# Undervaccination and severe COVID-19 outcomes: The entire UK population as a cohort study

HDRUK COALESCE Consortium

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## Introduction

COVID-19 vaccines have been proven to be effective against severe COVID-19 outcomes (hospitalisation or death). In the UK, initial vaccine uptake was high, especially for the first dose. However, by Summer 2022, a substantial portion of the population had received fewer than the recommended number of doses.

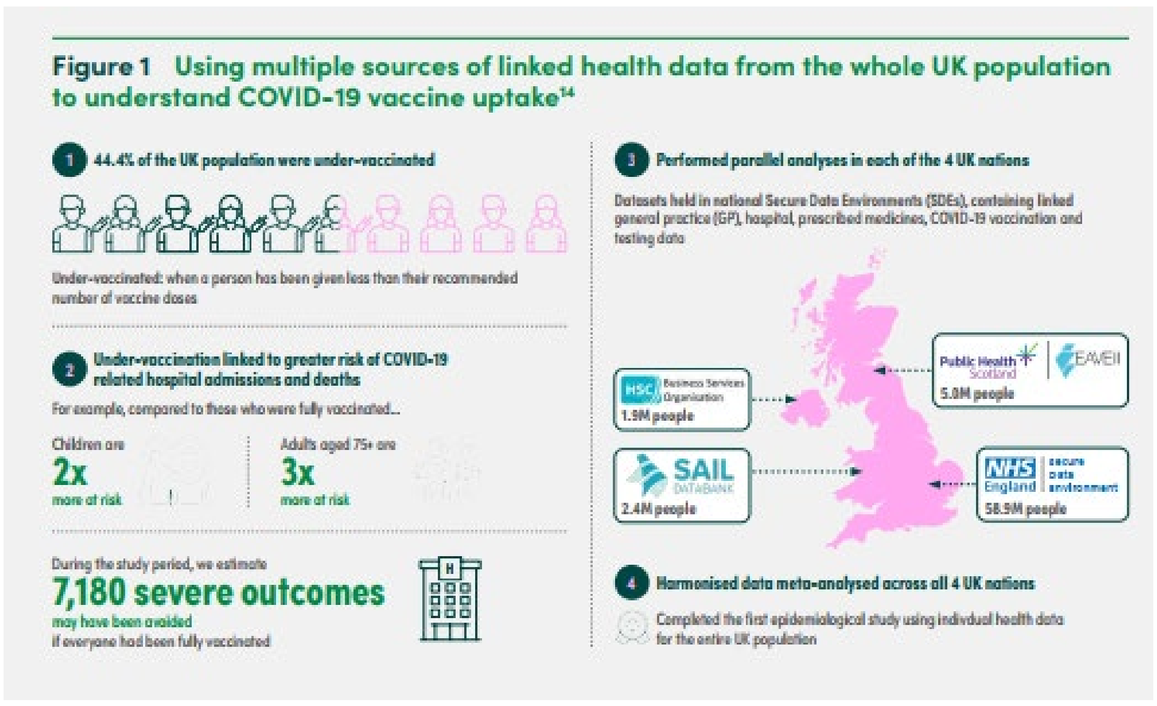
At the same time there are major efforts underway to unify the UK's extraordinary health data, making it accessible for researchers to carry out studies to benefit public health. In this study, we used electronic health records (EHRs) for the entire UK population to understand the characteristics of people who were undervaccinated, evaluate the risk of severe outcomes in undervaccinated people, and demonstrate the value of national level health data.

**If you live in the UK, you participated in this study. Your data helped generate insights that directly informed policy-making**

| Nation | % Undervaccinated June 1, 2022 |
|---|---|
| England | 45.8% |
| Northern Ireland | 49.8% |
| Scotland | 34.2% |
| Wales | 32.8% |
| **UK Overall** | **44.4%** |

Over the four-month study period, there were over **40,000** severe COVID-19 outcomes, with more than a third occurring in individuals who were undervaccinated. Based on our analysis, **if everyone had been fully vaccinated by June 1, an estimated 7,180 severe outcomes could have been prevented** — most of these among adults aged 75 and over.

| Age Group (years) | Estimated events prevented by full vaccination |
|---|---|
| 5–15 | 210 |
| 16–74 | 1,544 |
| 75+ | 5,426 |
| **Total** | **7,180** |




## Methods

We used anonymised health records from nearly every person in the UK aged 5 and over — more than 68 million people. These records included information on vaccinations, GP visits, hospital stays, COVID-19 test results, and deaths, held in secure environments in each country.

We analysed each nation's data separately using the same methods, and then combined the results in a UK-wide meta-analysis.

