Expert Report for the UK Covid-19 Public Inquiry

Module 4 – Vaccines and Therapeutics

Vaccine Delivery and Disparities in Coverage

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Author statement

We confirm that this is our own work and that the facts stated in the report are within our own knowledge. We understand our duty to provide independent evidence and have complied with that duty. We confirm that we have made clear which facts and matters referred to in this report are within our own knowledge and which are not. Those that are within our own knowledge we confirm to be true. The opinions we have expressed represent our true and complete professional opinions on the matters to which they refer.

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Preamble

Ben Kasstan-Dabush (MSc, PhD) is Assistant Professor in Public Health & Policy at the London School of Hygiene & Tropical Medicine and Lecturer in Global Health Policy at the University of Edinburgh. His research examines vaccine inequity, and issues underlying lower-level coverage among minority communities in the UK and internationally. He has supported public health agencies with outbreak responses and strategies to improve vaccine equity in the UK and US. He serves on the strategic council of the US CDC National Center for Immunization and Respiratory Diseases 'FOCUS' initiative (Fostering Overall Community Understanding and Support). His research has been funded by the Wellcome Trust, National Institute for Health Research, and the British Medical Association Foundation for Medical Research.

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This report, unless otherwise stated, focuses on the period of time between 30th January 2020 (the date upon which the first cases of Covid-19 were confirmed within the UK) and 28th June 2022 (the date on which the Inquiry was set up). The content of this report is accurate to the best of our knowledge, and whenever statements of fact are included, it is based on available scientific evidence and to the best of our knowledge. We have endeavoured to address the letter of instruction in as much detail as possible within the allocated timeframe.

Executive summary

1. The United Kingdom (UK) was the first country in the world to launch a Covid-19 vaccination programme on 8th December 2020. Several elements of the Covid-19 vaccine programme roll-out were underpinned by UK-wide collaboration and alignment, such as procurement processes and cohort prioritisation. The primary goal of the vaccination programme was to prevent mortality among the cohorts at highest risk from SARS-CoV-2 and to maintain resilience of the UK health and social care systems, and secondly to protect those at increased risk of severe illness and maintain public services. The Covid-19 vaccination programme was the largest in British history, and was delivered with flexibility and agility, but implementation strategies varied across the four UK nations. Evaluation of delivery pathways and disparities in coverage indicate strengths and limitations for future learning.

2. The percentage of adults who received two-doses of Covid-19 vaccination across the UK surpassed the planning assumption of 75% coverage and is an indicator of programmatic success. Yet, under vaccination based on uptake of all eligible doses according to age or risk status has been a significant issue across UK nations. Vaccination status (of two doses) differed remarkably by ethnicity, deprivation, and lower-priority age cohorts (e.g. children and adults aged 18-39) across the UK. Disparities (by ethnicity and region) were foreseeable and were consistent with those observed across routine immunisation programmes (such as childhood and influenza). People of Black Caribbean ethnicity in England were least likely to receive two doses of Covid-19 vaccination through to June 2022. Evidence indicates that the proportion of Black Caribbean adults in England who had received two doses increased slowly to 59% by June 2022; this was profoundly low compared to uptake in the White British population by this date (90.3%).

3. Attempts to monitor equity and reduce disparities in coverage were developed, often through multi-sector working groups in each of the four UK nations. Barriers to access varied by population and by area, but enhancing convenience, confidence and communication in delivery pathways was critical to influencing uptake in underserved communities or areas. Mass vaccination sites were less equipped than primary care to provide equitable access, and diverse delivery pathways were a crucial part of programme roll-out. What separates the Covid-19 vaccination programme from routine immunisation programmes was the use of flexible funding models and commissioning frameworks that allowed never-before-seen levels of resources to be rapidly disseminated for tailored communication and outreach delivery strategies. Collaborations between public health teams and community organisations were developed quicker in areas where partnerships were already in place, which helped to build convenience and confidence into delivery pathways for underserved groups. However, issues of trust and misinformation remained for some populations. Evidence indicates that there were insufficient strategies in place ahead of roll-out to prepare those considered less likely to be vaccinated. Minority communities with entrenched feelings of neglect and disenfranchisement in UK society remained unlikely to engage with the Covid-19 vaccination programme. Disabled people had accessibility and communication requirements that were not always met, though delivery pathways were adapted to enhance access at local levels and offer a model for future pandemics.

4. Several lessons can be drawn by comparing delivery strategies across the four nations. Vaccines were delivered through a parallel approach to care home residents and workers in

Scotland, where uptake among care home workers was higher than in England. However, evaluations of roll-out processes were not consistently undertaken across the four nations. This limitation is understandable because the priority for much of the Covid-19 programme was to deliver vaccines as quickly as possible to protect population health. However, the lack of comparable information prevents a thorough understanding of the diverse approaches taken and what lessons can be learnt for the future. There can also be no expectation to build evaluations into delivery programmes without allocation of sufficient resources or skills. A primary concern identified in this report is an inability to evaluate the tailored delivery pathways (including timing of activities) for underserved groups, who were less likely to receive vaccinations without outreach approaches.

5. The extent to which the public health and immunisation system entered the Covid-19 pandemic in a state of preparedness is debatable in the context of workforce constraints and austerity – and particularly in England, following consecutive reductions in the Public Health Grant (which disseminates funding to local authorities). The nation's public health infrastructure was closer to threadbare than prepared at the onset of the pandemic. The Covid-19 vaccine programme was delivered through public health and community partnerships that were more often fostered in real time, rather than benefitting from pre-existing partnerships. Frank questions must be addressed regarding the resources required to maintain a resilient public health and immunisation infrastructure that can respond robustly and rapidly in future pandemic scenarios.

6. Pandemics differ in epidemiological risk, but the Covid-19 vaccination programme offers profound learning for future preparedness. Strengthening the UK immunisation systems can be achieved through a diverse workforce, and assessing which healthcare professionals across the health and social care sector can be trained to recommend or administer vaccinations. Expertise and touchpoints could then be drawn upon in emergency scenarios. We have identified inconsistent approaches to delivering vaccines to care workers and age cohorts across the four nations and learning from approaches in the devolved administrations will benefit future UK-wide pandemic preparedness efforts. There is a need for consensus and backing from relevant medical associations and professional bodies when requiring vaccines as a condition for deployment among health and social care workers. Strategies to sustain optimal vaccination coverage and ensure equitable coverage must remain a priority for the UK immunisation systems, and assessments of the funding that is required to offer, and where possible, sustain tailored delivery pathways are essential.

7. The UK Government invested around £120 million in vaccine development between 2016-21[1] as part of preparedness efforts. However, no proportional commitment was made to strengthen UK immunisation deployment systems to enable rapid implementation of a universal vaccine programme in an emergency scenario and avoid foreseeable disparities in coverage. To meet the ambition of having vaccines available for deployment in the first 100 days of a pandemic, the UK immunisation systems need to be in a state of readiness to be pivoted. Key to this goal is closing gaps in routine programme delivery by addressing barriers to access, engaging proactively with underserved communities, and training healthcare providers across the sector to confidently recommend vaccination and to offer vaccines when feasible. Readiness for deployment is a multi-sector concern.

[1] See UK Covid-19 vaccines delivery plan, published by Department for Health & Social Care (2021a).

8. Pandemic vaccine programmes must be delivered within a responsible approach to managing public health emergencies to instil and maintain high levels of public trust in government recommendations. The flouting of public health rules by government, or those working within institutions governing and managing public health, can work to undermine trust in public health initiatives generally – including vaccination programmes. High standards of leadership are required in pandemics for the public to accept that government recommendations concerning vaccination are in place to protect them.

9. This executive summary is intended to be read in conjunction with the full report.

Topic 1: Overview of vaccine roll-out processes across the UK

Summary of Topic 1

10. This topic offers an overview of the roll-out processes pertaining to delivery of the Covid-19 vaccination programme across the UK. References are made to roll-out processes that were underpinned by 'UK-wide' collaboration and alignment, and those relevant to England and the devolved administrations (DAs) of Northern Ireland, Scotland and Wales.[2]

11. Vaccine roll-out processes form a complex cycle that include (but are not limited to) the following key steps: (i) procurement of suitable vaccines; (ii) assessment of evidence to determine eligibility based on harm/benefit risks and priority cohorts; (iii) monitoring of safety and adverse reactions; (iv) service commissioning and workforce; (v) public engagement to drive demand at universal level and tailored engagement in underserved[3] groups or settings; (vi) implementation strategies to meet demand, which range from invitations, to administration and record-keeping; and (vii) evaluation of programme delivery. Steps (iv)-(vii) are the subject of this report.

12. Development of the UK Covid-19 vaccination programme required integration of multi-disciplinary and multi-sector expertise (see **Table 1**). Stakeholders with immunisation implementation expertise (e.g. NHS England & Public Health England) were not included as core participants in key programme boards tasked with planning roll-out processes until September 2020, but we have not been able to confirm the reasons for this limitation. Future pandemics that require a vaccine response must involve implementation expertise in formative planning stages.

13. Covid-19 vaccine roll-out processes required a delegation of responsibility across national, regional and local levels of public health and health services. Research indicates that programme implementation in England was initially characterised by strong NHS England oversight; this changed gradually when regional and local areas were given more responsibility for vaccine programme delivery. This approach raised implications for local health partners tasked with programme delivery and offers lessons for delegating responsibility in pandemic preparedness. This approach differed from the DAs, such as Wales, where implementation was decentralised.

14. The UK was the first country to launch a Covid-19 vaccination programme on 8th December 2020, when doses were administered across all four nations. Stakeholders (see **Table 1 below**) were tasked with delivering the largest population-wide vaccination programme in the UK's history. Delivery of the UK Covid-19 vaccination programme was characterised by an

[2] The UK parliament legislates on areas of governance that are UK-wide and that are relevant to England. Several areas of legislation including health care are devolved in Northern Ireland, Scotland and Wales.

[3] The term 'underserved' is increasingly used in public health studies to emphasise limitations in service and outreach that prevent vaccines being received by specific populations or areas. Being underserved might not be limited to vaccination services, and may reflect limitations across statutory services. The term 'underserved' diverges from the designation of 'hard to reach groups' which is problematic, for example, by placing an emphasis on populations as if they seek to avoid healthcare services. The term 'underserved' reflects the importance of delivering vaccination programmes in ways that are equitable, and that meet the needs of specific populations – which can vary, for example, by ethnicity, disability or age (Kasstan et al, 2023a). There may be links between an underserved population or area and structural disenfranchisement / discrimination, though this will differ based on historical legacies in the UK (e.g. racism, ableism).

initial aim to protect cohorts identified as being at-risk of severe illness and mortality, and to reduce pressures on healthcare services. Roll-out followed a two-phase approach as advised by the Joint Committee on Vaccines & Immunisation (see **3A**). Roll-out processes evolved between the period 30th January 2020 to 28th June 2022.

15. The 2009 H1N1 pandemic was the most recent UK experience of a mass vaccination response. The Covid-19 and H1N1 2009 influenza vaccination programmes differed due to the epidemiology underlying each pandemic, but there are indications that learning had been applied from the former in Covid-19 roll-out processes. UK-wide collaboration was integral to the overall success of the H1N1 response and was evident in Covid-19 vaccine roll-out planning through procurement processes and aligned cohort prioritisation. Many Covid-19 roll-out processes were underpinned by UK-wide alignment because of the shared elements of expert guidance, procurement and vaccine manufacturing specifications.[4]

16. The Vaccine Taskforce (**Table 1**) pre-ordered substantial stock of UK Covid-19 vaccines prior to regulatory approvals by the Medicines and Healthcare products Regulatory Agency (MHRA).[5] Regulatory approval of vaccine candidates was a pre-condition to roll-out.

17. Universal vaccination programmes require multiple delivery pathways to ensure vaccine services are convenient, accessible and safe for target age cohorts or underserved groups or settings. Aspects of the implementation of the Covid-19 vaccination programme differed across priority cohorts, and across the four nations. UKHSA (then PHE) supported DAs with implementation plans to ensure approaches delivered JCVI recommendations as consistently as possible (INQ000496177), and there was reciprocal sharing of information between PHE and DA public health agencies (INQ000493687). A primary difference between the Covid-19 vaccination programme and routine vaccination programmes (e.g. childhood) was the use of mass vaccination sites, which are pragmatic for vaccinating large numbers of people at pace. However, mass vaccination sites are less equipped to offer equitable service-delivery for populations known to have lower levels of engagement with immunisation services, where uptake would be enhanced via tailored delivery pathways. Community pharmacies could have been more effectively integrated into roll-out processes from an early stage, and their role varied across the four nations. Offering choice (from booking system to vaccination site) is an essential component of convenient and accessible services to support people to accept vaccination within their constraints and needs. The use of mass vaccination sites in Covid-19 roll-out was a key difference to the H1N1 vaccine response.

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[4] Programme funding and vaccine stock distribution to DAs was determined via the 'Barnett Formula' (Audit Scotland, 2021; INQ000474334_0081). All funding apart from storage and distribution charges were met by the UK Government (INQ000474249). The Barnett Formula determined stock allocation based on whole population estimates, but concerns were raised in Wales that this would not reflect the number of people in JCVI identified at-risk groups. Programme implementers were anxious about stock-to-population ratio (INQ000501330_0022). These concerns were not shared by Northern Ireland (INQ000474476_0020). The functioning and efficacy of the Barnett Formula is outside our area of expertise, but may benefit from attention as part of preparedness efforts.

[5] Not all vaccines that were pre-ordered were deployed. We list here those that received regulatory approval to be used as UK Covid-19 vaccines up to 28th June 2022. Vaccines were produced for deployment by 4 manufacturers. Pfizer vaccines involved: adult (12 years of age and above) original formulation; child (under 12 years of age) original formulation; bivalent adult dose (12 years of age and above) original/omicron formulation. Moderna vaccines involved: original formulation; original/bivalent formulation. AstraZeneca vaccine. Novavax vaccine. Novavax received marketing approval for use in Great Britain (England, Scotland and Wales) on 3rd February 2022, but was not deployed by the 28th June 2022. Information sources from Health and Social Care Northern Ireland (2024). Vaccine candidates licensed by the European Medicines Agency (EMA) by 31st December 2020 were automatically valid in the UK as part of the terms of the UK departure of the European Union.

18. A definitive difference between the UK Covid-19 vaccination programme and routine vaccination programmes was the rapid allocation of sufficient financial resources to commission services and engagement strategies. This enabled novel delivery pathways to be collaboratively developed with community partners ('co-delivery'), which benefitted ethnic and religious minority communities. Those co-delivery models were a strength of Covid-19 vaccine roll-out processes.

19. The availability and quality of Covid-19 vaccine programme evaluations varies by UK nation, and evaluation was not consistently embedded in roll-out processes by DAs. The limitations in data availability hamper a comparative assessment of roll-out processes across UK nations. We approached Topic 1 (and the full report) within the limitations of available data.

Division of responsibility between stakeholders during roll-out

Organisational body	Primary role / responsibility	Remit
UK / DA Government Health Departments and Directorates ▪ UK Government Department of Health & Social Care (DHSC) ▪ Department of Health Northern Ireland ▪ Scottish Government Health and Social Care Directorate ▪ Welsh Government Health and Social Services Group	Policy, legislation, ensuring the provision of services, planning and oversight of deployment Elements of roll-out management may have been delegated to a 'Senior Responsible Owner' to oversee effective deployment and to coordinate delivery within UK-wide policy	DHSC was responsible for some UK-wide and England only roll-out processes. All others had a DA remit
Cabinet Office, notably Equality Hub (and component units of Race Disparity Unit and Disability Unit)	Operational functions regarding Equality legislation; production of disparity reports; campaigns and communications	England only
Department for Business, Energy & Industrial Strategy (DBEIS)	Securing vaccine supply chains; supporting research and development of potential vaccines; selecting which vaccines to purchase; securing access and developing manufacturing capacity to ensure supply	UK-wide
Vaccine Taskforce	Deliver responsibilities on behalf of DBEIS. Source and secure access to suitable vaccines for the UK population and expertise derived from civil servants, industry, management consultancies, and academia, supporting distribution	UK-wide
Chief Medical Officers (CMO)	Advisory and policy recommendations	Each UK nation has its own CMO
Joint Committee on Vaccines & Immunisation	Advisory	England and Wales; Scotland and Northern Ireland are

		not required to accept advice
Scientific Advisory Group for Emergencies (SAGE, including sub-groups)	Scientific and technical advice (no authority for decision or policy-making)	To support decision-making in the Cabinet Office Briefing Room
DA Covid-19 Advisory Groups (C-19 AG) ▪ Scottish Government C-19 Advisory Group ▪ Technical Advisory Cell (Wales)	Scientific and technical advice to DA, apply advice from SAGE to inform DA-level decision-making	DAs
Management consultancies	To support: analysis and presentation of data; efficiency in implementation, logistics, workforce, and supply chain management	UK-wide, England or DAs depending on the commissioning organisation
British Armed Forces	Optimising practice, deployment & delivery; administration; security of vaccine sites	UK-wide
Healthcare Services (including regional sub-divisions): ▪ NHS England (including at the time NHS Improvement) ▪ NHS Scotland ▪ NHS in Wales ▪ Health & Social Care (Northern Ireland)	Operational delivery including designing and implementing delivery models, storage and distribution arrangements	England and DAs (National and regional health commissioning and services)
▪ United Kingdom Health Security Agency (formerly Public Health England)[6] ▪ Public Health Scotland ▪ Public Health Wales ▪ Public Health Agency (Northern Ireland)	Health protection, technical and advisory, operational expertise, and data science Public Health England established a UK-wide Covid-19 Programme Board to plan for implementation. DA had their own national programme boards to assure system readiness and national oversight of planning	Limited UK-wide, mostly England DAs
Chief Pharmaceutical Officers / Pharmacy Leads	Advice, leadership liaison and delivery via non-NHS sites	DAs
Primary care (General Practice, Community Pharmacies) and non-primary care (e.g. hospitals, Trust-led vaccination centres)	Delivery arm	Place-based[7]

[6] The United Kingdom Health Security Agency (UKHSA) became operational on 1st October 2021, when health protection operations were transferred from Public Health England. UKHSA is primarily responsible for England but maintains limited UK-wide oversight on public health matters (INQ000474334_0022).
[7] Definitions of 'place-based approaches' vary, but are generally collaborative ways of serving communities in defined geographic locations. A 'place-based' remit can be at the level of neighbourhoods, borough or county, or larger.

Specialist pharmaceutical logistics suppliers	Logistics and temperature-controlled transportation	UK-wide distribution
Local government and their public health teams (/Directors of Public Health)	Promote equitable access by monitoring data and informing local/outreach delivery approaches	Local authorities
Professional medical and health organisations (e.g. British Medical Association; Royal Colleges)	Negotiating contracts; professional advice and representation; supporting public recommendations	UK-wide; DAs
Public and community groups/champions/ volunteers	Vaccine programme endorsement and delivery, and supporting the development of place-based partnerships	Local authorities and place-based partnerships

Table 1: Key stakeholders involved in preparing and deploying the Covid-19 vaccination programme, with a general description of their roles and remit

20. Most stakeholders existed prior to the pandemic response, but some were developed to support roll-out processes (e.g. Vaccine Taskforce). Several worked in direct collaboration through UK-wide and DA-level groups,[8] with division of responsibilities for Covid-19 vaccine programme planning and delivery. Publicly available documents do not always clearly define how responsibilities were divided. The lead responsibility of stakeholders for elements of roll-out processes varied across DAs in relation to commissioning, oversight, and data monitoring, (e.g. involving government departments, public health agencies, and healthcare services). Lead responsibility may have changed over the course of the Covid-19 vaccination programme (e.g. Northern Ireland). Stakeholders ceased activity at different points during Covid-19 vaccine programme roll-out. Vaccine equality divisions and groups were established within stakeholder organisations (e.g. NHS-E and UKHSA; DA-level services) with delegated responsibility for monitoring, addressing and evaluating coverage.

21. Management consultants were involved as 'key decision makers' in the Covid-19 pandemic response (INQ000474228_0178). The Hine (2010) independent review of the UK response to the 2009 H1N1 influenza pandemic does not mention involvement of management consultancies in the *vaccine response*. This may indicate that a precedent was set by involving management consultancies in Covid-19 vaccine roll-out processes. We are not aware of evaluations into the role of management consultant agencies during roll-out of the Covid-19 vaccination programme. Public scrutiny (regulation, independent oversight and evaluation) of the role of management consultant agencies in the NHS is advisable to assess their value-for-money and effectiveness (Kirkpatrick and Sturdy, 2021).[9] Evaluation is essential for transparent and holistic assessments of future pandemic preparedness. Decision-makers have a responsibility to explain why the contributions of management consultancies in the roll-out of the vaccination programme have not been evaluated or why any evaluations have not been made publicly available.

22. Decisions made by the Vaccine Taskforce (VTF) influenced programme deployment. However, representatives of national-level agencies, such as Public Health England (PHE) and NHS England and NHS Improvement (NHSE&I), were not involved as core participants in VTF

[8] Covid-19 vaccination programme board was launched by Public Health England (PHE) and was UK-wide.
[9] This source refers generally to the 'UK government and NHS,' and it is unclear the extent to which the issues they raise also apply to DAs. We maintain that transparency is also relevant for DA-level services.

decision-making until September 2020 when they became a member of the VTF 'Programme Board' (INQ000474228_0034). Such stakeholders have relevant operational experience of delivering routine vaccination programmes, and we therefore do not see any benefit or reason for delaying the core inclusion of national agencies with operational expertise in the VTF. It appears that there was no DA representation on the VTF 'Programme Board' (INQ000493687). While engagement between VTF and operational stakeholders did occur in different fora, we have not seen any justification as to why they were not included in the VTF 'Programme Board'.

23. Key lessons learned from H1N1 included the need to facilitate a common response through a co-ordinated UK-wide approach and four nations health forum, and to commence roll-out across the UK at the same time (Hine, 2010). During the Covid-19 pandemic, procurement of vaccines was managed by the UK government on behalf of all four nations, and roll-out began across all four nations on 8th December 2020. Health ministers of the four nations met to agree on UK-wide approaches for consistency, for example, on key messaging (INQ000493687). This indicates that lessons learned from past pandemic responses informed the UK Covid-19 vaccine response. Divergences between the four nations could cause public confusion, with DA-level communications needing to be clearly tailored to their national audience (UKIDM4SG0092).

Overview of roll-out processes for the UK Covid-19 Vaccines

The Joint Committee on Vaccines & Immunisation (JCVI) — Prioritisation

24. JCVI recommendations informed UK-wide roll-out of the Covid-19 vaccination programme. Membership of the JCVI does not include a representative from each of the DAs but does include co-opted members comprising one liaison from each DA public health agency. Co-opted members were not voting members, but they did contribute to discussions and conveyed the perspectives of their national vaccination systems to influence decision-making (INQ000501330_0015). Prior to roll-out, in November 2020, UK Health Ministers met and agreed several principles, including 'we all agree to take due regard of the Joint Committee on Vaccination and Immunisation's advice in developing its policy position on prioritisation' (INQ000474249_0043). JCVI began to review evidence to inform roll-out approaches from May 2020, far in advance of vaccine authorization, and produced interim and updated guidance which supported a rapid pandemic response (INQ000474334_0054). DAs may have sought to clarify guidance when required (see Appendix 2).

25. A JCVI 'Covid-19 sub-committee' met between September 2020 and July 2021. It was later replaced by the JCVI 'Covid-19 main committee', which is formed of 12 of the 16 JCVI members.[10] We draw on sub-committee meeting minutes below to illustrate key processes underlying cohort prioritisation and assessments of vulnerability among e.g. ethnic minority populations (JCVI, 2023). JCVI minutes are publicly available summaries of the content and conclusions of discussions, which are drafted by the JCVI secretariat and wording is agreed by the JCVI chair. Hence, they are not verbatim reports of discussions and it is not always possible to determine the different viewpoints of members. The minutes do offer insights into decision-making and cohort prioritisation in a context of anticipated supply limitations. Key

[10]As listed in December 2023.

dates of roll-out processes across the four nations of the UK were shaped by JCVI guidance but operationalised in varying timeframes.

Phase 1

26. JCVI attempted to ensure processes were in place to support roll out of the Covid-19 vaccines, in advance of regulatory approval. Minutes of the first sub-committee meeting on 24th September 2020 indicate that prioritisation for vaccination would aid programme implementation in the event of supply-side limitations, and future meetings would be held to refine definitions of high and moderate-risk groups.

27. Interim guidance on cohort prioritisation was released prior to roll-out (18th June 2020, 25th September 2020, 3rd December 2020), and updated guidance was produced after roll-out (INQ000408135). Guidance consistently referenced epidemiological and demographic data demonstrating that **risk of mortality increased exponentially with age** (DHSC, 2021b). JCVI recommended that the Covid-19 vaccination programme should be deployed in two priority phases to manage the age-related risk of mortality and increased risk of hospitalisation, and to maintain resilience of services.

28. Phase 1 priority groups included the below groups. The JCVI estimated that these cohorts constituted 99% of preventable mortality from Covid-19 and included approximately 27 million people in England and 32 million people across the UK [DHSC, 2021a].)

Priority group number:	**Group:**	**Cohort size:**	**Eligibility date:**	**Date priority groups vaccinated**
1	Residents in a care home or care home workers	0.3m 0.5m	08/12/20	All priority groups offered vaccination by 12th April in England, ahead of the 15th April target. All priority groups offered vaccination by 7th May 2021 in Scotland. All priority groups offered vaccination by 4th April in Wales,
2	Individuals aged ≥80 Frontline health and social care workers	3.3m 3.8m	08/12/20	
3	Individuals aged 75-79	2.3m	18/01/21	
4a	Individuals aged 70-74	3.2m	18/01/21	
4b	Clinically extremely vulnerable people under age 70	1.2m	18/01/21	
5	Individuals aged 65-69	2.9m	15/02/21	

6	Individuals aged 16–64 in an at-risk group and unpaid carers for elderly and disabled people	7.3m	15/02/21	ahead of mid-April target. We do not have comparable data for Northern Ireland.
7	Individuals aged 60-64	1.8m	22/02/21	
8	Individuals aged 55-59	2.4m	08/03/21	
9	Individuals aged 50-54	2.8m	19/03/21	

Table 2: Vaccination phase 1 priority groups 1-9.[11]

Phase 2

29. As Phase 1 roll-out was underway, JCVI meetings (13th meeting, 15th December 2020) note that there was a need to determine priority for phase 2 before planning could start and that 'a steer from DHSC' was required. It is not clear from meeting minutes how responsibility for decision making on prioritisation was shared between JCVI and DHSC.

30. Phase 2 cohorts were at lower risk of mortality from Covid-19. By 13th April 2021, Phase 2 cohorts (Table 3) were defined in terms of age-descending risk (cf. UKHSA, 2023b; DHSC, 2021c). The total cohort size for groups 10-12 was estimated to be 21m UK-wide, most of which (18m) were resident in England. Table is adapted from UK Covid-19 vaccines delivery plan and Horne et al (2022) supplementary tables.

Vaccine phase	Priority group number	Group	Eligibility date
2	10	Individuals aged ≥40	20/04/21
	11	Individuals aged ≥30	20/05/21
	12	Individuals aged ≥18	18/06/21

Table 3: Vaccination phase 2 priority groups for primary (2-dose vaccination) in UK adults.

Comparing cohort prioritisation during H1N1 and Covid-19 roll-out processes

31. The 2009 H1N1 and Covid-19 vaccine roll-out processes shared a two-phase approach to cohort prioritisation. However, the age cohorts that were prioritised in the H1N1 pandemic differed to Covid-19, which shaped implementation accordingly. H1N1 priority group 1 included front-line health and social care workers, pregnant women, and those aged over 6 months who are at higher risk of serious illness or death from influenza (Hine, 2010). As the highest rates

[11] Table is adapted from Horne et al (2022) supplementary tables. Cohort sizes were taken from UK Covid-19 Vaccines Delivery Plan, which were extrapolated to the UK population.

of infection were seen in children and young adults (de Whalley and Pollard 2012), priority group 2 involved all children in at-risk groups first followed by all children aged 6 months to 5 years to reduce the risk of hospital admission.

32. Evaluations (or corporate statements)[12] of Covid-19 roll-out processes and programme implementation rarely mention transferable learning from the 2009 H1N1 pandemic. One implication from H1N1 was that just 14.9% of pregnant women in England received an H1N1 vaccine (Health Protection Agency, 2010), though uptake in this cohort was higher in Scotland (40%) and Northern Ireland (57.1%). These differences may be linked to implementation strategies, for example, delivery in Northern Ireland was coordinated via acute trusts (Sammon et al, 2013). We have not seen evidence that Covid-19 vaccine delivery to pregnant women benefited from H1N1 lessons across the four nations.

JCVI discussions about criteria for prioritisation

33. JCVI adopted an age-descending approach to vaccine prioritisation. Increasing age accounted for the highest risk of mortality and severe illness. Secondary risk factors included having an underlying health condition, ethnicity, deprivation, and region (INQ000101218). Prioritisation was 'not able to address all inequalities in health that are rooted in the wider social determinants,' but sought to achieve an appropriate and pragmatic balance (INQ000474249). Implementation was consistently described as important to address risks posed to population groups by health and social inequalities, including the need for targeted action focussed on underserved groups and areas, including for instance people experiencing homelessness, Roma, Gypsy & Traveller groups, people with insecure immigration status and sex workers.

Age and clinical vulnerability

34. A degree of clinical judgement was exercised in roll-out to identify people considered to be **extremely clinically vulnerable** (CEV). The influenza immunisation programme served as a model for risk classification (e.g. for people under the age of 65 in which there is one list of risk groups), but a threshold of age 70 was used in Covid-19 prioritisation. It was noted that 'other groups should not be prioritised above the current clinically extremely vulnerable (CEV) group.' The scope of the CEV group for vaccine prioritisation was expanded and refined in subsequent JCVI meetings (6th meeting, 29th October 2020). The Green Book[13] (UKHSA, 2023b) notes that 'People previously defined as CEV were considered to be at high risk of severe illness from Covid-19 and these patients were initially flagged on the GP record and advised to shield themselves from exposure to infection.' This provision permitted certain flexibility in roll-out processes (within a specific priority cohort) to allow clinicians to identify patients who should shield, and subsequently be invited for vaccination. JCVI guidance dated 30th December 2020 placed CEV individuals in priority group 4.

35. The aim of mitigating inequalities in mortality rates informed roll-out preparations. On 5th November 2020 (7th meeting minutes), PHE presented a paper discussing the need to mitigate health inequalities concerning the risk of mortality and suggested 'the current prioritisation reduces inequalities between older and younger age groups.' and 'critical components around deliverability included communications and public trust, simplicity of the programme and the

[12] For example, see INQ000496177.
[13] See the Green Book (chapter 14a) for scope of high-risk and at-risk groups. The Green Book outlines information on vaccines and vaccination procedures used in the UK (UKHSA, 2023b).

need to proactively reduce inequalities and identify and address barriers.' The importance of data collection and monitoring of inequalities was also discussed. We note that there was a change in language and prioritisation of this cohort in JCVI guidance issued on 25th September 2020 and 3rd December 2020. Whereas the former distinguished between 'high-risk adults under 65 years of age' (priority group 6) and 'moderate-risk adults under 65 years of age' (priority group 7), the latter distinguished between 'clinically extremely vulnerable' (priority group 4) and 'underlying health conditions' (priority group 6). Understanding the reasons and implications of this shift in language may benefit public communication approaches in future pandemics.

Ethnicity

36. The association between **ethnicity** and risk of Covid-19 infection was carefully and repeatedly considered in meetings between Sept-Oct 2020, prior to the vaccine prioritisation list being refined. Evidence from the analysis of hospital case note reviews collated in April 2020 indicated increased Covid-19 mortality rates among people from ethnic minority backgrounds in England and Wales (Perkin et al., 2020).[14] JCVI members considered whether the disproportionate impact of Covid-19 mortality among people of ethnic minority backgrounds needed to inform vaccine prioritisation. Minutes dated 15th October 2020 note: 'People from South Asian and Black ethnic groups had substantially higher risk of death, only partially attributable to co-morbidity, deprivation, or other measured risk factors.' The 5th meeting noted that 'in a situation of limited supply, stratification by **sex** could be an option. Prioritisation by ethnicity and **deprivation** might be difficult to deliver and had ethical considerations.' Hence '…it was agreed that in keeping to medical factors and targeting groups with comorbidities, groups with other risks such as ethnicity and deprivation would be included, without specifying targeting.'

37. JCVI took the position that improving access to vaccines, rather than prioritisation, was the most appropriate strategy to address vaccine equity issues associated with ethnicity. For example, when it met on 29th October 2020, JCVI recognised a need for Covid-19 vaccine programme implementation to consider inequalities in vaccine uptake and barriers to access that affect routine immunisation programmes and use this learning to develop effective strategies to tailor delivery to ethnic minority groups.

Homelessness

38. On 11th March 2021, PHE (2021a) announced updated vaccine prioritisation of people experiencing **homelessness** based on new JCVI guidance.[15] Homeless people were assessed to have higher risks of poorer outcomes of Covid-19 and high rates of undiagnosed co-morbidity which justified their inclusion in cohort 6. Vaccinations could be administered in the absence of an NHS number or GP registration, and local decisions would be taken about offering a shorter dosage schedule for people unlikely to return for a second dose after 12 weeks.

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[14] There was no strong evidence that the disproportionate burden of infection and mortality could solely be explained by ethnicity, but that vulnerability was linked to underlying health and social inequalities (INQ000083875).

[15] 'Homelessness' has a legal definition in England (Shelter England), but we cannot say with certainty whether JCVI used this definition when formulating their guidance.

39. The announcement did not define the homeless cohort (i.e. who qualifies as homeless). Guidance issued for **Wales** recommended using inclusive definitions for this cohort and identification via outreach (Welsh Government, March 2021; INQ000493687_0041). It is unclear how vaccination was to be recorded and what the implications for recall for call/recall of the further second doses would be. This could be considered more carefully in future pandemic preparedness efforts.

40. Questions have been raised about why asylum seekers were not classified in the same bracket as people experiencing homelessness, despite being likely to have similar health needs (INQ000474430_0020).

Vaccination during pregnancy

41. Vaccination during pregnancy was subject to several changes in prioritisation during the Covid-19 vaccination programme, as evidence of risk and vaccine safety emerged, primarily because pregnant women[16] were excluded from vaccine trials as a matter of caution (Public Health England, 2021). Initial guidance dated 30th December 2020 noted there was insufficient evidence to routinely recommend Covid-19 vaccination during pregnancy, but vaccination should be considered where the risk of exposure to SARS-CoV-2 is high, or if there are underlying conditions creating very high risk of serious complications of Covid-19.[17] This guidance also noted that breastfeeding women may be offered vaccination with the Pfizer or Astra-Zeneca vaccines. In April 2021, the JCVI recommended that pregnant women and people should be offered the COVID-19 vaccine at the same time as their clinical risk or age groups (MHRA, 2023b). Pregnant women were encouraged to discuss the benefits and risks of Covid-19 vaccination with their healthcare providers. In December 2021, pregnancy was recognised as a clinical risk condition for COVID-19 infections (MHRA, 2023b). This change in guidance occurred amidst the period when the Delta wave was the dominant circulating strain (22nd May – 19th December 2021).

42. The communication of revised recommendations to healthcare providers, and their ability to confidently convey revised recommendations to pregnant patients, is an important consideration in roll-out processes due to the implications for uptake rates (**Topic 2**).

Deprivation

43. One evaluation of roll-out processes raised concerns that the national age-descending approach to prioritisation had the possible unintended consequence of reinforcing health inequalities in areas of higher **deprivation,** because life expectancy is lower in areas of greater deprivation and people in those areas are at risk of mortality at a younger age

[16] We recognise that not all pregnant individuals will identify as women, but refer to 'pregnant women' because it was the standard term used in JCVI guidance.

[17] Research published in July 2020 assessed factors associated with Covid-19 related death using data available from OpenSafely, and identified increased risk of mortality linked to a range of factors (e.g. age, clinical risk) but did not appear to consider pregnancy (Williamson et al, 2020). Subsequent research considered pregnancy to be a variable 'with too few events for inclusion' (Clift et al. 2020). Risk of hospital admission was higher in the third trimester of pregnancy, with a particular burden among pregnant women and people from Black and minority ethnic backgrounds (Knight et al, 2020).

(Timmins and Baird, 2022). These concerns are supported by documented health and social inequalities across the UK.[18]

44. However, JCVI's national age-based approach had the apparent benefit of clarity and **operational efficiency** in a context of limited and uncertain vaccine supply. The alternative approach of introducing nationally variable age cohorts informed by deprivation or other risk factors would raise practical issues for implementation at pace, primarily due to difficulties in defining at risk groups. Universal vaccination programmes require clear messaging to encourage public participation and responsiveness to campaigns. A multi-tiered approach to prioritisation runs a high risk of confusion – or lack of confidence at worst. Vaccine recommendations must be practical from an implementation perspective.

45. Without clear operational guidance, the use of clinical judgement has the potential to lead to variation and possibly unfair variation in practice. Provisions for local flexibility should be informed by operational guidance to manage differences in clinical decisions by healthcare providers and avoid discrepancies in access. In the context of Covid-19, this may have been more feasible to accommodate by expanding a particular priority cohort (e.g. 4b: Clinically extremely vulnerable people under age 70).

Occupation

46. There was public interest in prioritising **occupations, such as education** (including special education) for vaccination. The four UK Children's Commissioners wrote to the JCVI Chair to advocate for the prioritisation of teachers in roll-out processes (Children's Commissioner, 18 January 2021). Staff in special schools who support children with the most complex healthcare needs (CEV) were offered a Covid-19 vaccine in February 2021, but prioritisation was not extended more widely.

