Office for National Statistics

The Public Health Data Asset

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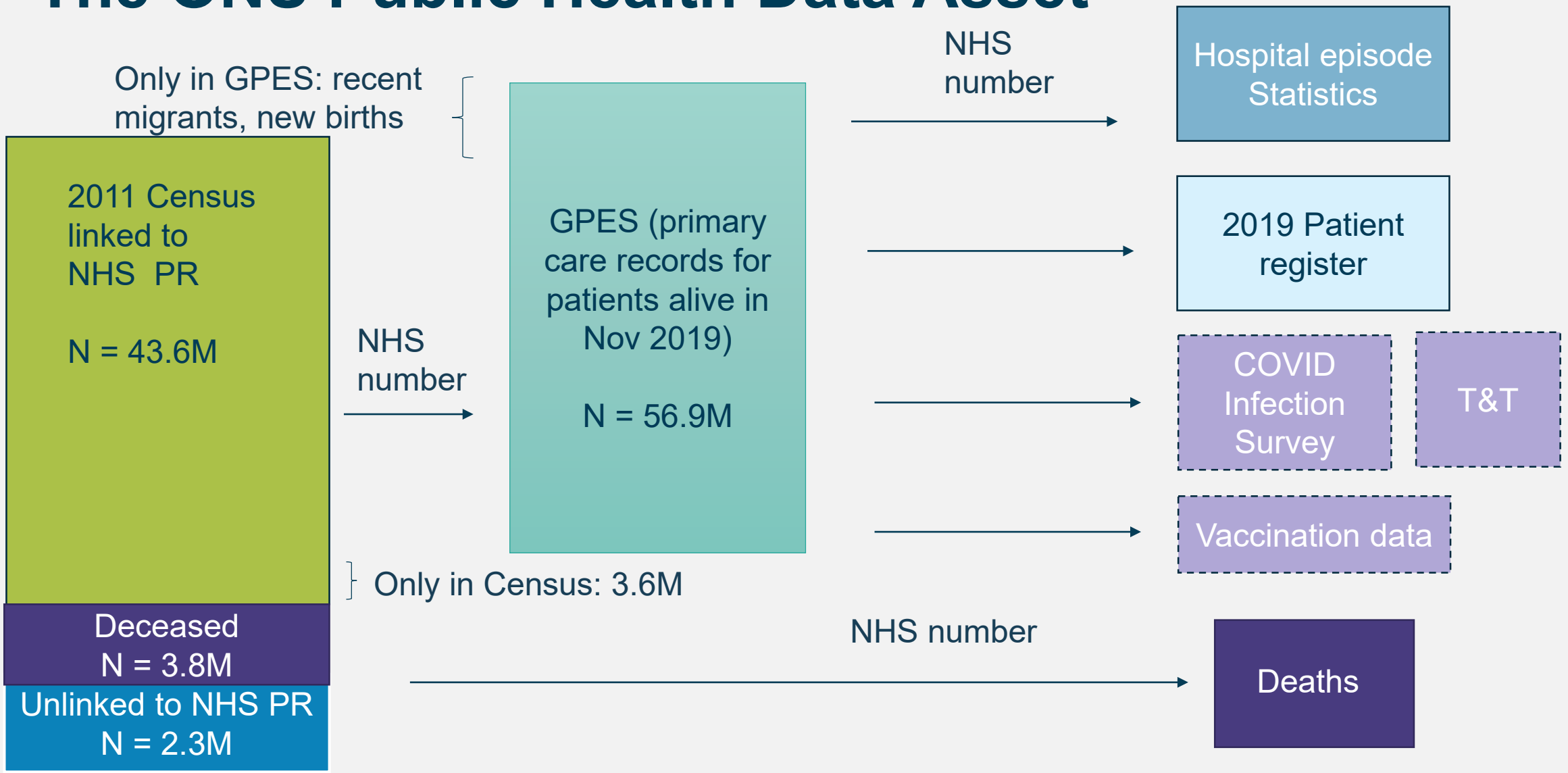
Health Analysis and Life Event

07 July 2021

The Public Health Data Asset

- COVID-19 pandemic increased need for timely evidence
  - Differential impact of COVID19
  - Inequality in vaccine take-up
- Importance of population-level data
- Limitations of existing data sources
  - Electronic health records (EHR)
  - Surveys
- Need to create a new data source, linking Census to EHR

The ONS Public Health Data Asset



Data on 40.0 million people aged 9+, alive on 24th Jan 2020

Demographics:
sex, age, ethnicity, religion

Census

Socio-econ.:
Household deprivation, education, SES, tenure, housing, household composition
Census