We looked at how many people had received the recommended number of vaccine doses for their age group as of June 1, 2022. We then tracked these individuals over four months to estimate the rate of severe COVID-19 events, and its relationship with undervaccination.

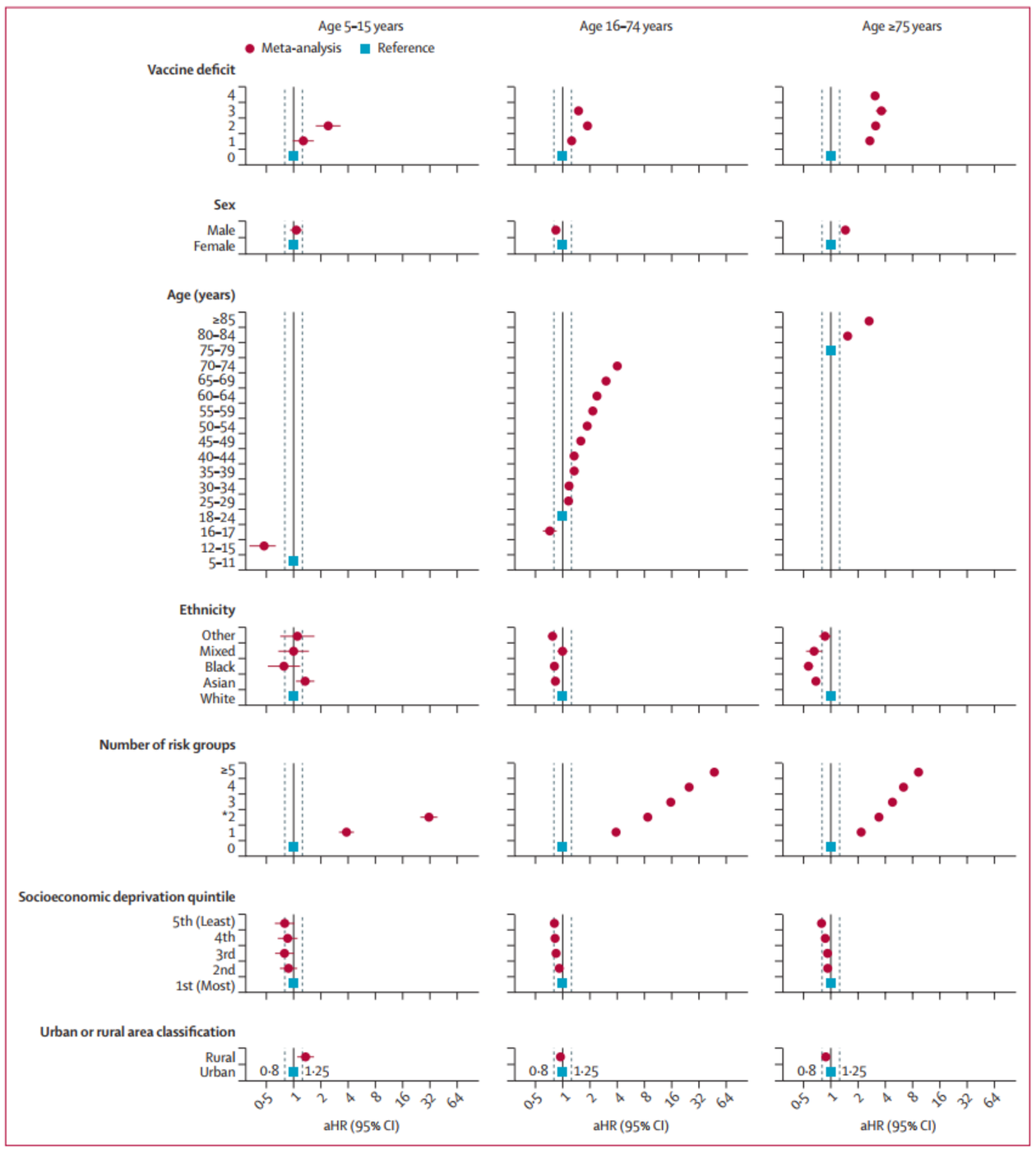
To make sure our results were robust, we took into account factors such as age, sex, ethnicity, existing health conditions, socioeconomic deprivation, and whether someone lived in a rural or urban area.

## Results

As of June 1, 2022, nearly **44% of the UK population** had received fewer COVID-19 vaccine doses than recommended for their age.

Undervaccination was especially common in **younger age groups**, **people living in more deprived areas**, and **those from minority ethnic backgrounds**.

**Rate ratios for severe COVID-19 events. Points to the right of the vertical line indicate increased risk.**




**Funding:** UK Research and Innovation National Core Studies: Data and Connectivity.
**Acknowledgements:** This work uses data provided by patients and collected by the NHS as part of their care and support.