47. In his evidence to the Inquiry in Module 2, Professor Sir Ian Diamond, Chief Executive of the UK Statistics Authority, noted that teachers and educational professionals had the lowest age-standardised mortality of occupational groups but among the highest risks of infection (INQ000271436).

48. Pandemic preparedness efforts may benefit from examining the impact of expanding definitions of 'essential services' and determining which professions should be given advanced access to vaccination. Several states in the USA prioritised teachers for vaccination as of January 2021, which may offer insights into the impact of expanding definitions of 'essential services' in UK preparedness efforts. However, we recognise that in the context of limited and uncertain vaccine supply, the clearest justification for prioritisation is risk of mortality and protecting frontline health and social care services.

Unpaid carers

49. Advocacy and representative groups argued that JCVI guidance on priority cohorts (published 2nd December 2020) did not make an explicit provision for people in receipt of carer's

[18] For example, the UK is ranked among the top ten (of 38) OECD countries for income inequality (OECD, 2022). As Public Health Scotland (2021a) note, 'one of the most fundamental causes of health inequalities is the unequal distribution of incomes across populations.'

allowance i.e. **unpaid carers** for people living with long-term conditions (Carers UK, 2023).[19] Revised guidance dated 30th December 2020 notified the public that people in receipt of carer's allowance or who were the main carer of an elderly or disabled person[20] whose welfare may be at risk if the carer falls ill, should be considered for vaccination alongside priority cohort 6 (DHSC, 2021b).[21] The lack of a detailed definition of this cohort may have led to inconsistency in how the vaccine was offered to unpaid carers (INQ000099707_0008). This type of inconsistency during roll-out should be minimised as much as possible.

50. Unpaid carer status is not recorded in GP records in **England**, and unlike other priority cohorts, their data had to be extracted from the Department for Work and Pensions and matched to NHS numbers (INQ000492335). Self-identification was considered to help avoid operational delays, but could not be scrutinised if people sought to use this provision as a path to 'queue jump' (INQ000492335). There is a need to efficiently and reliably identify this cohort.

51. **Northern Ireland** did not have a register of carers for identification and eligibility confirmation, and health partners recognised that flexibility would be needed to offer vaccination to this cohort (e.g. self-identification) (INQ000474249). Evidence indicates that 12% of residents in Northern Ireland provided some form of unpaid care in 2021; most were aged 45-64 and approximately 3,000 were children under the age of 15 (Northern Ireland Assembly, 2024). Not having a route to identify and contact carers may have resulted in delays in receiving vaccination, e.g. if individuals (particularly in lower-age cohorts) waited until their priority group was eligible for vaccination.

52. **Scotland** broadened its eligibility criteria for unpaid carers; 'those who have received Carer's Allowance, Child Winter Heating Allowance or Young Carer's Allowance during 2020/21, those who are identified in GP Practice systems as a carer, or those who have self-registered as carers (Public Health Scotland, n.d.).' Scotland took the decision to 'expand' definitions of eligibility by prioritising people providing unpaid care: 'we *expanded our definition* of unpaid carers within priority group 6 to ensure all those over the age of 16 who provide vital support to those they care for were able to access the vaccine at an early stage' (NHS Scotland and Scottish Government, 2021 [emphasis added]). We are unable to confirm the date Scotland made this decision and whether it occurred prior to the revised JCVI guidance dated 30th December 2020. We emphasise the above statement ('expanded our definition') as it suggests that Scotland implemented broader eligibility criteria than what was recommended by the JCVI for England.

53. **Wales** experienced challenges in identifying this cohort due to lack of definitive data, and local authorities and GP surgeries were consulted on the information they held (INQ000493687). An efficient identification process is required to avoid delays in the future.

54. Processes to identify unpaid carers differed across UK nations and required fact-finding by clinicians, which is challenging for a vaccination programme premised on delivery at pace. Consistent definitions and registers of unpaid carers may help to achieve fairness and an

[19] JCVI guidance dated 2nd December: https://www.gov.uk/government/publications/priority-groups-for-coronavirus-covid-19-vaccination-advice-from-the-jcvi-2-december-2020/priority-groups-for-coronavirus-covid-19-vaccination-advice-from-the-jcvi-2-december-2020

[20] Consistent with Cabinet Office and Disability Unit (2021) guidance on inclusive language, we refer to 'disabled people' in this report, but recognise there is also a preference to refer to 'Disabled people' (INQ000474256).

[21] JCVI revised guidance dated 30th December: https://www.gov.uk/government/publications/covid-19-vaccination-care-home-and-healthcare-settings-posters/covid-19-vaccination-first-phase-priority-groups

efficient UK-wide framework for vaccine roll-out. We are unable to confirm how healthcare providers implementing the Covid-19 vaccine programme approached eligibility of unpaid carers in cohort 6. If definitions of 'unpaid carers' vary across the UK, then consistent definitions that reflect an expanded range of eligibility may be beneficial to reduce variation in the four nations immunisation systems. We consider this is an issue pertaining to the social determinants of health because evidence indicates that a higher percentage of people provide unpaid care in the most deprived areas of the UK (Office for National Statistics, 2023; Scottish Government, 2023).

Disabled people

55. An issue that requires further attention is the higher risk of mortality among people with learning disabilities that became apparent over the course of 2020 (e.g. INQ000417384; INQ000280067), and implications for vaccine prioritisation. There was no explicit mention of prioritisation of people with learning disabilities in interim guidance issued by the JCVI on 25th September 2020, which referred only to 'high-risk adults under 65 years of age' and 'moderate-risk adults under 65 years of age.' The lack of explicit prioritisation for people with learning disabilities may have caused anxiety for families. The age band with the largest number of deaths was 55 to 64 years of age in people with learning disabilities, but over 75 for the general population (INQ000417384). This risk status raises implications for prioritisation and cohort identification.

56. On 3rd December 2020, guidance placed people with **Down's syndrome** in priority group 6, alongside people with a 'severe and profound learning disability.' JCVI guidance dated 24th February 2021 stipulated that people with Down's syndrome should instead be offered vaccination as part of priority group 4, but people with **'severe and profound learning disabilities, and those with learning disabilities residing in residential care**, should be offered vaccine in group 6' (DHSC 2021q). The guidance details that people with Down's syndrome were included in priority group 4 because of evidence indicating a very high relative risk of mortality.

57. JCVI recommended inviting anybody on the Learning Disability Register in **England** as part of priority group 6 on 24th February 2021, as GP systems may not always record severity of learning disability (INQ000417383). Not all DAs (e.g. **Scotland**) maintain such a register, which meant that health partners had to identify people in this cohort via different methods (INQ000474256). Similarly in **Wales**, clinicians were given discretion to identify people with severe/profound learning disabilities (Welsh Government, 2021e). Wales also expanded the prioritisation of this cohort by including people in 'serious mental illness groups' to protect more vulnerable people as quickly as possible. Approaches to identifying the learning disability cohort varied across the UK, and consistent processes (e.g. a register or guidelines for expanded range of eligibility) may be beneficial to reduce variation in four nations immunisation systems.

58. Concerns were raised that carers (priority cohort 6) were invited for vaccination prior to the disabled people they were caring for (INQ000474256_0008). It would be worth assessing the impact of inviting disabled people and their carers together in preparedness plans.

59. Concerns were raised that disabled people were not classified as a defined risk group, unlike, for example, care home residents (INQ000474256_0006). There is scope to learn from the

process of prioritising vulnerable groups *within* the umbrella category of disabled people as occurred during Covid-19. This is important to ensure that any higher relative risk of mortality is accounted for in future roll-out processes and clearly detailed in public guidance, alongside clear parameters and practical strategies for healthcare workers to identify eligible people for vaccination.

Implications for operations associated with prioritisation of health and social care workers

60. Frontline social care workers were a priority group for vaccination. Unlike Scotland, England and Wales did not maintain a central register of social care workers and the social care sector is institutionally fragmented (INQ000474430_0031). In England, the social care sector includes a large number of private organisations which are not all regulated by the Care Quality Commission (INQ000474430_0029). In England this meant that some social care workers did not know who was responsible for offering them Covid-19 vaccinations (their employer or the NHS). There was confusion about the priority status of personal assistants, who provide care support to disabled people (and receive remuneration via the Direct Payments scheme), as well as confusion about who was responsible for vaccinating this cadre (INQ000474256_0010). Unnecessary delays in vaccinating personal assistants may have occurred as a result. Future vaccine priority guidance should account for all health and social care workers (paid and unpaid), and clearly explain the justification for any differences in their priority status.

Change in recommendations/guidance regarding safety (May 2021)

61. On 7th May 2021, the JCVI recommended that all unvaccinated adults aged 18-39 be offered only Pfizer or Moderna Covid-19 vaccines (DHSC, 2021d). This was the most notable safety-related change affecting roll-out processes across the UK. People under the age of 30 in eligible priority groups who had appointments had to be contacted immediately and notified that their booking would be cancelled or re-arranged. Additional pressure was placed on the alternative vaccines (Pfizer BioNTech or Moderna) when supplies were already constrained and this led to waste of AstraZeneca vaccines. (INQ000474228_0026).[22]

62. The change in recommendation impacted the community pharmacy pathway and was noted to be an issue in Northern Ireland, as pharmacies were unable to deploy Pfizer vaccines due to handling constraints (INQ000474249).

Roll-out of 1st and 2nd) doses: intervals (Dec 2020 – May 2021)

63. JCVI recommendations on vaccine intervals changed according to epidemiology and surge in variants (DHSC Media Centre, 2021). Interval changes allowed greater equity in roll-out processes by offering larger proportions of the population a first dose vaccination in the context of limited and uncertain vaccine supply.

[22] Evidence indicated an 'albeit extremely rare' risk of adverse events associated with the first dose of Astra-Zeneca vaccine in adults under the age of 40. The adverse events included concurrent thrombosis (blood clots) and thrombocytopenia (low platelet count), covered in the UK Covid-19 Inquiry's expert report on vaccine safety by Professor Daniel Prieto-Alhambra and colleagues.

64. **Recommendations**: Intervals between the primary and second doses varied by Covid-19 vaccine at the point of roll-out (DHSC, 2021b).[23] JCVI minutes dated 31st December 2020 reference unpublished data indicating that vaccine efficacy and protective immunity lasted 12 weeks following an initial first dose of Pfizer-BioNTech or Astra-Zeneca vaccination. Following JCVI guidance, the four UK Chief Medical Officers extended the interval to 12 weeks in a statement released on 31st December 2020.[24] On 14th May 2021, the JCVI advised that the interval between the primary first and second doses be reduced to 8-weeks among the 9 priority groups who had not received their second dose (DHSC, 2021m). NHS England notifications (dated 20th May 2021) indicate that people in cohorts 10 onwards (Phase 2) would be vaccinated at an interval of 11-12 weeks (NHS England, 2021d).

65. **Operational adjustments**: Delivery of first and second doses raised different implications for implementation. The first dose required vaccination at pace and avoidance of waste, whereas the second dose had to be distributed based on the appropriate interval factoring in call/recall methods (INQ000492335). Interval changes involved rapid adjustments in programme implementation, requiring GP-based invitation teams to contact people aged 80 and above to cancel/postpone their appointment for a second vaccination. A call centre was set-up in England to assist with re-booking appointments, but GPs found themselves needing to 'contact 1,000 people over a weekend telling them that their appointment was postponed' (Timmins and Baird, 2022). Health partners recognised the operational challenges of re-scheduling second dose appointments, which would 'distress patients who were looking forward to being fully immunised' (Department of Health NI, 2020b). This raises the concern of interval changes negatively impacting public confidence in the programme. The benefit of protecting more people at pace was perceived by DA representatives to outweigh the challenges posed by re-arranging appointments and public disappointment (INQ000493687). We have not been able to assess the communications sent to people to postpone vaccine appointments, but note that it is important that communications transparently and sensitively convey the reasons for operational changes and what to expect concerning next steps.

Vaccinating children (July 2021 – February 2022)

66. We include a sub-section on vaccinating child cohorts **not** at particular risk. Decisions on this topic were influenced by CMOs statements and JCVI guidance. JCVI noted that guidance presented below applied to England, though the matters discussed may have been relevant for DAs.

Recommendations

3rd September 2021: all children aged 12-15

67. JCVI published updated guidance that was *not in* support of universal vaccination of healthy 12- to 15-year-olds based on risk. JCVI recommended the expansion of the list of conditions to which the offer applies for at-risk 12- to 15-year-olds (see DHSC, 2021f: guidance on 4th August 2021). The guidance noted it was *not* within the JCVI's remit to consider wider societal impacts of vaccination, including educational benefits. However, JCVI noted that 'the

[23] Intervals were initially assessed based on results of clinical trials (the scrutiny of which falls beyond our expertise). Upon roll-out, the interval between Pfizer Covid-19 first and second doses was 3-12 weeks. The interval between Astra-Zeneca doses was between 4-12 weeks.
[24] Northern Ireland set a 10-week interval for all eligible individuals to 'allow a 2-week grace period for those who had missed their second dose appointment at 10 weeks' (INQ000474249).

government may wish to seek further views on the wider societal and educational impacts from the Chief Medical Officers ('CMOs') of the four nations' (see DHSC 2021g). Ministers and Secretaries for Health from each UK nation instructed the four CMOs 'to consider the matter from a broader perspective' on 3rd September 2021 (see DHSC 2021g).

68. On 13th September 2021, the CMOs published a co-written letter to advise that there is 'an advantage to someone aged 12 to 15 of being vaccinated over being unvaccinated' (DHSC, 2021g). The CMOs recommended a universal vaccine programme for this cohort with a first dose of Pfizer-BioNTech COVID-19 vaccine to all children and young people aged 12 to 15 not already covered by existing JCVI advice. The broader considerations behind their advice were: 'the most important in this age group was impact on education. UK CMOs also considered impact on mental health and operational issues such as any possible negative impact on other vaccine programmes.' It was said 'it is likely vaccination will help reduce transmission of COVID-19 in schools which are attended by children and young people aged 12 to 15 years.'

15th November 2021: all children aged 16-17

69. JCVI issued guidance advising that young people aged 16 to 17 years who are not in an at-risk group should be offered a second dose of Pfizer-BioNTech (Comirnaty) Covid-19 vaccine, administered 12 weeks or more following the first dose (DHSC, 2021h). This followed the JCVI recommendation on 4th August 2021 to offer a first dose to this cohort.

16th February 2022: all children aged 5-11

70. JCVI advised '**a non-urgent offer**' to children aged 5-11 years of age who are not in a clinical risk group.[25] JCVI members considered 'the health benefits of vaccination in this age group, *the potential educational benefits*, and the impact on NHS services of delivering a 2-dose vaccination programme to around 5 million young children. We are unable to confirm if this recommendation was influenced by the CMO recommendation of September 2021 (described above). The flexibility to invoke broader evidence and criteria is integral to making appropriate recommendations when required, but we are not aware of how *consistently* broader forms of evidence were considered in JCVI recommendations and what informed a decision to request broader evidence. The benefits of universal child vaccination for education and learning raise implications for what forms of evidence and expertise are considered in vaccine prioritisation recommendations in future pandemics.

22nd February 2022: children aged 12 years and above, spring dose

71. JCVI advised offering a spring dose (around 6 months after the last dose) to individuals aged 12 years and over who are immunosuppressed, as defined in the Green Book.

Operationalising childhood vaccination

Individuals aged 12-15

72. The timing of the change in advice regarding children aged 12-15 (September 2021) meant that most children in this cohort would, at the time, have been starting school unvaccinated (except those eligible e.g. due to long-term conditions based on previous JCVI guidance).

[25] To the best of our knowledge, 1st dose vaccinations were offered to all individuals aged 5-11 from 4th April 2022.

73. NHS **England** notified the public on 20th September 2021 that approximately three million children aged 12-15 would be offered Covid-19 vaccines via School Aged Immunisation Services (SAIS) (NHS England, 2021a). On 30th September 2021, roll-out for children aged 12-15 in England began and the aim was to offer vaccines to all by the October half term (NHS England, 2021a). Delays occurred, as of 24th October 2021, approximately 10% of children under the age of 18 had received a first dose vaccination. Delivery limitations include the initial reliance on SAIS as the only commissioned provider, which meant that primary care services had to turn away children who could otherwise have been vaccinated (Timmins and Baird, 2022). Subsequently GPs and pharmacists in England were commissioned to also vaccinate this age group (date of this change in delivery approach not recorded) which resulted in a rapid increase of vaccine uptake. (Timmins and Baird, 2022). NHS England notified parents on 22nd October 2021 that children in this cohort could also receive Covid-19 vaccines via GPs and pharmacies in England (NHS England, 2021b).

74. The Department of Health (**Northern Ireland**) notified the public on 14th September that the 12-15 years cohort would be offered Covid-19 vaccines. To conserve limited resources, delivery was enveloped into the school-based influenza programme and led by Trust school nursing teams (INQ000474249; INQ000474476_0014). Delivery was supported by GPs where necessary. Parents were informed on 14th September that 'consent forms for vaccination will begin to be distributed via schools shortly' (Department of Health [NI], 2021). The influenza programme runs from October to the end of March, but the vast majority are administered pre-Christmas (INQ000474249), which was expected to facilitate timely Covid-19 delivery.

75. The Chief Medical Officer (**Scotland**) wrote a letter on 17th September 2021 outlining Scotland-wide policy for universal vaccination of the children aged 12-15 cohort. Drop-in clinics were expected to receive this cohort from 20th September 2021, and young people received information and invitations by post with appointments scheduled from 27th September 2021. Rural health boards opted for school-based vaccination delivery, with invitations dispatched from 27th September 2021. The Scottish delivery plan for children aged 12-15 appears to have been a combination of primarily community clinic-based delivery and school-based delivery (Chief Medical Officer Directorate, 2021c). This implementation approach meant 'Scotland leapt ahead with its vaccination rate while the programme in England lagged' (Timmins and Baird, 2022). The areas with the lowest percentage of unvaccinated people aged 12-15 tended to deliver Covid-19 vaccines via schools (Public Health Scotland, June 2022).

76. The Minister for Health and Social Services (**Wales**) communicated on 14th September 2021 that NHS Wales would begin offering Covid-19 vaccines to the 12-15 cohort. The letter outlined a blended model of offering the vaccine via vaccination centres and schools noting that 'the strength of this model is that it is based on local knowledge, and it is flexible and agile so it can change depending on the circumstances' (Morgan, 2021). It was expected that children would be offered vaccines via appointments on evenings or weekends. Roll-out processes in Wales appear to have been more integrated than the initial approach planned for England.

Individuals aged 16-17

77. NHS **England** advised that individuals aged 16-17 would be invited for vaccination by local NHS services, such as a GP practices, or may have been able to attend a walk-in delivery

point (e.g. mass vaccination site). In **Northern Ireland**, this cohort was vaccinated via Trust-led vaccination centres. In **Scotland**, this cohort was sent an appointment time by SMS or email, or contacted by their health boards to attend clinics, depending on region. In **Wales**, this cohort was vaccinated via mass vaccination centres, including by walk-in appointments.

Summary on childhood vaccination

78. Children were the lowest priority cohort in roll-out processes, and decision-making was slower compared with adult cohorts (INQ000474249). Research indicates that recommending and operationalising childhood vaccination in the UK occurred later than comparable higher-income countries such as the US and Canada, which led to an increased likelihood of acquiring SARS-CoV-2 prior to being invited for vaccination (Gurdasani et al., 2022). Vaccination of child cohorts brought new operational partners into roll-out processes in England, notably school-age immunisation services (SAIS), as well as different approaches across the DA.

79. A combination of delivery pathways is required to vaccinate child and adolescent cohorts, and to offer an accessible programme. Due mainly to the limited number of evaluations that have been conducted on Covid-19 roll-out processes, it remains unclear the extent to which school-based delivery in 2021 was affected by operational challenges and capacity limitations faced by SAIS, including prior to the pandemic.

Booster (3rd) doses (September 2021- November 2021; Spring Boosters 2022)

80. On 14th September 2021, the JCVI advised that a booster (third) dose be offered to individuals who were prioritised for vaccination in Phase 1 (DHSC, 2021k): Older adult care home residents; all adults aged 50 and above; frontline health and social care workers; people aged 16-49 years with underlying health conditions that put them at risk of severe illness and death; and adult household contacts (aged 16 and above) of immunosuppressed individuals. Lessons generated by regional approaches to vaccine delivery for the initial two doses informed the basic principles for booster roll-out (INQ000329507). Booster doses were delivered in a two-stage approach, through community pharmacies, general practice and vaccination centres (INQ000329507). Health partners experienced operational challenges by needing to complete the second dose universal offer and then commence a booster campaign in a short-time frame (Audit Wales, 2021). The booster offer ran simultaneously to the first dose offer for children aged 12-15 (outlined above). Pressure on GP surgery teams in England may have been offset by allowing them to focus on booster delivery and using school delivery pathways (at least initially) for the child cohort.

81. On 15th November 2021, the JCVI advised that all adults aged 40-49 should also be offered a booster vaccine 6 months after their second dose (DHSC, 2021i). JCVI stipulated that future considerations include the need for booster vaccination (third dose) for 18-39 year olds who are not in a defined at-risk group, and whether additional booster vaccination (fourth dose) for more vulnerable adult groups may be required, but this was uncertain at the time.

82. UKHSA designated Omicron as a SARS-CoV-2 'variant of concern' in late November 2021 (UKHSA, 2021). Guidance was revised on 29th November 2021 to expand the offer of a booster vaccine to all adults aged 18 to 39. Booster vaccines were made available in an

age-descending approach, with priority given to the vaccination of older adults and those in a COVID-19 at-risk group. Severely immunosuppressed individuals who had completed their primary course (3 doses) were eligible for a booster dose. All children and young people aged 12 to 15 years were offered a second dose (30 micrograms) of the Pfizer-BioNTech COVID-19 vaccine at a minimum of 12 weeks from the first dose.

83. JCVI anticipated that 'optimising individual protection ahead of a wave of infection will provide the largest benefit in terms of reducing the impact of the Omicron variant on the UK population.' By mid-to-late December 2021, Omicron became the dominant SARS-CoV-2 variant in the UK. MHRA approved use of the AstraZeneca vaccine as a third or 'reinforcing' dose. However, the Green Book notes that the Astra-Zeneca vaccine was not routinely used as a booster vaccine (UKHSA, 2023b).

84. Booster roll-out was extended to 30–39-year-olds on 13th December 2021 and extended to all 18-29 year olds on 15th December 2021. All 16- and 17-year-olds who had a 2nd dose at least 3 months ago become eligible for a booster dose on 17th January 2022.

85. On 21st February 2022, JCVI recommended that individuals aged ≥75, care home residents, and immunosuppressed individuals aged ≥75 receive a spring booster dose at an interval of 6 months after the last vaccine dose. This eligibility interval was generally reached between March and June 2022. A Spring booster was offered to select phase 1 priority cohorts (individuals aged 75 and above; older adult care home residents; immunosuppressed individuals aged 12 and older if they have received a booster dose at least 3 months ago) on 21st March 2022.

Key characteristics of processes adopted across the four UK nations

UK-wide characteristics

86. Delivery models differed across the UK nations (DHSC, 2021a). Programme Boards and specialist sub-groups across the four nations steered implementation and alignment when beneficial (e.g. INQ000499055_0040; INQ000474476_0004)). Enhanced workforce was required across the UK, including non-traditional immunisers who required training (INQ000474334_0078). UK nations mobilised a range of delivery points including hospital hubs, GP surgeries, pharmacies, and mass vaccination centres. Approval to use the Astra-Zeneca vaccine improved the efficiency of roll-out because its handling requirements were less restrictive than the Pfizer vaccine (Timmins and Baird, 2022).

87. Each UK nation produced and managed its own vaccine coverage data, and there were differences in how the four nations approached this (INQ000499055_0057). Statisticians from each nation met to share plans and identify issues in the coherence of vaccine coverage data (INQ000499055_0057), but enhancing the ability to compare vaccine uptake across UK nations in real time would be beneficial. While aligning UK-wide vaccine data management through one system may be challenging to implement considering the devolved organisation of healthcare, the feasibility of integrating or coordinating data management systems across UK nations should be explored. Data monitoring is discussed in **Topic 2**.

88. Draft versions of the UK Vaccine Delivery Plan (January 2021) did not represent the position of Welsh DA leads, who felt unable to sign up to the UK-wide strategy and produced their own strategy at pace (INQ000493687_0031). We are unable to confirm if this concern was shared by all DAs, but it would be worth considering how this lack of consensus can be avoided in a future pandemic response. There were broader issues raised for DA by UK Government approaches, including televised announcements by the then Prime Minister on timelines for completing vaccination of priority groups 1-4 without consulting DA stakeholders on feasibility (INQ000501330_0026). This indicates severe limitations in UK-level vaccine programme management, with a need for commitment to consultation on key decisions in roll-out processes in future pandemics.

89. Site selection is a sensitive element of roll-out processes, primarily because of the need to ensure accessibility for diverse populations. General Practice is traditionally an accessible and acceptable vaccination route, but GP was not employed as a primary delivery strategy in initial planning assumptions in England. GP contracts for delivery had to be negotiated, which was a repetition of past issues documented in H1N1 vaccine roll-out processes. Additional issues included being able to select and assure appropriate vaccine delivery sites alongside rapid roll-out processes. UK-wide comparison suggests there may have been opportunities to balance efficiency and flexibility while moving at pace. For example, Northern Ireland took an initial approach of directing cohorts to specific delivery pathways while roll-out in England saw people invited multiple times by different providers which resulted in a fragmented delivery approach.

90. Vaccine waste was managed differently across DAs. JCVI noted that flexible implementation approaches may help to minimise waste (DHSC, 2021b), though decisions on protocol would need to be taken in consultation with relevant health partners involved in operationalising delivery at national, regional and local levels. Guidance was produced to help avoid wastage in Scotland (e.g. Audit Scotland, 2021; Scottish Government, 2021a), but this was not the case for all DA (See Appendix 2). Provisions to transfer stock to other sites within a defined area appear to have been limited by restrictive policies in England (Mounier-Jack et al., 2022), which prevented attempts by healthcare providers to reduce waste. Limitations on stock transfer may have been due to Pfizer vaccine storage requirements. There appears to have been demand among healthcare providers for more local-level autonomy around vaccine stock transfer, which may benefit future pandemic vaccine deployment strategies. Programmatic oversight is important to ensure standards and safety, and public confidence in delivery. A vaccine response characterised by constrained supply and rapid deployment must aim to avoid waste by permitting safe dissemination or re-distribution of available vaccines that would otherwise be unused. Temporary and emergency legislation may be needed in instances to support re-distribution of stock. Place-based dissemination plans could help to quickly redistribute stock. Clinical teams at local levels are well-placed to know which registered patients would be suitable to be included in reserve lists. Tailored delivery pathways for underserved communities may have a relatively higher risk of waste, so contingency plans are needed to maximise use of stock. Operational guidance can help to have a consistent approach that helps to ensure fairness, for example, requiring that reserve lists follow the age-descending or risk-based priority order recommended by JCVI. Oversight can be maintained through audits that check who has been included in reserve lists to ensure a risk-based approach is followed, with clear and fair penalties.

England

Planning for deployment and capacity to vaccinate

91. The UK Covid-19 Vaccines Delivery Plan (DHSC, 2021a) aimed to achieve 100% coverage for all cohorts but acknowledged that 'best practice in existing programmes achieved 75% of total population cohorts.

92. In Summer-Autumn 2020, NHS England developed a workable and scalable plan for deployment despite uncertainty surrounding vaccine handling requirements and supply chains (INQ000474228_00017). The universal vaccine programme required an extensive workforce, with provisions for re-deployment of NHS staff to facilitate vaccination delivery. However, not all healthcare professional roles were pivoted towards delivery, including health visitors (**Topic 4**). The NHS was asked to prepare for deployment from the 1st December to avoid delays once a vaccine was released for use (INQ000421389).

93. The DHSC (2021a) operational vaccines delivery plan (January 2021) outlined organisational and delivery strategies along the areas of supply; prioritisation; places; people; and tracking progress. Site requirements included Covid-19 vaccine storage, personal protective equipment (PPE) and space for social distancing to be 'Covid-secure.' The handling requirements of expected UK Covid-19 vaccines were not due to be clarified until approximately October 2020, delaying the ability for NHS England to produce operational guidance (INQ000474228_0019). Roll-out occurred in phased tiers broadly in this order:

Delivery pathway	**Approximate number nationwide**	**Planned launch date**
Hospital hub sites	206	8/12/20
Local vaccination sites (primary care networks and community pharmacies)	1,200	21/12/20
Mass vaccination centres	50	11/01/21
Community clinics (including pop-up clinics in community or faith spaces)	Variable	Variable

Table 4: Delivery pathways, England.

94. The delivery plan estimated that 96% of the population in England resided within 10 miles of a vaccine service. Plans were made to reduce the gap by the end of January 2021, by deploying mobile vaccine units in highly rural areas (DHSC, 2021a).

95. The UK Covid-19 vaccines delivery plan stated that vaccine coverage will be reviewed and increased with support from UK military advisors who compared provision against key data such as population density (DHSC, 2021a). It can be inferred that provisions were made to monitor and assess gaps in coverage. PHE was aware of limitations in identifying people in underserved or vulnerable cohorts for vaccination, as health care records systems do not

routinely record membership of certain 'health inclusion groups.' Consequently, primary care records could not be used to identify and target people in these groups for prioritisation (INQ000496177).

Negotiating GP surgery contracts

96. Commissioning of GP teams for delivery was a key element of roll-out processes. Initial discussions envisaged a minor role for GP surgery teams, who would be expected to deliver a maximum of 20% of vaccines (Timmins and Baird [2022]). One reason why primary care had not been originally included as a delivery pillar was reported to be that the NHS *'wanted primary care focused on… business as usual'* (Mounier-Jack et al, 2022). Negotiations had been underway with the British Medical Association concerning GP remuneration for routine vaccine service delivery (Timmins and Baird [2022]). On 3rd November 2020, the government and BMA concluded that GPs would be paid £12.58 per vaccination (a 25% increase over the item of service charge for influenza vaccines).

97. GP surgeries were better placed to improve uptake through outreach activities, but did not feel that remuneration reflected the level of investment required to engage underserved or vulnerable groups (Ismail et al., 2023).

98. Challenges identified during the H1N1 response included negotiating contracts for delivery via GP surgeries while in pandemic response mode, with recommendations made to develop, for example, 'a sleeping contract with GPs' (Hine, 2010). Contract negotiation occurred amidst the Covid-19 response to determine GP payment (Timmins and Baird, 2022). It is unclear whether past recommendations to set up 'sleeping contracts' were followed, or processes were put in place to set up contracts at pace. We recognise that 'sleeping contracts' may be challenging to anticipate due to epidemiological characteristics of pandemics and risk cohorts and running costs that are subject to inflation. Sleeping contracts designed at one point in time may also not reflect the challenges that primary care may find itself in at a future point in time.

Delivery

99. Vaccines were distributed across multiple delivery points (hospitals; mass vaccination sites; primary care) raising challenges in the context of limited supply and storage requirements – particularly for Pfizer vaccines. Each delivery pathway had specific constraints and considerations that contributed to shaping roll-out processes:

    a. Hospital sites were among the first delivery points as they were better placed to accommodate Pfizer vaccine storage requirements. This pathway served health and social care workers and the 80+ cohort but raised access challenges. The need to travel and be in a hospital environment presented a risk of circulating infection, which raised anxiety for a cohort already considered vulnerable to severe illness (Ismail et al., 2023). Hospital sites were under pressure from caring for patients with Covid-19.

    b. Mass vaccination sites were considered a pragmatic option because the approximately 7,000 GP surgeries in England varied considerably in size and not all would be able to accommodate social distancing and offer a 'Covid-secure' space. Mass vaccination sites needed to provide geographical coverage and be within reasonable travelling distance. These sites were not always suitable, and possibly not safe, for a number of vulnerable

cohorts in the JCVI prioritisation list, including people in older age groups, CEV, and people who have physical or learning disabilities or are in underserved population groups. Mass vaccination sites also did not offer equity in access if the primary mode of access was by car or private transport. We are aware that existing legal mechanisms concerning who can lawfully administer vaccines to patients were not well suited to mass vaccination sites, which depended on the availability of a large workforce. Hence, the Human Medicines Regulations (2012) were amended in 2020 to create a protocol (Reg 247A). This protocol had a provision for some vaccination activities to be delegated to suitably trained and competent individuals, including volunteer vaccinators and healthcare assistants, under clinical supervision. This type of flexible provision should be included in preparedness plans to enable access to an expanded workforce.

c. Primary Care Networks (PCNs) consist of several GP surgeries that work together as a consortium. PCNs operationalised vaccination clinics (using existing health facilities or community buildings, including GP surgeries) to provide local Covid vaccination services for tens of thousands of people. On 9th November 2020, PCNs were given until 17th November 2020, to select the nominated vaccine delivery sites – which had to comply with protocols for vaccine storage, site safety and security, social distancing compliance, workforce, and data collection and reporting. Sites were assessed by Clinical Commissioning Groups (CCGs) for suitability. PCNs were informed of CCG decisions no later than 23rd November 2020. On 4th December 2020, PCNs were told that the first of their sites –those with the highest proportion of **people over 80**– would be stood up on 14th December (NHS England, 2022). This allowed the capacity to vaccinate at pace to be enhanced significantly (INQ000492335). PCNs were able to make efficient use of vaccine supply, which was not replicable in DA such as Scotland as GPs are organised by an 'individual practice model of delivery' (UKIDM4SG0092_12; UKIDM4CMO01). Home vaccination occurred via roving models and GP surgeries were tasked with identifying workforce to deliver to this cohort from 21st December 2020 (INQ000492335). Additional payments were offered to pharmacists and GPs, including for doses delivered on Sundays and to those unable to leave their houses.

d. Community pharmacies became a supplementary delivery pathway in 2021 (INQ000477610; INQ000477608). Community pharmacies were invited to express interest in joining delivery, and service specifications explicitly noted that expressions of interest would be prioritised based on an ability to improve health inequalities e.g. via accessibility and ability to address the needs of local populations (NHS England July 2021b). Initial commissioning requirements meant that community pharmacies had to have capacity to administer 1,000 doses per week (INQ000474318_0009), which may be linked to handling requirements of Pfizer vaccines and to avoid waste, but disadvantaged the sector and could have been redressed through place-base delivery strategies. They were considered important for offering convenience for younger age cohorts and familiarity in multi-ethnic urban populations, but several barriers to programme inclusion arose including authorisation and assurance processes (Ismail et al., 2023). Pharmacies were initially not able to pre-book or re-book people for vaccination (Ismail et al., 2023), indicating a reliance on walk-in appointments, and limited integration into roll-out processes. Community pharmacies performed a growing role in delivery processes (Company Chemists' Association, no date), signalling that it would be worthwhile to assess the impact of considering them a key pillar in future pandemic roll-out plans.

e. Pop-up clinics were funded based on each provider contract and delivered either by PCNs through smaller vaccination sites or mass vaccination centres. Location and site were expected to be tailored to the needs of target populations. Delivery via these pathways was limited due to storage requirements of Pfizer vaccines and logistical challenges of moving stock (INQ000496177).

100. By the end of June 2022, around 21% of first and second doses of Covid-19 vaccinations had been delivered at mass vaccination centres and 69% at GPs/PCN and pharmacy clinics (mostly GPs/PCNs at 53%) (INQ000474228_0067), indicating public preference for more local delivery pathways. We surmise that vaccines delivered via GP surgeries may have been more likely administered by trained healthcare professionals known to recipients compared to mass vaccination centres that may have been staffed by newly trained vaccinators (supervised by health professionals). In the context of a new and rapidly implemented vaccination programme, confidence offered by primary care teams may be critical.

101. A limitation identified in England was fragmented vaccination offers, which resulted in people being invited for vaccination multiple times by different providers in ways that signalled a lack of coordinated delivery planning and duplication of labour (Sharif et al., 2023). It was also a challenge to balance efficiency and delivery targeted at the highest priority cohorts. For example, roving models were essential to vaccinate care home residents but were less efficient compared with the numbers of people who could be vaccinated rapidly via vaccine clinics (INQ000492335).

Centralised control and implications for local level delivery

102. Regional-based health commissioners and local-level healthcare providers characterised the vaccination programme as 'top-down' due to strong central government oversight, and leadership over implementation maintained by NHS-E (Mounier-Jack et al, 2022). This 'centre' organised the rapid deployment of the vaccination infrastructure, setting up clinical and reporting systems and supply management. Lack of control at regional and local levels was reported as a major frustration by providers. Over time the same evaluation notes that there was 'gradual re-grouping of local systems and an allowance for greater flexibility in the delivery of the programme', but the time-period of these shifts is not clear. This limitation makes it difficult to assess the effects of different programme management approaches of the vaccination programme over time and across geographical regions.

103. The centralised control led to concerns among commissioners and regional public health professionals that the programme had not developed strategies to address inequalities of vaccine uptake among people from ethnic minority backgrounds (Mounier-Jack et al. 2023). Moreover, the lack of local government input meant that centralised rather than localised systems were developed, leading to poorer outcomes including appropriate place-based selection of vaccination delivery points (INQ000474430_0008). The evaluation notes that control over programme delivery loosened by Spring 2021, enabling tailored strategies to improve uptake among cohorts with lower-level coverage. By Spring 2021, the four highest priority groups would have been offered vaccination. Hence, autonomy translated into local delivery approaches over time.

104. Regions that progressed quickly with roll-out (e.g. the north-east) subsequently faced restricted vaccine supplies to allow regions elsewhere to catch-up (Timmins and Baird, 2022). This 'restrict-to-disperse' method appears to have been in operation in February 2021 to meet targets to vaccinate the first four priority cohorts across England. This evaluation notes that the restrict-to-disperse method was viewed negatively by implementation stakeholders in regions affected. However, this method should be understood in the context of an uncertain and limited supply chain. Offering vaccines to the first four priority cohorts – those most at risk from mortality – took precedent and it would have been inappropriate to restrict supplies to regions still attempting to vaccinate the four highest priority cohorts.