Pre-existing conditions
As per QCOVID risk model:
BMI, learning disability, cancer and immunosuppression, chronic kidney disease, diabetes, COPD, other pulmonary diseases, coronary heart disease , stroke , dementia , severe mental illness , etc
GPES/HES

Geographical factors:
Place of residence, Care home/private household, Population density, rural/urban, area deprivation
2019 Patient register

Occupational exposure:
Occupation; O*NET exposure measures
Census

Outcomes:
COVID-19 mortality & hospitalisation
Hospitalisation & diagnosis in primary care

Age	Coverage (% of total pop.)
9+	78.6%
40+	85.3%
65+	89.1%

Access

- ONS PHDA can be accessed via the Secure Research Service

- Data catalogue

Project	Outcomes
COVID-19 mortality by ethnic groups	Release on ONS website Wave 1 publication in International Journal of Epidemiology Wave 2 publication, accepted by European Journal of Epidemiology
COVID-19 mortality by religious affiliation	Latest release on ONS website Wave 1 Publication In the Journal of Epidemiology and Community Health
Ethnicity, Household composition and COVID-19 mortality	Publication in the Journal of the Royal Society of Medicine
Validation of Qcovid prediction model	Publication in the Lancet Digital Health
Post-COVID Syndrome	Release on ONS website Publication in the BMJ
COVID-19 mortality by occupation	Preprint under review at Occupational and Environmental Medicine
Vaccination rates by socio-demographic characteristics	Release on ONS website Preprint under review at BMJ Open

Differences in COVID-19 mortality between ethnic groups

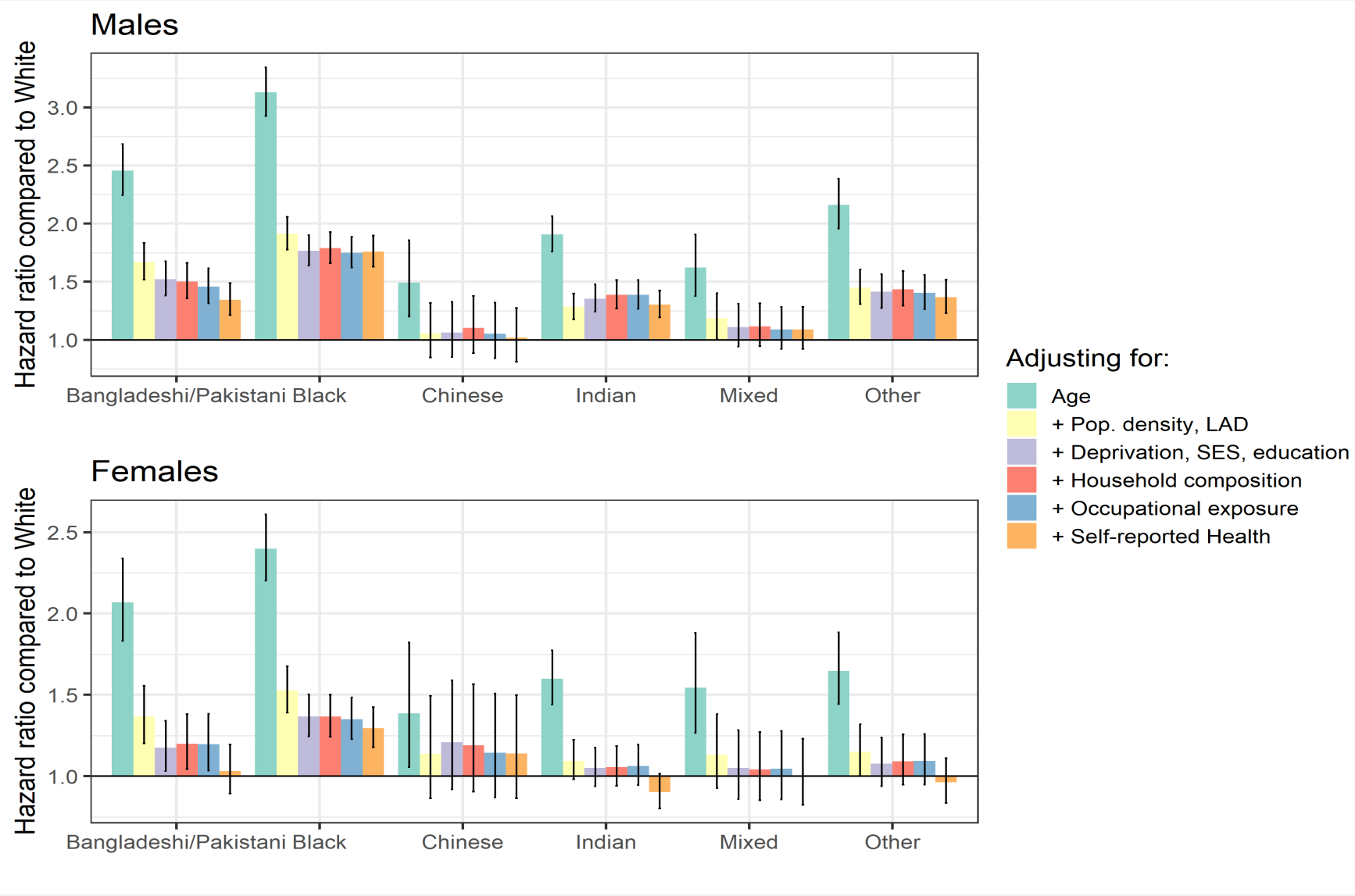
- Early signal of unequal impact of the pandemic

