

Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active. guide the rational design of host-directed therapies that reduce the incidence of superspreading for those virus classes. As these drugs act on host pathways, they can be evaluated beforehand for safety and then tested for efficacy in the early stages of a novel outbreak. Furthermore, many factors relevant to individual infectiousness, including how case characteristics affect the viability of the shed virus and the distributions of expelled respiratory particles, remain unclear. How behaviour, environment, host, and virus interplay to affect transmission modes or infection risk is also unclear. As seen over the past year,^{6,11} cross-disciplinary interaction among researchers is needed to best understand these myriad matters.

Research into this nascent topic uncovers epidemiologically relevant biological insight and might provide key considerations for public health. When kis small, few cases transmit but are more likely to be superspreaders, meaning epidemics are infrequent but explosive. Overdispersion increases the likelihood of disease extinction when case numbers are low, and control measures targeting high-risk settings or individuals disproportionally curb transmission.^{1,15} These measures can be particularly effective when implemented early in an overdispersed outbreak, as reflected in areas that have eliminated COVID-19, but have diminished effects on outbreaks with more uniform transmission. Currently, however, there is no way to predict the transmission patterns of novel viruses. Contacttracing studies empirically characterise k_{2}^{2-4} meaning considerable spread must have already occurred before its estimation. Broadly understanding the factors that mediate overdispersion, from virological to clinical and environmental, might provide early, predictive correlates for transmission patterns—including superspreading before widespread infection by novel viruses. In this case, a playbook of control strategies, each specified by transmission patterns, can be developed to then specifically address outbreaks.

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(Intersection) (Inter ethnic people in the UK

Published Online August 9, 2021 https://doi.org/10.1016/ S1473-3099(21)00404-7 According to data collected by Public Health England, in the UK, minority ethnic groups were between two and four times more likely to die due to COVID-19

compared with those from a White ethnic background.¹ These outcomes are independent of age, sex, or socioeconomic factors. Moreover, at the start of the national vaccine rollout, routinely collected clinical data in England showed that Black people older than 80 years were only half as likely as White people to have been vaccinated against COVID-19.² A UK-wide survey of 12 035 participants investigating attitudes towards COVID-19 vaccination showed that Black and Black British respondents had the highest rate of vaccine hesitancy (71·8%), followed by Pakistani and Bangladeshi respondents (42·3%), compared with White British or Irish respondents (15·2%) who were not likely or very unlikely to take a vaccine.³

Since the start of the COVID-19 vaccine programme, we, as health researchers, have sought to engage with over 200 community organisations that provide religious or social support for minority ethnic groups to offer information about available vaccines, answer questions, and encourage dialogue. We met with groups on online meeting platforms during the third national lockdown to answer questions and discuss concerns. The reasons for vaccine hesitancy are complex, multifactorial, and vary according to age, sex, and ethnic group. However, two broad themes were apparent.

The first theme relates to historical marginalisation, and this gap appears to have widened during the pandemic. Distrust of government and public health bodies has arisen due to ongoing discrimination (cited earlier this year by the independent National Health Service Race Observatory Board), previous unethical research (eq, in US Tuskegee syphilis study), and fears that groups are being misled about vaccines.4-6 All have contributed to current hesitancy among minority groups in receiving a COVID-19 vaccine. We found organisations supporting asylum seekers and migrants raise concerns regarding deportation through registering for a vaccine. These communities, in addition to minority ethnic groups who live in the most socioeconomically deprived urban areas, also highlighted concerns about access barriers in receiving a vaccine.

The second theme identified a range of similar concerns across minority ethnic groups relating to safety and potential long-term effects on health, in which these groups felt that there was no clear guidance and advice. The speed of COVID-19 vaccine development and underrepresentation of minority ethnic groups in clinical trials exacerbated underlying hesitancy. In particular, older individuals discussed concerns regarding developing a

rare blood clot after receiving the Oxford-AstraZeneca vaccine.7 Younger women frequently stated concerns about infertility after receiving a COVID-19 vaccine. Misinformation, through social media channels accessed by different minority groups, have amplified these anxieties and reduced confidence in COVID-19 vaccines. Furthermore, messaging from central government (through television, social media, or written media) to address vaccine safety concerns had not reached various communities we had engaged with. This was due to several reasons, including communication only being delivered in English and by politicians or policymakers who did not appear relatable. Celebrity adverts promoting COVID-19 vaccination also provided only one-way communication and did not enable a dialogue to occur with individuals and groups whose concerns had not been addressed.

WHO noted a substantial increase in misinformation during the pandemic, which has been challenging and onerous to monitor.8 It is, therefore, essential for information to be provided in different languages and is widely promoted through community champions. Local health-care providers and national policymakers should be encouraged to engage in a direct and two-way dialogue with communities to address specific concerns and ensure individuals have sufficient information to make evidence-based decisions regarding COVID-19 vaccines. Forging conversations with minority ethnic communities, with non-stigmatising language and focusing on listening to anxieties, would improve vaccine uptake and could also engender trust in governmental institutions. Practical solutions to make vaccination more convenient, including popup vaccine clinics in community centres, places of worship, and door-to-door administration, should also improve uptake. In the long term, quantitative and qualitative data will be required to monitor the uptake of vaccinations across all communities and understand the reasons for any decline.

The pandemic has disproportionality affected minority ethnic communities, causing some of the highest rates of hospitalisation and death. Developing and rolling out COVID-19 vaccines has been one of the biggest public health achievements in the current century. The success of the COVID-19 vaccine programme relies on ensuring all members of society can access and have confidence in receiving a vaccine. However, the increase of the SARS-CoV-2 B.1.617.2 variant among non-vaccinated people means that ongoing surveillance in minority ethnic populations makes effective engagement an urgent issue.⁹ This will also mitigate further worsening of disparities caused by the pandemic in minority ethnic groups.

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