

# Modelling study estimates impact of physical distancing measures on progression of COVID-19 epidemic in Wuhan

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New modelling research, published in *The Lancet Public Health* journal,

suggests that school and workplace closures in Wuhan, China have reduced the number of COVID-19 cases and substantially delayed the epidemic peak—giving the health system the time and opportunity to expand and respond. The study suggests extending school and workplace closures in Wuhan until April, rather than March, would likely delay a second wave of cases until later in the year, relieving pressure on health services.

Using mathematical modelling to simulate the impact of either extending or relaxing current school and workplace closures, researchers estimate that by lifting these control measures in March, a second wave of cases may occur in late August, whereas maintaining these restrictions until April, would likely delay a second peak until October—relieving pressure on the health services in the intervening months.

However, the authors caution that given the large uncertainties around estimates of the reproduction number (how many people an individual with the virus is likely to infect), and how long a person is infected on average, the true impact of relaxing physical distancing measures on the ongoing COVID-19 epidemic cannot be precisely predicted.

"The unprecedented measures the city of Wuhan has put in place to reduce [social contacts](#) in school and the workplace have helped to control the outbreak", says Dr. Kiesha Prem from the London School of Hygiene & Tropical Medicine, UK, who led the research. "However, the city now needs to be really careful to avoid prematurely lifting physical distancing measures, because that could lead to an earlier secondary peak in cases. But if they relax the restrictions gradually, this is likely to both delay and flatten the peak."

In December 2019, a novel coronavirus (SARS-CoV-2) emerged in Wuhan, China. In mid-January 2020, schools and workplace were closed as part of the Lunar New Year holidays. These closures were then

extended to reduce person-to-person contact and prevent the spread of SARS-CoV-2.

In the study, researchers developed a [transmission model](#) to quantify the impact of school and workplace closures using information about how often people of different ages mix with each other in different locations, and to assess their effects on bringing the outbreak under control.

Using the latest data on the spread of COVID-19 in Wuhan and from the rest of China on the number of contacts per day by age group at school and work, they compared the effect of three scenarios: no interventions and no holidays (a hypothetical scenario); no physical distancing measures but school winter school break and Lunar New Year holidays as normal; and intense control measures with school closed and only about 10% of the workforce—eg, health-care personnel, police, and other essential government staff—working during the control measures (as started in Wuhan in mid-January). They also modelled the impact of lifting control measures in a staggered way, and during different stages of the outbreak (in March and April).

The analyses suggest that the normal school winter break and Lunar New Year holidays would have had little impact on the progression of the outbreak had schools and workplaces opened as usual. However, putting extreme measures in place to reduce contacts at school and workplaces, could reduce case numbers and the size of the epidemic peak, whilst also delaying the peak. The effects of these distancing measures seem to vary by age, with the greatest reductions in new cases among school children and the elderly, and lowest among working-aged adults. However, once these interventions are relaxed, case numbers are expected to rise.

Further analysis suggests that physical distancing measures are likely to be most effective if the staggered return to work commences at the beginning of April—potentially reducing the median number of new

infections by 24% up to the end of 2020, and delaying a second peak until October.

"Our results won't look exactly the same in another country, because the population structure and the way people mix will be different. But we think one thing probably applies everywhere: physical distancing measures are very useful, and we need to carefully adjust their lifting to avoid subsequent waves of infection when workers and [school](#) children return to their normal routine. If those waves come too quickly, that could overwhelm health systems", says co-author Dr. Yang Liu from London School of Hygiene & Tropical Medicine.

Despite these important findings, the study has some limitations, including that it assumed no difference in susceptibility between children, and that the extreme distancing measures used in Wuhan may have increased the transmission within households. Finally, the model did not capture individual-level differences in contact rates, which could be important in super-spreading events, particularly early on in an epidemic.

Writing in a linked Comment, Dr. Tim Colbourn from University College London, UK (who was not involved in the study) says: "The study by Kiesha Prem and colleagues in *The Lancet Public Health* is crucial for policy makers everywhere, as it indicates the effects of extending or relaxing physical distancing [control measures](#) on the [coronavirus](#) disease 2019 (COVID-19) outbreak in Wuhan, China."

He continues: "Given many countries with mounting epidemics now potentially face the first phase of lockdown, safe ways out of the situation must be identified... New COVID-19 country-specific models should incorporate testing, contract tracing, and localised quarantine of suspected cases as the main alternative intervention strategy to distancing lockdown measures, either at the start of the epidemic, if it is very small,

or after the relaxation of lockdown conditions, if lockdown had to be imposed, to prevent health-care system overload in an already mounting epidemic."

**More information:** Kiesha Prem et al, The effect of control strategies to reduce social mixing on outcomes of the COVID-19 epidemic in Wuhan, China: a modelling study, *The Lancet Public Health* (2020).  
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