- No way of measuring this using mortality records

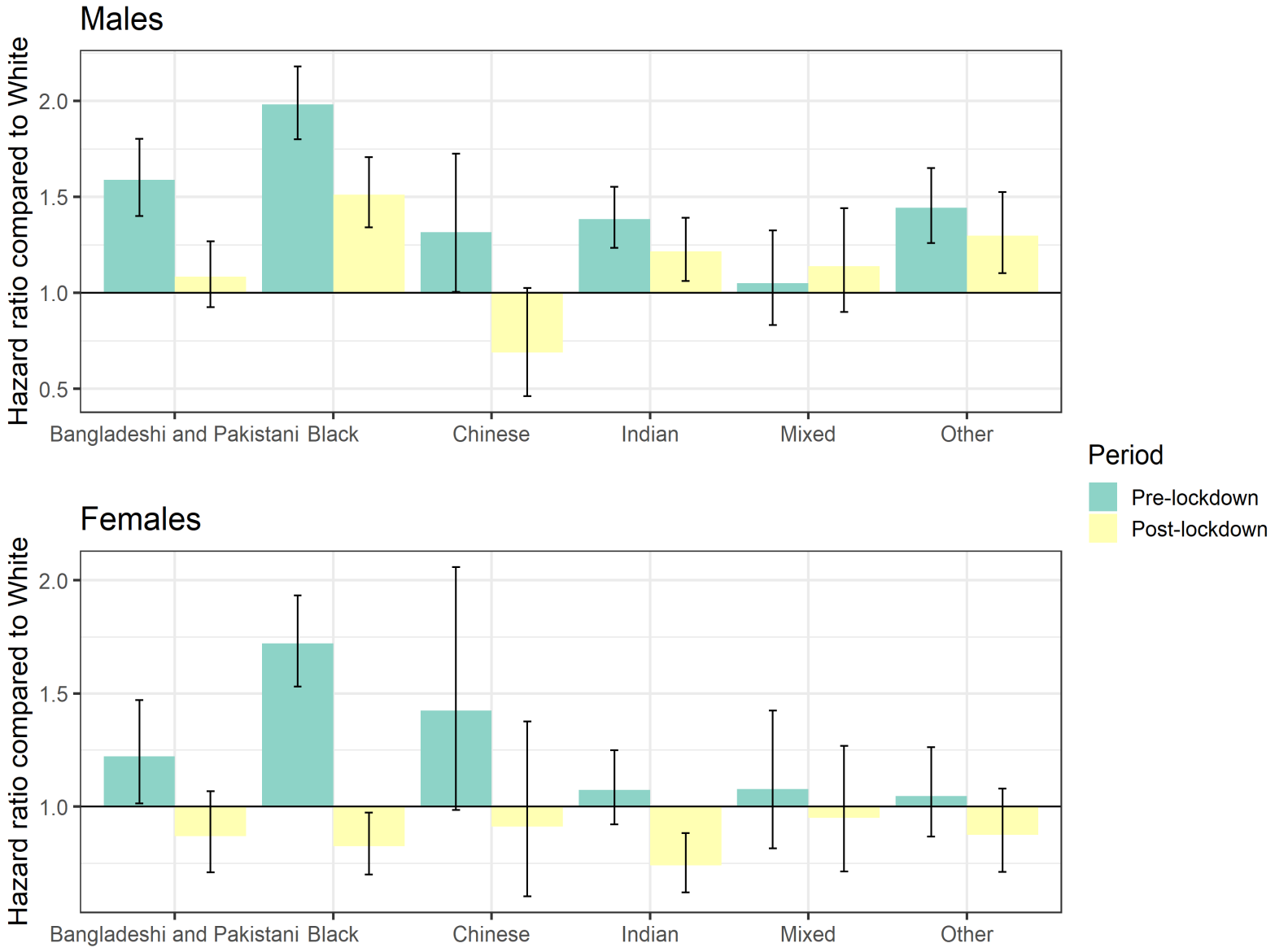
Analysis of linked Census-mortality records

- Estimate differences in COVID-19 mortality between ethnic groups, adjusting for age
- Adjust for geographical and socio-demographic factors that could explain these differences
- Did the lockdown affect the differences in mortality?