105. Individual sites were expected to deliver one vaccine type per day (Duffy et al., 2022). Hence, operational planning depended on knowledge of incoming vaccine stock – though local-level healthcare teams were not always aware in advance of delivery content.

106. In one evaluation, providers and commissioners described communication of changes to roll-out processes as non-transparent and last-minute, which affected the capacity to adapt to change and maintain public confidence (Mounier-Jack et al., 2022). Health partners involved in delivery described having to watch evening news announcements by the prime minister to plan for operations the next day (Mounier-Jack et al., 2022). Concerns were raised that the central approach to vaccine programme management lacked feedback systems to report consequences raised by delivery expectations. While this evaluation does not indicate the scale of these issues, it notes that the scope for flexibility and pragmatism increased as roll-out evolved.

107. An important step was the establishment of multi-stakeholder vaccination inequalities groups at regional and local levels, supported by PHE and NHS-E, to address the needs of under-vaccinated communities and to promote confidence in the vaccination programme (see **Topic 4).** With regards to the latter, regional screening and immunisation teams and local vaccine providers in England developed vaccine confidence training materials and bespoke Covid-19 vaccine communication resources that were used in their areas. Some of these resources were co-developed with community groups (e.g. minority ethnic groups, homeless people and charities) and featured trusted voices that people would respect and recognise. However, there was no consistent and national approach to Covid-19 vaccine confidence training for healthcare professionals in England.[26] This is surprising considering that Covid-19 vaccines were rapidly developed and implemented at pace and would inevitably raise questions for recipients when speaking to invitation teams or healthcare professionals. Responsibility for vaccine confidence training was not explicitly detailed in the DHSC vaccine delivery plan.

108. NHS-E published daily vaccine uptake data of the number of first and second doses administered, which was disaggregated in weekly datasets by region, age, ethnicity (INQ000474334_0082). A system of accurate data recording was required, to avoid affecting public confidence through incorrect data (INQ000492335).

[26] There may be historical issues underlying the absence of a national approach to Covid-19 vaccine confidence training. Major restructuring of the health system in England was undertaken in 2013, which dramatically affected the immunisation service (Chantler et al, 2016). Responsibility for the funding and commissioning of vaccine training and confidence training was not clearly defined.

Accessibility

109. The number of vaccination sites in England doubled between phase 1 and 2 of roll-out. Research has assessed the accessibility of the vaccination site network to be 'excellent,' but several barriers were flagged which challenge government claims of population-wide access to a vaccination service (Duffy et al, 2022). No justification had been offered for the 10 mile-threshold for access to a mass vaccination site and research has criticised the failure to consider accessibility – the ease with which those sites can be reached – which could hide considerable geographical inequity in provision (Duffy et al, 2021). GP-led provision was critical for providing local-level access to vaccination, particularly in rural and isolated areas or for people who did not own a car.

110. The National Booking Service was advertised to people when they became eligible to receive a Covid-19 vaccine, and they were offered the choice to book an appointment at a GP surgery PCN site, community pharmacy site, mass vaccination centre, or other relevant sites. The nearest 30 vaccine sites within 100 miles were offered based on post code (INQ000477608).

111. Average journey times to vaccination centres varied considerably across England. They were shorter in large cities and comparatively longer in rural and isolated regions. Vaccination sites tended to be clustered around major urban areas, which may have driven additional inequalities in provision and accessibility between urban and rural areas. Households that did not have access to private transport faced additional challenges in accessing vaccination sites. Over 97% of the population lived within a one-hour journey (one-way) of their nearest vaccination site by public transport. Yet, inequalities in provision and accessibility between neighbourhoods remained irrespective of mode of transport (Duffy et al, 2022).

112. The roll out of future pandemic vaccination programmes in England may be influenced by the new NHS Vaccination strategy published on 13th December 2023. The strategy builds on learning from the NHS COVID-19 vaccination programme, for example, by increasing convenience and access to vaccination via local sites and engaging more closely with local communities to increase vaccine uptake. Integrating vaccine programmes into place-based health services involves commissioning assessments of optimal and effective provider networks. The strategy places an emphasis on outreach and opportunistic delivery, which is important to address inequalities and differences in uptake. However, increasing convenience alone does not always address inequalities, which requires a dedicated action plan and long-term engagement. The new NHS Vaccination strategy is still being embedded nationally with pilot demonstrator sites being evaluated and new commissioning arrangements to be finalised. The strategy does not detail what financial resources have been allocated to strengthen vaccine delivery models and partnerships. The pilot demonstrator sites will indicate the feasibility and sustainability of developing service innovations in the absence of increased funding.

Northern Ireland

113. Direct control over the Covid-19 vaccination programme in Northern Ireland was maintained by the Department of Health until April 2022, when responsibility passed to the Public Health Agency (INQ000474249). We have not been able to identify academic evaluations of roll-out in Northern Ireland, and the number of government or agency reports evaluating roll-out

processes are limited. Northern Ireland's Public Health Agency did not conduct a formal evaluation of Covid-19 vaccine roll-out.

114. The Department of Health established a NI Covid-19 Vaccination Programme Oversight Board in July 2020. Its role was to set the direction for a future Covid-19 vaccination programme, oversee the progress of the development and implementation of the vaccination programme (INQ000474249). Separately, an implementation group had been established by the Public Health Agency but was subsequently integrated into the oversight board in October 2022. We are unable to determine the separation of roles and responsibilities between July and October 2020.

115. Delivery was first managed through Trust-led mass vaccination sites (a new concept for Northern Ireland) and 321 GP surgery teams, and was later complemented by 350 community pharmacies from March 2021 as well as tailored delivery via one-off pop-up or mobile clinics. Covid-19 vaccine deployment was modelled on influenza vaccine delivery primarily via general practice, but expanded to be pragmatic, agile and flexible (INQ000474249). The handling requirements of the Pfizer vaccine meant that first phase vaccination took place via Trusts, with delivery broadening out to general practice and community delivery over time. The approach of one large, central delivery point for a whole Trust area did not adequately serve all large areas, which could have benefited from several vaccination centres (INQ000474249).

116. Delivery pathways varied for the priority cohorts:

    a. Northern Ireland was the first UK nation to deliver Pfizer vaccines in **care homes** via a Trust mobile team, which helped to facilitate maximum deployment and uptake in the highest priority cohort and within the handling requirements. Delivery procedures were arranged directly with the MHRA and allowed swift vaccination of two doses among care home residents and staff by 26th February 2021 (INQ000474249). Relationships with care homes were made in advance of deployment to facilitate rapid roll-out (INQ000474249).

    b. The first 2 priority groups of Phase 1 were treated as one group with Health and Social Care workers invited to get vaccinated in a Trust vaccination centre. People **aged over 80** (priority group 2) were invited by GP surgery teams, as Trust vaccination centres were considered inappropriate for a cohort who was less mobile.

    c. A 'twin track' approach was then implemented whereby **priority group 4** (**aged 70-74** and **CEV**) had been offered vaccination mainly by their GP surgery team, whereas **priority group 5** (**aged 65-69**) were invited to attend Trust-led vaccine centres (INQ000474476_0010). A benefit of this approach was that roll-out occurred at pace, however in some instances it initially resulted in group 5 members being vaccinated before group 4 where GP surgeries were struggling with capacity (INQ000474249). This should be considered a minor consequence of fast-paced delivery and is comparable to vaccine delivery points inviting people from the next eligible cohort in the event of missed appointments to prevent waste.

    d. Roll-out evolved into a 'multiple track' approach with greater choice over vaccine delivery point. As eligibility opened to people under the age of 50, delivery became more concentrated via Trust vaccination centres to allow GP surgery teams to focus on routine care.

e. Trust vaccination centres offered a combination of walk-in and pre-booked appointments, as survey data indicated a preference among **younger age-cohorts (e.g. priority groups 10-12)** for walk-in options (INQ000474249).

117. By May 2021, some areas did not have Covid-19 vaccine delivery coverage by participating pharmacies and alternatives e.g. mobile units were considered (INQ000474249). Until July 2021, community pharmacies were not able to offer a second dose to an individual who had received their first dose via general practice or Trust vaccination centres (INQ000474249). This limited the flexibility of roll-out processes, but the time in which this barrier was addressed would have enabled greater access for priority groups 10-12 in full time education or work.

118. Northern Ireland and the Republic of Ireland (RoI) was a singular epidemiological unit due to cross-border travel, but roll-out processes were not aligned in the two nations. The earlier start of roll-out in the UK compared with the RoI resulted in implementation pressures and opportunities for Northern Ireland. Health partners in Northern Ireland had to confirm eligibility of RoI residents who, for example, worked for health services or may have been registered with a GP surgery, or who tried to attend vaccine delivery points in Northern Ireland (INQ000474249). Health partners had regular contact to share learning from implementation strategies.

Scotland

Planning for deployment and capacity to vaccinate

119. The Scottish Government, NHS Scotland and Public Health Scotland were responsible for delivering the Covid-19 vaccination programme in Scotland. The Scottish Government published its first Covid-19 vaccine deployment plan on 14th January 2021. The second plan was published on 24th March 2021. The third plan was published on 23rd July 2021. The Scotland Covid-19 vaccine deployment plan 2021 (update – March 2021) notes an aim of 80% vaccination take up among all JCVI priority groups 1-9, which was higher than the 75% target in England. We have not been able to identify academic evaluations of overall roll-out processes in Scotland (as with England), and hence roll-out processes are limited to government and agency reports. Academic evaluations of delivery and coverage in relation to specific population clusters are available, such as pregnant women and people (Stock et al, 2022).

120. A National Vaccination Inclusive Steering Group was initiated, though no date of inception is specified in Scottish Government reports. The steering group brought together expertise from health boards, academia, faith groups and voluntary/community sector organisations to support delivery plans for underserved communities.

121. Implementation was categorised into 3 'tranches' (Audit Scotland, 2021): I) 'Vaccinating all adults in Scotland with 2 doses of a Covid-19 vaccine'; II) 'autumn and winter 2021/22 flu vaccinations and Covid-19 booster vaccinations'; III) 'longer-term, business-as-usual approach to providing vaccinations in future across Scotland.' We infer that the 3 tranches were developed as the Covid-19 vaccination programme evolved, as stakeholders could not foresee requirements around boosters upon roll-out on 8th December 2020.

Integrating influenza and Covid-19 planning

122. In Autumn/Winter 2021-22, delivery was planned to include Covid-19 and influenza vaccinations (Scottish Government, 2022). Scotland developed its influenza vaccination programme in consideration of the risks of people being infected with Covid-19 and influenza, and the implications for burdens on the healthcare system (Scottish Government, 2022). It appears that preparation was underway in advance of Autumn/Winter 2021-22. The Scottish Government created the Flu Vaccine Covid Vaccine (FVCV) Delivery Programme to help ensure readiness for the implementation of an expansion to flu vaccination programme and delivery of a COVID-19 vaccination (McQuillan et al, 2022).

123. Prior to roll-out, Public Health Scotland (2020) had conducted a health Inequalities Impact Assessment (HIIA) via stakeholder engagement from September to November 2020. The HIIA was primarily designed to identify any barriers to accessing influenza vaccines across eligible population groups. Such barriers were anticipated to also apply to the Covid-19 vaccination programme. The HIIA focused on national Scotland-wide programme delivery, while also helping to inform how local areas considered the 'potential impacts for their population based on the services that they provide.' Detailed recommendations were drawn from the stakeholder engagement with different social groups to address barriers, summarised as follows:

124. Communication: tailored information from healthcare providers; explaining benefits/risks of vaccination and relevance of vaccines for long-term condition management; ensure that communications and invitations are accessible/inclusive across age-groups, and in a range of formats (e.g. easy read, hard copy, digital); using local community champions in engagement and outreach (e.g. videos) to provide reassurance, particularly among ethnic minority communities; informing publics about vaccine components, particularly for communities who may decline vaccines that are derived from porcine or egg; training healthcare providers to support people and patients with their vaccine decisions.

125. Delivery: flexible roll-out whereby individuals at-risk can be vaccinated alongside their carer/advocate, and clear guidance on home vaccination procedures; flexible services (times, locations), transport to delivery points if required, and information on delivery options; opportunistic vaccination e.g. via maternity services as pregnant women and people attend for antenatal appointments; accessibility of sites (e.g. wheelchair or mobility aid, and buggy access, physical access to sites) and provide information on accessibility.

Delivery

126. Covid-19 vaccine delivery via primary care differed in Scotland because of restructuring that was initiated in April 2018 to move responsibility for vaccine delivery from GP surgeries to NHS Board/Health and Social Care (INQ000492099). GP surgery teams had a relatively smaller role in Covid-19 delivery processes compared to with the focus on Hospital Trust-led vaccination models (INQ000474249). However, the transformation had not been completed when the Covid-19 pandemic began, leading to regional variation as some health boards were more advanced in the transformation phase than others (UKIDM4SG0092_009). Delivery pathways in Scotland were consistent with England (Public Health Scotland, n/d), but we are unable to confirm the point in time that these pathways were commissioned or approved in roll-out processes. GP delivery was advantageous for upper age cohorts

(UKIDM4SG0092_009). Community pharmacies were not routinely used in Scottish roll-out processes, though some health boards did choose to use them in their local delivery plans (UKIDM4SG0092_009).

127. Scottish Government reports indicate that initial deployment in December 2020 relied on mass vaccination sites, on an appointment only basis. As part of roll-out preparations, Scottish NHS Health boards were tasked with assessing whether mass vaccination sites would be suitable for underserved populations, such as Roma, Gypsy & Traveller communities or people experiencing homelessness, and what outreach should be undertaken. This universal offer was complemented by outreach services. Inclusion and inequalities were factored into the Scottish Covid-19 roll-out processes at the national, regional, and local levels. Delivery in Scotland relied on a temporary workforce, and the Scottish Government recognised that a longer-term and sustainable solution was required for future phases of Covid-19 vaccine programme roll-out (Audit Scotland, 2021).

128. Pfizer vaccines were delivered directly in care homes in December 2020. Scotland initiated a policy of 'vaccinating care home staff on the same visit as residents [...] Along with providing expert webinars to counter a targeted disinformation campaign' (All Party Parliamentary Group on Vaccinations for All, 2021). Uptake was noted to be 97% among healthcare workers and 93% in social care workers (BBC News, 2022).[27] While there was a recognition that vaccination in workplace settings was a positive approach to roll-out and should be continued when offering booster vaccination doses, further insights were required to examine whether workplace vaccinations have equity of access between healthcare staff and social care staff (Public Health Scotland, 2021).[28] Vaccinating care staff and residents together may offer UK-wide learning to support uptake in this cohort.

129. By June-November 2021, the Delta variant became the dominant strain of SARS-CoV-2 and subsequently the roll-out approach in Scotland changed to include drop-in, pop-up, and mix-model delivery. Evidence indicates that delivery was co-designed with community leads to offer vaccinations in inclusion sites, such as places of worship to facilitate access. Scottish Government reports indicate that flexible delivery pathways were stood-up to target different sectors of society based on, for example, age and employment. Vaccines were delivered via mobile units, agricultural workplaces to vaccinate seasonal workers, shopping centres and education settings.

130. Universal delivery points were deemed suitable for most of the population in Scotland, yet tailored pathways were important for engaging cohorts – some of whom may not have otherwise received vaccinations (Public Health Scotland, October 2022):

[27] The data appears to be drawn from Public Health Scotland, but we are unable to verify due to the information being removed from their website https://public.tableau.com/app/not-found

[28] 'Evaluation of Covid-19 vaccination uptake by delivery model, eligibility cohort and booking method,' dated 14th December 2021 (Public Health Scotland).

Delivery model	Number of vaccines administered	% of all vaccines administered
Mass/community vaccination centre	9,025,413	69.0
General practice	1,663,939	12.7
Hospital	1,205,316	7.8
Health and social care workforce (HSCW)	437,608	3.3
Care home	195,759	1.5
Home visit	189,219	1.5
Outreach	61,384	0.5
Pharmacy	8,178	0.1
Unknown delivery model	471,227	3.6
Total	13,078,041	100

Table 5: Number and proportion of vaccines administered per delivery model. Data presented here is up to and including 30 June 2022, Public Health Scotland (2022).

131. Concerns were raised about diverting resources away from the universal delivery approach to service outreach pathways during roll-out, which were often linked to the pressure to vaccinate large numbers of people at pace to satisfy roll-out goals. Mass vaccination centres were accessed more constantly and consistently compared to outreach models, the latter of which had more variable patterns of use but were more likely to be accessed by people from ethnic minority backgrounds. Vaccination teams wanted '"permission" in future to prioritise more targeted outreach work (Public Health Scotland, 2022a). These concerns indicate a clear need to include tailored delivery pathways as a key pillar of roll-out process to target underserved groups.

132. Scottish roll-out processes permitted health boards serving rural and remote populations to vaccinate across cohorts, and out of priority order when required, to ensure operational efficiency (UKIDM4SG0092). The low number of vaccines administered via pharmacies reflects under use (INQ000474318_0021) compared with other UK nations. We are aware of media reports identifying challenges of the centralised booking platform for remote and geographically isolated areas of Scotland, where delivery models may differ to urban areas (Pringle, 2021), but academic evaluations would be welcome to obtain detailed insights on differing regional experiences.

Bookings and appointments

133. Different delivery and engagement approaches appear to have been taken according to age cohorts. Self-registration and drop-in clinics were found to be the best way to reach the 18-29 cohort. Self-registration and flexible drop-in clinics were offered as lead delivery routes

(Scottish Government, 2022). The online booking portal was used less by older age groups and people living in more deprived areas (Public Health Scotland, 2022). Approximately half of appointments were scheduled, and half were unscheduled. Unscheduled appointments included drop-ins, outreach vaccinations, in-reach vaccinations (such as care homes), and healthcare worker vaccinations.

Wales

Planning for deployment and capacity to vaccinate

134. A Wales Covid-19 Vaccination Board was developed to advise on delivery and ensure preparation. It first met on 18th July 2020 and existed until June 2021, when responsibilities were transferred to the Wales Covid-19 Vaccine Delivery Programme Board (INQ000501330_0014). The Covid-19 Vaccination Board included representation from the 7 Welsh health boards. Implementation was more decentralised than in England as each health board led its own roll-out of the vaccination programme with central oversight from a multi-organisation COVID-19 Vaccination Board (CVB) chaired by Welsh Government (Perry et al., 2021). Further evaluation is required to understand whether and how this approach supported implementation of flexible delivery strategies. Implementation was premised on a 'national enabling, local delivery' approach (INQ000501330_0015). Several sub-groups were initiated to advise on and action elements of roll-out processes, which included (but was not limited to) workforce, logistics, data, and communications. In Wales, executive directors of public health sit in health boards which enabled health protection leadership to be embedded in NHS responses (INQ000499055_0040). This differs to England, where these roles are situated in local government.

135. Military Liaison Officers were assigned to support the 7 health boards, as the need for rapid deployment was considered 'akin to that of a battle campaign plan'. Military officers noted that there was 'a lack of experience of emergency planning within the Welsh Government wider Health and Social Services Group to mobilise such a large project on a tight deadline' (INQ000501330_0028-29). Military personnel provided security for a Wales-based vaccine packaging plant, following bomb threats and sabotage that disrupted production processes (INQ000501330_0031).

136. We have not been able to identify academic evaluations of overall roll-out processes in Wales, and hence roll-out processes are limited to government or agency reports. All health boards were responsible for the equitable delivery of the vaccination programme in their areas (INQ000501330_0040). By February 2022, the vaccination strategy for Wales notes that roll out was guided by four approaches: Vaccinating the most vulnerable; nobody left behind; booster vaccination; vaccinating children and young people. Health boards were considered an optimal model for a 'place-based approach' to integrated delivery strategies, as they were formed of primary and community health services, secondary care and tertiary care. Unlike the command-and-control approach adopted initially in England, the Welsh approach was considered to enhance delivery ownership and make effective use of health infrastructure already in place (INQ000501330_0056).

Equity

137. A 'Vaccine Equity Committee' was launched to monitor uptake among underserved groups. Data was drawn from the Public Health Wales monthly surveillance reports. The Committee included representation from third sector organisations supporting underserved groups to understand barriers to uptake. The Welsh Government Equity Strategy was published in March 2021, and an equity action plan was published in June 2021 with a more specific remit of 5 population clusters including people with learning disabilities, mental health needs, asylum seekers and undocumented migrants, and ethnic minorities (INQ000501330-0046).

Delivery

138. In January 2021, DA stakeholders recommended maximising the involvement of primary care in deployment plans and were recognised as being experienced in vaccination delivery (INQ000493687_0030). At the end of May 2021, vaccines were being delivered in 54 mass vaccination centres, 346 GP surgeries, 30 hospital locations, 18 mobile unit teams and 11 pharmacies. Community pharmacies held a more minor role in roll-out by the end of May 2021. Delivery points appear to have been suited to context. On 2nd July 2021, the Minister for Health and Social Service announced that more than 75% of adults aged under 50 had received their first dose of a COVID-19 vaccine.

139. Mass vaccination sites were used in areas of higher population density, whereas health boards in rural and isolated areas made use of smaller local delivery pathways or GP surgery teams. The majority of adults were offered their first dose Covid-19 vaccination in the first half of 2021 and would have been offered vaccination within a mass vaccination centre (Jones et al, 2023). Mass vaccination sites were made available to health partners through 'goodwill,' indicating reduced or minimal overheads. Many of these sites had been closed to the public as part of Covid-19 control measures, and were repurposed for vaccination delivery. The easing of restrictions meant that venues would look to re-open, requiring health boards to search for alternative cost-effective options. Mass vaccination sites with extended opening hours, and a central appointment allocation system, were considered to reduce barriers to access (INQ000474311_0032).

140. All health boards used outreach delivery pathways for inclusion, e.g. care homes and mobile units.

141. A 'no one left behind' approach was implemented whereby NHS Wales offered opportunities for people in priority groups 1-4 to be invited again for vaccination as delivery worked through groups 5-6 (Welsh Government, 2021a).

142. The Minister for Health clarified JCVI guidance concerning which 'front-line social care workers' should be prioritised in group 2, as variation in practice and clinical judgement had occurred based on local-level interpretations of JCVI guidance. Clarification also saw the prioritisation of foster carers of children with complex medical needs in group 2 in line with education staff serving this cohort and undertaking personal care (INQ000493687). The cohort size is not defined in this resource but would likely be small and not entail operational delays to the age-descending priority approach.

Conclusion and lessons learned on roll out processes across the UK

143. Evaluations of Covid-19 vaccine roll-out processes varied considerably across the UK, which has hampered this comparative assessment. There are currently no UK-wide approaches to evaluating immunisation programmes. Having minimum requirements for evaluation would help to compare delivery processes across the four nations and identify models of practice. Evaluations are not cost-neutral and require human and financial resources. Evaluations would help to understand the benefits and limitations of approaches taken across the UK nations, such as the decentralised approach taken in Wales and for example the impact on pace of delivery.

144. Programme implementers require resources and guidance to work more closely with vulnerable populations to strengthen the roll out of UK vaccination programmes. Engagement strategies with underserved communities need to be embedded in routine immunisation programmes. Programme implementers felt concerned about directing resources and manpower away from mass vaccination sites to offer tailored pathways, due to the focus on vaccinating large numbers of people at pace. Tailored delivery pathways should be considered a key delivery pillar in roll-out processes and have their own measures of value by supporting uptake among underserved groups who may be less likely to access universal pathways (**Topic 4**).

145. Approaches taken by JCVI to determine prioritisation involved flexibility to request broader forms of evidence, particularly concerning the impact of vaccination on education for children. Evaluating the consistency in which JCVI used broader forms of evidence to inform vaccine recommendations may benefit future pandemic preparedness.

146. DAs had the flexibility to vaccinate across age cohorts, including out of priority order, when required, which can present operational benefits particularly for more geographically isolated populations. However, this flexibility should be used sparingly to ensure resources are directed to achieving national goals.

147. DA services operationalised delivery of child and adolescent cohorts in different ways, and England appeared to draw on (at least initially) one mode of delivery e.g. school age immunisation services. Integrating delivery approaches in roll-out, for example by combining school-age immunisation services and primary care, may help to attain higher levels of vaccination coverage. Assessing differences in implementation between routine childhood vaccination and Covid-19 vaccination for children across the UK and national regions may help to generate lessons learnt for the future.

148. Further investigation is required to assess whether references to a 'non-urgent' offer of Covid-19 vaccines to children aged 5-11 in JCVI guidance in 2021 may have influenced parental decision-making and risk perceptions. Assessing the impact of the language used in notifications and guidance may help preparedness efforts, for example, the implications for maintaining parental confidence in vaccine recommendations aimed at children and delivery pathways.

149. Future discussions should consider the impact of enhanced definitions of frontline or essential service staff to maintain public services such as the education sector, though this needs to be

considered in relation to limited and uncertain vaccine stock. Looking at the impact in jurisdictions that did prioritise vaccination of, for example, teachers (in the USA) may support future strategies.

150. Unnecessary waste can be reduced by dose dissemination across sites or areas as part of place-based delivery strategies, if permitted. Further information about dose dissemination during the Covid-19 vaccination programme is outlined in Annex 2, including handling requirements set by Specialist Pharmaceutical Services that limited the time period within which vaccine stock had to be used or moved. Such requirements could not be ignored, and by-passing any requirements could have the negative implication of affecting public confidence. Future universal vaccination campaigns may benefit from guidance to enable dose dissemination across sites to avoid waste and maximise uptake in a context of limited supply and within permitted flexibility. Stakeholders should assess optimal ways to enable dose dissemination at local levels, and appropriate approvals that are conducive to efficient transfer of stock at local levels. To avoid wastage in these circumstances there needs to be more flexibility to share doses across vaccination centres if storage requirements allow. The authority to manage this would need to be delegated to local levels to ensure that doses can be used as efficiently as possible.

151. Management consultancies were commissioned to aid planning and implementation of roll-out processes, but evaluation of their roles appears to be scant. Further discussion about independent oversight and evaluation may be in the public interest to assess their value-for-money and effectiveness. There is benefit in evaluating the impact of management consultancies in the Covid-19 roll-out processes for understanding future commissioning.

152. The issue of negotiating contracts for involvement of GP surgeries in Covid-19 roll-out processes reflects limitations in learning from the 2009 H1N1 pandemic. The Hind review of the UK response suggested considering the design of 'sleeping contracts' to support negotiations within a timely manner, underpinned by a defined trigger for when the contract would be brought into place and ended. We have been unable to determine whether this recommendation was explored following the 2009 H1N1 pandemic, but further exploration of the impact of a 'sleeping contract' may be beneficial given that contract negotiation consistently emerged during H1N1 and Covid-19 roll-out processes.

153. Community pharmacies performed a 'gap-filling' or secondary role in Covid-19 vaccine roll-out in England, and their integration in roll-out processes (e.g. ability to perform outreach) was initially limited. Community pharmacies may not have appropriately served the needs of all cohorts, such as pregnant women requiring toilets at delivery sites (an access issue), but are advantageous in reaching areas of diversity and deprivation. Pharmacies in England were under financial and operational pressures during the vaccine roll-out (INQ000477610), which has continued and is impacting the ability to offer enhanced access like late opening times and is leading to closures. Such operational constraints may disproportionately affect areas of higher deprivation (Community Pharmacy England, 2024). Strengthening the coverage and viability of community pharmacies is important for this sector to be pivoted in pandemic vaccine responses. There is a benefit to comparing commissioning and service specifications of community pharmacies across UK nations as part of preparedness efforts, particularly considering their role in delivering a critical proportion of vaccines in areas of greater deprivation (**Topic 4**). Comparing lessons from UK nations may help to identify strategies for

more effective integration of the pharmacy sector in future pandemic vaccine roll-out processes.

154. Disparities in vaccination uptake between population groups were anticipated prior to roll-out. The allocation of funding to mitigate inequalities in roll-out processes is not transparent, and difficult to trace. GPs and community pharmacies in England were paid via their contracts, and funding for outreach to local communities was provided to each Clinical Commissioning Group (since disbanded and replaced with Integrated Care Boards). However, it is not clear how funding for outreach was then disseminated onwards. We have not been able to identify the timing through which funding was released to regional and local levels, and what performance reporting was required as a condition of funding. Understanding these pathways is an essential element of evaluating effective pandemic roll-out processes as part of preparedness plans.

155. Operational stakeholders (at the time, Public Health England; NHS England & Improvement) were not involved in a formal capacity as part of Vaccine Taskforce deployment ('programme board') planning prior to September 2020. This appears to be a significant shortcoming of roll-out processes that requires scrutiny from decision-makers and should be revised as part of future pandemic preparedness efforts. Operational stakeholders should be asked about the impact of not being included as key participants from inception.

156. It appears that different delivery approaches for social care workers were implemented across the UK, with workplace-based delivery increasing access for social care workers in Scotland. Rates of vaccination coverage among health and social care workers in Scotland were significantly higher, hence there are UK-wide lessons to be learned from roll-out processes in Scotland. UK nations varied in their ability to identify unpaid carers, which may have led to operational delays, and we recommend exploring models of good practice to identify and invite this cohort as part of UK-wide preparedness efforts. Northern Ireland imposed age restrictions (18+) when defining eligibility of unpaid carers for vaccination (INQ000474256), which was removed on 19th February 2021. It should be noted that JCVI guidance (dated 30th January 2021) outlined that anybody aged 16 and above in clinical risk groups could be invited for vaccination. In future pandemic scenarios, age restrictions for unpaid carers should align with JCVI guidance based on available safety evidence.

157. The approach of the Welsh Government to identifying people with severe/profound learning disabilities and allowing practitioners the discretion to ensure no vulnerable person in these groups was missed appears to have diverged from other UK nations. If approaches to identifying this cohort did indeed vary across the UK, then consistent approaches that reflect an expanded range of eligibility may be beneficial to reduce variation in four nations immunisation systems

Topic 2: Vaccine Coverage

A summary of coverage of the UK Covid-19 Vaccines in the UK and across the four nations

158. Each of the four nations reported high population-wide coverage levels of one and two doses by 2022, and coverage rates across DA were among the highest achieved in recent history for adults (Jones et al, 2023). However, disparities in COVID-19 vaccine coverage were most stark among ethnic minority groups and people residing in deprived areas across the four nations of the UK. This Topic assesses disparities based on one and two dose uptake, as common indicators across UK-nations. However, under-vaccination (receiving all recommended doses according to age) was identified as an issue across UK-nations. The disparities in coverage per UK nation are outlined below.

159. Covid-19 vaccines were rolled out sequentially across JCVI priority groups, with eligibility based primarily on age thresholds **(Topic 1)**. As a result of this approach, vaccine coverage at any point in time is significantly determined by age.

160. However, as a broad indication of vaccine coverage across the UK, we summarise below the proportion of the population who received at least 1 dose of Covid-19 vaccination by 30th September 2021. There was modest variation in coverage by UK nation. Coverage was highest in Scotland (76.73%) and the lowest in Northern Ireland (69.27%).

161. Data below (Figures 2-3) are drawn from Our World in Data, which uses the whole population as the denominator (based on UN data). Hence the % coverage is of the entire population, *not the population eligible for vaccination*. For example, there was no recommendation for universal vaccination in children under the age of 5, only children aged 6 months to 4 years of age with an underlying clinical risk factor.

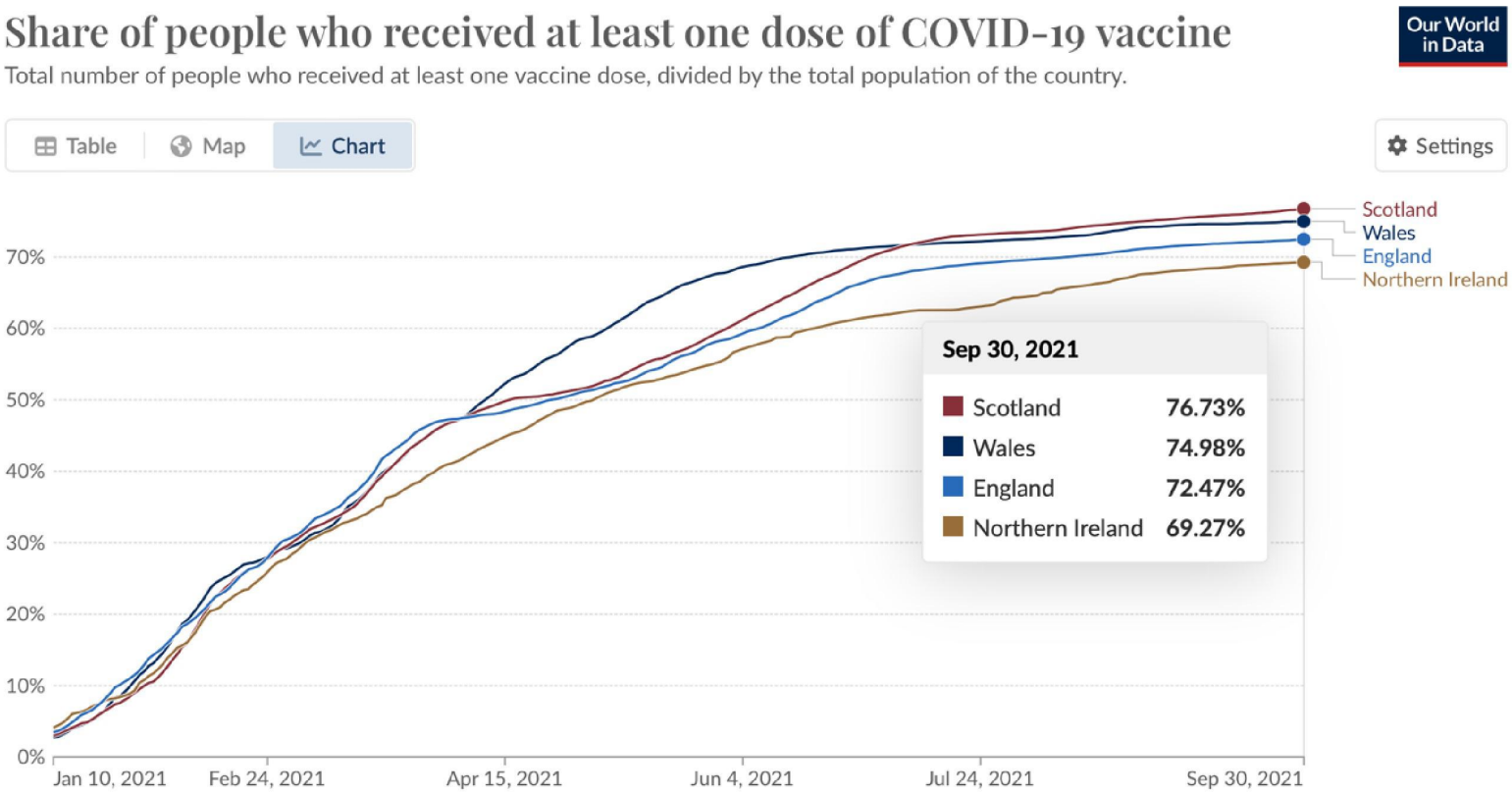

Figure 1: Population-wide coverage of at least one dose up to 30 September 2021 across the four nations. As of 30 June 2022, coverage had increased to 83% in Scotland, 81% in Wales, 80% in England, and 75% in Northern Ireland. Data obtained from Our World in Data, which presents UK vaccination data sourced from UK Gov dashboard.

162. The proportion of the population who received 2 doses of Covid-19 vaccination ('initial COVID-19 vaccination protocol') by 30th September 2021 is surmised below. Modest variation in coverage occurred between UK nations, with the same stratified levels of coverage (Scotland highest, Northern Ireland lowest).

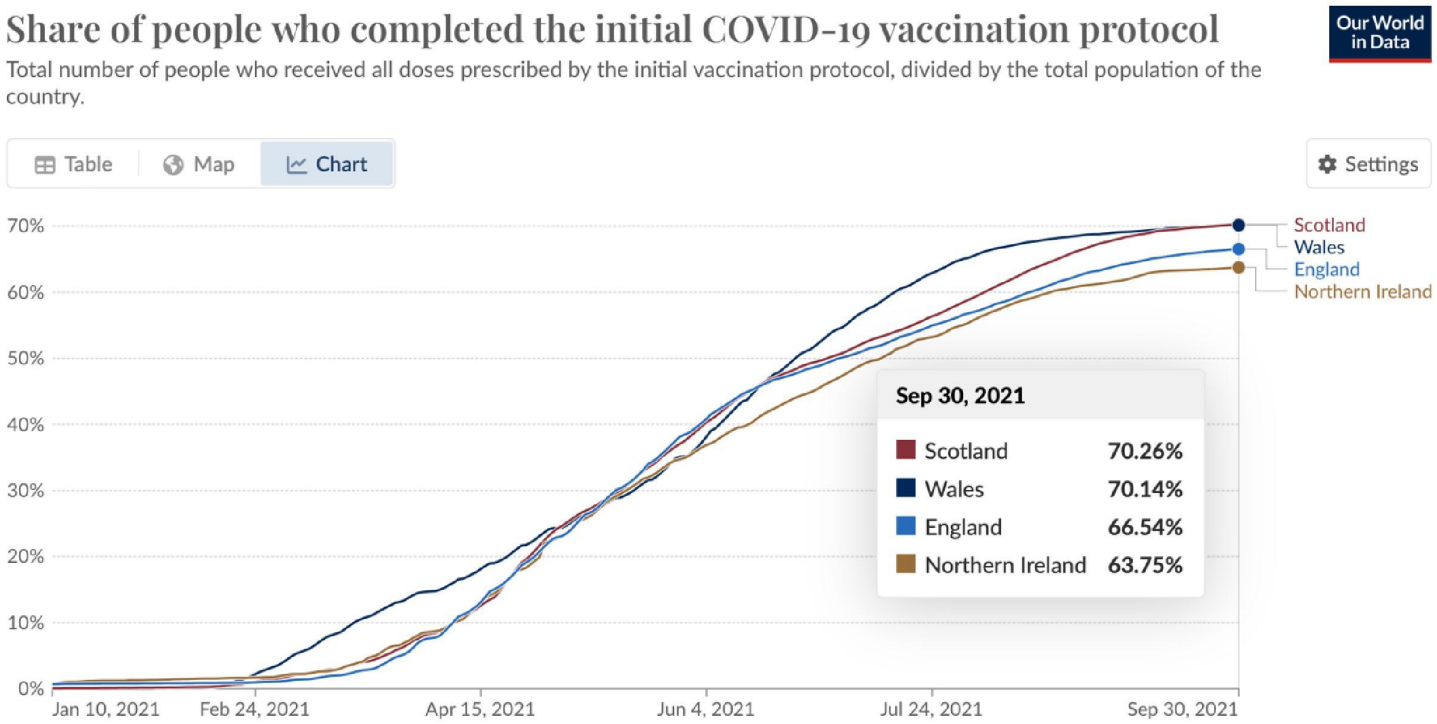

Figure 2: Population-wide coverage with at least two doses up to 30 September 2021 across the four nations.[29]

[29] As of 30th June 2022, coverage had increased to 78% in Scotland, 77% in Wales, 75% in England, and 71% in Northern Ireland. Data obtained from Our World in Data, which presents UK vaccination data sourced from UK Gov dashboard.

