

*Editorial*

## Health in people

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### EDITORIAL

In recent weeks, several new strains of SARS-CoV-2, the causative agent of COVID-19, have emerged. These variants have evolved an increased transmission rate compared to the original strains, which makes controlling this virus even more challenging. What has happened, and how do we best respond now? One strain-UK lineage (variant of concern 202012/1) in particular is currently sweeping the UK. A recent report has suggested that this strain has a significantly higher potential rate of transmission ( $R_0$ ) compared to previous variants. Genomic analysis of the strain found substantial novel sequence variation caused by mutations, which may provide a biological reason for the observed increase in transmissibility. Initial assessments suggest the novel variants show an improved interaction with host cell receptors, such as ACE2 on epithelial cells. This enables the virus to better establish and propagate infections, resulting in higher levels of virus in the host and increased rate of transmission [1].

A recent analysis of the transmission characteristics of the variant stratified by age suggests that its higher  $R_0$  may be largely attributable to an increase in transmission to and among school-age children, whilst infection rates for older people appear to be less affected. The successful emergence of such variants is most rapid with a higher  $R_0$ . Such so-called “selective sweeps” are common in pathogen evolution. According to the Red Queen hypothesis, each increment in the fitness of the pathogen results in an equivalent reduction in fitness of the host. If the  $R_0$  of the most virulent variant can be many lives in the years to come [2].

Thus, a policy of minimizing the  $R_0$  by closing schools will help to contain the establishment of highly virulent strains. Employing vaccines is a more long-term strategy, but it will take several months to become an effective control measure [3]. Governments are negotiating a precarious balance between saving the economy and preventing COVID-19 fatalities. However, the roll-out of economic stimulus packages and related activities in many countries appears to have fuelled the rate of person-to-person transmission. This created two distinct problems. Firstly, at the start of the winter, the population number of the virus continued from a much higher base than would otherwise have been the case. With an exponentially growing rate of the infection ( $R_0 > 1$ ), the time it takes to increase the number of infected hosts from  $N$  to  $2N$  people is the same, irrespective of  $N$  [4]. In other words, if we had halved the number of infections, we would have had (approximately) half the number of cases now. Secondly, the probability that the pathogen evolves, and that the next infection is caused by the mutant strain of the virus, is equal to the mutation rate for each transmission ( $\mu$ ). By not absolutely minimizing the  $R_0$  when we had the chance, we extended the pathogen transmission chains, allowing it to mutate and evolve into more virulent variants. Put Humanity is faced with a new reality prospects [5]. We must stop the evolution and spread of more virulent virus strains now. We, therefore, support public health policies with strict control measures in order to protect our public health system, our individual wellbeing, and our future.

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