Hazard ratios for COVID-19 related death for ethnic minority groups compared to the White population



HRs for COVID-19 related death for ethnic minority groups compared to the White population, before and after lockdown plus 21 days



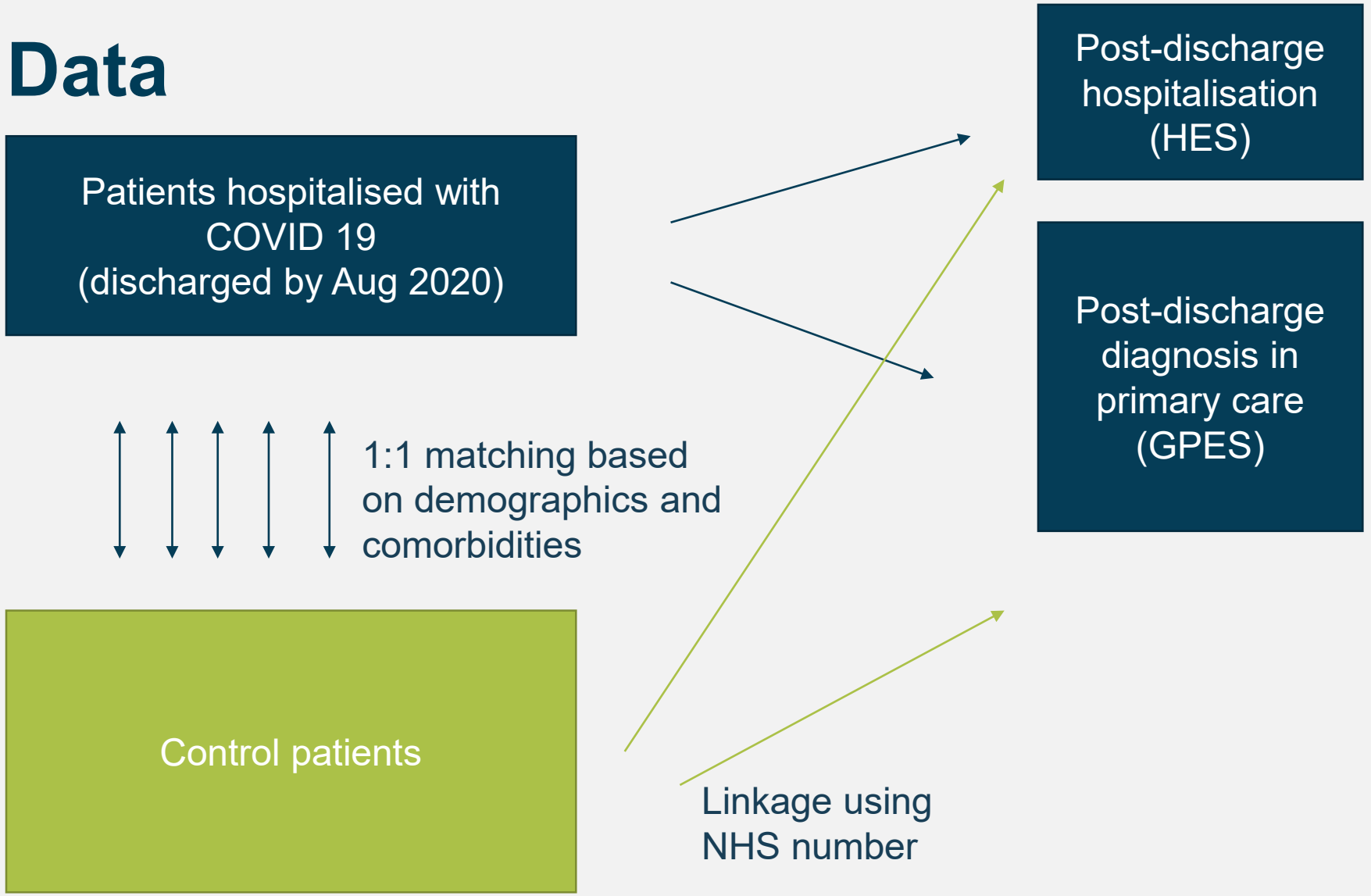
Impact

- Wide media coverage
  - “Coronavirus: Black Britons face ‘twice the risk of death’ say ONS” was the top news story on the BBC website on the day of release
- Policy impact
  - UK Government ordered a review of the disproportionate impact of COVID-19 on Black, Asian and Minority Ethnic (BAME) communities
  - Community-led interventions to reduce inequalities and raise awareness
  - Regular updates and further analyses provided to SAGE ethnicity subgroup
- Scientific/academic impact
  - Published research in peer-reviewed journals
  - Developed collaborations with leading academics
  - Obtained funding for further research from HDR-UK