163. Coverage rates in England indicate increased over the course of the Covid-19 vaccination programme. All phase 1 and phase 2 priority cohorts were eligible for vaccination by 8th June 2021, as noted in **Topic 1**. To exemplify upticks in coverage, in the tables below we relay coverage as of the following dates:

    a. 27th June 2021 (when phase 1 and phase 2 priority cohorts would have been invited for vaccination)

    b. 26th December 2021 (6-month interval, when under-18 cohorts would have been eligible for vaccination following CMO recommendation (see **Topic 1**).

    c. 26th June 2022 (date closest to the 28th June 2022 cut-off date).

164. Age cohorts between 18 and 45 exhibited the starkest increases in coverage at first dose and second dose between these three time periods. We attempt to contextualise disparities between age cohorts in Section II. Data made available by PHE CHIME illustrates the percentage of adults receiving two vaccinations by age cohort. By May 2021, 95.2% of adults aged 80+ in England had received two Covid-19 vaccinations. While adults aged 18-29 remained the least-vaccinated age cohort, coverage attained the 75% target (planning assumption) by June 2022 (75.9%).

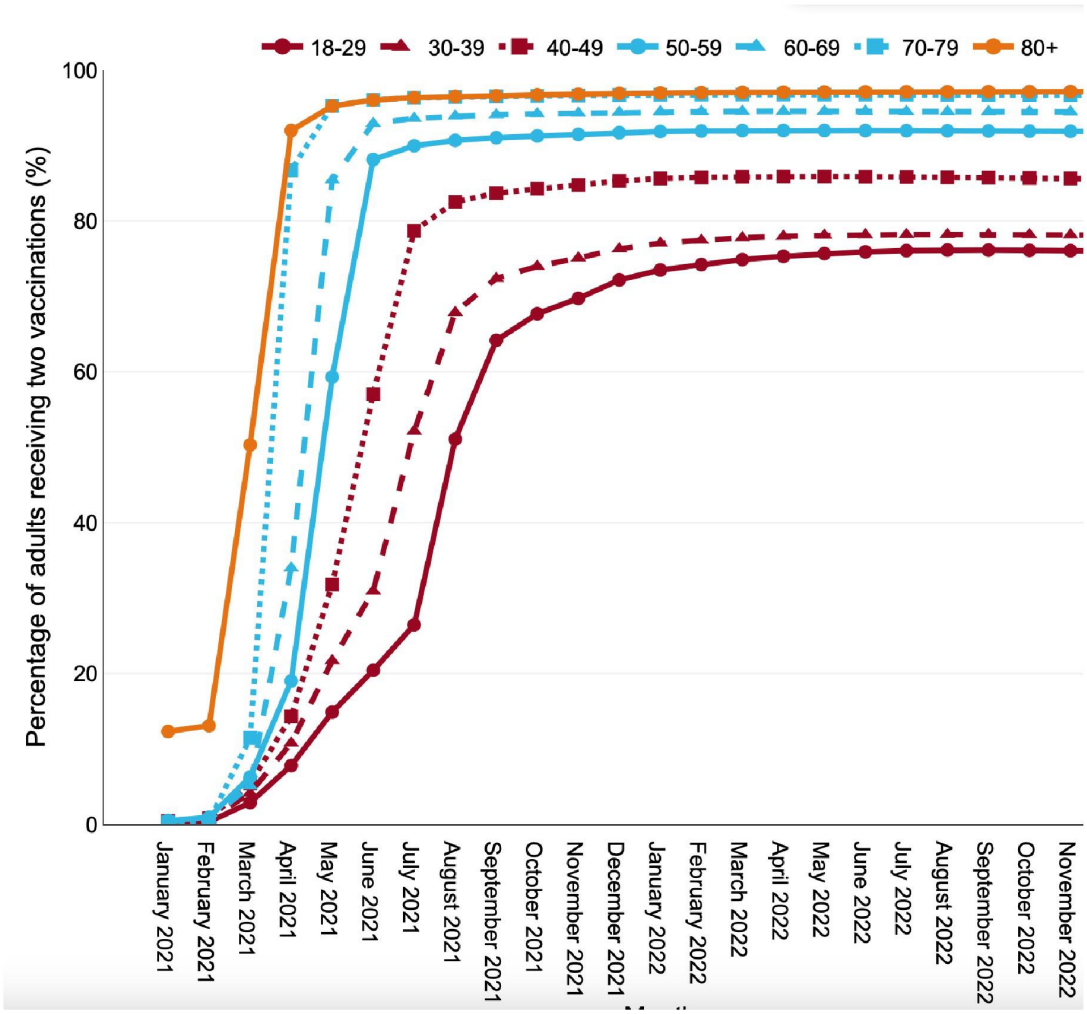

Figure 3: Percentage of adults receiving two Covid-19 vaccines by age cohort in England.

165. The below tables are drawn from National flu and COVID-19 surveillance reports on 1 July 2021 (week 26), 6 January 2022 (week 1), and 30 June 2022 (week 26). They offer more granular data, including the changing age groups across timepoints.[30]

Coverage by age over time in England					
	27/6/2021				
		≥1 dose		≥2 doses	
Age	N (NIMS)	N vaccinated	%	N vaccinated	%
≥80	2,943,660	2,799,087	95.1	2,751,535	93.5
75–79	2,351,875	2,237,381	95.1	2,211,888	94.0
70–74	2,766,506	2,585,721	93.5	2,548,235	92.1
65–69	2,991,477	2,726,219	91.1	2,660,536	88.9
60–64	3,626,033	3,234,195	89.2	3,103,666	85.6
55–59	4,173,716	3,633,372	87.1	3,443,490	82.5
50–54	4,247,544	3,559,285	83.8	3,152,258	74.2
45–49	3,956,343	3,074,800	77.7	2,015,780	51.0
40–45	4,345,825	3,089,581	71.1	1,552,648	35.7
35–39	4,685,833	2,967,955	63.3	1,178,431	25.1
30–34	4,894,237	2,762,847	56.5	999,717	20.4
25–29	4,562,298	2,227,975	48.8	786,654	17.2
20–25	3,919,496	1,631,468	41.6	561,375	14.3
18–19	1,389,534	315,906	22.7	93,443	6.7
16–17	1,392,666	35,539	2.6	18,969	1.4
12–15	2,943,308	1,028	0.0	331	0.0
5–11	5,083,985	114	0.0	13	0.0
<5	3,094,683	73	0.0	4	0.0

Table 8: Coverage by age in England, according to dose, by 27th June 2021.

	26/12/2021						
	≥1 dose			≥2 doses		≥3 doses	
Age	N (NIMS)	N vaccinated	%	N vaccinated	%	N vaccinated	%
≥80	2,943,660	2,811,525	95.5	2,791,989	94.8	2,646,422	89.9
75–79	2,351,875	2,249,099	95.6	2,233,338	95.0	2,142,470	91.1
70–74	2,766,506	2,604,213	94.1	2,581,003	93.3	2,447,152	88.5
65–69	2,991,477	2,754,683	92.1	2,721,329	91.0	2,499,560	83.6
60–64	3,626,033	3,279,405	90.4	3,228,364	89.0	2,813,501	77.6
55–59	4,173,716	3,701,259	88.7	3,630,490	87.0	3,003,529	72.0
50–54	4,247,544	3,656,526	86.1	3,567,040	84.0	2,753,773	64.8
45–49	3,956,343	3,215,059	81.3	3,106,756	78.5	2,074,068	52.4
40–45	4,345,825	3,309,874	76.2	3,159,296	72.7	1,887,461	43.4
35–39	4,685,833	3,338,927	71.3	3,136,208	66.9	1,591,289	34.0
30–34	4,894,237	3,317,416	67.8	3,055,687	62.4	1,362,218	27.8
25–29	4,562,298	3,002,821	65.8	2,717,738	59.6	1,037,613	22.7
20–25	3,919,496	2,692,569	68.7	2,373,063	60.5	794,141	20.3
18–19	1,389,534	950,144	68.4	755,527	54.4	173,140	12.5
16–17	1,392,666	803,765	57.7	299,296	21.5	13,065	0.9
12–15	2,943,308	1,164,297	39.6	33,840	1.1	227	0.0
5–11	5,083,985	469	0.0	163	0.0	1	0.0
<5	3,094,683	113	0.0	13	0.0	0	0.0

[30] We thank Dr Ed Parker for his support in collating this information, which is beyond our expertise.

Table 9: Coverage by age in England, according to dose, by 26th December 2021.

	26/6/2022						
	≥1 dose			≥2 doses		≥3 doses	
Age	N (NIMS)	N vaccinated	%	N vaccinated	%	N vaccinated	%
≥80	2,943,660	2,815,970	95.7	2,798,876	95.1	2,725,963	92.6
75–79	2,351,875	2,253,038	95.8	2,238,030	95.2	2,183,976	92.9
70–74	2,766,506	2,608,808	94.3	2,586,328	93.5	2,498,704	90.3
65–69	2,991,477	2,761,826	92.3	2,730,188	91.3	2,586,989	86.5
60–64	3,626,033	3,290,155	90.7	3,244,313	89.5	2,984,917	82.3
55–59	4,173,716	3,716,523	89.0	3,654,615	87.6	3,277,041	78.5
50–54	4,247,544	3,676,933	86.6	3,600,944	84.8	3,124,293	73.6
45–49	3,956,343	3,242,244	82.0	3,152,649	79.7	2,580,736	65.2
40–45	4,345,825	3,351,105	77.1	3,228,310	74.3	2,485,570	57.2
35–39	4,685,833	3,403,609	72.6	3,242,287	69.2	2,317,914	49.5
30–34	4,894,237	3,411,412	69.7	3,205,531	65.5	2,135,781	43.6
25–29	4,562,298	3,117,882	68.3	2,890,434	63.4	1,809,998	39.7
20–25	3,919,496	2,828,268	72.2	2,562,356	65.4	1,533,820	39.1
18–19	1,389,534	1,018,130	73.3	897,310	64.6	473,785	34.1
16–17	1,392,666	910,663	65.4	699,839	50.3	189,298	13.6
12–15	2,943,308	1,568,417	53.3	1,047,893	35.6	18,489	0.6
5–11	5,083,985	487,587	9.6	24,856	0.5	41	0.0
<5	3,094,683	124	0.0	15	0.0	2	0.0

Table 10: Coverage by age in England, according to dose, by 26th June 2022.

A summary of any known disparities in coverage of the UK Covid-19 Vaccines within the UK

166. Disparities in coverage should be understood intersectionally. We refer the Covid-19 Inquiry to the Scottish Government (2022a) report, which offers a helpful overview of the development of intersectionality as a framework:

> 'a recognition that **people are shaped by simultaneous membership of multiple interconnected social categories**. The interaction between multiple social categories occurs within **a context of connected systems and structures of power** (e.g. laws, policies, governments). A recognition of inequality of power is key to intersectionality. Structural inequalities, reflected as relative disadvantage and privilege, are the outcome of interconnected social categories, power relations and contexts.' [Emphasised in original report]

167. A study published in *The Lancet* in 2024 captures the proportions of under-vaccinated people across UK-nations, based on receiving all recommended doses (according to age cohort or risk) (The HDR UK COALESCE Consortium, 2024). The study identified that Northern Ireland tended to have the largest percentage of under-vaccinated people across age cohorts of all UK-nations. Scotland and Wales consistently had smaller percentages of under-vaccinated people across age cohorts compared to England.

Age

168. NHS England had offered all adults a first dose, and two thirds of adults their second dose, by 18th July 2021. Age-related differences reduced throughout the Covid-19 vaccination programme:

    a. As of 18th July 2021, approximately 65% of adults aged 18-24 had received a first dose and 19% had received a second dose (NHS England, 2021f).

    b. By 24th October 2021, coverage in this age cohort increased to approximately 75% for the first dose and 63% for the second dose (NHS England, 2021e).

    c. By 26th June 2022, approximately 81% had received a first dose and 74% had received a second dose (NHS England, 2022).

169. Adults aged 18-29 were the last eligible cohort to be invited for vaccination in Phase 2. Vaccinations for JCVI group 12 began in June 2021. Timelines indicate that Covid-19 control measures ("social distancing" or "lockdown") were eased in England prior to this cohort being offered vaccinations (Institute for Government, no date), including:

    a. Re-opening of 'non-essential enterprises', gyms in April 2021

    b. Spectator numbers of 10,000 people permitted in outdoor venues such as football stadiums in May 2021

    c. Step 4 of the roadmap originally was set for 14 April 2021 but delayed until 19 July 2021 to enable the Covid-19 vaccination programme to progress.

    d. We are unable to draw a direct correlation between loosening of restrictions before June 2021 and lower-level uptake in the last priority groups. However, the loosening of restrictions before June 2021 may have impacted risk-perceptions and how vaccine recommendations were received by people aged 18-29. Risk perceptions were speculated to be an issue underlying lower-level uptake among the lowest Phase 2 priority groups in England (Timmins and Baird, 2022), and similar challenges were encountered in Scotland (Health and Social Care Alliance Scotland, 2021).

170. Disparities within child cohorts, and between UK nations, was evident for the period under study. Data illustrates that uptake was lower among the 12-15 cohort compared to the 16-17 cohort across all UK nations (Aldridge et al., 2024). Coverage of first dose vaccination for these age cohorts was consistently lower in England than Scotland, though second dose coverage was higher for both cohorts in England indicating higher retention in the Covid-19 vaccination programme. There was no comparable coverage rates for children aged 12-15 and 16-17 as of 26th June 2022 (the closest day to 28th June 2022 cut-off for which vaccine coverage data is available).

Vaccinated by 19th December 2021 (NHS England, 2021g)	**Individuals aged 12-15**	**Individuals aged 16-17**
1st dose	50%	69%

Vaccinated by 26th June 2022 (NHS England, 2022)	Individuals aged 12-15	Individuals aged 16-17
1st dose	58.6%	73.4%
2nd dose	39.1%	56%

Table 11: Proportion of children vaccinated according to age in England.

Vaccinated between 6 August 2021 and 1 March 2022, Scotland (Rudan et al., 2022)	Individuals aged 12-15	Individuals aged 16-17
1st dose	64.5%	75.9%
2nd dose	37.2%	49.0%

Table 12: Proportion of children vaccinated according to age in Scotland.[31]

171. Behavioural insights research conducted in Scotland (Scottish Government, 2022b) indicated the importance of risk perceptions in decisions to vaccinate children:

    a. Older children tended to be more involved in decision making compared to younger children. However, there was no indication of these age ranges;

    b. Those with strong views on the Covid-19 vaccination typically felt similarly regarding whether their children should be vaccinated;

    c. Those who had not had any Covid-19 vaccinations themselves were particularly against their children receiving it;

    d. Parents may have accepted Covid-19 vaccination for themselves but were not confident in their children being vaccinated for two key reasons: a perception that children did not need the vaccine due to being low risk; and believing that they had taken a risk by getting a newly developed vaccine and feeling uncomfortable with taking this decision on behalf of their children;

    e. Parents were more accepting of the child receiving an influenza than Covid-19 vaccine due to 'greater overall trust in the flu vaccine.'

[31] Coverage in Scotland has been drawn from Rudan et al (2022), which uses a slightly earlier cut-off than the data available for England. We have not been able to determine comparable information for Wales. Research identified that 72.4% of individuals aged 11-15/16 received a first dose vaccination by 31st May 2022, and of these, 82.5% received a second dose (Lowthian et al, 2023). The age range used in this study appears to be broader than the 12-15 age range referred to in the comparison between England and Scotland. By 11h January 2022, 78.5% of 16 and 17 year olds received their initial first dose (Welsh Government 2022).

172. Scotland began vaccinating children aged 5-11 at higher risk on 25th January 2022. Reports produced by Public Health Scotland (of which all data between #5-5.3 is drawn) notes that by 8th May 2022, uptake at one dose was 28.6%. Scotland began vaccinating all children aged 5-11 from mid-March 2022. First dose uptake for all children aged 5-11 on 8th May 2022 was 17.7% (n=74,114). By May 2022, Scotland had the highest Covid-19 vaccine uptake rate in the UK amongst 5–11-year-olds:

Country	Uptake	Uptake reported as at
England	6.3%	5 May 2022
Northern Ireland	-	-
Scotland	17.7%	8 May 2022
Wales	9.5%	9 May 2022

Table 13: Uptake of first dose of Covid-19 vaccine among 5–11-year-olds across the UK.[32]

Sex

173. By 18th July 2021, when all adults in England had been offered a Covid-19 vaccine, there were negligible differences in first dose vaccine uptake between males and females in upper age cohorts but higher uptake among females in second phase cohorts. Approximate percentages are as follows (NHS England, 2021f):[33]

Age cohort	Female	Male
80+	94%	95%
75-79	100%	100%
70-74	97%	97%
65-69	95%	96%
60-64	99%	100%
55-59	98%	99%
50-54	94%	92%
45-49	87%	87%
40-44	92%	88%

[32] We were unable to determine data for Northern Ireland.
[33] Data presented in this table derives from ONS denominators, which are estimates and not individual-level data. More information in Annex 3.

35-39	95%	90%
30-34	81%	75%
25-29	72%	65%
18-24	68%	60%

Table 14: Percentage difference in first dose Covid-19 vaccine uptake by sex in England.

174. A study led by UKHSA (Tessier et al, 2022) found higher coverage in females than males aged ≥50 years up to 17th May 2021 after accounting for other factors that might contribute to variation. No marked discrepancy between sexes was seen in 1-dose coverage up to 17 March 2021 during a study of individuals aged ≥80 years conducted in OpenSAFELY (Curtis et al, 2021).

175. The Public Health Scotland (2022a) programme evaluation reported overall vaccination rates with at least one dose of 80.8% in females and 76.2% in males.

176. In Wales, the archived dashboard does not contain coverage data by sex (Public Health Wales Health Protection no date). Further information (unpublished data) is available (INQ000474538), which notes that vaccine uptake among women at younger ages was higher (linked to a higher likelihood of working in the health and social care sector and being eligible for vaccination for longer). The Health and Social Care Northern Ireland (2024) COVID-19 Vaccinations Dashboard does not contain a breakdown of vaccine coverage by sex at the time of writing.

177. Several studies found significantly higher coverage in females than males after accounting for demographic (and some clinical) factors, but clinical factors are generally not very detailed. Underlying health conditions associated with sex may therefore have contributed to these discrepancies in coverage in ways that are not reflected in current analyses.

178. Studies have indicated that there was little difference in vaccine uptake by sex among child cohorts aged 12-15 (e.g. Aiano et al, 2023).

Ethnicity

179. Disparities in Covid-19 vaccine coverage by ethnicity were continuous throughout the period of roll-out to 26th June 2022. Ethnic minority groups in **England** had lower age-standardized rates of vaccination coverage compared with the White British population (Office for National Statistics, 2022). Covid-19 vaccine uptake varied by ethnicity in upper age priority cohorts that had been eligible for vaccination the longest. Among adults aged 80+ who received two Covid-19 vaccine doses, people of **Black African** and **Black Caribbean** ethnicities in England consistently had lower-levels of uptake compared to people of White British and Indian ethnicities. Just 65.6% of Black African people aged over-80, compared with 97.4% respectively of White British people, were vaccinated in England (Race Disparity Unit [3rd quarterly report], 2021). People from the **Indian ethnic group** have the highest uptake rates after White ethnic groups, at 91.2% of over-80s (Race Disparity Unit [3rd quarterly report], 2021). **Given that JCVI ranked the age 80+ cohort as the second priority group due to**

severity of risk of morbidity and mortality from SARS-CoV-2 infection, the disparity is of major public health concern.

180. In adults aged 50+ who received two doses of Covid-19 vaccination, adults of Black Caribbean ethnicities were consistently the least vaccinated ethnic minority from May 2021, when coverage was 53% compared to 54.7% among people of Black African ethnicities. The gap between the two least-vaccinated ethnic minorities widened thereafter. Uptake among adults aged 50+ appears to have increased at different rates among minority groups. An efficient pattern of uptake was observed in people of Chinese ethnicities, which increased from 33.2% in April 2021 to 66.4% in May 2021, and then to 84.2% in June 2021. Uptake among adults of Black Caribbean ethnicities increased from 29.8% in April 2021 to 53% in May 2021 and then to 65.4% in June 2021. More granular data, including cohort size, are outlined in the below tables:

	27/06/2021 (reported for ≥50s)				
	≥1 dose		≥2 doses		
Ethnicity	N (NIMS)	N vaccinated	%	N vaccinated	%
White - British	16,072,114	15,325,493	95.4	14,902,867	92.7
White - Irish	162,141	146,648	90.4	140,990	87.0
White - Other	1,195,565	956,751	80.0	906,370	75.8
Mixed - White and Black Caribbean	40,309	29,205	72.5	26,573	65.9
Mixed - White and Black African	29,495	21,995	74.6	19,719	66.9
Mixed - White and Asian	30,165	25,601	84.9	24,161	80.1
Mixed - Any other mixed background	70,025	57,483	82.1	53,861	76.9
Asian or Asian British - Indian	448,449	401,578	89.5	380,442	84.8
Asian or Asian British - Pakistani	250,340	201,634	80.5	173,540	69.3
Asian or Asian British - Bangladeshi	75,246	66,801	88.8	60,789	80.8
Asian or Asian British - Any other Asian background	227,405	194,852	85.7	181,675	79.9
Black or Black British - Caribbean	207,492	137,021	66.0	122,637	59.1
Black or Black British - African	250,904	180,513	71.9	156,725	62.5
Black or Black British - Any other Black background	98,803	68,125	69.0	59,556	60.3
Other ethnic groups - Chinese	87,714	68,807	78.4	64,574	73.6
Other ethnic groups - Any other ethnic group	276,179	213,057	77.1	196,238	71.1
Not Stated/Unknown	2,870,314	2,230,068	77.7	2,100,966	73.2

Table 15: First and second dose data captures at 27th June 2021.

	26/12/2021 (reported for ≥30s)						
	≥1 dose			≥2 doses		≥3 doses	
Ethnicity	N (NIMS)	N vaccinated	%	N vaccinated	%	N vaccinated	%
White - British	25,483,618	23,589,627	92.6	23,140,189	90.8	NR	NR
White - Irish	262,403	222,160	84.7	216,919	82.7	NR	NR
White - Other	3,420,748	2,337,940	68.3	2,248,711	65.7	NR	NR
Mixed - White and Black Caribbean	103,490	66,360	64.1	61,883	59.8	NR	NR
Mixed - White and Black African	86,620	63,163	72.9	59,186	68.3	NR	NR
Mixed - White and Asian	89,281	70,878	79.4	68,071	76.2	NR	NR
Mixed - Any other mixed background	206,835	153,731	74.3	146,506	70.8	NR	NR
Asian or Asian British - Indian	1,155,915	963,638	83.4	933,651	80.8	NR	NR
Asian or Asian British - Pakistani	757,781	599,003	79.0	553,471	73.0	NR	NR
Asian or Asian British - Bangladeshi	270,638	227,611	84.1	216,469	80.0	NR	NR
Asian or Asian British - Any other Asian background	647,960	531,055	82.0	508,993	78.6	NR	NR
Black or Black British - Caribbean	339,863	206,638	60.8	193,340	56.9	NR	NR
Black or Black British - African	675,055	482,896	71.5	447,481	66.3	NR	NR
Black or Black British - Any other Black background	241,318	157,122	65.1	144,724	60.0	NR	NR
Other ethnic groups - Chinese	252,375	180,469	71.5	173,560	68.8	NR	NR
Other ethnic groups - Any other ethnic group	806,140	567,236	70.4	537,690	66.7	NR	NR
Not Stated/Unknown	4,840,685	3,333,475	68.9	3,132,445	64.7	NR	NR

Table 16: First and second dose data captures at 26th December 2021.

181. By April 2021, 62.2% of adults of Black African ethnicities had been vaccinated compared to 93.2% of White British and 87% of people of Indian ethnicities. It was not until June 2022 that coverage attained the 75% coverage threshold (planning assumption) in people of Black African ethnicities.[34]

	26/06/2022 (reported for ≥18s)						
	≥1 dose			≥2 doses		≥3 doses	
Ethnicity	N (NIMS)	N vaccinated	%	N vaccinated	%	N vaccinated	%
White - British	30,802,432	28,062,083	91.1	27,436,135	89.1	23,765,827	77.2
White - Irish	305,717	253,280	82.8	246,518	80.6	214,829	70.3
White - Other	4,388,904	2,906,037	66.2	2,790,477	63.6	2,048,085	46.7
Mixed - White and Black Caribbean	164,639	102,115	62.0	94,665	57.5	60,582	36.8
Mixed - White and Black African	127,505	90,488	71.0	84,403	66.2	51,723	40.6
Mixed - White and Asian	142,794	111,964	78.4	106,847	74.8	80,681	56.5
Mixed - Any other mixed background	311,702	225,224	72.3	212,705	68.2	152,819	49.0
Asian or Asian British - Indian	1,474,694	1,224,103	83.0	1,176,847	79.8	912,168	61.9
Asian or Asian British - Pakistani	1,054,661	824,367	78.2	767,846	72.8	374,811	35.5
Asian or Asian British - Bangladeshi	383,513	315,819	82.3	298,084	77.7	180,916	47.2
Asian or Asian British - Any other Asian background	896,719	722,976	80.6	687,083	76.6	495,730	55.3
Black or Black British - Caribbean	414,385	242,911	58.6	227,074	54.8	147,501	35.6
Black or Black British - African	922,766	642,042	69.6	593,107	64.3	325,935	35.3
Black or Black British - Any other Black background	349,417	218,379	62.5	200,496	57.4	111,353	31.9
Other ethnic groups - Chinese	457,585	289,346	63.2	264,323	57.8	211,474	46.2
Other ethnic groups - Any other ethnic group	1,131,916	768,320	67.9	723,290	63.9	487,308	43.1
Not Stated/Unknown	6,386,870	4,131,308	64.7	3,824,863	59.9	2,934,506	45.9

Table 17: First and second dose data captures at 26th June 2022.[35]

[34] Points 7.14-7.16 discuss disparities in England.

[35] Data obtained from National flu and COVID-19 surveillance reports on 1st July 2021 (week 26), 6th January 2022 (week 1), and 30th June 2022 (week 26). Note the changing age groups across timepoints. NR is an abbreviation for not reported.

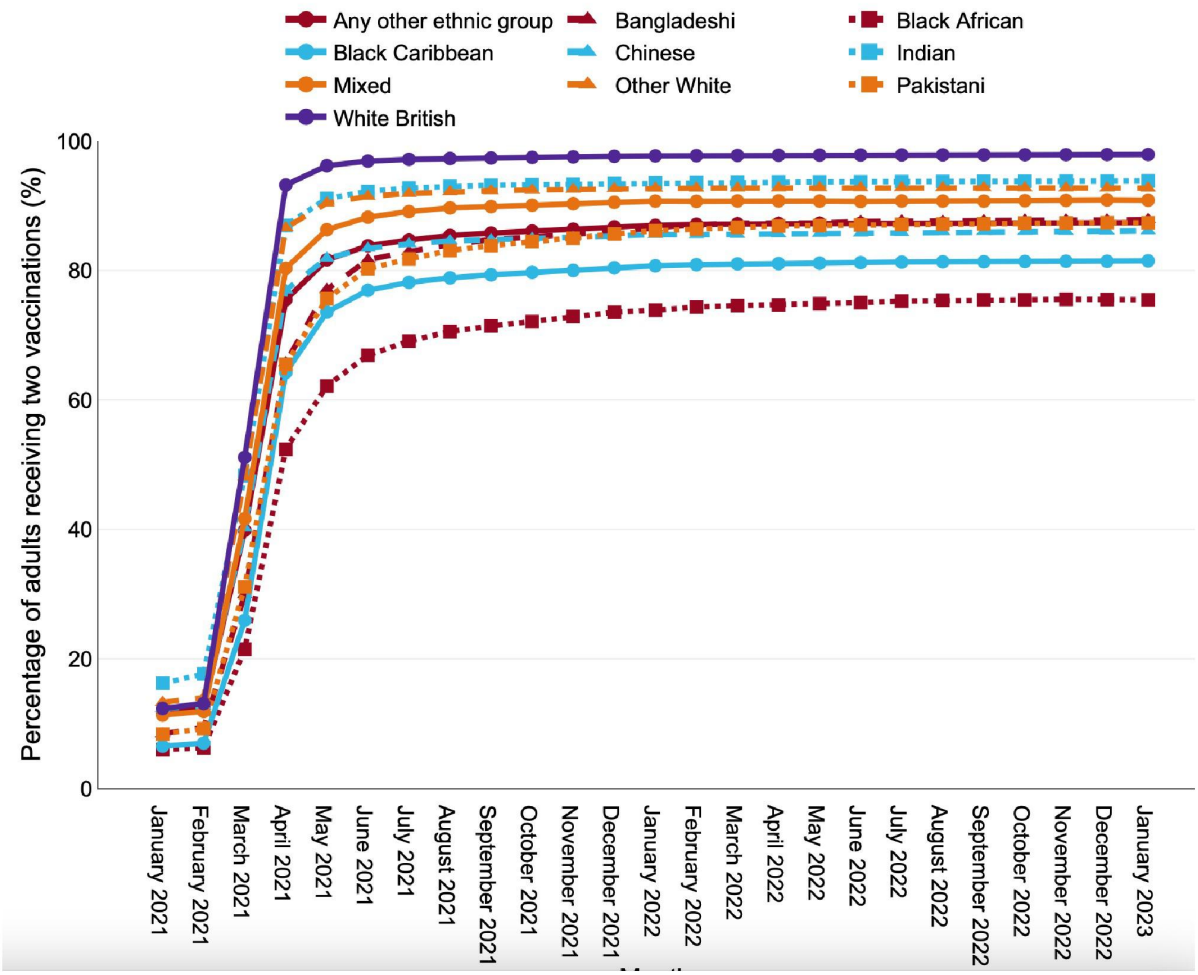

Figure 5: Percentage of adults who received two vaccinations by ethnic group, England. PHE Chime.

182. The proportion of under-vaccinated (i.e. not receiving all eligible doses) people of Black ethnicity was highest in **England** (74.6%) compared to **Scotland** (61.0%) and **Wales** (60.5%) – but information for Northern Ireland is not available (HDR UK Coalesce Consortium, 2024).

183. The Office for National Statistics (2022) surmised that lower vaccination coverage in some ethnic groups in **England** was a contributing factor to the elevated risk of COVID-19 death.[36] People from Black Caribbean and Black African ethnic groups were at higher risk of COVID-19 mortality than White British people after adjusting for age, socio-economic factors and pre-existing health conditions. **However, after adjusting for vaccination status, there was no evidence of greater risk of death involving COVID-19 compared with the White British ethnic group, suggesting that differences in vaccination coverage between the Black Caribbean and Black African ethnic groups and the White British ethnic group explain a large part of the excess risk.**

[36]Based on analysis of death rates in England from Covid-19 between 8/12/2020 to 8/12/2021.

184. Public Health **Scotland** began to publish disaggregated data (ethnicity; deprivation) in March 2021 (Scottish Government, 2021b). Uptake among people of Black African and Black Caribbean ethnicity, and Polish origin, was significantly lower than White British/Scottish/Irish ethnicities. As of 28 September 2021, dose 1 vaccine uptake was highest among White ethnicities aged 18 and above at 89% compared to 68% in 'Caribbean or Black ethnic groups.' Uptake at 2 doses was 84% and 60% respectively. Uptake at 2 doses was lowest among 'African ethnic groups' (54%). People of Polish, Other African, and Gypsy/Traveller groups were a third as likely to take up one or more vaccine doses compared with the White Scottish population (Public Health Scotland, October 2022). The below table outlines ethnic groups with the 3 highest and 3 lowest levels of uptake in Scotland, up to and including 30th June 2022 (Public Health Scotland, October 2022):

Ethnicity	**% vaccinated with at least one dose**	**% unvaccinated**
Irish	88.6%	11.4%
Other British	86.%	13.4%
White Scottish	84.9%	15.1%
Other African	54.1%	45.9%
Polish	52%	48%
Gypsy/Traveller	44.9%	55.1%

Table 18: Percentage of people vaccinated with at least one dose compared to unvaccinated, by ethnicity in Scotland. Adapted from Public Health Scotland (2022).

185. Percentage uptake of first dose Covid-19 vaccination by 5th May 2021 was lower among people of ethnic minority backgrounds in **Wales**, and was lowest among people of Black ethnicities. The gap in coverage observed between ethnic groups widened over the first five months of the programme as additional priority groups became eligible (Perry et al., 2021). Differences were consistent across age cohorts eligible for vaccination by this time (Audit Wales, 2021; Perry et al, 2021):

Ethnic Group	**White**	**Black**	**Asian**	**Mixed**	**Other**
Age 80+	97.2%	80.7%	87.3%	93.1%	82.5%
Age 70-79	96.6%	79.9%	87.3%	88.0%	83.4%
Age 60-69	94.4%	76.8%	86.6%	84.5%	78.9%
Age 50-59	91.3%	71.9%	84.3%	79.4%	71.7%

Table 19: First dose data captures by age and ethnicity in Wales.

186. Further disaggregation of this data would be helpful, as it is not possible to ascertain the 'Other' category – which had the lowest-level uptake after people of Black ethnicities. There are long-standing issues in data capture concerning particular minorities that are distinct in terms of ethnic background. This raises implications for accurate assessments of coverage, for example, among Orthodox (Charedi) Jewish populations (in England) and Roma, Gypsy, Traveller communities (UK-wide).

187. Evidence indicates that inequalities linked to ethnicity occurred among child cohorts. Aiano et al's (2023) report on vaccine uptake among 12-17 year olds enrolled in state-maintained schools across England. Inequalities linked to ethnicity were extremely clear, and low-level uptake among children of Black Caribbean origin was consistent with upper age cohorts:

Individuals aged 12-17 by ethnic group	**Percentage with 1st dose vaccination by 9 January 2022**
Chinese	75.5%
Indian	65.7%
White British	59.1%
Bangladeshi	45.8%
Black African	27.1%
Gypsy or Roma	12.4%
Black Caribbean	12.4%

Table 20: First dose data captures by ethnicity, England.

188. Uptake among Roma, Gypsy & Traveller (RGT) communities in Scotland was lower compared to the White Scottish population. However, there were limitations in accurately assessing RGT population size and vaccination coverage,[37] which was not specific to Scotland, and issues in accuracy of data coverage limit our ability to gauge disparities across the UK. Accurate disaggregation of data is important for understanding variation within ethnic groups with low-level coverage, such as people of Black African ethnicity. For example, disaggregated data for people identifying as Somali is not available. Consequently, indications are drawn from small-scale surveys and local authority data in London, which note lower than average uptake of childhood immunisations (London Borough of Hammersmith and Fulham, 2021). A possible reason for the lack of accurate data on vaccine uptake among Somali populations is the use of broad, non-specific identifying terms such as 'BAME' or 'Black African' when coding ethnicity in vaccine coverage (Somali Youth Development Resource Centre, 2022).

[37] The Covid-19 Inquiry provided us with a summary report of an Inclusion Sharing Session (31 March 2022) produced by Public Health Scotland Vaccine Evaluation and Confidence & Equity Teams, focusing on vaccine uptake in Gypsy Traveller communities (INQ000408679).

Religion

189. We are not able to draw a firm conclusion on how religion influenced vaccine uptake and disparities because it is difficult to disaggregate religion from the intersecting issues of ethnicity, gender and deprivation. Available data uses homogenous categories of 'Jewish' or 'Muslim,' which prevents an understanding of uptake among different denominations and how this might be relevant to disparities in uptake.

190. Limitations in data recording hampers accurate assessments of childhood vaccine coverage among sub-groups or denominations. This is particularly the case for Orthodox (Charedi) Jewish populations (Kasstan et al., 2023b), who have been vulnerable to persistent outbreaks of preventable diseases. Approximate coverage levels instead need to be inferred from GP surgeries that may serve Charedi populations, but this does not offer an accurate view. Seroprevalence studies indicated that Charedi Jews in north London had extremely high rates of Covid-19, of approximately 74% among adults (Gaskell et al., 2021). Demographers have argued that 'the excess mortality among Jews was higher relative to non-Jews' in England and Scotland (Staetsky, 2024). There is no way to accurately discern Covid-19 vaccine uptake among Charedi groups.

191. While we are unable to determine if religion was the core influence or root cause of disparity, there is strong evidence that interventions to promote uptake among religious groups were effective **(Topic 4)**.

