

# Coronavirus (2019-nCoV) plausible worst-case scenarios for the education system

Disclaimer: this note has been compiled at pace. It reflects a quick review of the existing literature on the impacts and possible responses to a possible pandemic. However, given the nature of 2019-nCoV, and the uncertainties around its virility and severity, evidence based on analysis of previous pandemics may not serve as a useful guide in this case.

Most of the evidence on 2019-nCoV examines epidemiology, there is general evidence on the efficacy of specific school-based responses to pandemics, and evidence on the possible general trends of the diseases. This means assessing the specific impacts on the education system from the existing literature is very challenging.

## Section 1: plausible worst-case scenarios

### WHAT COULD HAPPEN?

The impact of the disease depends on two factors, over which there is considerable uncertainty at this stage:

1. **Transmissibility** – the reproductive rate ( $R_0$ ) of coronavirus is estimated to be between 1.5 and 3.5 – meaning each case will create between 1.5 and 3.5 new cases. This is higher than the common flu (1.3) and SARS (2.0) (<https://www.worldometers.info/coronavirus/>)
2. **Impact** – how severe each infection is. This can be measured by the fatality rate (see below) but other more pertinent factors for the education system might be hospitalisation rates, and the rates of infection for younger people.

The virus seems to be affecting older, more vulnerable people (median age outside China is 45 years), but people of all ages can be infected – WHO myth-busting pages:

- People of all ages can be infected by the new coronavirus (2019-nCoV). Older people, and people with pre-existing medical conditions (such as asthma, diabetes, heart disease) appear to be more vulnerable to becoming severely ill with the virus.
- WHO advises people of all ages to take steps to protect themselves from the virus, for example by following good hand hygiene and good respiratory hygiene.

Impact on school may be more limited because of this. However, there is some evidence that children are contracting a milder virus (<https://www.nytimes.com/2020/02/05/health/coronavirus-children.html>) so number may well rise

**The impact for the UK and the EU/EEA is predicted to be low as at 7 Feb 2020:**

### What is the risk of 2019-nCoV infection for the EU/EEA and UK population?

The risk of 2019-nCoV infection for the EU/EEA and UK population in Europe is currently **low**.

This assessment is based on the following factors:

- Probability of infection for the EU/EEA and UK population is considered **very low**. While there have been imported cases reported from seven EU/EEA countries and from the UK, the overall number of cases reported in the area remains low and containment measures are in place. There are, however, uncertainties regarding transmissibility and under-detection particularly among mild or asymptomatic cases.
- If an infection is acquired, the impact for the infected individuals is considered **high**. For the population, the impact of one or more infections is also considered **high**. Although information on case severity and the effectiveness of control measures remains very limited, data reported as of 7 February accounts for 31 503 confirmed cases, including 638 deaths (2.0%).

## OLDER STUDENTS – FE AND HE

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Behind paywall – a study on preparedness of the University of Washington to a pandemic  
(<https://www.liebertpub.com/doi/pdf/10.1089/bsp.2007.0029>)

Some guidance for universities has already been published: <https://www.universitiesuk.ac.uk/policy-and-analysis/Pages/coronavirus.aspx>

## CHILDREN'S SOCIAL CARE

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- “Well run education & health systems are the best protection against epidemics” (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4517126/>)
- In many cases, parents and pupils may not follow advice given by schools, either in the event of becoming infected themselves, or if schools are closed (source). This underlines the importance of communicating the risks effectively to all.

## PREVENTION MEASURES

### Vaccinations

Developing a vaccine is likely to take at least a year (<https://www.cnn.com/2020/01/28/us-fast-tracks-coronavirus-vaccine-hopes-to-start-trial-in-three-months.html>). We obviously can't wait that long.

- Who to vaccinate is also a difficult question. This study found that very high-resolution data (ie. which we don't have) would be needed to develop immunisation strategies that are any better than random chance: <https://www.pnas.org/content/pnas/107/51/22020.full.pdf>

### Treatment and care for children in schools

Case study of H1N1 outbreak in France: Control measures were implemented as soon as a new case was confirmed in a school, which included active case finding among the pupils in the same class as the index case, setting up a dedicated influenza outpatient clinic that families were recommended to consult if necessary, prophylactic treatment of contacts and school closure

- Rapid response appeared effective: *“In this context, good communication and cooperation among the different people involved (healthcare authorities, the city council, clinicians, staff from schools, parents and children) were of major importance. This epidemic shows the transmission of the pandemic virus in a school setting and in households. The measures established appeared to have stopped the transmission. The absence of transmission in the community at that time in France justified the measures taken.”*

### School closures

BMJ meta analysis: school closures can be effective in controlling influenza, but significant heterogeneity in results, and lack of clarity over the optimal duration and timing of closures – this will also depend on the disease type) see also here.