The epidemiology of post-COVID syndrome

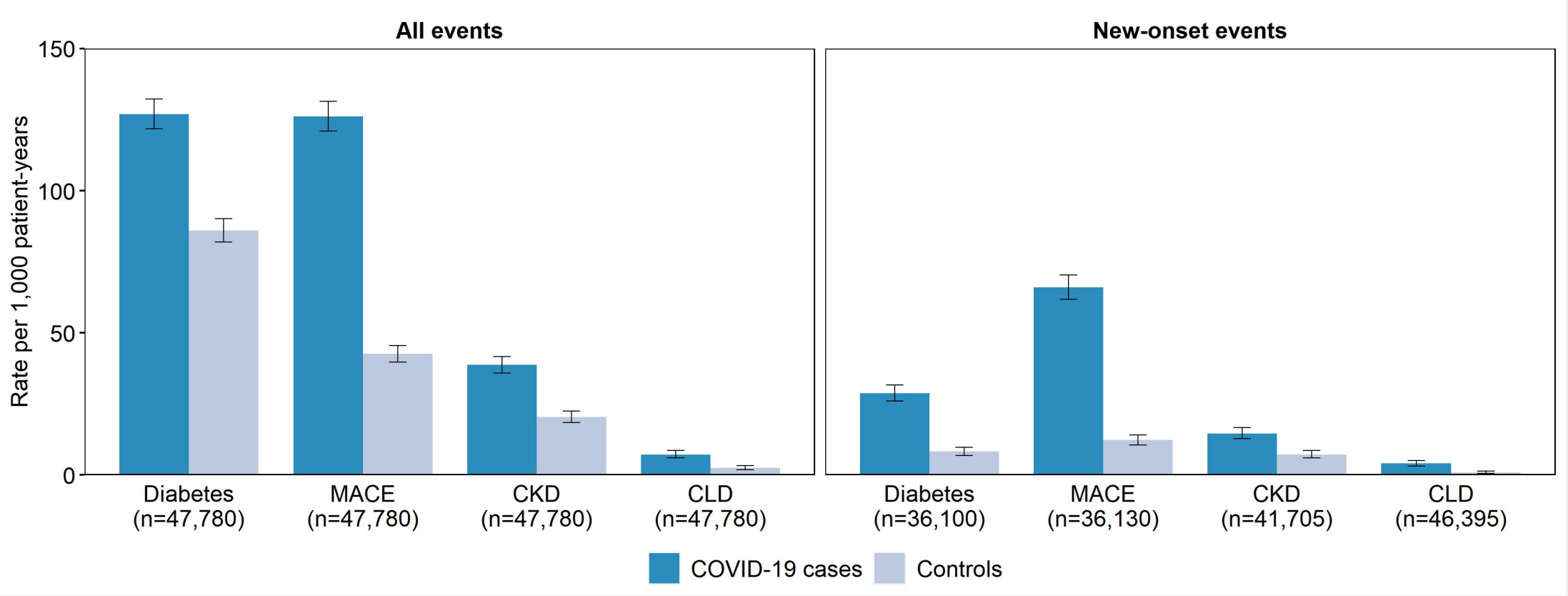
- Post-discharge mortality and readmission are common among individuals in hospital with COVID-19
- What about multi-organ morbidity?
- Estimate the rates of post-discharge diagnoses of respiratory, cardiovascular, metabolic, kidney and liver diseases
- Use matched patients as a control group

Data


Patients hospitalised with COVID 19 (discharged by Aug 2020)
1:1 matching based on demographics and comorbidities
Control patients
Linkage using NHS number
Post-discharge hospitalisation (HES)
Post-discharge diagnosis in primary care (GPES)

COVID-19 hospitalisation is associated with multi-organ impairment following discharge

