of cases or only slow the spread of COVID-19?
- Which is more important:
 - Getting through the pandemic quickly?, or,
 - Managing the pandemic so the infrastructure has a better chance of coping?

Option 1: Do nothing

- COVID-19 spreads rapidly throughout the population
- Inadequate healthcare facilities
- Potentially faster economic recovery
- Potential for population to feel abandoned

Option 2: Enforced national quarantine

- Growth of COVID-19 slowed
- Economic recovery delayed
- Healthcare support better able to cope
- Restore public confidence

Option 3: Selective isolation

- Acknowledge COVID-19 will spread irrespective of measures taken
- Recognise the public health impact is significant only for high risk groups, i.e. the elderly and those with some medical conditions
- Restrict isolation measures to those at high risk
- Encourage children and working adults to continue as normal to accelerate closure of the pandemic

- Reduced overall economic impact
- Slower rate of spread amongst high risk groups easing demand on the healthcare system
- ?Attitude of the public?