192. We have considered vaccine uptake (two doses) and disparities using the Covid-19 Health Inequalities Monitoring for **England** (CHIME) tool, but are not able to source comparable data for DA. **Jewish** adults in England had the highest levels of uptake from January 2021 to July 2021 (78.3%). **Hindu** adults had the highest levels of uptake from August 2021 (84.6%) until June 2022 (90.4%). **Muslim** adults consistently had the lowest levels of uptake over this period. Data indicates the level of uptake increased, almost attaining the 75% target by June 2022 (74.9%), but this is too far into the Covid-19 vaccine programme to be considered a success. By June 2022, only **Hindu**, **Christian** and **Jewish** adults had received three vaccinations at a rate of 75% uptake or above.

193. Gaughan and colleagues (2022) used vaccination data from the National Immunisation Management System (NIMS) linked to the 2011 Census and individual health records for people aged >40 in **England** (n= 24,094,186). The authors focused on ethnicity and individual sociodemographic factors (such as age and religious affiliation), drawn from the 2011 census. The authors attempted to estimate vaccination rates disaggregated by ethnicity and religious affiliation. The authors noted that 'people who identified as Muslim (compared with Christian, Hindu or no religion) had lower vaccination uptake across most ethnic groups.

Geographic region

194. The number of adults who had received two doses of Covid-19 vaccination was lowest in London across all age groups by June 2022:

Age Group	London %	Highest region %
80+	92.4%	North East 98%

70-79	92.5%	North East 97.8%
60-69	89.3%	North East 96.1%
50-59	85.7%	South West 93.7%
40-49	77.3%	South West 89.3%
30-39	70.3%	South West 83%
18-29	69.1%	South West 81.3%

Table 21: Data via CHIME (Office for Health Improvements and Disparities, no date).

195. Uptake among child cohorts was lower in London than the rest of **England**, based on research examining vaccine uptake among 12–17-year-olds enrolled in state-maintained schools across England (Aiano et al, 2023). The lower level of coverage in London for Covid-19 vaccination is consistent with routine vaccination programmes (see below).

Individuals aged 12-17 by region	**Percentage with 1st dose vaccination by 9 January 2022**
South East	60.7%
South West	58.5%
East of England	57.2%
East Midlands	54.9%
North East	54.4%
Yorkshire and the Humber	51.8%
West Midlands	49.8%
North West	48.8%
London	40.8%

Table 22: Percentage uptake of one dose among individuals aged 12-17 by NHS region England, adapted from Aiano et al (2023).

Socioeconomic status

196. Indicators of higher socio-economic deprivation have consistently been linked to lower uptake of Covid-19 vaccines across the UK.

197. By 25 April 2021, uptake of first dose Covid-19 vaccine was lower in the most deprived (89.7%) compared to the least deprived (94%) regions of **Wales** (Perry et al., 2021).

198. There was a 10% difference in the proportion of people who received at least one vaccine dose between the most (70.1%) and least (80.5%) deprived areas of **Scotland** (Public Health Scotland, 2022).

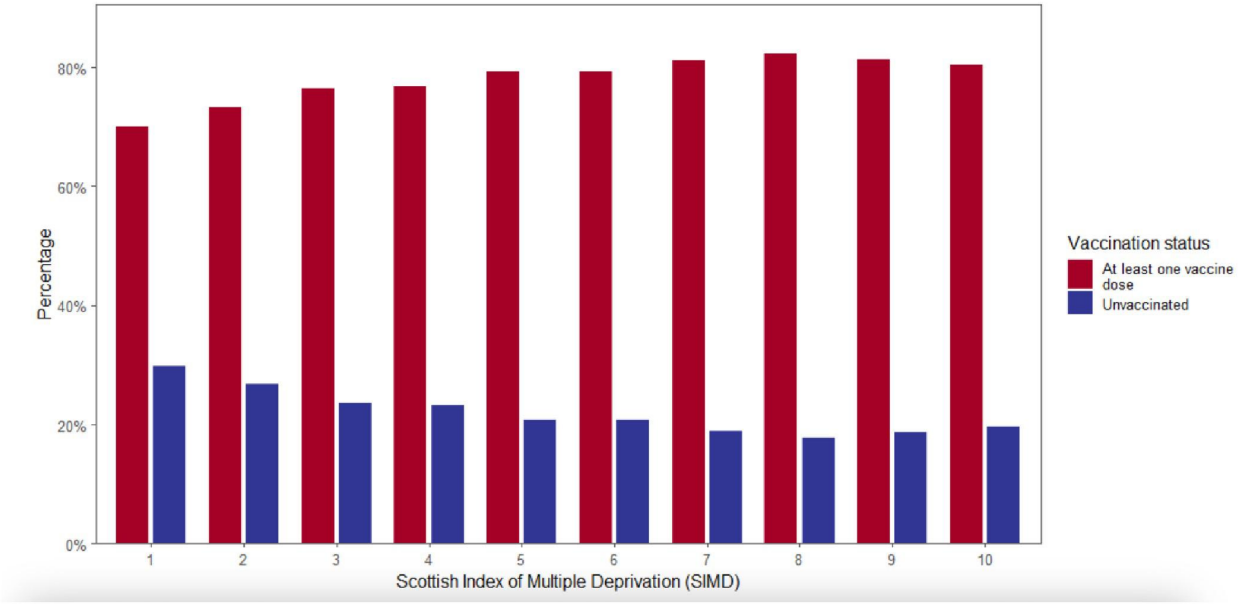

Figure 6: Proportion of vaccinated (one or more vaccine dose) and unvaccinated with Covid-19 vaccine by Scottish Index of Multiple Deprivation (SIMD).[38]

199. Disparities in vaccination coverage linked to inequality and deprivation were consistent across roll-out. By 30th January 2022, '71.3% of those in the least deprived areas [of **Scotland**] had received either their 3rd dose or booster Covid-19 vaccination. This compares to 51.0% in the most deprived areas' (Public Health Scotland, 2022). Analysis of **Scotland's** unvaccinated population indicates that approximately 494,288 adults had no record of Covid-19 vaccination by 10 August 2022 (Hameed et al., 2022). We recognise that the date used in the study falls beyond the 28th June 2022 cut-off date requested by the Covid-19 Inquiry but nonetheless offers helpful indicators of disparities at the Scotland-national level. The study notes that the unvaccinated cohort 'contained similar proportions of males and females, with similar age distribution across both sexes.' The mean age of the unvaccinated cohort was 42.4 years. The study notes that 29% of the unvaccinated cohort (and 18.7% of vaccinated individuals) lived in areas of higher deprivation (ranked by the Scottish Index of Multiple Deprivation as containing the most deprived 20% of the Scottish population. People living in areas of heightened deprivation were more likely to have remained unvaccinated.

200. The difference between the cumulative percentage of adults aged 18+ who received two Covid-19 vaccines by June 2022 was sharper in **England**. Uptake among adults in the most deprived areas was 79.3%, compared with 92.9% in the least deprived (Office for Health Improvements and Disparities, no date). Aiano et al's (2023) study of Covid-19 vaccine uptake among 12-15 year olds in England found that children in the most deprived decile were half as likely to be vaccinated (36.1% uptake of 1st dose) compared to the those in the least deprived decile (70.3% uptake of 1st dose). Patterns of inequality were also

[38] Key: 1=most deprived; 10= least deprived. Data presented here is up to and including 30th June 2022.

documented between children who had received free school meals compared to those who had not:

Status based on free school meal access	At least 1st dose vaccine uptake
Has accessed free school meals in the past 6 years	35.9%
Has not accessed free school meals in the past 6 years	58.9%

Table 23: Percentage uptake of at least one dose based on access to free school meals in England, adapted from Aiano et al (2023).

Pregnancy / breastfeeding status

201. Surveys conducted in **England** *prior to roll-out* (between March-October 2020) indicated higher reluctance to accept Covid-19 vaccines among pregnant women, with income and ethnicity serving as particular predictors of refusal (Skirrow et al., 2022). The survey also identified that women who had not been vaccinated against pertussis in pregnancy were four times more likely to report intention to decline the offer of a Covid-19 vaccine. A cohort study conducted between March 2020 and July 2021 in England identified that less than one third of eligible pregnant women and people had accepted Covid-19 vaccination (Blakeway et al., 2022). Low uptake was again linked to income and ethnicity. The dates in which the study was conducted indicate that inclusion criteria would be based on the JCVI guidance of April 2021, stipulating that pregnant women should be invited for vaccination along with their age or clinical risk group. The study notes that women from the most deprived socioeconomic background were less likely to receive a vaccine, highlighting the need for intersectional analysis on vaccine uptake.

202. Covid-19 vaccine uptake among pregnant women and people in **Scotland** reflected patterns across the UK, with significantly lower uptake among pregnant women and people by October 2021. Just 32.3% of women giving birth in October 2021 had received two Covid-19 vaccine doses, and further disaggregation of data indicated that rates were lower among the most deprived areas of Scotland (Stock et al., 2022). The study notes that 'The percentage of pregnant women vaccinated each month has declined since August 2021, reflecting the roll out of the vaccination program and the likelihood that an increasing proportion of women entering pregnancy are fully vaccinated. However, vaccine coverage, although increasing, remains low, with only a minority of pregnant women fully vaccinated by the time of delivery' (Stock et al., 2022).

Vaccine uptake	Pregnant women	All women aged 18-44
At least one dose	43%	85%
Two doses	32%	77%
Third or booster dose	1%	7%

Table 24: Percentage vaccine uptake by dose comparing pregnant women and all women aged 18-44, Scotland. Adapted from Covid-19 in Pregnancy in Scotland Study (2022).

203. Research conducted in **Wales** between April 2021 and December 2021, indicated that 32.7% of pregnant women received at least one Covid-19 vaccine dose during pregnancy; 34.1% were not vaccinated; 33.2% received the vaccine after giving birth (Mhereeg, et al. 2022).[39] Vaccine uptake rose rapidly in April 2021, which could be associated with JCVI advice that pregnant women should be invited for vaccination along with their age or clinical risk group. It was not until December 2021 that the JCVI advised that pregnant women constituted a priority cohort for vaccination. The study relayed that pregnant women were concerned about vaccine safety and long-term implications for their child's health.

Proficiency with the English language

204. CHIME data shows that adults resident in **England** who did not speak English as a main language were less likely to have received two doses of Covid-19 vaccine by June 2022 (74.9%) compared to adults who spoke English as a main language (88.5%).

Health and social care workers

205. Frontline health and social care workers were prioritised for vaccination in line with JCVI guidance, and social care (care home) workers were required to be vaccinated as a condition of deployment from 11th November 2021 to 15th March 2022.

206. Research indicated that 6.6% (n=116) of health and social care workers in **England** who participated in a survey had declined the Covid-19 vaccine when offered, of whom 22.7% identified as Black or Black British Caribbean or Mixed Black Caribbean Bell et al., 2022).[40] Black African or Mixed Black African health care workers participating in the study reported being offered COVID-19 vaccination at a lower rate than White British and White Irish participants (87.5% *vs* 92.1%). We have not seen disaggregated data for social care workers, including unpaid carers and personal assistants across UK nations.

207. Data provided by UKHSA demonstrates percentage of vaccine uptake of healthcare workers with direct patient care in England by dose:[41]

[39] This study used national health data linkage of Covid-19 vaccination and pregnancy records to identify vaccine uptake among pregnant women and people, and to examine disparities between social groups.
[40] This was a mixed methods (interview and survey) study to assess Covid-19 vaccination perceptions, attitudes, and behaviours among health and social care workers in **England** between 22 January and 8 February 2021 (Bell et al., 2022).
[41] Further disaggregation of data for healthcare workers in England in this time period note a range across NHS London commissioning regions, with percentage of vaccine uptake (at least one dose) being lowest in North East and Yorkshire (87.1%) and highest in East of England (94.2%). This disparity continued with percentage of vaccine uptake (at least two doses), being 82.8% in North East and Yorkshire and 93% in the East of England.

England	Number of HCWs with direct patient care where vaccination data has been provided	Numbers vaccinated	Percentage vaccine uptake
Those with at least one dose of COVID-19 vaccine	652,032	588,315	90.2
Those with at least two doses of COVID-19 vaccine	637,486	560,207	87.9
Those with at least three doses of COVID-19 vaccine	630,710	431,779	68.5

Table 25: Cumulative data from 1 September 2021 to April 2022 inclusive but caveats on data are outlined by UKHSA (2022).

Vulnerable due to homelessness, experience of substance misuse, or prison population

208. Vaccine uptake in prisons and places of detention in England were lower, and disparities within this cohort reflected those observed in the general population, e.g. lower uptake among Black men (INQ000496177).

209. Severe mental illness, history of substance misuse, and experience of homelessness were some of the factors that were negatively associated with vaccination uptake in **Wales** (Jones and colleagues, 2023) and these groups were 'invisible' in routine surveillance data:

Cluster	**Vaccination coverage**
Substance misuse	76.3%
No experience of substance misuse	92.8%
Cluster	**Vaccination coverage**
Experience of homelessness	70.6%
No experience of homelessness	92.5%

Table 26: Data drawn from Jones et al (2023), based on percentage of adults aged 18 and over in Wales who had received their first dose vaccination by July 2022.

Disability status

210. CHIME data indicates differences in the proportion of adults who received two Covid-19 vaccines in **England** according to self-reported data on disability status. This data suggests that uptake was lowest among people whose day-to-day activities are not limited (87.1%) compared to activities limited a lot (89%) or activities limited a little (91.1%) by June 2022. By

11th March 2021 in England, disabled people over the age of 70 had lower levels of vaccination uptake than the non-disabled population of the same age (91%) (INQ000083885).[42] Such data reinforces the need for an intersectional approach to examining vaccination coverage rates. However, there is a lack of disability data associated with primary care records, which precluded risk assessment tools and data monitoring (INQ000083885). By September 2022 (shortly after the cut-off date of this report), 85.8% of the 269,856 people in England on the GP Learning Disability Register aged 16-64 had received at least two doses of Covid-19 vaccination (INQ000492335)

Comparison of Covid-19 vaccination rates and disparities with other vaccine-preventable diseases.

211. Comparing the coverage rates of Covid-19 and routine vaccine programmes should be done with caution, because vaccination programmes vary according to the following issues: (i) Number of doses required for a complete course, and intervals between doses; (ii) eligibility criteria; (iii) delivery strategies and commissioned providers; (iv) universal/regional scope of delivery; (v) social and political context of delivery; and (vi) public familiarity and interactions with the vaccine programme.

212. **Inequalities observed in roll-out of the Covid-19 vaccination programme are broadly consistent with those observed in routine vaccination programmes, notably influenza vaccination (see Appendix 2).** Research compared inequalities between Covid-19 (first dose only) vaccines (between 1st December 2020 and 18th April 2021) and influenza vaccine uptake (between 1st September 2019 and 31st March 2020) to estimate inequalities for 16 minority ethnic groups based on uptake among adults aged 50+ or in an 'at-risk' group in Greater Manchester, **England** (Watkinson et al, 2022) using data of approximately 2.8million patients aged 18+ and registered with GP surgeries in Greater Manchester. Three key points emerged: 1) Inequalities in vaccine uptake were wider for Covid-19 than influenza vaccination; 2) there were wider ethnic inequalities in COVID-19 vaccine uptake, notably among individuals who previously received influenza vaccination; 3) ethnic inequalities in vaccine uptake were wider for Covid-19 than influenza vaccination for 15 of 16 ethnic minority groups. The issues identified appear to be intersectional, as ethnic inequalities in Covid-19 vaccine uptake were concentrated amongst older and extremely clinically vulnerable adults, and the most income-deprived. The authors argue that 'the magnitude of ethnic inequality in Covid-19 vaccine uptake [in comparison to influenza vaccine uptake] is unusual and far exceeds the inequalities associated with uptake of other vaccines.' We were unable to determine a UK wide pattern for this. The reasons for lower-level uptake will vary between the 16 minority ethnic groups in the study and cannot be attributed to any single factor. It is likely that a combination of issues should be considered, such as Covid-19 roll-out being a new campaign, pre-existing issues of disenfranchisement, misinformation, and the ability of health partners to prepare communities in advance of roll-out.

213. The Public Health England (2021b) Immunisation Inequalities Strategy noted that 'In general, coverage of routine vaccinations was high. However, we also demonstrated that avoidable inequalities in vaccination still exist within some population groups, and that likelihood of complete and timely vaccination may still be influenced by where people live, their

[42] Data is separated by disabled people 'limited a little' (89.9%) and 'limited a lot' (86.9%), though the boundaries of these categories are not clear.

socioeconomic status, and their ethnic group. Vaccination coverage could also be significantly lower in vulnerable and underserved populations such as people with chronic illness or disabilities, migrants, Travellers and Roma, and looked after children.' **Differences in Covid-19 vaccine uptake among children reflect long-standing inequalities in routine childhood vaccination coverage, particularly among children of Black, Asian and Bangladeshi ethnic backgrounds in London (Tiley et al., 2018).**

Data collection and publication

The type of Covid-19 vaccine coverage made available.

214. The scale and urgency of the Covid-19 vaccination programme catalysed the development of novel digital tools for the management and recording of vaccinations. These included:

    a. The National Immunisation Management System (NIMS; England);

    b. The Vaccination Management System (VMS; Northern Ireland);

    c. The Turas Vaccination Management Tool (Scotland); and

    d. The Welsh Immunisation System (WIS; Wales).

215. Functions included the identification of eligible individuals, management of vaccine appointments and reminders, and recording of vaccine doses. The systems enabled near-real-time monitoring of COVID-19 vaccine coverage in each nation, as well as the concurrent or retrospective analysis of disparities in coverage according to demographic and clinical subgroups. Further details regarding NIMS are described in a peer-reviewed publication (Tessier et al, 2023) and summarised below as an indicative example of these vaccine management systems. We are not aware of equivalent publications summarising the systems used in **Wales**, **Scotland**, and **Northern Ireland**, limiting the potential for direct comparison of precise functionalities across nations (though some details are provided in the links above). The NIMS vaccine register was created to record COVID-19 vaccine delivery and support monitoring of vaccine coverage, safety, and effectiveness in **England** (Tessier et al, 2023).

216. NIMS was initially commissioned to support the national influenza vaccine programme but was adapted following the onset of the COVID-19 pandemic. NIMS functions include:

    a. Identifying groups eligible for vaccination (based on JCVI guidelines).

    b. Sending invitations and reminders for vaccine appointments via mail, email, and text; and

    c. Recording vaccination data via point-of-care applications.

    d. Several mandatory data items are recorded for each dose, including: NHS number of the recipient; date of vaccination, and vaccine batch number.

217. NIMS captures data from mass vaccination sites, primary care settings, pharmacies, and hospitals. Data are validated by NHS Digital and linked with GP and hospital records to identify individuals in specific cohorts (e.g. clinically extremely vulnerable individuals and

pregnant persons). Vaccination data are electronically transmitted to patients' GP records on a daily basis (Curtis et al, 2021). UKHSA also receives NIMS data daily, enabling near-real-time monitoring of vaccine coverage. Further linkages are made by UKHSA to allocate region, rural/urban status, deprivation status, ethnicity, sex, and care home residency.

218. The Vaccine Management System (VMS) was launched 'to create a digital vaccine appointment booking capability initially for vaccinators and health and care professionals and subsequently the citizens of NI' (NI DHSC, 2023). VMS did not exist prior to the Covid-19 vaccination programme and was refined over the course of the programme. VMS data was used to report on population uptake by phase of the programme and other agreed data variables (such as age group and mortality), and to identify areas of low uptake (INQ000474249).

219. Devolved administrations were not consistent in evaluation of data management systems. Documents submitted to the Covid-19 Inquiry, and which were shared with us, indicate logging of limitations to fine-tune data management systems (see A).

220. The National Vaccination Scheduling System (NVSS) presented opportunities and limitations for programme delivery (Public Health Scotland, 2022). Self-registration of younger cohorts helped produce contact details for a population that is often difficult to contact, and the Vaccination Management Tool (VMT) was praised, particularly the ability to access the system from anywhere. Limitations included:

    a. Not meeting the scheduling requirements of people in remote geographical areas.

    b. Identifying some cohorts within existing data systems was difficult, e.g. those who are pregnant, disabled, and detailed ethnicity information.

    c. The lack of online verification process (for self-registration systems) meant Health Boards were unsure about 'the veracity of some cases.'

    d. The pace of set-up meant there was initially insufficient technical support available for Boards.

    e. The booking system only allowed for translation in June 2021. Further research is required to understand the impact for cohorts who would rely on translation for booking appointments.

221. The 'Wales Immunisation System' (WIS) operated using the register for NHS care in Wales (the Welsh Demographics Service dataset). WIS had a function to manually add anybody not previously registered for NHS care and identify anybody classed as a priority for vaccination e.g. on the basis of clinical risk (Perry et al, 2021). WIS also experienced challenges in identifying people in priority cohorts for vaccination, and for example unpaid carers (Audit Wales, 2021), but the audit report does not offer further elaboration of how they were navigated.

Methods used to obtain data on UK Covid-19 Vaccines coverage across the UK.

Routine monitoring by public health agencies

222. The novel digital infrastructure for the recording of vaccine doses enabled near-real-time monitoring of COVID-19 vaccination coverage across the UK. Results were shared via summary reports and dashboards compiled by public health agencies in each nation, with coverage broken down by factors such as age, region, sex, and ethnicity.

223. At the time of writing Version 1 of this report (23rd January 2024), COVID-19 vaccination dashboards continued to be maintained in England, Scotland, Wales, and Northern Ireland. With the exception of Northern Ireland (where all doses administered since 2020 are included), data are limited to ongoing or recent COVID-19 booster campaigns rather than the vaccination programme as a whole (e.g. the UKHSA dashboard covering England is currently limited to the autumn 2023 booster campaign, with no prior data presented). In England and Scotland, archived versions of routine monitoring reports are available (Table 2), highlighting some vaccine coverage metrics that were available over the course of the COVID-19 vaccination programme. We are not aware of equivalent archived reports for Wales or Northern Ireland.

Nation	Report	Metrics reports	References
England (UKHSA)	National flu and COVID19 surveillance reports	Cumulative coverage by age, sex, and ethnicity[43]	03/12/2020 to 08/07/2021 15/07/2021 to 07/07/2022
England (UKHSA)	COVID-19 vaccine surveillance reports	Focus on vaccine effectiveness, but later reports included coverage in immunosuppressed populations and detailed breakdown of coverage in pregnancy (stratified by age, deprivation index, and ethnicity). Graphs in some reports also display coverage over time by age.	31/05/2021 to 23/09/2021 30/09/2021 to 12/10/2023
England (NHS-E)	COVID-19 vaccination statistics	Vaccination counts and coverage by factors such as age, region, care home status, healthcare worker status, and immunosuppression status	Archive of daily counts Summary coverage reports
Scotland	COVID-19 statistical reports	Cumulative coverage by age. Specific reports included data related to characteristics	Public Health Scotland publications archive

[43] Coverage data by age first appeared in report published on 11/03/2021. Data broken down by ethnicity first appeared in report published on 22/04/2021. PHE Weekly National Influenza and Covid-19 Surveillance report, week 10 report (to up week 9 supplemented data), 11th March 2021.

(Public Health Scotland)	such as ethnicity, deprivation index, teachers, prisoners, and pregnancy[44]

Table 34: Routine monitoring of Covid-19 vaccine coverage by UK public health agencies.

224. The reports listed above are an illustrative rather than exhaustive indication of the coverage data available throughout the Covid-19 vaccination programme. Several dashboards maintained by public health agencies and NHS England are no longer viewable in the form in which they were available during the primary and early booster campaigns in 2020–2022.

225. Alongside routine monitoring via public health agencies, electronic health records (EHRs) were used by researchers to analyse variation in Covid-19 vaccine coverage. The OpenSAFELY EHR research platform (developed in response to the pandemic) was used to report on COVID-19 vaccine coverage in **England**. OpenSAFELY vaccine coverage data were first shared via preprint publication on 27 January 2021 and subsequently updated via weekly reports, with the latter covering 40% of general practices in England. By linking vaccination records with patients' full de-identified EHRs, the OpenSAFELY reports provided detailed estimates of vaccine coverage broken down by dose (first, second, and booster), demographic characteristics (e.g. age, sex, ethnicity, and deprivation index), and clinical factors (e.g. body mass index, chronic cardiac disease, dementia, and numerous others). In doing so, the reports highlighted key disparities in coverage from the early stages of the COVID-19 vaccination programme in England.

226. In addition to enabling near-real-time monitoring of trends in vaccination, digital vaccine records and linked EHR data provided a basis for stand-alone analyses of demographic and clinical factors associated with COVID-19 vaccine coverage. These include studies of the general population in each nation (e.g. Tessier et al, 2022; Curtis et al, 2021; Perry et al, 2021; Hameed et al, 2022), as well as analyses focusing on specific subpopulations, such as people with kidney disease (Parker et al, 2023) and homeless individuals (Thomas and Mackie, 2023). Studies were shared by peer-reviewed publications, often supplemented by preprint publications that enabled data to be openly available while under review by journals. Document INQ000414509 notes that data collection methods allowed surveillance of low take-up in defined areas, prompting targeted outreach efforts (see **Topic 4**).

Suitability of data collection and publication methods.

227. Strengths of monitoring systems:

    a. Innovations in digital infrastructure enabled near-real-time monitoring of the progress of the UK COVID-19 vaccination programme.

    b. Public health agencies in each nation used dashboards and reports to regularly share vaccine coverage data, typically stratified by key factors such as age, sex, ethnicity, and

[44] Data was included in a programme evaluation published on 12/10/2022 (and an interim report published in November 2021), and a report into factors associated with COVID-19 vaccine coverage published on 29/06/2022. Individual Covid-19 reports provide links to dashboards that are no longer available; however, the Public Health Scotland data archive includes raw daily data by age, region, sex, JCVI cohort, and dose.

region. This provided early insights into disparities in vaccine coverage across different demographic subgroups.

c. Vaccination data were transferred to patients' GP records daily, enabling linkage to de-identified EHR data. This, in turn, supported detailed analyses of vaccine coverage in clinical subgroups.

228. Limitations of monitoring systems:

a. People without NHS numbers were not included in vaccine monitoring systems such as NIMS. Although such individuals could still present for vaccination (and would be allocated an NHS number upon doing so), they would not have received invitations for vaccine appointments, potentially leading to gaps or delays in vaccination. These gaps would not have been reflected in routine monitoring efforts by public health agencies.

b. It is challenging to look back and across national COVID-19 vaccine datasets. Although vaccine dashboards continue to be maintained by public health agencies in England, Scotland, Wales, and Northern Ireland, it is challenging to determine what metrics were available at various stages of the COVID-19 vaccine roll-out. Broken or superseded links in archived reports and dashboards are a particular issue.

c. Recording COVID-19 vaccination with patients' NHS numbers enabled rapid linkage to demographic data help by GPs and health-related data such as underlying health condition. However, linkage to other relevant datasets such as occupation and religion is not widely available for EHR data, limiting or delaying the potential to study discrepancies in coverage relating to these characteristics.

Conclusions on vaccine coverage

229. Disparities in Covid-19 vaccine coverage were linked to ethnicity, age and deprivation, but the context underlying lower uptake may not be the same across these categories.

230. The disparities observed in the Covid-19 vaccine programme reflect vaccination coverage across most programmes, which indicates that disparities were foreseeable. Inequalities in Covid-19 vaccine uptake were more acute when compared with routine vaccinations (i.e. influenza) in regions of England. A key factor underlying the difference is that Covid-19 vaccination programme was new and rapidly implemented, which required groundwork involving key community stakeholders to support roll-out. **Community engagement with underserved groups needs to be better embedded within planning and delivery stages of current vaccination programmes and to prepare more strategically for the roll-out of new vaccines (whether routine or pandemic), as discussed in Topic 3.**

231. There are clear correlations between areas of higher deprivation and lower vaccination coverage, reflecting broader deficits of health across the UK. These disparities were also foreseeable, reflecting documented issues in routine immunisation programmes. **Whilst social deprivation has been associated with lower uptake of vaccines it has received less attention in terms of identifying and addressing underlying factors that could be contributing to under vaccination. This needs to be redressed to strengthen routine immunisation programmes and inform future pandemic vaccination strategies.**

232. Uptake was lower across younger age cohorts, notably 18-29 and 30-39. This difference may reflect the language of prioritisation and fact that these cohorts were the last to be invited for vaccination. Risk perceptions may have been a particular driver of lower-level uptake among

these cohorts. We cannot be certain that risk perceptions are the only reason for lower uptake as there is a dearth of published literature pertaining specifically to these age groups' perceptions of vaccinations that they are offered.

233. Several changes in Covid-19 vaccination in pregnancy recommendations occurred at formative stages of roll-out, which sets this cohort apart, and the impact on uptake must be explored as part of preparedness efforts (see **Topic 3**).

234. Mechanisms for understanding vaccine coverage by religion across UK nations is inadequate, and access to more reliable data for comparison may be needed to help allocate resources to interventions in religious groups.

235. Taking England as an example of data management in roll-out processes, NIMS was scaled up quickly and updated daily to enable near-real-time monitoring of vaccine coverage. Additional linkages to primary care and hospital records formed the basis for swift evaluation of vaccine safety and effectiveness, and a granular understanding of disparities in coverage in clinical and demographic subgroups like pregnant women.

236. There are limitations in the digital archiving of information, notably broken links, which prevent retrospective evaluations of vaccine responses and comparative analysis of data. Minimum requirements for digital archiving of information, with a UK-wide portal, may be beneficial for enabling comparative assessments of UK responses.

237. The COVID-19 vaccination programme fostered advances in the recording and monitoring of vaccine delivery by public health agencies, enabling near-real-time insights into vaccine coverage and coverage disparities. Standardised reporting and archiving of data across the four nations is imperative for retrospective evaluations and comparative assessments.

Topic 3: Causes of Disparities in Coverage

238. The causes for disparities in vaccination coverage across the UK are diverse, and may include individual, social or community, health systems, and structural determinants.

239. The terms 'access' and 'accessibility' are used interchangeably in studies of vaccination. Causes of disparities during the Covid-19 programme were often framed as an issue of 'hesitancy,' indicating that individual acceptance of vaccines is considered a primary issue over the wider experience of vaccination such as access. Access can involve a range of interlinked requirements, that include:

    a. Acceptable, affordable and safe modes of transport, including assessments of travel times and routes that suit individual circumstances.

    b. Design of clinic space and suitability for people living with disabilities, large families, or any other needs such as clinical risk status and ability to distance.

    c. Flexible clinic times, supported by effective invitation and reminder (call/recall) processes.

    d. Language support for informed consent.

    e. Confidence in the safety and professionalism of the service through which vaccines are offered, particularly if delivered via an unfamiliar site.

    f. Engagement strategies that balance sensitivity and urgency to vaccinate, particularly in outbreak and pandemic scenarios, with provisions for tailored communications for underserved groups.

240. Causes of disparities are not always linked to issues of access or engagement, and there is not always a direct correlation between disparities in vaccine uptake and structural discrimination. Perceptions and experiences of exclusion in one sector or across sectors of statutory services (e.g. healthcare, education, policing and justice) can have legacies that then raise questions for individuals and communities about confidence in government recommendations concerning vaccination and health protection.

An overview of common practical barriers to vaccination

Awareness of eligibility and options for vaccination

241. Research and programme evaluations demonstrate that awareness of eligibility in a number of population groups could have been improved by information and engagement strategies. Limitations in engagement may have contributed to disparities in vaccination.

242. Barriers to information identified across the UK included government messaging not reaching various ethnic groups, particularly if delivered only in English, and that one-way communication methods did not offer an opportunity for dialogue to address concerns (Kadambari and Vanderslott, 2021). Poor communication prior to roll-out and pertaining to pandemic management or 'lockdowns' were 'seen to impact BAME communities negatively' (INQ000474228_0121).

243. **Disabled people** were disadvantaged by communication strategies across all DA, which may have contributed to delays in receiving Covid-19 vaccines or prevented access.

Reported barriers include people with disabilities receiving letters and invitations in non-accessible formats, absence of British Sign Language (BSL) interpretation during UK Government briefings, delays in receiving QR codes for audio readings of communications, and online booking systems that lacked features for enhanced access (easy-to-read translations; telephone options). Such limitations occurred despite documented knowledge that this cohort is less likely to have digital literacy skills (INQ000474256_0012; INQ000280067_008).

244. Lower 'health literacy' in general was considered to be a barrier to accessing Covid-19 vaccines in areas of **higher deprivation** in Scotland (Public Health Scotland, 2022).

245. **Recently-arrived migrants** to the UK and **mobile people**[45] were perceived by primary care teams in England to experience a lack of targeted information – particularly in the context of changing guidance concerning vaccination (Knights et al., 2021). Issues of proficiency with the English language and digital literacy (or access to digital technologies) were cited: 'the healthcare system is mainly built for fairly tech-literate, English- literate people.' Recently arrived migrants may then have been more vulnerable to misinformation circulating on social media and via social networks if access to official information in accessible formats was limited.

246. The language of a **'non-urgent' offer for child cohorts** may have also influenced parental decision-making about prioritising vaccination based on risk, indicating attempts to understand government recommendations but a need for more guidance. Parents in Scotland found themselves wanting further information and engagement to support decision-making: 'Besides polling, focus groups with parents/carers of 5-11-year-olds also found that they often felt a desire for more information, including on issues such as likely side effects' (Public Health Scotland, October 2022).

247. **Misinformation** and **vaccine safety** concerns may have had an impact on the acceptability of the vaccine offer. Unsubstantiated claims circulated that the Covid-19 vaccines could affect women's ability to reproduce, which was noted to be a concern among women in ethnic and religious minorities as well as the White British population (Kasstan et al., 2022a; Qureshi et al., 2023; Kühlbrandt et al, 2023). Such concerns around reproduction were acknowledged by public health teams to be an issue, yet they struggled to produce communications in communities who did not '*want those kind of subjects spoken* about' (Kasstan et al., 2022a). Health care support workers also expressed concerns about the safety of Covid-19 vaccinations (INQ000474344_0017).

248. These limitations indicate the importance of multi-sector and multi-agency collaborations to support access to the Covid-19 vaccine programme, either by promoting convenience or confidence in the vaccination offer (also discussed in **Topic 4**). We expect a focused discussion on confidence to be covered in more detail by the Module 4 expert report on vaccine hesitancy, led by Professor Heidi Larson.

[45] Defined in the study as having been in the UK less than 10 years.

Accessibility, availability and convenience of vaccination sites and services

Distance and accessibility

249. The nearest vaccination delivery point may not have been able to offer vaccination to all cohorts. Hospital hubs 'gave priority for vaccinating hospital staff and in-patients and were generally not available for public appointments' (Duffy et al., 2022). Similar issues were documented in GP surgeries, where 'many (but not all) GP-led services were only available to patients registered at that practice' (Duffy et al., 2022). Most delivery pathways in England would have been via local vaccination sites (e.g. primary care) and mass vaccination centres. GP surgery teams reported being prevented from vaccinating members of the same households who had been booked on different dates but presented together (Mounier-Jack et al., 2022).

250. Evaluations of the Covid-19 vaccination programme indicate that **healthcare workers** perceived the reliance on mass vaccination sites in initial roll-out processes (**Topic 1**) as not conducive to access for ethnic minority populations or the general population, including in areas of higher deprivation (see Kasstan et al, 2022a; also Mounier-Jack et al, 2023). Clinically vulnerable people were likely to have heightened concerns about attending mass vaccination centres due to risk of transmission in places of higher footfall.

251. **School-age children** were disadvantaged in areas of the UK that relied (at least initially) on school-based delivery only, particularly as access to vaccination could be missed by those needing to self-isolate if they had tested positive for SARS-CoV-2 (INQ000474249; Public Health Scotland). Parents would then need a secondary offer via schools or primary care to help ensure uptake. The initial reliance on school-age immunisation services (SAIS) in England appears to have limited the pace of roll-out, and there were limitations in the ability of SAIS to offer vaccination to every eligible pupil. In 2020, SAIS reported numerous pupil absences due to home isolation but also practical issues in programme delivery such as consent and inefficient (paper-based) data management (Henty, 2020). SAIS are not able to access all schools when offering the routine adolescent vaccination programme. Poor access to independent schools is a particular issue and hampers the ability of SAIS to offer vaccines to 100% of eligible children. Parents have reported being unaware their adolescent children are entitled to routine vaccines and think all child and adolescent vaccines are offered via primary care. Such issues affecting SAIS delivery are long-running and would likely have occurred during the Covid-19 vaccination programme.[46]

252. **Social care workers** in England were unsure whether their GP or employer was responsible for providing their COVID- 19 vaccination. This is likely to be linked to the organisational structure and nature of roles within social care. Social care can be provided by local authorities, private sector companies or voluntary organisations. Funding is either paid for by the individual or by local authorities where the individual cannot self-fund. As noted (**Topic 1**), this situation appears to diverge from Scottish roll-out processes (All-Party Parliamentary on Vaccinations for All, 2021). Barriers to access were also flagged by **health care workers** from ethnic minority backgrounds, which depended on pay grade. Some reported being able to access vaccination appointments during working hours, but in practice this was not

[46] This case study currently unpublished.

happening for all staff, as staff in job grades 5 and below, often belonging to ethnic minority groups, were less likely to have their time freed up during working hours to access vaccination (Bell et al., 2022). Members of the Royal College of Nursing raised several reasons for non-vaccination in a survey conducted from 29th January to 1st February 2021, including barriers such as inconvenient appointment times to inaccessible clinic sites (INQ000474344_0016). It was noted that internationally-recruited nurses may not be registered with a GP, and therefore lack an NHS number, which may have been a barrier to receiving Covid-19 invitations. Healthcare professionals redeployed to frontline patient-facing roles as part of the Covid-19 response did not have confirmation that they would be vaccinated before taking up their new role, and evidence indicates that issues in staff capacity meant that healthcare professionals had to postpone or cancel vaccine appointments. A limitation of these survey findings is that results do not contextualise responses according to the relevant UK nation, which may reflect differences in delivery strategies to HSCW.