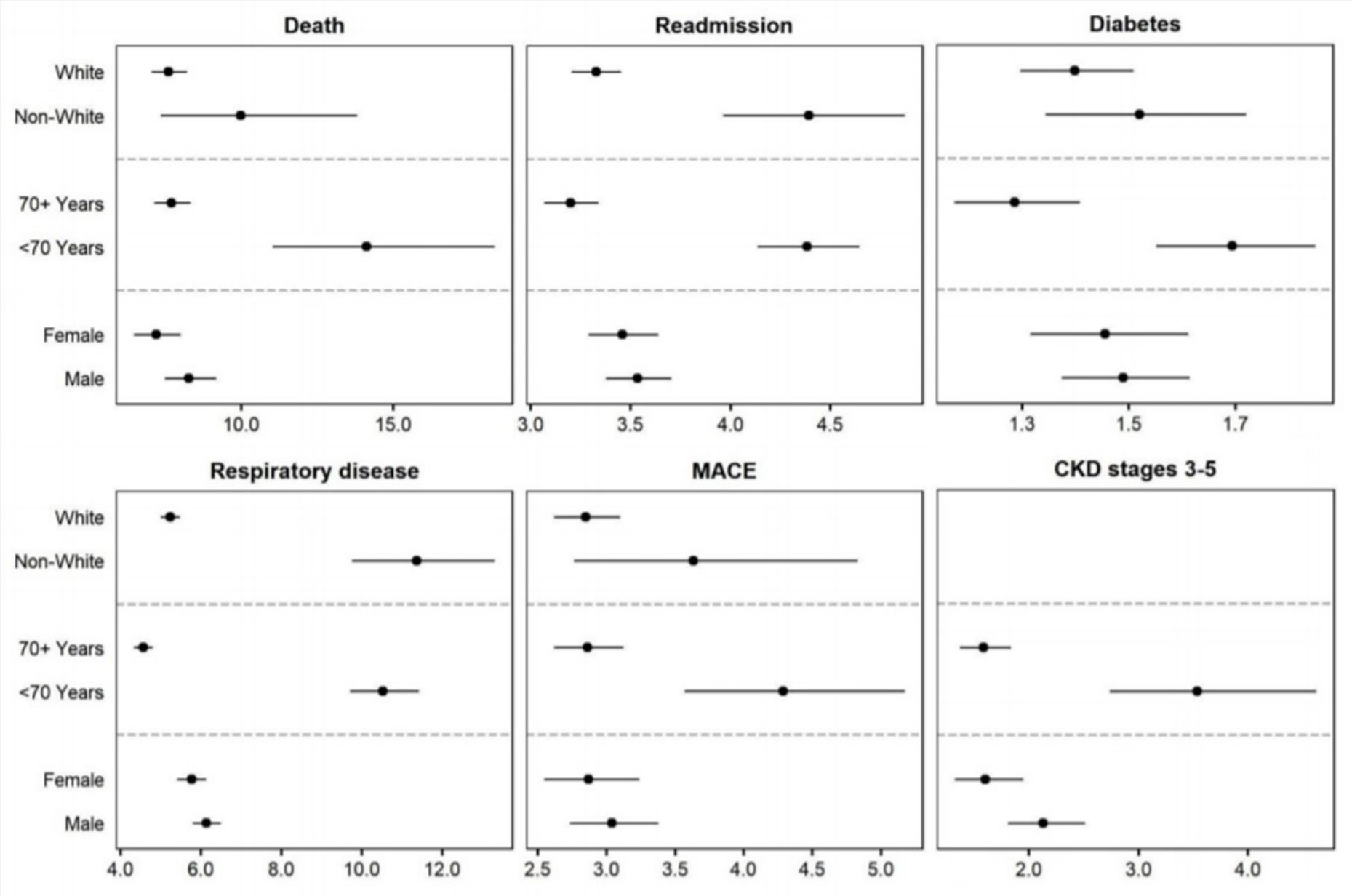
Rates of adverse events in discharged COVID-19 patients in England compared with matched controls



- Sources: HES to Aug 2020, GPES to Sep 2020, death registrations to Sep 2020
- Diabetes includes both type 1 and type 2; MACE: major adverse cardiovascular event (a composite of heart failure, myocardial infarction, stroke and arrhythmia); CKD: chronic kidney disease stages 3-5, including dialysis and kidney transplant; CLD: chronic liver disease
- Matching variables: age, sex, ethnicity, region, IMD quintile, smoking status, pre-existing conditions (hypertension, MACE, respiratory disease, CKD, CLD, diabetes, cancer)

Source: Ayoubkhani et al. 2021. Available at: https://www.bmj.com/content/372/bmj.n693