#### Is School Closure an Effective Strategy to Control Influenza? Summary Version

Making decisions on school closures depends on the availability of a variety of evidence, including the:

...and information about the local population that may heighten risks for adverse effects of closure and influenza severity, such as:

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|---|---|
| • dominant influenza strain   | • demographic make-up (e.g. population under age 5, over age 65)  |
| • strain severity (mild, moderate, severe)  | • inadequate housing (e.g. crowding)  |
| • age-specific attack rates as an indication of which sub-populations are susceptible | • water and sanitation conditions   |
| • transmission rate ( $R_0$ ).  | • prevalence of predisposing health conditions and risk factors (e.g. diabetes, smoking)                        |
|   | • social factors influencing contact patterns (e.g. mass gatherings, multi-generational households, caregiving) |

There is some evidence of effectiveness

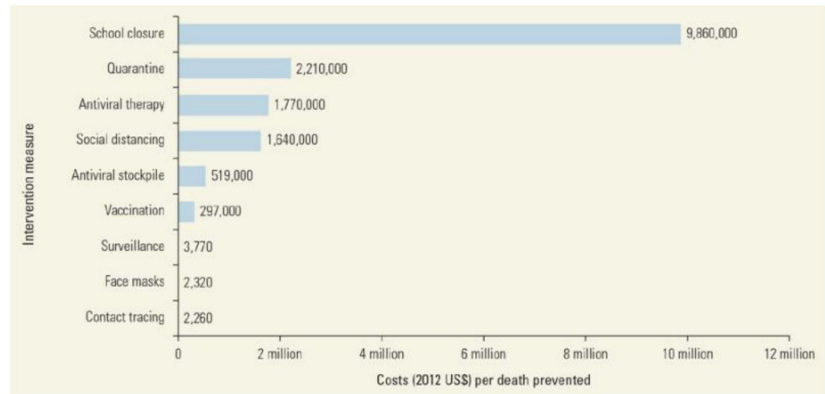
- School closure can considerably slow down influenza epidemics and mitigate their impact on the population De Luca et al (2018), different strategies based on pupil absenteeism can all be effective,

but costly (Fumanelli et al 2016 – based on computer modelling). Influenza spreads more slowly during the holidays (source)

- WHO says that school closures ‘early in the outbreak’ can be effective at slowing the spread (and that the ‘benefit needs to be weighed against the cost’:  
<https://www.who.int/emergencies/diseases/managing-epidemics-interactive.pdf>;  
<https://www.sciencedirect.com/science/article/pii/S1755436518301749>

*But there are significant costs of school closures, and they may only be effective in certain situations*

- Scale of closures matters to control epidemics (eg 2016). School closures may not have a huge impact on hospital bed space – when ICU space is severely limited, only widespread school closures are likely to be beneficial. There is a strong need for local coordination (House et al 2011) but this comes with substantial economic costs. Ineffectual school closures can have significant wider implications for other public services and the economy.
- School closures are expensive ways to prevent deaths (chart based on influenza, so harder to control diseases may have higher costs per death prevented.
  - Measures that decreased person-to-person contact, including social distancing, quarantine, and school closures, had the greatest cost per death prevented, most likely because of the amount of economic disruption caused by those measures. Social distancing includes avoidance of large gatherings and public places where economic activities occur. School closures often lead to lost productivity because they cause workplace absenteeism among caretakers of school-age children. Macroeconomic model simulations also have identified school closures as a potential source of GDP loss during a moderately severe pandemic (Smith and others 2009).
  - But this is contested – for the most severe pandemics, school closures may be the most cost effective way to save lives
  - Also see economic costs below
- During the swine flu outbreak in 2009, the UK decided not to close schools. This decision has been supported/validated by research evidence since then. Instead stockpiled anti-viral medication for almost the entire population, distributed informational leaflets to every household, etc. Not much on what schools, universities & childcare providers did though
- Efficacy is unclear, and economic impacts are significant (esp. If caregivers have to stay home from work): <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0029640>
- School closure will also have a significant impact on more vulnerable groups (eg those who are FSM eligible, as they may not be able to access free meals, and those with unsalaried parents)  
<https://nccid.ca/publications/is-school-closure-an-effective-strategy-to-control-influenza/>



### Alternative to school closures

- Simulation studies in the US suggest that total number of contacts between children within schools can be roughly halved by implementing relatively simple interventions like schedule shifts and internal movement restrictions <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0029640>
- Supported to some extent by other studies, but generally from very limited samples (like one day of data from one school in the US). The studies openly say that public health decisions shouldn't be based on those results alone.