253. Accessibility of vaccination may have been compromised for **religious** groups due to ethical concerns surrounding vaccine production. Covid-19 vaccines were tested using cell lines from aborted foetal cells collected in the past, and in Northern Ireland (INQ000474249). Concerns that Covid-19 vaccines contained animal products or may not be kosher or halal have been cited as a cause for differential uptake by **religion** (INQ000492283), but this statement does not indicate the scale of the concern. Further information about the relationship between Covid-19 vaccine access barriers and pre-existing inequalities are outlined in #13, with specific reference to **ethnicity**, **socioeconomic deprivation**, and **disability**.

Cost

254. Indirect costs (e.g. transportation; child care; leaving work early) were described as a barrier to access, particularly in areas of higher deprivation (Public Health Scotland evaluation, 2022; Public Health Scotland, not dated). This would be a particular issue when needing to access mass vaccination sites as opposed to community-embedded GP surgeries or pharmacies. Cost-related barriers were an issue that could be offset by offering choice of delivery points, including those accessible by foot, in areas of higher deprivation or urban settings. Appointments were not always available in the closest venue, and hence was challenging for those relying on public transport (ScotCen, 2021) and would have incurred additional costs.

255. **Residential segregation**[47] may have generated barriers to accessing mass vaccination sites at the beginning of the Covid-19 vaccine roll-out due to costs associated with extended journey times (Watkinson et al, 2022).

Access to vaccination in pregnancy

256. Many NHS Trusts in England offer **maternal vaccinations** within a hospital antenatal or ultrasound unit (Anderson et al., 2023). However, limitations of Covid-19 vaccine programme delivery in antenatal healthcare provision during the pandemic were identified (Berendes et al., 2023), which would impact convenience and confidence:

[47] Residential segregation means that minoritised populations are more likely to live in areas of higher deprivation than the White population, and the concentration of poverty reduces access to the resources required to enhance health (Razai et al, 2021).

a. Interruption of 'continuity of care' models to minimal time allocated to discussing vaccination in pregnancy in midwife-led care.

b. Lengthy waiting times for Covid-19 vaccine points of distribution (PODs) close to antenatal care services in hospitals.

c. Healthcare professionals were not always up to date on changes in guidance concerning Covid-19 vaccination during pregnancy.

d. Midwives perceived vaccination to be a responsibility of nurses, indicating issues of confidence to raise the subject of vaccination as part of shifting divisions of labour.

e. Community pharmacies were considered a convenient POD, but definitions of access barriers were raised concerning public toilets on site.

257. Uncertainty surrounding vaccine recommendations for this cohort may have been a barrier, as clinicians were recommended to discuss 'the **absence of safety data** for the vaccine in pregnant women' (Potter, 2021). Women were initially advised not to come forward for vaccination if they may be pregnant or were planning a pregnancy within 3 months of the first dose, which proved very difficult to overcome and may have contributed to a reluctance to take up the offer even when the evidence base supported changes in recommendations (INQ000474249). Discussion of vaccination in pregnancy under these conditions would require appropriately skilled and trained healthcare staff in pregnancy and primary care services. Pregnant women reported barriers to consulting GPs on vaccine decisions due to primary care capacity, but also perceived a lack of confidence among midwives to discuss and recommend vaccination (Berendes et al., 2023; Skirrow et al., 2024). These studies show that key concerns included the impact of vaccination on the foetus and breastfeeding. When pregnant women did not receive the clear recommendations and information they wanted from healthcare providers, they looked to the internet and social media 'to fill information gaps with the risk of misinformation that compounded (pre-existing) uncertainties and mistrust.' Evidence suggests that women in Wales on occasion received incorrect advice from healthcare professionals, including midwives, which discouraged uptake (INQ000474311_0047). Influences on vaccine decisions during pregnancy include family and social networks that cut across national and international borders. This reinforces the need for specialist staff in maternity care who are trained to discuss vaccinations in pregnancy based on UK recommendations.[48]

Relationship between UK Covid-19 vaccine uptake and pre-existing inequalities

258. We comment on the interplay between the UK Covid-19 vaccine programme roll-out and pre-existing inequalities and structural discrimination pertaining to immunisation service delivery. Structural discrimination differs from disparities (a difference seen as unfair) and offers a more explicit recognition of how differences in vaccine uptake between population groups are rooted in or linked to inequalities of power and resources.

[48] Such processes of decision-making are not specific to Covid-19 vaccination during pregnancy, and similar issues have been documented concerning routine vaccinations in pregnancy (influenza and pertussis) (Wilson et al, 2017). Encounters with healthcare professionals, particularly in maternity services or general practice, which addressed pregnant women's concerns tended to nurture confidence in vaccine recommendations

Ethnicity

259. **Racism in healthcare:** People of Black ethnicities and Roma, Gypsy & Traveller (RGT) communities experience a range of barriers to accessing primary care services as well as poorer quality care, which are understood by patients as experiences of systemic racism (Ojo-Aromokudu et al., 2023; Kühlbrandt et al., 2023). The persistence of health inequalities, which is an issue of structural discrimination, has led people of Black and Asian ethnic minority backgrounds 'to feel neglected with a consequent lack of trust with the NHS and wider Government' (INQ000474228_0116). One study reported that Black health and social care workers were cautious of the 'sudden drive to protect ethnic minorities from COVID-19, given the "decades long" health inequalities experienced by ethnic minority groups' (Bell et al., 2022). Links have been made between Covid-19 'vaccine hesitancy' among people of Black ethnicities and past experiences of racism and discrimination when accessing healthcare services (Ozduzen et al, 2022; Paul et al., 2022). One study reported a four-fold total effect of racial/ethnic discrimination on vaccine refusal' where '6.69% of participants who had refused Covid-19 vaccination reported they had experienced poorer service or treatment than other people in a medical setting because of their race or ethnicity. Focusing exclusively on vaccine misinformation may disregard concerns about mistrust that is largely due to past experiences of racial and ethnic discrimination (Paul et al., 2022).

260. **Racism in UK society:** Healthcare services acknowledged the role of structural discrimination for Black African and Black Caribbean people in England (INQ000414509, 2021) and drew attention to recent national scandals including the government handling of Windrush immigration scandal and the Grenfell Tower fire, as underlying a persistent narrative of undervaluing the lives of ethnic minority people and subsequently their reluctance to engage with statutory services. Social and health inequalities have been left unaddressed prior to the pandemic. Policy-makers should have known that pre-existing inequalities were not proactively mitigated prior to the pandemic, and could have addressed this as part of roll-out processes to build trust in government recommendations through tailored engagement (INQ000485278_0004). Black health and social care workers considered racism to be deeply embedded within government, leading them to question why people from ethnic minority backgrounds would trust government recommendations on vaccination' (Bell et al., 2022). Past medical racism (in the UK and internationally, present and historical) hampered uptake among people of Black ethnicities were and 'reports of unethical medical experimentation by Pfizer in Africa in the past (see POST, 2021; Wilson, 2017; Kadambari and Vanderslott, 2021). Disengagement from the Covid-19 vaccine campaign is not appropriately classed as 'hesitancy' in this context but decline of a vaccine offer is a consequence of lived experience of exclusion that affects how government recommendations are viewed.

261. **Safety and vaccine trials:** Broader reasons for dis-engaging from the Covid-19 vaccine campaign can include perceptions of safety for people of diverse ethnicities that were not included in vaccine trials: 'BAME healthcare workers have actively researched the vaccine. The group believe that a lack of BAME representation in vaccination trials and the speed at which the vaccine has been deployed heightens feelings of the vaccine being unsafe for BAME staff and their communities' (INQ000421368_0003). Surveys indicated that people of ethnic minority backgrounds were less likely to receive vaccinations if they rated the government's pandemic response poorly (INQ000492283).

262. **Access barriers:** Access barriers, rather than refusal, have been described as the primary barrier to Covid-10 vaccination for Roma, Gypsy & Traveller (RGT) communities. NHS England regional teams noted that the RGT population was much less likely to be registered at a GP surgery (INQ000414461). GP surgeries are known to refuse registration without

proof of a fixed address, despite there being no formal requirement to provide proof of address (Friends, Families & Travellers) which disproportionately affects RGT people. This would affect how people would receive invitations for Covid-19 vaccination. Literacy can also be a barrier to vaccine information and access to healthcare services, with oral messaging being an enabler to service use (Friends, Families & Travellers)

Socioeconomic background

263. Deprivation is a structural form of discrimination, that is the 'outcome of policies that have been deliberately designed' and is more appropriately understood as an issue of 'economic injustice' (Joseph Rowntree Foundation, 2024). Disenfranchisement and unfair social outcomes in areas of the north west of England has been linked to doubt in recommendations to vaccinate, and government handling of the pandemic (Gillibrand et al., 2024). Aside from issues of trust and misinformation (Dickerson et al., 2021), barriers to vaccination have been referenced (London Assembly, 2021) but not explicitly detailed. Research demonstrates that, in England, there was 'no evidence for inequalities in Covid-19 vaccination site accessibility driven by underlying neighbourhood-level deprivation (Duffy et al., 2022). However, costs of travelling to vaccination delivery points may be a more acute issue in such regions, particularly when combined with complex lives due to precarious work and family dynamics.

264. Disparities in Covid-19 vaccine uptake in areas of higher deprivation (INQ000474249), as noted, reflect issues documented in the routine vaccination programme and differential health outcomes more broadly. Areas of greater deprivation are more likely to be characterised by unequal access to health services and reduced coverage of direct patient care staff in primary care services (Nussbaum et al., 2021). Cuts in funding to community pharmacies have led to closures or service reductions that disproportionately impact the most deprived communities in England (Company Chemists' Association, 2023). Preparedness requires a committed effort to address these issues to ensure the immunisation system will reach all communities in any future pandemic response.

Disability

265. **Disabled people** experience structural discrimination, whereby health and statutory services are not always adapted to meet their needs, and they are expected to adjust or fit in (INQ000474256; INQ000280067). The Covid-19 pandemic saw 'potentially discriminatory critical care guidelines and doctors' blanket use of do not attempt resuscitation notices', which made disabled people feel like their lives were less worth saving (INQ000176311). Emergency legislation introduced during the pandemic had adverse implications for disabled people's rights (INQ000176311). There is evidence to suggest that elements of Covid-19 vaccine programme roll-out were continuous with experiences of structural neglect in this pre-existing backdrop. The higher risk of death in this cohort (**Topic 1**) would suggest a need for efficient and conducive delivery strategies (including relevant communication and decision-making support models) (Rotenberg et al, 2021), which were ready for deployment at the point that people living with disabilities were eligible for vaccination. However, several barriers have been identified that may have prevented access:

    a. GP surgery records may not always capture the severity of a registered patient's disability, which may affect their prioritisation in line with JCVI guidance (INQ000417383).

    b. People living with disabilities reported that not all mass vaccination centres were accessible for wheelchair or mobility aid users or that accessibility information was not

clearly noted on websites. While primary care and temporary vaccination clinics were required to be accessible (INQ000492335), barriers appear to have remained. In future it would be more appropriate for disabled people to be offered vaccination in sites that are accessible for them based on their routine service use, which may include their local primary care services, adapted clinics in alternative settings or mobile (domiciliary) services. Clinics could also be held at specific time periods for people with disabilities including those with neurodiversity disabilities who may prefer smaller and quieter clinics.

c. Vaccine delivery points, including primary care and placed-based pop-up clinics, were not conducive to sensory needs of people living with learning disabilities due to lighting, noise, and waiting times (INQ000474256; Whitehouse et al., 2021).

d. Disabled People's Organisations arranged transportation to vaccine delivery points to enable people with disabilities to attend their appointments, when this should be the responsibility of health services or local authorities. However, we cannot confirm the scale of this problem.[49]

e. There was variation in the offer of home vaccination visits by primary care teams.

266. Such barriers are preventable by embedding equity strategies in vaccine roll-out processes.

Migrants and people with insecure immigration status

267. Barriers to accessing Covid-19 vaccination varied by migrant status (Deal et al, 2021). General barriers included profoundly low GP registration, which has been linked to systematic refusals by services to register individuals with insecure immigration status or without proof of right to residency) as patients (INQ000474407_0017). People with insecure immigration status were not always aware that they were entitled to receive Covid-19 vaccinations free-of-charge (Deal et al., 2021). Some may have been aware that they were eligible to be vaccinated, but were concerned about being charged or facing immigration controls and checks if they presented for vaccination (Deal et al., 2021). This concern relates to established data sharing arrangements between NHS services and the Home Office (Deal et al., 2021). The 'hostile environment' framework, which consolidates several policies, has been described as a root cause of this barrier (INQ000474407_003).

268. Data sharing arrangements mean that the NHS is legally obliged to inform the Home Office if there is unpaid debt for NHS hospital treatment, which may be a ground to refuse an application for a new visa, or extension of stay for a person subject to immigration control (Department of Health & Social Care, 2019; UK Health Security Agency, 2019). As part of determining a person's eligibility for care, NHS Trusts can seek information from the Home Office about an individual's immigration status and share the patients' personal details (e.g. address). This can result in a fear of immigration enforcement. Evidence indicates that this framework does not only affect people with insecure immigration status, but raises implications for migrants and people from minority ethnic communities (who hold residency rights and citizenship) who have been subject to racial profiling in NHS settings. For example, UK citizens from ethnic minority backgrounds being asked to prove eligibility to receive NHS care without charge in England (Institute for Public Policy Research, 2021; New Economics Foundation, 2020). The impact on vaccine decision-making among such population groups during the Covid-19 pandemic needs to be understood, and lessons for preparedness learnt accordingly. Deal et al (2021) note that the UK Government announced

[49] Local Resilience Forums (local government) were tasked with providing logistical support to vaccination sites, including co-ordination of travel for vulnerable people to vaccination sites (INQ000474299_0016).

that people with insecure immigration status could register with a GP to receive a Covid-19 vaccine without facing immigration control checks in February 2021, but no statements were made about whether registration would entail data sharing with the Home Office or immigration enforcement in the future. Moreover, participants in this study were not aware of the UK Government announcement. Such lack of clarity, and ineffective communication pathways, is not conducive to building confidence in pandemic vaccine offers for people with insecure immigration status.

Conclusions on causes of disparities

269. Disparities in vaccine coverage between populations with protected characteristics (e.g. age, ethnicity, pregnancy) are not necessarily caused by structural discrimination. It is not always helpful to isolate one characteristic of an individual or group to try and pinpoint the causes for under-vaccination. An overall difference in percentage uptake by group does not necessarily indicate an inequality that is rooted in structural discrimination. An intersectional approach can help to illustrate the causes of disparities. An intersectional approach could mean, for example, recognising that inviting age cohorts for vaccination requires an understanding of literacy among RGT groups or that invitations to attend mass vaccination sites entail a cost-burden in rural areas or areas of greater deprivation or accessibility for people living with disabilities.

270. Community engagement in the initial phases of roll-out were critical to allow informed decision-making and to address misinformation prior to cohorts being invited for vaccination. There is evidence to suggest that government attempts to address misinformation had not been received by intended beneficiaries, particularly among underserved groups. Attempts to address misinformation may not have been conducive to addressing questions and concerns, for example, if produced in a one-directional format without the opportunity for dialogue. However, the one-directional format should be understood in the context of public health restrictions in place during Covid-19 roll-out (which pushed many fora online) and the urgency to deliver vaccinations at pace.

271. Tailored engagement and delivery occurred at different points during roll-out. Areas with pre-existing relationships between health partners and services in underserved communities were able to develop Covid-19 initiatives in a timely manner. This was not the case for *all* underserved communities, particularly those less likely to have institutional representation and advocacy groups (e.g. Roma, Gypsy and Traveller communities). Crucial relationships between statutory services and vulnerable communities (those likely to have lower-level take-up) were not always in a state of preparedness upon roll-out, in other words, relationships were not in a conducive place to immediately begin engagement activities through existing channels. Further research is required to assess the impact of reduced public health budgets (via the Public Health Grant) on the ability to maintain and sustain relationships between local authorities and community groups in the years prior to the pandemic.

272. The causes of lower-level vaccine uptake among pregnant women reflect several issues, such as safety concerns but also service delivery limitations. Safety concerns appear to have been more acute in the context of a rapidly developed vaccination programme that was subject to changes in clinical guidance. This should be understood in the context of an evolving evidence-base as pregnant and lactating individuals were not initially being included in Covid-19 vaccine trials. Health care professionals were not always up to date on these changes. Offering strong recommendations through trusted healthcare professionals is important to influence decision-making, such as trained midwifery professionals having the appropriate time, knowledge and confidence to discuss vaccine recommendations. Midwives, and all healthcare professionals involved in managing pregnancies, offer important touchpoints to offer guidance and reassurance around vaccine recommendations, but they

also need to be appropriately equipped through vaccine confidence training and it is not clear to us who has oversight for this.

273. People living with disabilities experienced regrettable barriers to vaccination, which suggest a limited consideration for their needs in roll-out processes at national and regional levels. We see no justification that a mass vaccination site was not accessible for wheelchair or mobility aid users (also a problem for parents attending with children in prams), or that transport had to be arranged by Disabled People's Organisations rather than health services. Such considerations are equity issues that need to be addressed in preparedness plans.

274. The age-descending approach to vaccine eligibility is reflected in higher-uptake among upper-age cohorts and significantly lower-level uptake among people aged 30 and below (including children and adolescents). However, child and adolescent cohorts were the last to be invited for vaccination as they were at much lower risk from hospitalisation and mortality. Risk/benefit assessments of vaccination need to be understood against this backdrop.

275. The language of a 'non-urgent offer' indicated a softer recommendation for parents to consider. We are unable to determine whether the 'non-urgent' approach may have influenced delivery strategies in England (initially via school-age immunisation services only), but the option for parents to choose a delivery point and attend with their child (as in Scotland) may have offered them reassurance (and consultation with a trained healthcare professional) in the context of a newly developed vaccination programme.

276. Our review of available evidence indicates that the stark disparities of Covid-19 vaccine coverage among people of Black ethnicities are rooted in inequality rather than difference (e.g. compared with the lower-level uptake in some lower-age cohorts). Disengaging from vaccine programmes may not be about the vaccine offer itself, but the absence of trust in recommendations from statutory services due to a legacy of marginalisation. There needs to be a frank recognition of how to build trust with marginalised communities, what investment is required, and which parties are best placed to mediate relationships to enhance trust. People from ethnic minority communities need to be incorporated into vaccine programme design prior to implementation, to learn how coverage across the routine programmes can be improved, and to pivot this strategy in future pandemics that require a vaccine response.

277. People working in the social care sector in England require clarity over who is responsible for offering vaccination (employers or primary care). Vaccine delivery in the social care sector appears to be most effective when offering vaccines to care home residents and staff. In future, this delivery route should be considered across all four nations.

278. Policies that restrict or undermine the ability for individuals with insecure immigration status to register with GP services in non-pandemic times limits opportunity for their access to vaccination in a pandemic scenario. Diagnosis of underlying health conditions can be prevented, which affects their ability to access vaccination as part of appropriate priority groups to reduce risk of mortality. The impact of removing such restrictions, where they are in place, must be considered.

Topic 4: Addressing Disparities in Coverage

279. In Topic 4 we outline how strategies were deployed to assess and address disparities in Covid-19 vaccination coverage across the UK. We focus particularly on attempts to address uptake among people from ethnic minority backgrounds due to the stark disparities and underlying causes outlined previously (**Topics 2 and 3**). Tailored vaccine delivery via innovative transport and outreach models were critical to reach vulnerable groups and to address barriers to vaccination underlying disparities in coverage. The development and design of pop-up clinics were informed by data on disparities in community uptake (Halvorsrud et al., 2022; Bulmer et al., 2021). This indicated a targeted and evidenced-based approach to tailored delivery, which required multi-sector collaboration. However, disparities between populations across the UK persisted 'despite substantial efforts to reach them' (Timmins and Baird, 2022).

280. The UK Covid-19 experience demonstrates that health partners cannot expect to see equitably high coverage through responsive engagement during a public health emergency. There is evidence that vaccine decline among people of Black ethnicities is the result of long-running and entrenched inequalities (**Topic 3**), which will continue to negatively impact preparedness and future pandemic vaccine responses if allowed to persist. Local place-based partnerships developed during the Covid-19 vaccine programme and pandemic response may offer a stepping stone to support underserved communities to place their confidence in the health and public health system and co-develop strategies to tackle longer-standing health and social inequalities (INQ000198850).

281. There are limitations in our ability to assess the time and adequacy in which disparities in coverage were addressed because of the few evaluations of targeted delivery pathways conducted by DA health services and public health agencies in the period under investigation. We include examples only when evaluations were conducted in academic institutions, public health agencies or healthcare services.

The extent to which the coverage issues identified above were foreseeable

282. Issues in Covid-19 vaccine coverage mirrored the performance of routine immunisation programmes. Roll-out of the Covid-19 vaccination programme was expected to face very specific challenges compared to the routine vaccination programme, notably maintaining public confidence amidst conditions of uncertainty (Royal Society and British Academy, 2020). As noted in **Topic 1**, JCVI meeting minutes deliberated over the prioritisation of people from ethnic minority backgrounds prior to roll-out but expected those responsible for programme implementation to ensure rapid engagement in this cohort. Hence, attention to coverage issues and engagement strategies should have been on the roll-out agenda prior to 8th December 2020. While the Scientific Advisory Group for Emergencies (SAGE 2020) ethnicity sub-group formulated recommendations to support delivery for underserved groups through tailored pathways, we are unable to confirm how these recommendations were subsequently applied. Publications produced by NHS inclusion teams indicate that foreseeable issues in attaining high coverage among ethnic minorities, particularly concerning confidence, were not acted on: 'National communications campaigns have not prepared the ground for vaccine hesitancy among ethnic minorities' (NHS England and NHS Improvement – South East, 2021). Steps to prepare vulnerable communities prior to roll-out

could have been more robust, for example, by including stakeholders from target communities in programme design and co-production of campaign materials.

283. Prior to and following roll-out, surveys consistently indicated a lower likelihood of accepting Covid-19 vaccines among people of ethnic minority backgrounds across the UK, notably Black and Asian ethnicities in Great Britain (Freeman et al, 2020; Dickerson et al, 2021; Office for National Statistics, 2021; Royal Society for Public Health, 2020; Understanding Society, 2021; Robertson et al, 2021). However, evidence indicates that *intention* to decline Covid-19 vaccination (when asked prior to roll-out) did not necessarily result in decline when invited (Allington et al., 2021). **This would indicate that roll-out of the programme appears to have shifted perceptions of accepting the Covid-19 vaccine when offered**. Such survey results can only be taken as indicative, because roll-out processes such as invitations, call/recall notifications and communications may impact individual decision-making. Taking these indications of intention to decline alongside the existing disparities in vaccination programmes serve as foreseeable issues in coverage.

When and how any disparities in coverage become apparent and steps taken to address disparities in coverage

284. Ethnicity data was not routinely collected from people at the point of vaccination upon roll-out on 8th December (INQ000492283), which was raised with NHS-E in January 2021 and rectified shortly after. Data on differential uptake emerged as early as January 2021 in England (INQ000492335). However, the question of whether anticipated disparities were reasonably mitigated is not straightforward. There is ample evidence to suggest that *efforts* to mitigate disparities were made. The impact of interventions can be measured on different scales (individual; neighbourhood; ethnic minority population).

285. A key limitation is that we cannot disaggregate with certainty the effectiveness of a particular outreach scheme or tailored communication from the broader context of Covid-19 roll-out processes. Tailored communications were distributed concurrently to a national communications campaign. People may have felt more inclined to accept vaccination from a tailored delivery point simply because the passing of time improved their perception of safety. We are unable to comment on the effectiveness of steps taken to address disparities in the absence of evaluations of programme delivery. Evaluations have not been consistently built into roll-out processes – especially those pertaining to flexible and tailored vaccine programme delivery in minority communities. We have attempted to reference timeliness of intervention where possible, for example, in relation to key dates in the pandemic timeline. We also wish to note that effectiveness of inclusion interventions can be defined in a range of ways, and indicators of effectiveness may not be confined to increased vaccination coverage but also, for example, the ability to engage with marginalised or underserved populations in ways that had not previously been tried and to learn what works.

286. Disparities become increasingly apparent across UK-nations as delivery progressed through descending priority groups and revealed coverage rates (**Topic 2**; Curtis et al, 2022; Welsh Parliament, 2021). Implementation strategies appear to have evolved to simultaneously work through descending priority groups and to engage with people who had not yet accepted their offer for vaccination, as occurred in Wales from February 2021. Responding to evidence of low uptake was a continuous process, led by dedicated equity focused groups across UK nations. Insights on vaccine uptake were gathered to develop solutions to address barriers, often through collaborations between Health Boards, faith and community groups and the third sector to inform delivery (Scottish Government, 2021). While 'equal access' was built

into roll-out processes in England, for example, through the 10 mile geographic limit on accessing a vaccination delivery point (INQ000492335), this is not the same as equity in access and offering communities tailored provision.

287. While uptake of the Covid-19 vaccine was lower among all ethnic groups compared to the White British population, there is evidence to suggest that Covid-19 vaccine uptake rates increased across all ethnic groups in England over the course of the pandemic response, This would indicate that positive trends occurred in a context of disparity. For example, uptake increased among people aged 80+ of 'Other Black' ethnicities (in England) from 53.4% on 4 February 2021 to 72.3% on 14 April 2021 (Race Disparity Unit, 2021).[50] There is evidence of a modest yet steady increase in the percentage of double-vaccinated people of ethnic minority backgrounds by June 2022. The below tables indicate the increase for adults of 'Black African' and 'Black Caribbean' ethnicities by December 2021 and June 2022:

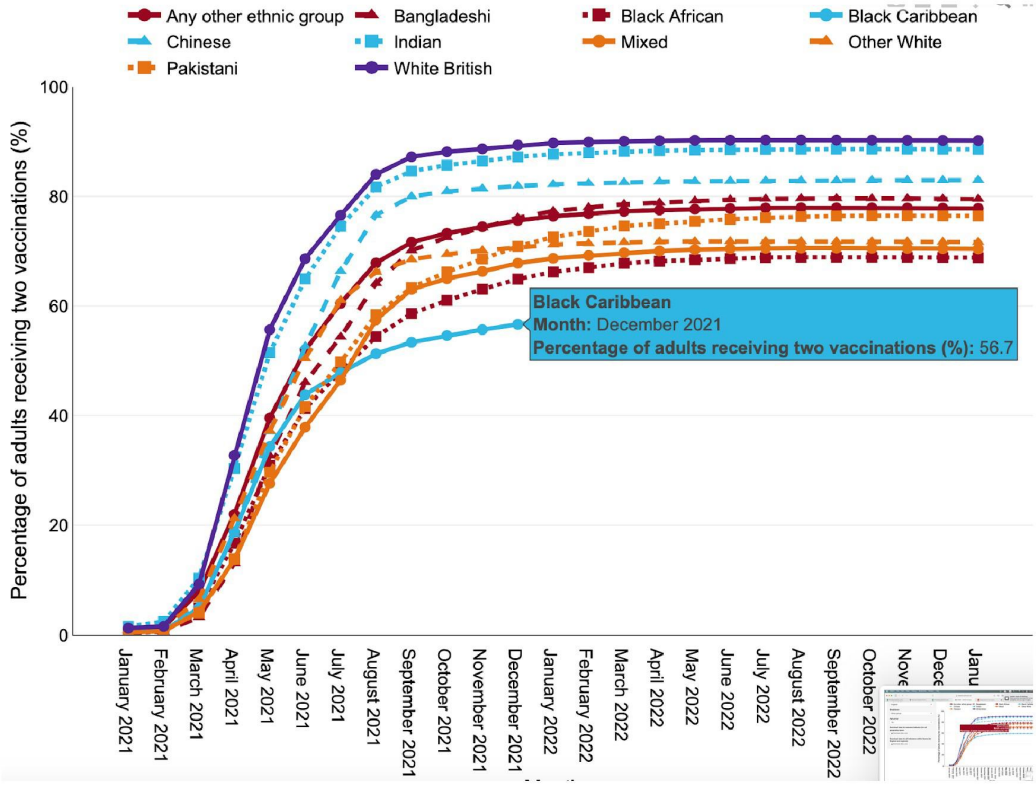

Figure 7: Percentage of two-dose uptake among adults of Black Caribbean ethnicities in England by December 2021, CHIME.

[50] Produced by the Equality Hub, Government Equalities Office, and Race Disparity Unit (2021).

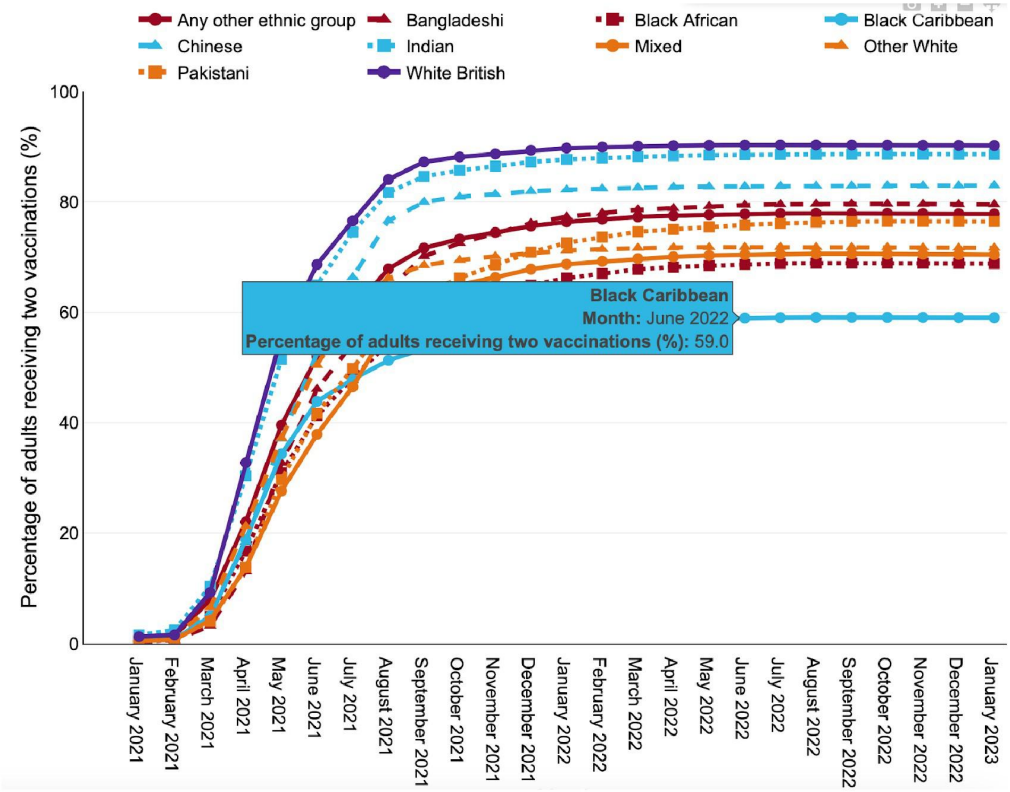

Figure 8: Percentage of two-dose uptake among adults of Black Caribbean ethnicities by June 2022, CHIME.

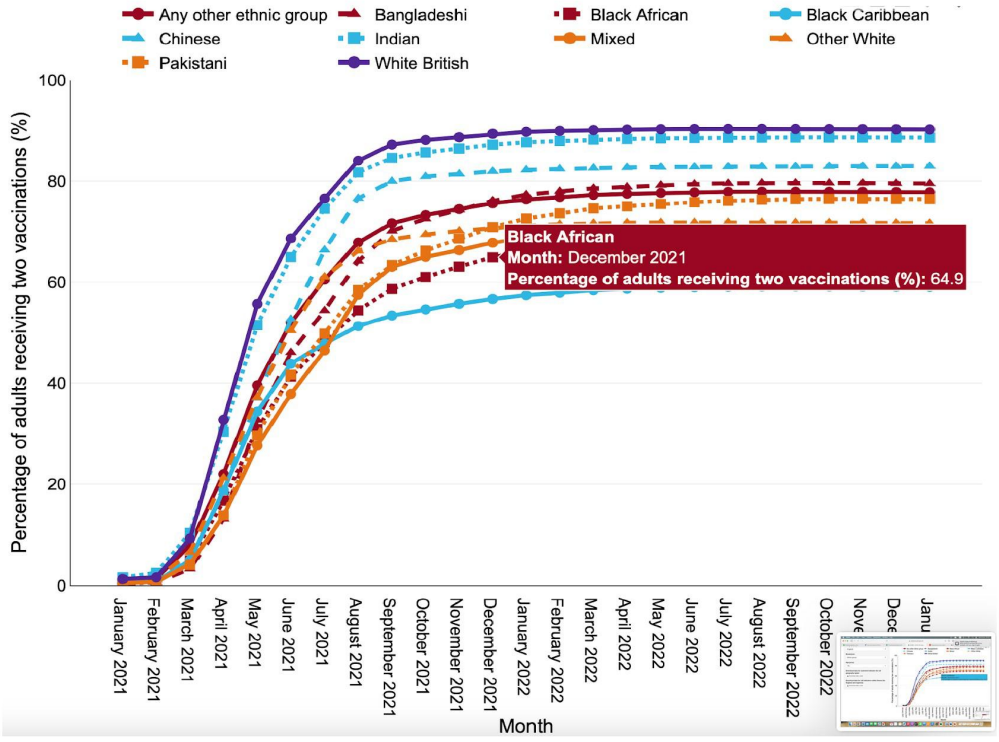

Figure 9: Percentage of two-dose uptake among adults of Black African ethnicities by December 2021, CHIME.

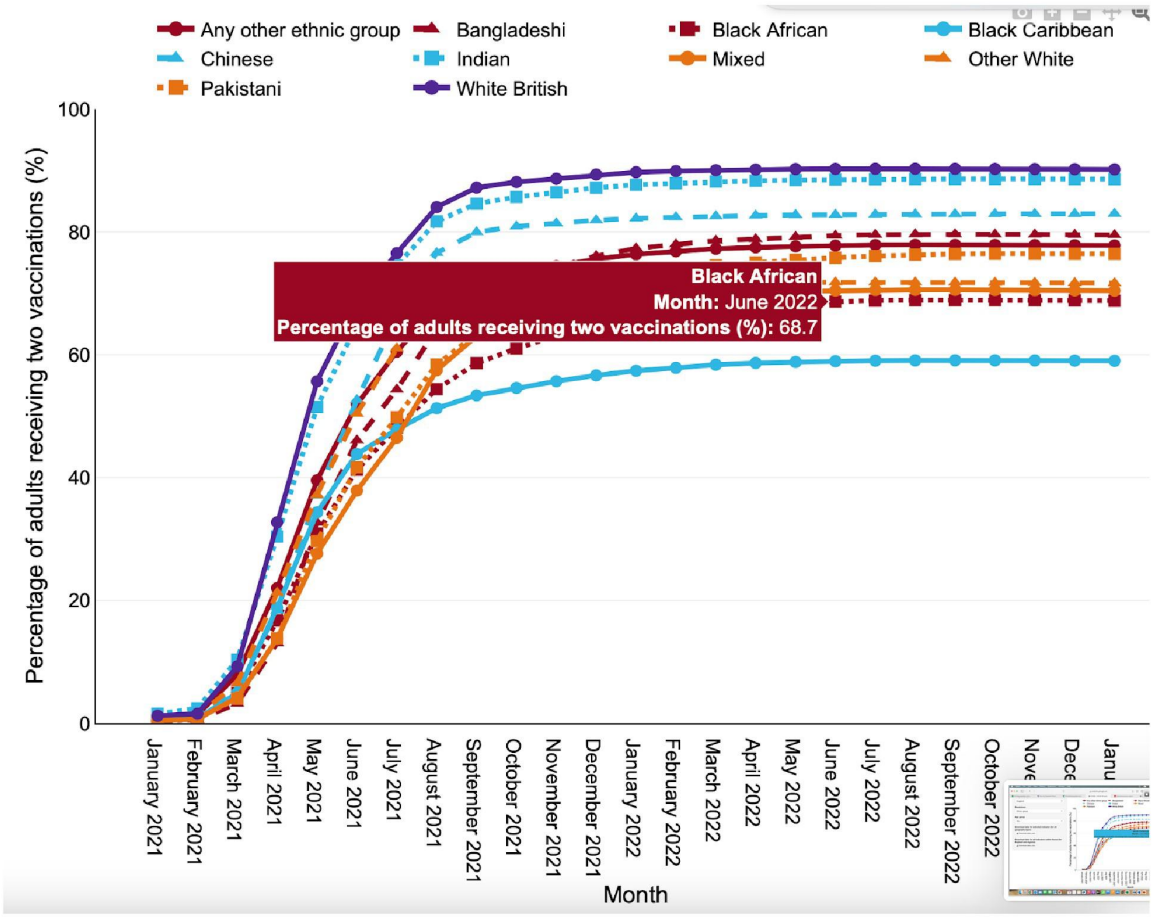

Figure 10: Percentage of two-dose uptake among adults of Black African ethnicities by June 2022.

288. Strategies to overcome communication/information barriers and engage diverse populations across the UK included translation of Covid-19 vaccine information in a range of languages (including Braille, BSL video). These **translations** were produced by health services, the voluntary and community sector, and professional bodies. For example, NHS Inform produced Covid-19 vaccine information in over 30 different languages (Audit Scotland, 2021). Covid-19 vaccine information was produced in Yiddish, primarily intended for Orthodox (Charedi and Chassidic) Jewish populations in England. (See British Society for Immunology, n.d.). To our knowledge, no evaluations were conducted as to how user-friendly these translated resources were for minority communities where children learn in independent faith schools that have limited interaction with the national curriculum. Information was produced in digital and print formats, due to stratified digital access in minority communities such as the Orthodox Jewish population (Kasstan et al., 2022b) and age-related differences in social media use (Age UK, 2023).