Relative risk greater in younger people and ethnic minorities



Impact

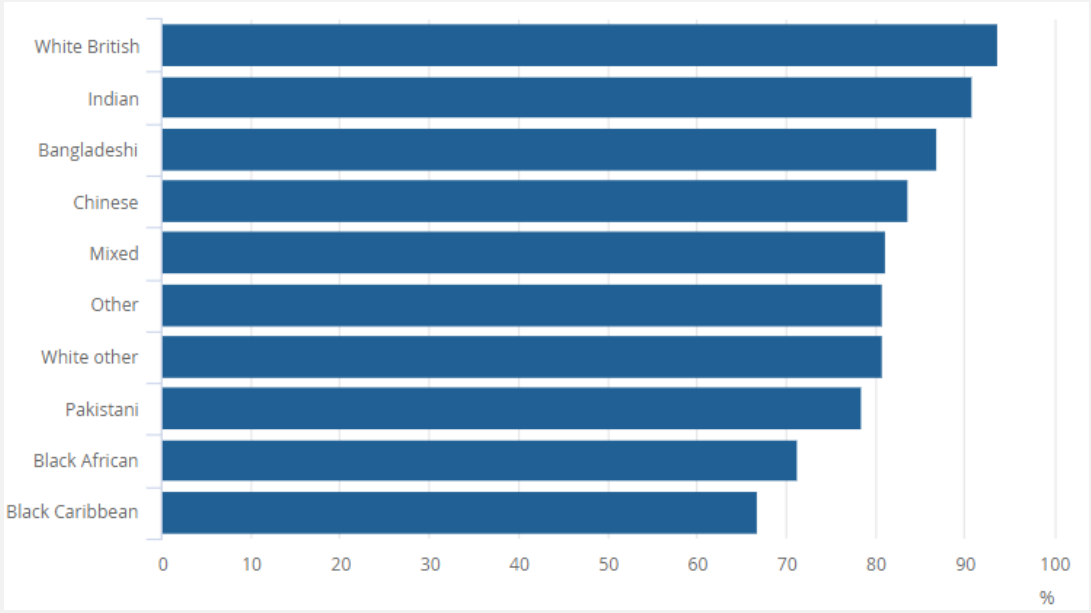
- Published in the BMJ
- Presented findings to 3,000 medical practitioners and health researchers at a BMJ webinar, and to over 25,000 health professionals across 12 different countries at a long COVID training event
- Extensively cited in the NIHR's recent review of international evidence on long COVID prevalence and impact
- Fed into government thinking on the response to the pandemic, by personally discussing the results with Matt Hancock and Chris Whitty, and providing written briefing to the PM

Vaccination coverage by socio-demographic characteristics

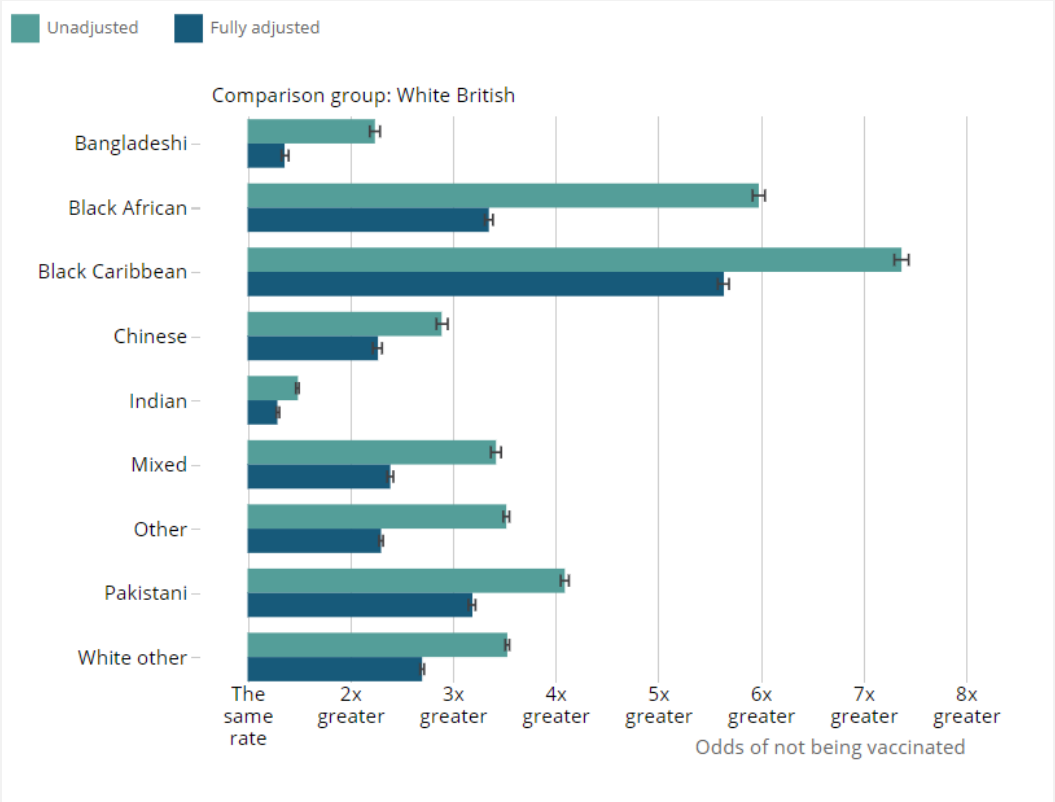
- Linking NIMS to ONS PHDA
- For 50+, linkage rate = 86.1%
- Analysis:
  - Estimate coverage rates by socio-demographic characteristics
  - Adjusted OR of not being vaccinated

