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## Rapid COVID-19 vaccine rollout: immense success but challenges ahead



In *The Lancet Infectious Diseases*, Eric Haas and colleagues<sup>1</sup> estimated the benefits of the rapid mass roll-out of the Pfizer-BioNTech vaccine in Israel between Dec 20, 2020, and April 10, 2021. They found substantial benefits of the vaccine in terms of preventing thousands of deaths, hospitalisations, and new SARS-CoV-2 infections in individuals aged 16 years and older.<sup>1</sup> Thanks to the successful vaccination programme, non-pharmaceutical restrictions were gradually lifted in Israel in February–March, 2021,<sup>1,2</sup> and the national economy is reported to have recovered in April–June 2021, with an estimated economic growth of more than 5.5% forecasted for 2021.<sup>3</sup>

The mass COVID-19 vaccination roll-out in Israel has been followed with great interest internationally because it was the fastest roll-out globally, and achieved high levels of vaccine uptake within a few months.<sup>1</sup> The vaccination programme was introduced at the beginning of a new outbreak wave in Israel in December, 2020, when the alpha (B.1.1.7) variant was predominant.<sup>1,2</sup> The authors report that nearly 74% of individuals aged 16 years or older in Israel had received two vaccine doses by April 10, 2021,<sup>1</sup> increasing to 81% by June 1, 2021.<sup>2</sup> Despite a new outbreak wave caused by the delta (B.1.617.2) variant in Israel, with case numbers in August, 2021, being at similar levels to those in October, 2020, and January, 2021,<sup>4</sup> the number of new cases are not translating into similar numbers of deaths.<sup>4</sup> This situation underlines the continued importance of individuals being fully vaccinated despite emerging variants, which is also supported by the experience of other countries with high uptake of COVID-19 vaccines, like the UK.<sup>4</sup>

Haas and colleagues found that, when they looked at the direct benefits of vaccination, COVID-19 vaccines were far more effective at preventing deaths than mild infections.<sup>1</sup> Other countries have also seen substantial decreases in mortality after the introduction of COVID-19 vaccination programmes, which have shifted the disease burden from mortality to morbidity.<sup>5</sup> Combined with the growing concern about COVID-19 cases with persistent symptoms (often called long COVID), this shift in the disease burden highlights the

need to better understand non-fatal COVID-19 and its effects on health-related quality of life. Notably, Israel started vaccinating individuals aged 12–15 years in June, 2021,<sup>2</sup> who are at lower risk of COVID-19-related mortality than older individuals.

The study excluded individuals with previous laboratory-confirmed SARS-CoV-2 infection.<sup>1</sup> By Jan 1, 2021, more than 400 000 individuals were reported to have recovered from COVID-19 in Israel.<sup>2</sup> Hence, the direct benefits of the vaccination programme are a conservative estimate because previous infection does not guarantee perfect protection, and one dose of the Pfizer-BioNTech vaccine after a previous SARS-CoV-2 infection leads to similar antibody levels as two vaccine doses.<sup>6</sup>

Additionally, the effect of COVID-19 vaccination extends beyond the direct benefits of the vaccination programme, with reductions in COVID-19 cases being reported in all age groups and among unvaccinated individuals in Israel.<sup>2</sup> Haas and colleagues acknowledge that the indirect effects and the long-term benefits of vaccination were outside the scope of the analysis.<sup>1</sup> Additional indirect benefits that have been reported elsewhere include the alleviated effect of COVID-19 on the mental health of health-care workers and the general public,<sup>7,8</sup> the recovery of the national economy,<sup>3</sup> and freeing up vital resources like hospital beds and staff for other patients without COVID-19.

Challenges remain and new challenges will undoubtedly continue to arise. For instance, more variants are likely to emerge that increase the potential for breakthrough infections in vaccinated individuals, which will force manufacturers to adapt the vaccines. Similarly, in light of newly emerging variants, the duration of vaccine-induced protection against both symptomatic disease and asymptomatic infection is unclear, raising questions of the need for (and appropriateness of) regular booster doses (which started to be offered in Israel in August, 2021).<sup>9</sup> Many countries also use different COVID-19 vaccine dosing intervals from the officially licensed interval used in Israel, and combine different vaccine products in the national vaccination programmes, including in heterologous vaccination schedules. From a global



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perspective, other issues outside the scope of this Article<sup>1</sup> are vaccine equity, access, and affordability.<sup>10</sup> Despite the challenges ahead, Haas and colleagues' research documents the immense success that rapid COVID-19 vaccine roll-out had in terms of reducing COVID-19-related morbidity and mortality at the population level.

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\**Frank G Sandmann, Mark Jit*  
**frank.sandmann@phe.gov.uk**

Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, UK (FGS, MJ); Statistics, Modelling and Economics Department, National Infection Service, Public Health England, London, NW9 5EQ, UK (FGS); School of Public Health, University of Hong Kong, Hong Kong Special Administrative Region, China (MJ)

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