Interventions to address disparities in England

289. Access to vaccination expanded via GP surgeries, community pharmacies and flexible delivery strategies over the course of roll-out **(Topic 1)**. Offering the choice to receive

Covid-19 vaccines via mass vaccination sites or community-embedded points of delivery (GP surgeries, community pharmacies, pop-ups and neighbourhood PODs) was imperative to facilitate access. As noted in the King's Trust evaluation, it has become clear now that it is not enough for the NHS just to offer a universal service. It has to offer equal access, taking the service to places to which the NHS would not normally go to allow that to happen (Timmins and Baird, 2022).

290. Evaluations of Covid-19 vaccine delivery across London (where uptake was lower than the national average) were conducted between December 2020 and June 2021 (Halvorsrud et al., 2022; Bulmer et al., 2021).[51] Several requirements to enable and promote access to vaccination were identified in these linked outputs, which help to address disparities in a range of cohorts:

    a. **Flexible booking systems** to offer several routes to obtaining an appointment (e.g. digital and non-digital; appointment and walk-in).

    b. **Convenient vaccination sites** that can be safely reached by public transport, private vehicles, and active travel.

    c. **Safe vaccination sites**, ensuring an ability to maintain physical distance and provide ventilation.

    d. **Familiar vaccination sites** (e.g. primary care) for people with neurodiversity or anxiety.

291. The scale of funding that was made available by the UK Government to support Covid-19 vaccine programme delivery and public engagement offered an opportunity to help address foreseeable issues that have been documented in, for example, barriers to participating in the routine immunisation programme. A key enabler was the ability to release funds to host services at pace to tailor implementation swiftly. Funding provision for tailored pathways to encourage uptake among minority communities was released by DHSC after roll-out, and it was not until 24 February 2021 that £4.2 million in additional funding was made available for this purpose (INQ000492335). We are not able to confirm whether this allocation of funding was decided prior to roll-out, or what informed the allocated sum. It is plausible that flexibility evolved with the Covid-19 vaccine programme and in response to emerging intelligence e.g. monitoring trends and disparities in coverage.

Ethnicity

292. The UK government produced a series of four quarterly reports to investigate and address disparities experienced by ethnic minority groups during the Covid-19 pandemic (Race Disparity Unit, Cabinet Office, 2021).[52] The first quarterly report (October 2020) notes that the UK Government was aware of the challenges facing an eventual Covid-19 vaccination programme and was planning to promote positive vaccine messaging ahead of roll-out to engage minority communities. This would imply that vaccine messaging was planned to be a

[51] These evaluations were based on the experiences of Directors of Public Health (or their teams) to map borough-level activities undertaken to increase uptake. Broader reflections were obtained from participants based in Integrated Care Systems, NHS England and NHS Improvement, Public Health England, Greater London Authority, London councils, and community champion leads.

[52] This was in response to a 2020 Public Health England (PHE) report 'COVID-19: Review of Disparities in Risks and Outcomes'. The report drew on surveillance and broader health data sets to confirm 'that the impact of COVID-19 has replicated existing health inequalities and, in some cases, has increased them.'

key part of community outreach and public engagement as part of a strategy to build trust in government messaging. However, it is not clear what evidence was used to indicate that their communications would be effective in rebuilding trust and whether 'ethnic minority people' viewed communications as the primary strategy to gain their confidence.

293. The second quarterly report (1st March 2020) was published during the Covid-19 vaccination programme. Key examples of attempts to reduce disparities include public communications and vaccine delivery. Examples of the latter include ring-fencing funding for the Community Champions scheme (see below), countering misinformation at national and local-level communications, and digital advertising. Examples of vaccine delivery-focused interventions include establishing NHS vaccination centres in sites used by target communities, such as places of worship (See **Topic 2**). **This would imply that tailored delivery pathways were used following roll-out and not at the onset of roll-out**. Plans were made to continue monitoring inequalities and respond accordingly through a Vaccine Equalities Committee established by NHS England, which integrated expertise from government departments with national representatives from the Association of Directors of Public Health, Local Authorities, Fire and Police services and third sector organisations to advise and guide the vaccine deployment programme on addressing inequalities.

294. The 3rd quarterly report (3rd September 2021) was published after priority groups 1-12 had been offered vaccination. The report emphasises strategies to address inequalities in Covid-19 vaccination among ethnic minorities, and cites places of worship to offer vaccinations during Ramadan, refining outreach by sourcing suitable influencers on social media, making information available in diverse languages, and directly challenging misinformation (e.g. that vaccination affects fertility). The 3rd quarterly report notes that 'Taken together, these initiatives have led to increases in both positive vaccine sentiment and vaccine uptake over time across all ethnic groups, although variances still remain.'

295. The 4th and final quarterly report (3rd December 2021) explicitly notes that targeted engagement was a priority of the post-roll out phase (Race Disparity Unit, Cabinet Office, 2021). The report offers a number of case studies of interventions developed between stakeholders (**Topic 1**) and diverse communities, including the design of a 'Bridging The Gap' toolkit specifically for people of Black African and Black Caribbean groups. Key components included:

    a. Data and population behavioural insights to help users gain a detailed understanding of local Black African and Black African Caribbean populations, identify gaps in uptake and facilitate targeting of initiatives;

    b. Encouraging vaccine uptake in these groups by removing barriers;

    c. Sharing what works via the NHS Connect and Exchange Hub and encouraging users to post useful material;

    d. Using high-profile and trusted voices to support vaccine uptake, with advice on how to communicate clearly with target audiences;

    e. Using targeted conversations to boost vaccine confidence – for example, hosting a series of clinically-led, online dialogues using trusted voices to engage Black groups;

    f. Encouraging use of venues for mobile and pop-up vaccination centres that the target audience feel comfortable with and frequently visit, such as places of worship, community organisations and schools.

296. An example of measures taken to reduce disparities among Black African populations are the use of oral methods that convey information and recommendations in key languages via spoken and digital communications in a range of formats, including oral recordings, online videos, YouTube webinars (Local Government Association, 2022; Camden Council, 2021; BBC News, 2021d).[53] Delivery interventions included male and female vaccination teams, who speak languages of local target populations, with delivery taking place in mosques (Royal College of General Practitioners, 2021; Health Watch Leeds, 2023).

297. Building on past recommendations (Letley et al., 2018), public health professionals applied a local approach to Covid-19 vaccine delivery for Orthodox (Charedi) Jewish residents in north London by co-developing a select number of clinics with a volunteer paramedic service (Kasstan et al., 2022b). Past recommendations for enhancing service delivery to Charedi Jewish residents of north London involved flexible delivery processes such as community-embedded points of delivery, Sunday clinics and a combination of walk in/booked appointments (Letley et al., 2018). However, sustaining these services have been challenging due to inconsistent funding arrangements and changes in commissioning arrangements.

298. There were indications that the delivery approach reached individuals who were considered unlikely to come forward for vaccination via the universal offer as mass vaccination centres to be an unsuitable and unfamiliar delivery point, which rendered the sites inaccessible. By partnering with respected community organisations, target audiences benefitted from enhanced convenience and confidence in the vaccine offer but also a sense of 'community ownership' that helped to generate interest and upticks in coverage (see also Ismail et al., 2023 for mosque-delivery; INQ000421391 for church-based delivery). We maintain that sharing responsibility with community partners or organisations does not mean devolving responsibility, and oversight may be required to ensure site assurance.

299. The British Islamic Medical Association produced statement positions on the UK Covid-19 vaccines for Muslim communities.[54] Collaborations were developed between the Department for Digital, Culture, Media and Sport and local-level religious leaders to counter-misinformation that was circulating, and to attempt to reduce the disparities recorded by religion (**Topic 2**) and especially among Muslim people (INQ000492283). Additional measures included supporting 'family vaccinations' delivery to benefit multi-generational households, which were factored into health messaging ahead of Ramadan 2021 (April-May 2021), though this statement does not detail how 'family vaccinations' occurred in the context of age-descending priority cohorts (INQ000492283).

300. A 'places of worship' taskforce and roundtables were stood up in England, which convened key faith leaders as part of the pandemic response and to promote involvement in the vaccination drive (INQ000474299). We are unable to confirm if this approach was taken in the four nations, and if not, would support preparedness efforts. Lack of timeliness in developing vaccination sites in places of worship was perceived by intended beneficiaries as reactive rather than proactive though it is not possible to determine scale from this submission (INQ000485278-0017-18).

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[53] These interventions were produced in Somali, which was the main language for 59.6% of people identifying as Somali and resident in London. People who reported not speaking English tended to be in older-age cohorts of 65+ (Office for National Statistics, 2021b).

[54] Link is signposted via the Muslim Council of Britain but no longer working: https://mcb.org.uk/resources/opvac/ but is broken: https://britishima.org/statement/pfizer-biontech-covid19-vaccine/

Care home residents

301. Mobile or 'roving' vaccination teams were used to rapidly and conveniently vaccinate care home residents and was as a method to vaccinate rural as well as vulnerable populations, such as people experiencing homelessness those escaping abuse in refuges, or communities with lower vaccination rates (DHSC, 2021a). This indicates application of learning as roll-out processes progressed along descending priority groups. Records note that NHS England worked with the Care Quality Commission (CQC), local authorities and integrated care boards to develop a list of registered care homes to mobilise vaccine delivery (INQ000474228_0051), though the need to compile such information in real time is a limitation and could have been averted by preparedness planning.

Disabled people

302. Information provided by NHS-E and UKHSA indicates that national-level communications were produced (by NHS-E) prior to roll-out to prepare people living with learning disability or with autism for the vaccination programme, and information was directed to healthcare providers to recommend reasonable adjustments (INQ000492335). Service adjustments included dedicated and fast-tracked time slots were used in diverse ways, for example, by 'giving someone a priority appointment if they find it difficult waiting in their GP surgery or hospital' or 'longer appointment' to support people to understand the information being offered' (INQ000414507;[55] also Whitehouse et al., 2021). A range of strategies were implemented to improve uptake among people living with disabilities, for example, having specialised learning disability nurses in vaccine clinics, and 'quiet' hours (INQ000414461). However, it is not possible to assess the impact on vaccination uptake based on these resources, only that attempts were made to enable access and address barriers. NHS England issued guidance to primary care services to mitigate barriers to access for people living with learning disabilities and autism, to ensure compliance with the Equality Act (2010) concerning reasonable adjustments of service provision. PHE and NHSE collaborated with charities such as Rethink Mental Illness to produce communications for people living with severe mental illness, learning difficulties or autism (INQ000496177). Regional health teams paid for taxis to transport people with physical disabilities to vaccination sites (as well as people facing financial barriers to vaccination), and in other areas mobile units would deliver vaccinations to housebound people (INQ000492335). GP practices received an additional supplement of £10 (on top of the item of service fee) per visit to housebound people (INQ000329444), though we are unable to confirm how this figure was reached and if it was adequate to cover costs.

303. A model of good practice included an NHS trust vaccination centre located in a hospital, which had access to multi-disciplinary expertise, including trained learning disability nurses and access to pharmacists to provide advice around multiple medications and vaccination (Whitehouse et al., 2021). One service was developed following stakeholder engagement, and applied learning by having a dedicated room with its own entry/exit and control over lighting, sound and temperature. Referrals to the bespoke service could be made by families, professional and service providers, which were screened by a specialist nurse to confirm needs and requirements prior to attendance. While such tailored provisions are resource and

[55] This resource is not dated, so we are not able to confirm when in roll-out this guidance was released.

labour-intensive, they can be operated on a weekly basis to consolidate appointments into an efficient number of days.

304. One region in England decided to move people with learning disabilities from priority cohort 10 to cohort 6, two weeks prior to the official change in February 2021 (INQ000414459). However, it is not clear what process of approvals this went through. This would set a precedent for local flexibility on prioritisation as opposed to a standard approach of working through each priority cohort and may cause confusion as people with learning disabilities living in other areas would not have received the same offer. Based on the limited detail it is difficult to contextualise the implications for example any re-direction of resources or stock to offer vaccines to this cohort early, and the issue of fairness and whether a local approach to flexibility could have also benefited other vulnerable groups (**Topic 1**).

Mobile populations and individuals with insecure immigration status

305. GP Access Cards distributed via community sector, explaining that recipients do not need e.g. proof of address to register for general practices, but that registration can support people who for example are CEV to be prioritised for vaccination (INQ000414498). This intervention was considered a particular benefit to RGT populations. Populations with insecure immigration status (and migrants) were considered to benefit from telephone messaging (Knights et al., 2021), which could also note their delivery site options if they were not registered at a GP surgery or in the absence of a fixed address.

306. Arrangements to provide free transport by NHS trusts or boards helped to increase uptake in areas of greater deprivation (England; Scotland): "between 26 March and 6 August 2021, a total of 713 journeys were undertaken by individuals to get vaccinated, who may not have otherwise taken up the offer.' We are not able to determine whether vaccines would have been sought out in the absence of this support (INQ000414461). It is not clear how many NHS trusts/boards offered this service. It may be beneficial to assess the impact of a nationwide approach to support people living in the areas of highest deprivation or as a means-tested offer.

307. Walk-in vaccination services, which did not request proof of identification or NHS numbers as a requirement for vaccination, helped to enable access for individuals with insecure immigration status (INQ000474407_0044). Hosting walk-in vaccine clinics in spaces that were likely to be used by this cohort (due to restrictive immigration policies) were considered an enabler to access, including foodbanks and community centres or services for homeless people (Deal et al, 2021). Advocacy organisations worked with local authorities to convey the importance of telling this cohort that patient data would not be shared with the home office. NHS England launched an online search tool to locate a local walk-in vaccination clinic, but we are unable to determine if this was replicated across DAs.

Vulnerable due to homelessness, experience of substance misuse, or prison population

308. Government allocation of resources to offer temporary accommodation for people experiencing **homelessness** helped to locate and identify people for vaccination. This intervention was termed the 'Everyone In' campaign in England and funding for this purpose was made available in DA) (Local Government Association, 2020), which supported

implementation as health partners could map facilities and temporary accommodation used by people experiencing homelessness (The Queen's Nursing Institute, n.d.). PHE/UKHSA provided guidance for vaccination of people experiencing homelessness and collaborated with charities to develop outreach approaches (INQ000496177).

309. Vaccination for whole prison populations were recommended by PHE/UKHSA if outbreaks were difficult to manage, prior to official national policy providing such operational flexibility in March 2021 (INQ000496177).

Deprivation

310. Of the vaccines delivered via community pharmacies, over a third were in the most deprived communities (INQ000474318_0013). This indicates the strategic role of vaccination via this sector in public health emergencies.

Interventions to address disparities in Northern Ireland

311. The Public Health Agency set up Covid-19 vaccine low uptake working group to further support a number of key cohorts that had been identified as having low vaccine uptake (INQ000474249). Evidence indicated a strong correlation between low vaccine uptake and areas of higher **deprivation** or that are home to **ethnic minority** & **migrant** communities. Strategies to address uptake among underserved communities included workplace-delivery, which helped to increase vaccination in key sectors such as food distribution. Running clinics over 2 days tended to result in increased uptake on the second day, possibly to allow time to generate public interest and confidence (INQ000474249). Mobile clinics were considered pragmatic delivery routes for such settings and tailored delivery plans were refined through multi-agency collaborations (INQ000474249).[56] Vaccination teams built on existing mobile health check tests (e.g. to test blood pressure, BMI) to farming communities and attended to offer vaccination (INQ000474249), but this resource offers no indication of impact. This indicates how relationships and strategies that were already in place to engage underserved communities could be pivoted in the vaccine response quickly, whereas relationships that were not in place took time to build. Pop-up clinics were hosted in a community-led facility supporting primarily ethnic minority, migrant and Traveller communities. The venue was used over a 9-month period to host vaccination clinics. Figures of vaccine uptake indicate majority engagement with people from ethnic minority backgrounds during these pop-up clinics, which offered Pfizer first dose vaccinations.

312. Key relationships were developed with care home and home care providers prior to the commencement of the vaccination programme and continued as needed through the deployment in care homes, which allowed swift roll-out to a high priority cohort (INQ000474249).

[56] 'Covid Vaccine Oversight Group 26/05/22 Low Vaccine Update/Equity Presentation (INQ000390122). The purpose was to 'review Vaccine update equity data, action planning to date and next steps.' The slide-deck was produced by HSC Public Health Agency, shared by the Covid-19 Inquiry team. The slide-deck is not dated. It is unclear from the information provided how the backgrounds of recipients were obtained. It is also unclear how recipients perceived the delivery point in relation to mainstream delivery routes.

313. To enhance vaccine access for **unpaid carers**, self-identification without a requirement to provide proof of care status was permitted to enable a large number of people to be vaccinated (INQ000474249).

314. Attempts were made to enhance vaccine uptake among **pregnant women and people** by hosting pregnancy-only vaccine clinics in maternity services or to host vaccine clinics in antenatal services – though uptake remained low (INQ000474249).

315. A 'low vaccine uptake toolkit' was produced to support health partners in Northern Ireland seeking to promote COVID-19 vaccination uptake within their local communities. It contained resources and models of practice targeted at the general population, as well as materials specifically designed for target audience groups – to support the design and implementation of interventions to improve COVID-19 vaccine uptake. The toolkit is no longer publicly available.

316. 'Big jab weekend' was hosted to accelerate uptake among **university age students** and **young adults** via pop up clinics across learning institutes (INQ000474249). By August 2021, supplies of Moderna had increased to support deployment via different delivery points to support uptake among 18+. Intelligence on declining uptake led to operational changes for example allowing walk in clinics in Trust delivery points.

Interventions to address disparities in Scotland

317. Health boards were expected to offer diverse delivery pathways, including mass vaccination sites as well as community clinics, domiciliary visits, and tailored delivery approaches for several marginalised populations (UKIDM4SG0092). Outreach delivery approaches were responsive to emerging data on vaccine coverage gaps. The scope and importance placed on inclusion appears to have evolved over the course of programme implementation. As roll-out evolved, there was a recognition in documents published in October 2021 that tailored approaches supported uptake among minority ethnic groups that may not be vaccinated through any other model' (Public Health Scotland 2022). Such methods were acknowledged to be more resource intensive than the universal offer and delivery route, and to result in fewer overall vaccinations. Yet, they provide return on investment by vaccinating groups least likely to be vaccinated through the universal approach: 'they reach both disproportionately at-risk groups and individuals who are unlikely to be vaccinated through any other delivery model and should be taken in parallel with other delivery models.'

318. Mass vaccination sites can attempt to balance efficiency and equity as long as accessibility criteria are maintained: 'Mass/community vaccination centres are an effective way to vaccinate a large volume of people at once but must have good transport links for convenience and equity of access' (Public Health Scotland, October 2022). However, tailored pathways were critical to enhance uptake among underserved groups.

Ethnicity

319. One church accounted for '25% of all African ethnicity outreach vaccinations across Scotland.'

320. As a significant number of the Polish group had not had any dose of the vaccine (in comparison with the White Scottish group, a range of strategies were developed to mitigate this disparity, including, but not limited to (Public Health Scotland Vaccine Evaluation and Confidence & Equity Teams 3 March 2022):

a. Information translated into Polish and disseminated via a range of media;

b. Training sessions for vaccinators on how to work with interpreters;

c. Worked with Polish community, faith and commercial groups to disseminate information;

d. PODs were initiated in areas where Polish residents live, though this did not result in increased vaccine uptake.

321. Misinformation against vaccination in Polish communities was reported, which hampered inclusion approaches. Considering the average age of the Polish demographic in Scotland (higher % of people in the 30-49 age group and in areas of higher deprivation), recommendations focused on attempting to increase engagement via maternity and midwifery services. Engaging at earlier ages, for instance, through schools, was also recommended.

322. Delivery pathways had a clear influence on uptake in under-served minorities, with a higher proportion of most ethnic minority groups using outreach vaccinations when compared to white groups, further demonstrating the value of tailored interventions (Public Health Scotland, not dated).

Age

323. To address age-related preferences in appointment booking in Scotland, recommendations were made to offer a self-appointing and digital-based approach for the 18-29 age range and appointments via letters in older cohorts. Those who did not make an appointment after a period of time would be sent an appointment letter or followed up by phone (Public Health Scotland, not dated). A recommendation was made for clinic schedulers to build in some flexibility to accommodate opportunistic vaccinations in all clinics (where possible). This cohort was also identified to require flexible delivery approaches due to the higher likelihood of being in full-time education or employment.

Access due to rurality or higher deprivation

324. Vaccines were delivered in outreach modes to rural and geographically isolated settings to avert the need to travel long distances for vaccination. Regional-level interventions were designed to facilitate access to vaccination, such as the provision of tokens for free bus travel to and from vaccination delivery points included in vaccine appointment letters by NHS Ayrshire and Arran. This was to prevent household income from being a barrier to accessing vaccine delivery points.

325. Inclusion recommendations focused on delivery models via community-based vaccination centres in familiar, accessible locations and venues, and were cited to reduce barriers to access for most cohorts, but in particular those people on low incomes, and those who are high clinical risk and would prefer not to get on public transport (Public Health Scotland).

Prison populations

326. The Scottish Government and Public Health Scotland produced tailored resources to obtain informed consent, including letters, and Q&A sessions that were broadcast via 'prison radio and TV.' The EIA also notes: 'Prisoners due to be released now have leaflets in liberation

packs encouraging them to receive a second dose in the community and information on how they can do this. PHS [Public Health Scotland] has published data on prison vaccine uptake showing it is close to the population as a whole.'

Mobile populations

327. As migrant seasonal workers were considered much less likely to not be registered with a GP, the Scottish Government agreed with Health Boards that 'vaccines can be administered and details recorded so CHI [Community Health Index] numbers can be retrospectively produced.'

328. To address disparities among undocumented migrants, Public Health Scotland co-produced information with the Scottish Refugee Council which explicitly stated that NHS Scotland 'does not pass personal details to the Home Office for the purpose of immigration enforcement and that immigration checks are not required to access vaccination.'

Interventions to address disparities in Wales

329. As noted, roll-out processes in Wales included strategic aims on equity and 'additional tailored support' for under-served groups. A Vaccine Equity Committee was designated to 'work to ensure equitable uptake of Covid-19 vaccination across Wales.' The programme included 4 key elements to mitigate disparities, including strategy; data and intelligence; tailored operational delivery; and communication and engagement.

330. Requiring local health boards to undertake equality health impact assessments (EHIA) supported attempts to reduce disparities between groups. This, for example, ensured reasonable adjustments were put in place to enable people with protected characteristics, such as disabilities, to safely and easily access the service they provide. Considerations included access to BSL interpreters, disabled access, provision of toilets and suitable private spaces. EHIA require regular review as the vaccination programme model of delivery adapts with progression through the priority groups (Welsh Government Digital 2021). This approach may have helped to identify and address barriers to vaccination across cohorts.

331. Outreach attempts were undertaken with **Black, Asian and minority ethnic groups**, people experiencing **homelessness** and members of **Traveller** communities. Novel and innovative approaches to tailoring their vaccination programmes have been developed such as the use of a converted mobile library into an "Immbulance" in Swansea Bay UHB to enable mobile outreach clinics for under-served groups.' (Welsh Government Digital 2021). The Welsh Government made approximately £2,500,000 available for outreach and engagement workers within each health board to engage 'Black, Asian and minority ethnic groups.' Funding was made available to 27 organisations 'to help support and sustain volunteering and community action during recovery from the Covid-19 pandemic' (Welsh Government Digital 2021). We do not have sufficient information to compare how different health boards employed outreach and engagement workers.

332. Multi-sector collaborations were formed to engage Syrian refugees and Gypsy, Roma and Traveller communities to promote acceptance and innovation in vaccination delivery from using drive-in centres and walk-throughs, to mobile and pop-up clinics in shopping and faith centres (Welsh Government, 2022). However, we have been unable to access evaluations of

these vaccination sessions to view detailed feedback on effectiveness of pathways from intended beneficiaries.

333. In August 2021, Public Health Wales produced educational videos to improve uptake of **vaccination during pregnancy**, including for midwives, on having effective conversations around the benefits, safety, and risks of vaccination (INQ000474311_0028).

334. To increase vaccination uptake among **child cohorts**, comic strips and YouTube videos were produced for child cohorts with positive vaccine messaging and to shape expectations e.g. how children may feel post-vaccination (INQ000474311_0048-0049).

Community champions (England unless otherwise stated)

335. In February 2021, £23.75 million in funding was made available by UK Government departments to local authorities under the Community Champions Scheme (POST, 2021), though plans for this scheme were agreed in advance of roll-out (INQ000474299_0022-0023). The scheme sought to 'provide a framework which aligns key messages at a national and local level during a national emergency' (Kamal and Bear n.d.). The scope of the scheme appears limited to England. It is not clear whether an organised funding scheme for Community Champions was implemented across DA. To the best of our knowledge, this was not the case.

336. The UK Covid-19 Vaccines Delivery Plan published by DHSC on 13 January 2021 noted that the programme sought 'to work with up to 65 local authorities across England to boost work to reach out to ethnic minority and disabled communities. This will include intensive engagement by community voices around vaccinations – learning and other resources from local activity will be shared to a wider audience.' The UK Covid-19 Vaccines Delivery Plan does not elaborate which local authorities would be engaged as part of the programme, or according to what assessment or needs-based criteria. Evidence indicates that these were areas with the lowest vaccine uptake among the age 30+ cohorts (INQ000474299_0028).

337. Evaluations noted that community champions were able to impact vaccination coverage rates by, for example, by supporting the set-up of vaccination pop-ups, translating and circulating information through multiple modes of delivery, responding to misinformation; leveraging trust with communities to instil confidence in vaccine recommendations; and answering questions raised within communities (Kamal and Bear n.d; NIHR Public Health Intervention Responsive Studies Teams 2023). The scheme benefitted from decentralisation and the flexibility to use funding according to local demographics and challenges, and to set their own aims. The aims of the local authorities included in the evaluation gravitated around building trust within the vaccination programme.

338. Barriers to programme implementation included challenging timeframes to implement activities and community and organisational challenges pertaining to cohesion. Burn-out was an issue due to over-reliance on a small pool of people. Sustaining resources and support were crucial to the ability of the programmes to operate. Community champions did not receive official training and often felt 'organically trained' (Vanderslott et al, 2024; see also Gilburt et al, 2024). The study does not sufficiently detail what training would have been helpful. Community champions came from a range of professional backgrounds, from healthcare professionals to local elected representatives (Vanderslott et al, 2024), indicating that some community champions would have had more capacity to confidently address vaccine-related questions than others. Provision of training is essential to ensure that community champions can confidently promote vaccinations in outbreak and pandemic responses.

339. Peer-led engagement was not significantly successful across all age cohorts. Focus groups conducted with 'younger people' in Scotland (who had lower compared to upper-age cohorts) indicates a preference for messaging from experts rather than peers – having 'greater credibility than, for example celebrities.'

340. Further funding was allocated to local authorities as part of the 'Community Vaccines Champion,' which was announced on 19th December 2021, and supported the design of bespoke vaccination programme delivery (INQ000474299_0030).

Steps not taken to address disparities in coverage

Vaccination as a condition of deployment (VCOD) in health and social care

341. If it had been implemented with front line health and social workers (HSCW), VCOD may have helped to attain maximum levels of coverage among these workers, a significant proportion of whom are from ethnic minority backgrounds. On the other hand, *how* VCOD was managed especially in England provoked significant pushback that may have influenced perceptions of the Covid-19 vaccination programme among HSCW and the general public. Below, we outline the issues surrounding attempts to introduce VCOD.

342. In England, Covid-19 vaccination uptake rates (first dose) as of October 2021 were estimated at 92.8% amongst NHS healthcare workers and 83.7% amongst domiciliary care workers in adult social care. Differences in uptake were therefore evident between the two sectors (data drawn from DHSC & NHS England [2021]). Regional disparities in health and social care worker vaccination uptake rates were also identified (NHS England and NHS Improvement, 2021), and research indicated higher levels of vaccine hesitancy and variation in uptake by ethnicity amongst healthcare workers (Martin et al., 2021; Woolf et al., 2021). As of 13th June 2021, only 64.7% of care homes were achieving first dose Covid-19 vaccination rates of 80% and 90% for workers and residents – with only 44.1% of London care homes reaching these levels (DHSC, 2021n).

343. DHSC ran two consultations on making vaccination a condition of deployment, one for care home workers and one for all health and social care settings (DHSC and The Rt Hon Sajid Javid MP, 2021). An outcome of the first consultation was that care home workers were required to have a complete primary course of Covid-19 vaccination by 11 November 2021. On 9 November 2021, DHSC and NHS England announced plans to require a complete course of Covid-19 vaccination as a condition of deployment for all frontline health and social care workers. The requirement was due to be enforced on 1 April 2022. Those that did not meet the 1 April 2022 deadline were at risk of dismissal and no compensation would be available (British Medical Association, 2022).

344. VCOD prompted large-scale refusal and resignation among front-line workers, which was more pronounced for ethnic minority women who were less likely to be vaccinated (INQ000492283_0005-0006). An impact assessment of Covid-19 vaccination as a condition of deployment in care homes estimated that approximately 37,000 additional staff might leave the care home workforce as a result of implementation of the policy. The care home workforce dropped by 19,300 between 20 July 2021 and 29 December 2021. However, 'this also reflects the effect of new staff joining the sector over the same time period and staff leaving for other reasons' (DHSC, 2022b). Disciplinary procedures included requiring unvaccinated employees to return sick pay or only receive statutory sick pay if they

contracted Covid-19 and were unable to attend work (INQ000474344_0045). As people of ethnic minority backgrounds are more likely to be in lower-paid frontline positions in the health and social care sector (Hussen, 2022), our concern is the impact of these events for vaccine confidence among people of ethnic minority backgrounds.

345. Concerns of large-scale refusal and resignation were shared amongst professional healthcare bodies including the Royal College of Nursing, Royal College of Midwives, Royal College of General Practitioners, Royal College of Obstetrics & Gynaecology, and the British Medical Association (Kmietowicz, 2022). This indicates that the DHSC plans did not have consensus from a range of stakeholders, and learning from this dispute should be considered an essential step of preparedness plans. The requirement was revoked on 15 March 2022 for all health and social care workers, including those working in or deployed to care homes (British Medical Association, 2022b; Care Quality Commission, 2022).

346. The planned requirement for healthcare providers to be vaccinated against Covid-19 was consistent with steps taken in EU countries in 2021, including France and Germany (Wise, 2021). There are precedents for requiring vaccination as a condition of deployment for certain NHS professionals, such as hepatitis B vaccination. While there is no requirement for care home workers to be vaccinated against hepatitis B, compulsory vaccination against Covid-19 was enforced for those working in care homes (Timmins and Baird, 2022).

347. VCOD was considered in **Northern Ireland** to improve uptake and protect those receiving care, but was not developed as policy. To improve uptake of the vaccine by health care professionals, the Department of Health sought engagement and support from professional bodies and Unions to help encourage staff to take up the offer of vaccination (INQ000474249_0028). The position in **Scotland** was that VCOD should remain voluntary and be encouraged for HSCW, and there appears to have been particular concern for the impact on staff from ethnic minority backgrounds (INQ000474350_0022-23). In **Wales**, high vaccine uptake among this cohort meant that mandatory vaccination was not considered necessary, though stakeholders in Wales also observed the controversy unfolding in England when considering their position (INQ000501330_0054). It is not clear to us what steps were taken to formulate a UK-wide consensus position on vaccination of HSCW, which should be a priority for preparedness in the future.

348. Research indicated that health and social care workers that felt pressured by their employer to be vaccinated were more likely to decline Covid-19 vaccination (Bell et al, 2022). This was particularly evident amongst social care workers, for whom pressure was exacerbated by hearing of care sector employers making COVID-19 vaccination mandatory for staff, and the vulnerability of social care worker positions (e.g. employment on zero-hours contracts). Rather than resorting to more coercive approaches, evidence indicates that increasing vaccine uptake among health and social care workers can be achieved by creating positive work environments that support vaccination uptake as part of a broader remit to promote staff wellbeing (Bell et al, 2020; Mounier-Jack et al, 2020). Such approaches may support uptake of Covid-19 vaccine uptake among health and social care professionals.

Health professionals not included in roll-out processes

349. Health visitors could have been integrated in the Covid-19 vaccine programme roll-out to enhance uptake among anybody who had deferred vaccination due to pregnancy or

breastfeeding. Following the 17th March 2020 decision to re-prioritise the health system and build hospital capacity as part of the Covid response, health visiting services underwent a 'partial stop' and support to families was significantly reduced (Morton and Adams, 2022).

350. There is variation in the remit, roles and workforce capacity of health visitors across UK nations (Morton, 2024). Health visitors are a strategic public health role and are typically recruited by local authorities in England, meaning they operate in set geographic regions and areas of deprivation and deficits in health. They come 'into contact with every family in the country, and able to build up trust through regular visits, often in the family's own home' (Institute of Health Visiting, 2022).

351. Health visitors perform a fundamental role in discussing childhood immunisations, but maximising their potential was prevented because of long-running under-investment in the health visiting profession. The national public health grant funds the health visiting service, but successive cuts in public health spending meant that the health visiting service entered the pandemic in a state of depletion (Morton and Adams, 2022).[57] The decline in central government funding to councils via the Public Health Grant means that public health has been operating in a resource constrained environment. The national public health grant 'has been reduced in real terms £858 million (in 2022/23 prices) between July 2015 and 2024 (Local Government Association 2024). National public health agencies (PHE) reported being 'neither mandated nor funded by Government to be ready to respond to a pandemic of the scale that we encountered with Covid-19' (INQ000496177_0006). Evidence of a commitment to funding for vaccine inequalities at national and local levels by central government prior to the Covid-19 pandemic is lacking.

352. Researchers attempting to engage with the health visiting service during the Covid-19 pandemic identified high turnover of staff due to 'enormous challenges' posed by the sector being 'decimated with public health cuts' (Anderson, 2024). Changes to commissioning frameworks have prevented health visitors from being able to vaccinate (Redsell et al, 2009), and this has directly removed a touchpoint for convenient or opportunistic vaccination when catch-up of childhood vaccination is required. The 2012 Health & Social Care Act has been described as 'fragmenting' the vaccination programme, and it separated health visiting and the delivery of vaccinations in community settings (Mahase, 2021). The ability to offer vaccination to parents who have not responded to invitations and reminders was effectively removed. The pattern of decline in childhood immunisations should be understood against this backdrop of changes to commissioning and investment in this public health service.

353. Health visitors could have been in a position to offer Covid-19 vaccines had the service been appropriately funded and resourced prior to the Covid-19 pandemic and mandated to deliver vaccinations (i.e. if households already expected to be offered childhood vaccinations by health visitors). Health visitors could have offered Covid-19 vaccinations to mothers during visits, particularly those that had deferred vaccination during pregnancy or prior to pregnancy due to concerns about implications for conception (as discussed previously in this report). Health visitors could also have reinforced guidance or offered vaccinations to children aged 6

[57] Numbers of health visitors are declining and 'there is currently an estimated shortage of 5,000 health visitors in England,' which constitutes a decline of more than 40% of the workforce since 2015 (Institute of Health Visiting 2024)

months to 4 years in a clinical risk group, who were recommended vaccination by the JCVI from 9 December 2022 (though this recommendation falls beyond the scope of this report).

354. District nurses continued to visit housebound people during the pandemic hence there was a precedent for performing clinical duties in people's homes. The experience and safety measures applied in these visits could have informed health visitor home visits to ensure that families who were finding it difficult to reach vaccination centres could be vaccinated.

Conclusions on addressing disparities in coverage

355. The Covid-19 vaccination programme faced specific challenges of maintaining public confidence and demand in a condition of uncertainty over many aspects of roll-out processes, such as supply, safety and recommendations, and workforce limitations. It was foreseeable that public communication and engagement strategies would need to navigate these issues. Public confidence may have been further undermined by the lack of consensus on requiring vaccination as a condition of deployment and the possible impacts among ethnic minority communities which form a large part of lower-paid ranks of the health and social care sector.

356. Health partners sought to mitigate disparities that had become apparent across population cohorts, often through tailored engagement or delivery approaches. Parliamentarians considered vaccine roll-out procedures to be 'adequately tailored to meet the needs of those groups with lower levels of vaccine uptake' (INQ000492283_0010), and there is evidence of local, regional and national attempts to address disparities. However, some of the causes for disparity outlined in **Topic 3** are deeply rooted and outreach activities did not have the impact needed to support uptake in some populations, such as people of Black Caribbean and Black African ethnicity.

357. Our attempt to assess the steps taken to address disparities in coverage has been severely limited by the lack of publicly available evaluations of outreach activities and delivery pathways. Consequently, we have been unable to assess and compare effectiveness and timeliness of interventions to address disparities in vaccine uptake and coverage. Part of this issue may be attributed to the fact that outreach activities were responsive to emerging data about disparities and their causes (**Topics 2-3)**. Community stakeholders should be involved in the design of outreach delivery of routine and outbreak vaccination campaigns.

358. We have been unable to determine the exact period in roll-out processes when funding and flexible commissioning models were made available for tailored delivery pathways, and whether these models were designed prior to roll-out on 8th December 2020 or after. Funding and service commissioning models are necessary for tailored delivery pathways, as they allow the rapid availability of funding for procurement (e.g. sites, staff) and programme delivery. Such provisions are essential to improve uptake among underserved populations in outbreak and pandemic scenarios.

359. Engagement between health agencies and faith and CVSE organisations contributed to an increase in positive vaccine sentiment and vaccine uptake in underserved communities. The additional funding that supported this partnership work was critical for enabling this vital work and there are key lessons to be learned about continuing to resource community engagement to maintain trust in public health services. Tailored approaches to vaccination provision which resulted in improved access to vaccination clinics including those hosted by people or at places that people trust (e.g. Mosques and churches, community services) and are more convenient for them to reach. There appears to have been a particular benefit to

involving faith-based spaces or services, which may offer key learning for engaging underserved groups in pandemic preparedness efforts. Such collaborations also helped to co-produce communications with community groups and featured 'trusted voices', including health professionals from ethnic minority groups. UK-wide guidance may help to consolidate models of good practice as part of preparedness efforts.