Vaccination by self-reported ethnicity in 50+

Vaccination rates of adults aged 50 years or over, by self-reported ethnic group

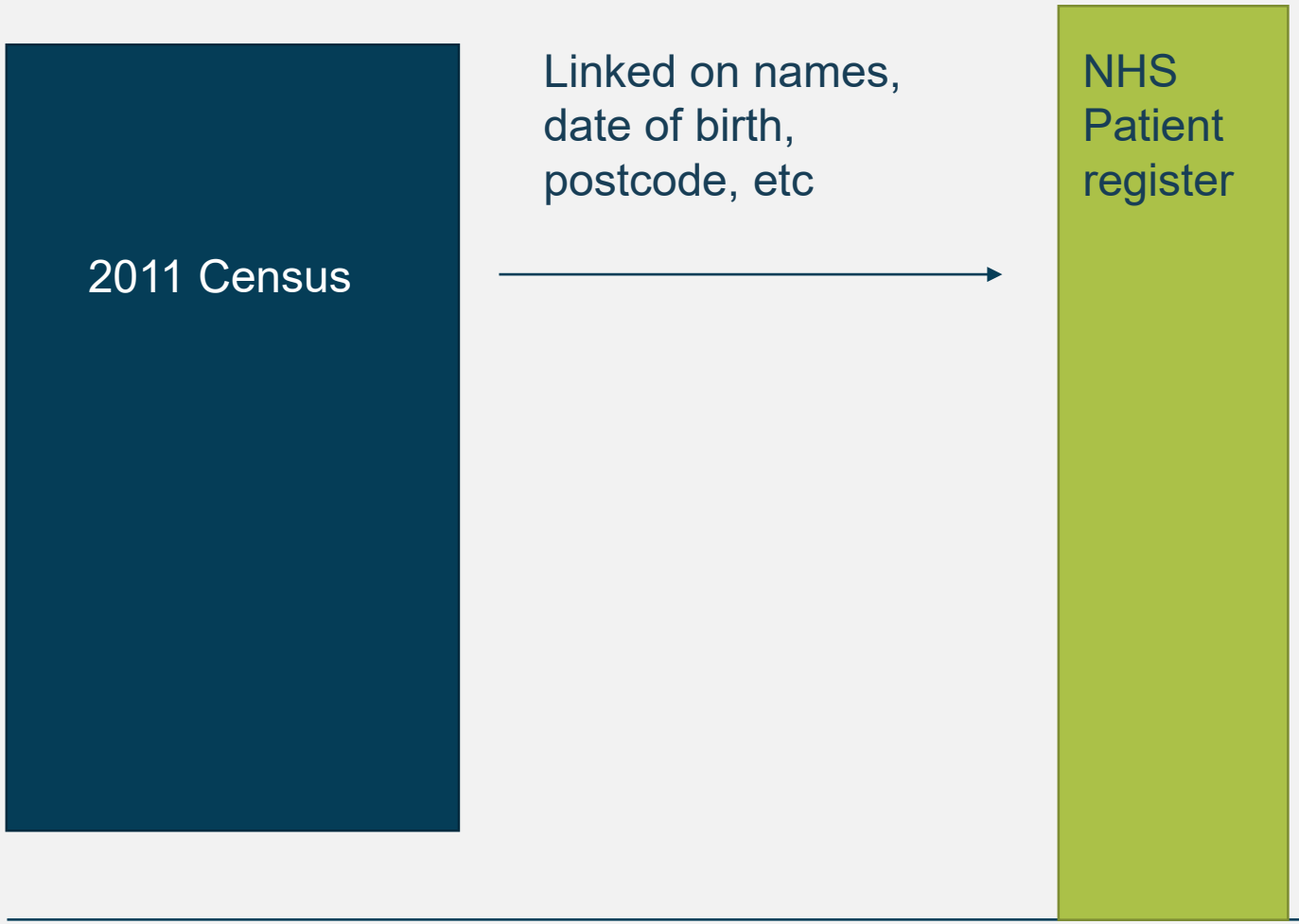


Odds ratios of not having received the first dose of a vaccination for COVID-19, compared to White British



Publication link

Obtaining NHS numbers for Census respondents



Of the 53,483,502 Census records:

- 50,019,451 were linked deterministically.
- 555,291 additional matches were obtained using probabilistic matching.
- **Total linkage rate: 94.6%**