360. The 'community champions' model helped to address issues of mistrust that developed over time and impacted on coverage rates among ethnic minorities. Voluntary organisations were a key point of engagement to familiarise the public, notably people of minority ethnic backgrounds, with the Covid-19 vaccination programme. However, using volunteer-led programmes to address an issue as severe as inequalities is not sustainable in the long-term. Community engagement is pivotal to public health, and engagement professionals (or champions) should be employed either at local authority levels or contracted as consultants.

361. Writing Topic 4 has been hampered by incomplete or broken links to retrieve information about interventions deployed during the Covid-19 pandemic. Archiving digital information about outbreak and pandemic vaccine programmes is important for evaluations of programme delivery and to inform future pandemic preparedness.

362. If requiring vaccination as a condition for deployment in the future, penalties for refusal must be proportional and considered carefully. However, vaccine requirements should be 'undergirded by a commitment to building trust in immunisation and understanding of immunisation as a social good' (Chantler et al, 2019). We have identified strategies to build trust in immunisation among health & social care workers, such as offering vaccination as part of a broader approach to staff wellbeing. Research reviewed in this topic indicates that this approach is preferred to coercion and could be trialled across the sector to improve uptake of influenza vaccines and to generate learning for future pandemics requiring a vaccine response.

363. Mass vaccination sites are a universal delivery pathway that aim to 'consolidate resources and experience into a single entity, and greatly improve the efficiency of a vaccine rollout' (Goldberg et al, 2021). Yet, mass vaccination sites are less equipped to address inequalities among populations that require tailored delivery pathways and should be complemented by community-embedded points of delivery.

364. Health visitor involvement in the delivery of the COVID-19 vaccination programme could have been useful to increase uptake of vaccines among women and people who had declined vaccination during pregnancy or due to circulating misinformation about fertility risks. Health visitors have an unparalleled vantage point into family life in their role of accompanying families in the early stages of infant's lives. They would have been able to engage parents who were making decisions about vaccination for themselves and older children. Moving forward, health visitors have a critical role to play in increasing vaccine uptake and improving the resilience of the vaccination programme.

365. People living with disabilities were at higher risk of Covid-19 mortality and experienced preventable barriers to vaccination, which need to be factored into any preparedness plans across UK nations. Attempts to address the barriers experienced by this cohort appear to have gone beyond place-based tailored implementation and national-level access requirements (e.g. BSL, digital booking platforms with enhanced access features). In one area of England, those responsible for vaccination provision moved people with learning disabilities from priority cohort 10 to cohort 6, two weeks prior to the official change in February 2021 (INQ000414459_0016). This local flexibility in adapting priority cohorts warrants further examination to consider its implications for equitable distribution of vaccines.

Models of good practice for delivering vaccines to people with learning disabilities should be shared with regional teams across the UK.

366. Healthcare services across the UK can support vaccination uptake among populations that are mobile or have insecure immigration status by developing search tools to locate walk in vaccination services, ensuring that there is an availability of walk in vaccination services, and informing staff in those settings that vaccinations can be administered without an NHS number or proof of residency. Community pharmacies are well placed to offer such a walk-in service.

367. Digital exclusion means that there are population groups that require printed or verbal communications to be updated about changes in recommendations and vaccine invitations in a pandemic. These population groups can be diverse and include upper age cohorts, disabled people, and ethnic minorities such as Somali or Roma, Gypsy & Traveller communities. Healthcare services should continue to produce non-digital communications and ensure sufficient funding for these methods.

Topic 5: Facing the Next Pandemic – Lessons Learnt and Recommendations

368. This topic concludes our report for Module 4 of the UK Covid-19 Inquiry by outlining lessons from the UK Covid-19 vaccine programme for future outbreak and pandemic preparedness. The aim of Topic 5 is primarily to offer an expert conclusion and recommendations based on material that has featured in **Topics 1-4**. Where relevant, we cite any literature relied on in our responses.

369. *Attaining high pandemic vaccine coverage at the national level must be balanced by a commitment to addressing disparities:*

    a. The success of universal vaccination programmes is measured by attaining target coverage rates, which, in the case of the Covid-19 vaccination programme, aimed to reach 75% of the UK population. To the best of our knowledge, 75% Covid-19 vaccine coverage (of two doses) among adults was achieved across all UK nations by June 2022. However, there is evidence of significant under-vaccination (based on all eligible vaccines) across age cohorts (HDR UK COALESCE Consortium, 2024). Disparities between population groups were profound, with lower uptake recorded among people from minority ethnic backgrounds. Attempting to attain high coverage at the national level must be balanced by a commitment to addressing disparities in populations who may benefit from tailored delivery pathways or outreach to enhance access.

370. *A robust approach to routine vaccine programme delivery is a prerequisite to effective vaccine roll-out as part of pandemic preparedness*

    a. UK health agencies and local governments were operating in a resource-constrained environment prior to the onset of the Covid-19 pandemic. Evidence collated by the British Medical Association (2022) notes that the UK would have been in a stronger position had its public health systems been adequately resourced and staffed before the pandemic.' The Association of Directors of Public Health (2024), a UK-wide body, have drawn attention to the impact of higher inflation and pay increases on the ability to deliver services amidst increasing demand with less and less money. It has been estimated that additional investment of £1.4 billion a year would be needed by 2024-25 to restore these cuts and keep pace with rising demand and costs (The Lancet Gastroenterology & Hepatology 2021; Finch et al 2021). Austerity (and its legacy) has had a profound impact on public health (Marmot, 2020), and the implications for the 'where' of vaccine delivery and 'how' of community engagement remain poorly understood. The onus is on public health agencies and politicians to explain how preparedness can realistically be pursued in a context of declining or stalling investment in public health at national, regional and local levels.

    b. The allocation of sufficient resources to routine immunisation delivery is needed to maintain routes of vaccine delivery and communication between health providers and marginalised communities. These relationships could then be quickly mobilised as part of the response to any future pandemic. It will be essential to determine the levels of

resources and investment required to ensure health systems have the capacity to adapt vaccine engagement strategies in this way.

371. *Children were not a high priority group in the Covid-19 vaccine programme, but there needs to be contingency plans to prioritise the vaccination of children in future pandemics*

a. A future pandemic may differ to Covid-19 and place children at greater risk or priority status for vaccination, as occurred during the 2009 H1N1 pandemic. Pandemic preparedness must involve contingency plans for prioritising vaccination of children, which requires different delivery and communication plans to adult cohorts. Several lessons emerge from UK Covid-19 vaccine roll-out processes for children, notably the language of 'non-urgent offers' and delivery strategies relying only on schools. Routine vaccination of children, particularly the 0-5 cohort, can bring operational challenges to GP surgeries in outbreak and pandemic vaccine responses due to capacity issues (Kasstan et al, 2023; Bell et al, 2020b). We urge relevant policy-makers to explore delivery of childhood immunisations as part of a comprehensive approach to managing family health and wellbeing. This could, for example, see primary care services collaborating with Sure Start children centres in England (or relevant services across DAs) to counsel parents and provide information on routine vaccination programmes, and provide a complementary site for administration of vaccines where appropriate. This would help to offer vaccination as part of a priority focus on child health and development. The economic benefits of reviving children's centres, many of which were closed due to austerity (Marmot et al, 2020), should be considered. Further research into the relationship between increased child poverty under austerity and declining immunisation coverage will help inform national child and family health and wellbeing strategies.

b. Health visitors have an important role to play in developing family-focused approaches to immunisation delivery, but their involvement varies by UK nation and region. Decision-makers across UK nations should explore steps to enhance their role in the immunisation programme, either when recommending or delivering routine vaccines. Areas with lower routine vaccination coverage, or inequities in uptake should examine the acceptability of health visitors vaccinating children. This will involve assessing what is needed to re-integrate and commission health visitors in vaccine delivery strategies as part of preparedness and building resilience into the immunisation system. Initial steps to achieve this aim include comparing how health visitors work across the four nations to determine models of communication or delivery, and assessing the costs and benefits of commissioning health visitors to deliver vaccines. A comprehensive evaluation will likely need to be conducted for health visitors to deliver vaccines to determine acceptability, feasibility and capacity under current staff numbers.

c. Adolescents are generally more likely to access information about health and wellbeing via the internet and social media and are therefore more likely to be exposed to vaccine misinformation online. UK public health agencies should consider how immunisation is taught in school to identify whether vaccine education could be strengthened for young people. In England, for example, all state-funded schools should teach Health Education, which includes 'the facts and science relating to immunisation and vaccination' (Department for Education, 2019), but this requirement does not extend to all schools and evaluation is required to understand how this curriculum relates to the adolescent

vaccination programme. Comparing the role of school nurses across the four nations would help to understand if and how they currently help to reinforce the adolescent vaccination programme, and what opportunities exist to enhance their role in recommending or counselling pupils and their families on vaccination. Understanding the differences in the commissioning of school nurses and service specifications will further help with this goal. These steps are important to have cohort-specific immunisation touchpoints in place for preparedness plans.

372. *Addressing disparities in vaccine coverage requires careful data monitoring*

a. Public health and healthcare services are not able to clearly ascertain vaccine take-up for particular population clusters (e.g. Orthodox Jewish). General ethnic categories (e.g. 'White Other') and religious denominations ('Christian') encompass a diverse range of populations, hampering granular understandings of barriers to vaccination. In order to develop tailored delivery pathways targeting groups with lower uptake, health services must have access to sophisticated and detailed information about inequalities in uptake. Essential to this is sustainable financial investment and adaptive health system planning mechanisms that support vaccine engagement activities. Countries across the world, even those with robust immunisation programmes, will remain vulnerable to the diseases we seek to eradicate until tracking and addressing inequalities becomes as routine as measuring vaccine coverage (Kasstan et al, 2023b). As noted in the Final Progress Report to Address Covid-19 Health Inequalities (Race Disparity Unit, 2021), there is a need to improve the quality of health ethnicity data so that patterns and trends can be spotted quicker in future. Progress on UK-wide data approaches are required for pandemic preparedness efforts. This will require attention to the type of data recorded and integration into health records, and alignment of data recording across UK nations to enable effective comparisons. Decision-making during pandemic responses evolves rapidly and relies on access to accurate data and information. Every effort should be invested in developing robust reporting in the routine immunisation programme that can be pivoted during a pandemic.

373. *Involve operational experts as key stakeholders in vaccine programme boards*

a. Involving national-level operational stakeholders in key decision-making boards at a formative stage of roll-out processes is essential. Any impact of initial decisions to not involve operational experts (e.g. Public Health England and DA equivalents) across the four nations as key stakeholders in the Vaccine Task Force 'programme board' meetings (until September 2020) should be evaluated, and consideration to their early involvement given in a future pandemic. Scotland, Wales and Northern Ireland should be consulted on any roll-out plans or changes that are presented as having a UK-wide implication or that raise implications due to lack of UK-alignment, from early stages of pandemic planning.

374. *Clarify and align prioritisation*

a. Key stakeholders such as the JCVI should review how risk categories were defined, refined and communicated ahead of roll-out (e.g. from high and moderate risk to clinically extremely vulnerable and underlying health conditions), and determine core learning for future preparedness. It is important to not provoke anxiety among vulnerable cohorts and to help ensure the public receive clear messaging during a pandemic.

b. Priority risk groups (based on eligibility criteria) must be identifiable in data and recording systems for rapid invitation in pandemic scenarios. People may be living with undiagnosed conditions or have conditions that are not recorded in patient notes, and addressing such limitations are important to ensure rapid identification during pandemic responses. Consultation should assess the benefits and limitations of UK-aligned methods of recording vulnerable or at-risk cohorts in primary care registers.

c. Efficient UK-aligned processes aimed at identifying carer cohorts (unpaid carers; personal assistants for disabled people) eligible for vaccination could help to reduce variation, and improve equity, in timely invitation. This approach may help to mitigate the challenges identified in the Covid-19 vaccination programme, such as diverse methods to identify and invite these cadres across UK nations. All UK nations should explore the feasibility of recording carer status in GP surgery records for quick identification in pandemic scenarios. Consistent definitions of unpaid carers (including age) may also be beneficial to reduce variation in the four nations vaccine delivery systems and improve equitable access for carers. Operational guidance, when relevant, may help to prevent registered patients or carers being vulnerable to variation in clinical judgement. System-wide evaluation will be needed to strengthen cohort identification, for example, by encouraging health partners to maintain lists of registered care homes (that are regularly updated) to avoid fact-finding missions in real time during a pandemic.

d. UK-nations differed in their approach to learning disability registers, resulting in variation in identification and invitation pathways in the Covid-19 vaccination programme. Pandemic scenarios require efficient processes to allow priority cohorts to receive vaccination as soon as they are eligible. DAs that do not currently maintain learning disability registers may want to consult with Disabled People's Organisations to explore the impact and benefit of this method for quick identification in public health emergencies.

e. Maintaining essential public services, such as schools, will require a broader definition of 'front-line' workers. Prioritising vaccination of teachers to afford protection early in programme delivery (see Children's Commissioner, 2021) needs further thought to ensure schools can operate as effectively as possible in a pandemic scenario. To inform UK preparedness plans, it will be important to learn from the experience of countries that prioritised vaccination of teachers, especially regarding the impact on children and young people's wellbeing by reducing disruption in schools.

375. *Delivery pathways should be flexible and adaptable*

a. A place-based approach may help to balance efficiency and flexibility, and avoid duplication of invitation efforts. Planning delivery approaches by area or place should be improved, for example, by offering multiple pathways to vaccination, or directing cohorts to the most accessible pathways for them. A place-based approach may help to direct particular patient groups, such as clinically extremely vulnerable or disabled people, to suitable delivery sites such as primary care settings with designated hours for reduced foot flow. Environments that follow strict safety guidelines instil confidence about the safety of vaccine delivery, particularly for clinically extremely vulnerable and older people.

b. Operational flexibility for dose dispersal across sites should be allowed (when safety protocols permit) to avoid waste. Place-based partnerships can help to ensure that doses are dispersed to at-risk cohorts efficiently.

c. Initial planning assumptions in England indicated that GP surgeries were not considered to be a major delivery arm, but there was strong public preference for primary care providers that offer convenience and are familiar and trusted. The issue of negotiating GP contracts in pandemic scenarios occurred during both the 2009 H1N1 and Covid-19 pandemics, and therefore indicates that pandemic preparedness efforts should attempt to understand the potential contribution of 'sleeping contracts' (Hind 2010; **Topic 1**). However, the feasibility of sleeping contracts will depend on the propensity for remuneration to be revised according to the characteristics of financial conditions (inflation) to fairly cover costs of involving primary care in future pandemic responses.

d. The role of community pharmacies may need to be elevated from a supportive or secondary pathway in future pandemic roll-out processes, due to their particular ability to offer convenience. The removal of limitations placed on community pharmacies as part of some service specifications would enhance their potential for vaccine delivery from a formative stage of the vaccine roll-out process. Further research is required to compare how UK nations integrated pharmacies into delivery plans, and how different UK population cohorts (e.g. by age; pregnant women; ethnicities) engaged with pharmacy services, to support preparedness planning. Delivery via community pharmacies does not in itself address inequalities, and further learning is required to understand the capacity of community pharmacies to undertake outreach and engagement activities.

e. Vaccine booking systems need to function according to the needs of geographically diverse areas, including isolated rural and urban areas. Scheduling systems need to be accessible for several populations with inclusion needs, such as people who are disabled, have limited proficiency in England, or have insecure immigration status and are likely to rely on a walk-in service. Requiring an NHS number for vaccine scheduling prevents access for those less likely to be registered with a GP service, such as people from Roma, Gypsy and Traveller backgrounds or individuals with insecure immigration status. Language support features are required for disabled people and for people with limited proficiency in English. The ability for people to book an appointment at their most convenient or accessible site, and with language support, is an essential component of roll-out processes. Local vaccination services may need to enhance capacity to meet accessibility needs, and criteria should be developed in consultation with intended beneficiaries (e.g. disabled people). Exclusive use of digital booking systems (including booking links in text messages) is a barrier to access, and there is a need to maintain complementary booking pathways (e.g. by telephone).

376. *Embedding evaluation in programme delivery to generate appropriate evidence*

a. Monitoring and evaluating the performance of vaccine programme delivery helps to identify barriers and enablers to access and to document the benefits of tailored pathways for under-vaccinated groups, and record experiences of those involved in roll-out and intended beneficiaries of vaccine programme delivery. Standard evaluation frameworks are available (UKHSA, 2023d), which include essential and optional criteria for comprehensive and robust evaluation. Requiring standard and minimum-level elements of evaluation from all four nations would support comparative learning. This

approach can ensure an evidence base to understand the effectiveness of strategies to reduce disparities in vaccine coverage.

b. Delivering vaccines via outreach clinics helps address inequities in access for underserved groups. In order to allocate resources properly, governments need to understand how outreach and community delivery pathways can be most effectively used in local, regional, and national delivery strategies. The Public Health Scotland evaluation (October 2022) of roll-out Covid-19 processes included a cost effectiveness pilot and identified that mass vaccination models were less cost-effective than rural delivery models when attempting to serve rural populations. There were different costs associated with both approaches: mass vaccination venues had to navigate higher set-up and running costs, whereas rural delivery models required more senior staff because they were working independently. This kind of valuation is helpful in calculating the cost effectiveness of delivery models. Such analysis should not be limited to a calculation of whether overall vaccine uptake has increased, but should appreciate the broader forms of 'value' brought by community engagement, decided in consultation with community partners. While 'value' is a difficult concept to define, a key denominator is the ability to build relationships with underserved communities and collaborate to share responsibility for health promotion. Community engagement enables conversations and consultation with healthcare providers, which has potential to translate into increased normalisation of vaccination to schedule and future vaccine uptake.

c. Evaluations can support commissioners or programme managers to decide whether to fund outreach services as part of the routine programme or as part of outbreak and pandemic vaccine responses. Outreach and complementary delivery pathways may have an additional cost compared to the universal offer, but if successfully able to engage marginalised communities, constitute an investment in population health by reducing and mitigating inequalities.

377. *An evaluation of vaccination as a condition of deployment policies should form part of pandemic preparedness*

a. The policies and proposals about vaccinating health and social care workers as a condition of deployment generated significant debate and opposition in England. Attempts to require vaccination of front-line healthcare professionals did not have the backing of key professional and representative organisations. Further consultation is required as part of pandemic planning to assess how vaccination among health and social care workers can be effectively approached, or under what conditions vaccination can be required as a condition of deployment, and what penalties would be considered fair. It would be in public health interests to host these consultations as an element of preparedness. A key step may be to build on existing learning concerning vaccination of care home staff, that indicates that when influenza vaccines are offered as part of a broader wellbeing approach this is more effective at increasing uptake than coercing staff to accept vaccination.

378. *Improved data management and records for identification of cohorts*

a. Aligning UK data portals would be beneficial for future vaccination programmes to allow near-real time and comparative monitoring of data. It is important to be able to accurately disaggregate data according to protected characteristics, such as ethnicity and disability

status, to inform quick and appropriate interventions. Aligned UK data portals should come with minimum requirements for digital archiving of information to facilitate public health evaluations and research.

379. *Workforce and training*

a. A sustainable vaccination workforce is critical to ensuring the capacity to deliver universal programmes at pace. Questions remain about the risks of relying on temporary staff and non-registered volunteers, which include sustainability, maintaining efficiency and high standards of public confidence. Further consultation is required as to the feasibility of recruiting a sustainable vaccination workforce formed of different roles (e.g. health visitors; healthcare assistants), to meet the challenges associated with decline of childhood immunisation coverage and pandemic preparedness. Covid-19 roll-out processes (in England) allowed for a temporary workforce to be trained to administer vaccines under clinical supervision, but relying on a temporary workforce was not considered sustainable in Scotland. The legal provision to expand workforce in a pandemic is important to deliver universal vaccination programmes at pace, however, this can only ever complement a skilled and sufficient cadre of healthcare professionals with immunisation expertise. An expanded vaccination force has the potential to strengthen routine programme delivery. One example could be for primary care teams to train volunteer vaccinators from trusted community organisations, or culturally-competent healthcare assistants, to counsel and vaccinate underserved groups at local levels.

b. Healthcare commissioning arrangements vary across the UK. The Public Health Scotland evaluation (October 2022, p86) indicates that changing GP surgery contracts as part of health systems restructuring may prevent the ability of GP surgery teams to play a vaccine delivery role in future outbreak or pandemic responses. This may put particular cohorts (e.g. older age groups, clinically extremely vulnerable and disabled people) at a disadvantage, and hence the ability for accessible and community-embedded points of delivery would need to be factored into preparedness delivery plans. If such organisational reforms are likely to raise particular implications for cohorts that are at increased risk from the effects of respiratory illnesses, pandemic preparedness plans need to ensure immunisation delivery systems are adaptable (and ready to provide back-up) to help protect the most vulnerable cohorts in society.

c. Developing national approaches to vaccine confidence training for healthcare professionals may help to attain consistency in how vaccines are recommended (including opportunistically) across patient touchpoints. Consultation may be required to explore the benefits of training that is aligned across UK nations, or if each UK nation requires its own national vaccine confidence training programme due to differences in programme implementation. The benefit of a consistent approach to vaccine confidence training is to support effective recommendation of vaccines, including opportunistically across patient touchpoints. This approach may benefit vaccine programmes (e.g. pregnancy or influenza) and underserved or vulnerable populations (e.g. under 65 at risk cohort) (Kasstan et al, 2024). Such touchpoints can then be leveraged in a pandemic scenario. A review of vaccine confidence training needs may be required for specialist healthcare professionals, such as learning disability nurses, to learn from their experiences during Covid-19 roll-out and to prepare for future pandemics. Vaccine

confidence training should not be limited to a one-time offer, but a regular (e.g. annual) opportunity to maintain competence. There needs to be clear accountability and responsibility for ensuring that healthcare workers receive regular vaccine confidence training across different ranks (e.g. vaccinators; receptionists who field calls; invitation/reminder services), and guidance may help to raise awareness among managers. Allocation of funding for vaccine confidence training will be required. Maternity services have a particular responsibility to confidently recommend vaccination in pregnancy according to updated guidance in pandemic scenarios. Further work is required to ascertain the scope and quality of immunisation training in midwifery education and professional practice, as a good foundation is needed to confidently handle conversations about the routine maternity immunisation programme and outbreak vaccinations.

d. In UK nations where health visitors discuss vaccinations with parents, such as England, we urge decision-makers to explore the acceptability of supporting health visitors to administer vaccination. This could operate on a catch-up basis when children have not been vaccinated to schedule, according to parental preference to increase convenience, or in remote/isolated geographies. Determining what is needed to re-integrate health visitors in vaccine delivery strategies is important as part of preparedness and building resilience into the immunisation system.

380. *Vaccine inequalities, engagement and outreach*

a. Inequalities in uptake should be addressed across all programmes and regions to ensure UK immunisation systems are in a position of strength when entering the next pandemic. National level multi-stakeholder committees have existed since before the pandemic, but this work also needs to include regional and local level bodies who can ensure that action is taken to redress vaccination inequalities. The provision of sufficient resources to establish these groups and fund evaluation and interventions will be fundamental to increasing vaccination uptake in underserved areas and populations. This work represents the essential building blocks of pandemic preparedness and will increase the resilience of the vaccination programme.

b. Each UK nation would need to develop its own framework for engaging underserved and marginalised communities through consultation. The process for consultation could be supported by each nation developing a vaccine equity taskforce or set of taskforces, which are formed of health agencies and community stakeholders, to co-determine short and long term aims vis-à-vis challenges, collaborations/partnerships, and guidelines for regional/national strategies. Vaccine equity taskforces will need to engage with community groups with protected characteristics and known underserved or health inclusion groups. Taskforces may also help to determine appropriate indicators or metrics of success, which should not be limited to increases in vaccination coverage but the ability to engage with communities in ways that are appropriate and effective. A key concern will be the accountability of such a taskforce within the health and social care structure of each nation. By undertaking adequate consultation, national health agencies should have an understanding of the access and engagement issues to be considered as part of pandemic preparedness. Involving key community partners in the design of routine vaccine programme delivery strategies may help to identify the best delivery sites or adaptations to reach underserved communities. Tailored delivery

pathways that help to increase uptake among underserved communities should receive committed funding and investment to try and sustain increases in coverage.

c. The operational benefits of inviting disabled people and their unpaid carers (or personal assistants providing paid care) together for vaccination should be explored as part of preparedness plans.

d. Delivering vaccination in pregnancy through an opt-out rather than opt-in service in antenatal care may help to strengthen uptake in this cohort and ensure a touchpoint is offered to discuss vaccination. Lessons from successful models of vaccine delivery to pregnant women, in routine and H1N1 programmes, should be reviewed for pandemic preparedness efforts.

e. Strengthening longer-term engagement with underserved communities via community champions, faith communities and leadership, or scaling-up pre-existing links in communities is critical to identify and address vaccine inequalities. This groundwork could be used to prepare underserved communities, who tend to have lower-level uptake of routine vaccinations, for the roll-out of new vaccination campaigns. Community champions should be commissioned and remunerated as consultants to ensure a more sustainable approach to community engagement, and to recognise the contribution of their engagement skills.

f. National policies impact vaccine delivery strategies during pandemic scenarios. The Covid-19 pandemic response illustrated how new policies to provide shelter to people affected by homelessness can help to rapidly identify and locate cohorts for vaccination. Restrictive immigration policies around access to health and vaccination services (and new data-sharing regulations between NHS Trusts and the Home Office) can affect how people with insecure immigration status – and migrant and ethnic minority groups more broadly – engage with primary care services in non-emergency and emergency scenarios. We recommend consultation on the lessons learned surrounding the impact of national policies (welfare, immigration) on access to vaccination services and their impact on trust and confidence in services, as part of preparedness efforts. Policies that enmesh access to healthcare in immigration enforcement action are counter-productive to health protection, and influence how migrant and ethnic minority communities engage with immunisation services during a pandemic, even when restrictions are temporarily relaxed. Such policies erode confidence in vaccination systems for underserved groups, with clear evidence that the impact is felt more widely across communities, beyond the irregular migrants being targeted.

g. Inequalities affecting vaccination uptake among population groups will not be addressed without systematic change to address the marginalisation and disenfranchisement of communities from British society. The lessons surrounding community engagement and community responses during the Covid-19 pandemic cannot be forgotten and need to be thought about carefully by statutory services. Community experiences of marginalisation and disenfranchisement have a profound impact on their engagement with government recommendations during a pandemic. Increasing convenience is not always the solution to inequalities, and consultation is required to understand how inequalities should be considered in service specifications. There is evidence of commitment to addressing vaccine inequalities in the 2023 NHS Vaccination Strategy (for England), however, this needs to be complemented with clear accountability measures.

381. *Pandemic vaccine programmes require the highest standards of leadership*

a. The Covid-19 vaccination campaign was considered by stakeholders as the opportunity 'to do the right thing' (Timmins and Baird, 2022) following a host of issues that have been examined throughout the course of the Covid-19 Inquiry. We maintain that governments need to effectively manage public health emergencies to maintain high standards of public confidence in pandemic vaccination programmes and vaccine recommendations.

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Annex 1: Inquiry Documents

INQ000496177	Witness statement provided by Mary Ramsay on behalf of The UK Health Security Agency, dated 26/07/2024.
INQ000493687	Final Module 4 Statement of Vaughan Gething, dated 18/07/2024.
INQ000474334	Sixth Witness Statement of Clara Swinson (Part A) on behalf of the Department of Health and Social Care, dated 06/09/2024.
INQ000474249	Witness statement of Professor Sir Michael McBride, Chief Medical Officer for Northern Ireland, dated 05/07/2024.
INQ000501330	Witness Statement provided by Gillian Richardson, dated 16/08/2024.
INQ000474476	Witness statement of Dr Naresh Chada, Deputy Chief Medical Officer, dated 28/10/2024
INQ000474228	Witness Statement of Stephen Russell, dated 07/06/2024.
INQ000408135	Report from Joint Committee on Vaccination and Immunisation titled advice on priority groups for COVID-19 vaccination, dated 30/12/2020.
INQ000101218	Report by Public Health England, titled Disparities in the Risk and Outcomes of COVID-19, dated August 2020.
INQ000474430	Witness Statement provided by Joanna Killian on behalf of the Local Government Association, dated 14/10/2024.
INQ000083875	Letter from Kemi Badenoch MP, (Exchequer Secretary to the Treasury & Minister for Equalities), to Chair, Covid-19 Immunisation, titled COVID-19 health disparities, dated December 2020.
INQ000271436	Additional Witness Statement of Sir Ian Diamond, Chief Executive of the UK Statistics Authority and National Statistician, dated 11/09/2023.
INQ000099707	Response from Carers UK to the Covid-19 Inquiry's Modules 2-2C Impact Questionnaire, dated January 2023.
INQ000492335	Witness statement of Dame Emily Lawson, Chief Operating Officer of NHS England, dated 05/07/2024.
INQ000417384	Report from Department of Heath and Social Care titled COVID 19 deaths of people identified as having learning disabilities: summary, dated 12/11/2020.

INQ000280067	Expert report from Professor Nick Watson (Chair of Disability Studies and Director of the Centre for Disability Research, University of Glasgow) and Professor Tom Shakespeare (Professor of Disability Research, London School of Hygiene and Tropical Medicine), titled structural inequalities and disability, dated 21/09/2023.
INQ000417383	Advice from Public Health England titled JCVI advises inviting people on Learning Disability Register for vaccine, dated 24/02/2021.
INQ000474256	Witness Statement of Kamran Mallick on behalf of Disabled People's Organisations, dated 18/07/2024.
INQ000329507	Letter from Dr Nikki Kanani (Medical Director for Primary Care), Professor Keith Willett (NHS Strategic Incident Director) and Emily Lawson (SRO and Chief Commercial Officer, NHS England) to NHS Colleagues, regarding COVID-19 Vaccination Autumn / Winter (Phase 3) planning, dated 01/07/2021.
INQ000499055	Final Witness Statement of Dr Andrew Goodall, dated 12/07/2024.
INQ000421389	Draft paper from NHS COVID-19 Vaccine Deployment Strategy for England, for discussion at the Vaccination Programme Board, dated 16/12/2020.
INQ000477610	Letter from Mark Lyonette (Chief Executive, NPA) to Lord Prior of Brampton (Chair, NHS England), regarding pharmacy employer bodies has been put on hold, dated 18/01/2021.
INQ000477608	Presentation from NHS, titled Covid-19 vaccination programme community pharmacy, dated 12/01/2021.
INQ000474318	Witness Statement of Dr Olivier Picard, Vice Chair of the Board of the National Pharmaceutical Association (NPA), dated 29/09/2024.
INQ000492099	Report from Vaccine Transformation Programme Board titled National Framework for Vaccine Administration by HCSW in Scotland, dated 01/07/2020.
INQ000474538	Report from Public Health Wales titled Wales COVID-19 Vaccination Enhanced Surveillance, dated 01/03/2022.
INQ000083885	Presentation, titled Disability and Covid-19 Deep Dive, Disability Unit, dated 30 March 2021.
INQ000414509	Guidance from NHS titled Black African and Black African Caribbean Communities COVID-19 Vaccination uptake Toolkit, undated. [Publicly Available]
INQ000474344	Witness Statement of Lynn Woolsey of Royal College Nursing, dated 19/09/2024.
INQ000492283	Witness Statement of Kemi Badenoch MP (Secretary of State for the Department of Business and Trade, Secretary of State for

	International Trade, President of the Board of Trade and Minister for Women and Equalities), dated 04/07/2024.
INQ000485278	Witness Statement of Dr Salman Waqar, NHS General Practitioner on behalf of the Federation of Ethnic Minority Healthcare Organisations (FEMHO), dated 06/06/2024.
INQ000414461	Powerpoint from NHS South East Region, titled Equality Stories from the Covid-19 vaccination programme, dated December 2021.
INQ000176311	Report from the House of Commons and Women and Equalities Committee titled Unequal impact Coronavirus, disability and access to services Fourth Report of Session 2019 to 21, dated 22/12/2020. [Publicly Available]
INQ000474407	Witness Statement of The Migrant Primary Care Access Group, dated 04/10/2024.
INQ000474299	Witness Statement of Catherine Frances, Director General for Local Government and Public Services, dated 26/07/2024.
INQ000198850	Witness Statement of Marcus Bell from Equality Hub with Cabinet Office dated 16/05/2023.
INQ000421391	Paper from NHS England and NHS Improvement in partnership with London Black Churches, titled Increasing COVID vaccine confidence in London African and Caribbean communities, undated.
INQ000414507	Article from NHS Egnland, titled Reasonable adjustments, undated. [Publicly Available].
INQ000329444	Letter from Ed Waller (Director of Primary Care, NHS England) and Dr. Nikita Kanani (Medical Director for Primary Care, NHS England) to PCN-led local vaccination sites, community pharmacy-led local vaccination sites, regarding making the universal offer of vaccination to JCVI cohorts 1-4 ahead of February 15, and additional funding for vaccination of housebound patients, dated 04/02/2021.
INQ000414459	Powerpoint for Connect and Exchange Hub COVID-19 webinar, titled "This is what autism looks like in our home", undated.
INQ000414498	Article from healthwatch Bexley titled Do you know anyone who could benefit from a GP Access card?, dated 12/03/2021. [Publicly Available]
INQ000408679	Report from Public Health Scotland, titled Inclusion sharing session summary report - Supporting vaccine uptake in Gypsy traveller communities, dated 31/03/2022.
INQ000474311	Final Witness Statement of Dr Christopher David Johnson Bsc (Hons), dated 22/08/2024.
INQ000390122	Presentation from Public Health Agency, titled Low Vaccine Uptake/Equity Presentation, dated 26/05/2022.

INQ000421368	Paper from National Incident Response Board, NHS England, Summary of Chief People Officer's Black, Asian and minority ethnic (BAME) Clinical Advisory Group, Meeting on COVID-19 Vaccination and BAME staff, dated 01/12/2020.
INQ000474350	Witness Statement provided by Caroline Lamb (Director General for Health and Social Care) on behalf of the Scottish Government, dated 05/08/2024

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Annex 3: Supporting Information

Additional information moved from report to appendix, per topic.

Topic 1:

Procurement

Vaccines deployed by 28th June 2022 included:

- Pfizer-BioNTech (BNT162b2) on 2 December 2020 (see MHRA, 2023a; DHSC, 2023).[58]
    - Has remained a UK Covid-19 vaccine since 8 December 2020.
    - Authorised for use in adults and use in persons aged 12 to 17 years in the UK
- Astra-Zeneca on 30th December 2020 (see MHRA 2021a).
    - Was a UK Covid-19 vaccine from January 2021 to August 2022.
- Moderna on 8 January 2021 (see MHRA, 2021b; DHSC, 2023).[59]
    - Has remained a UK Covid-19 vaccine since April 2021.
    - Authorised for use in persons aged 12 to 17 years in the UK.

Cohort prioritisation

DA may have sought additional advice on JCVI recommendations for priority vaccination:

- Northern Ireland is not legally bound by JCVI advice but has always followed JCVI recommendations. During Covid-19 roll-out, the Health Minister considered recommendations made by the JCVI and did not introduce any other factors to determine cohort prioritisation (INQ000474249_0027).
- Scotland is not legally bound by JCVI advice; decisions around cohort prioritisation and inclusion were made that did not explicitly follow JCVI recommendations. A Policy Panel Group was established in March 2021 to allow 'holistic consideration of the merits of vaccinating specific cohorts' (UKIDM4SG0092).
- In Wales, 'The Vaccination Clinical Advisory and Prioritisation Group' (INQ000493687_0039) interpreted JCVI guidance for the Welsh context and provided additional guidance where further clarity on prioritisation was required (Audit Wales, 2021).

Waste avoidance and stock dissemination

Maintaining public confidence in the Covid-19 vaccination programme was important to reduce the likelihood of waste. The likelihood of waste was linked to handling requirements of vaccines and

[58] MHRA authorisation of Pfizer-BioNTech Covid-19 vaccination on 2 December meant that the UK was the first country to have a clinically approved Covid-19 vaccine for supply, which enabled the UK to be the first country to begin roll-out on 8th December 2022 (DHSC, 2020).

[59] The Moderna vaccine is known as 'Spikevax'.

changes in clinical guidance. Pfizer vaccines were the only available stock on 8th December 2020, but were supplied frozen and needed a storage temperature of between –90C to –60C (DHSC 2021b).[60] Hospital sites were considered more likely to have extreme-cold storage capabilities. The handling requirements surrounding Pfizer vaccines raised implications for equity-focused delivery strategies, for example vaccinating the housebound where '4 out of 5 doses would be wasted' (INQ000421389_0004). These issues were improved with the introduction of the Astra-Zeneca vaccine in January 2021, which was better equipped for rapid deployment and flexible delivery models and less likely to be wasted. Guidance issued in May 2021 confirmed that unopened thawed Pfizer vaccine vials could be kept refrigerated for up to 31 days, bringing more flexibility to programme implementation and reducing the likelihood of waste (NHS England, 2021c).[61] The recommendation that people under 40 should preferably be given an alternative to the AstraZeneca vaccine meant that GPs had to destroy supplies if the shelf-life was too short to disperse to other sites in the UK or internationally (Timmins and Baird, 2022). These issues affected UK-wide roll-out processes, but waste may have been mitigated depending on implementation strategies across DA as outlined below.

England

Inviting subsequent priority cohorts to avoid waste

The enhanced GP service specification for the Covid-19 vaccination programme 2020-21 notes that 'vaccination will be permitted to patients outside of the announced cohort where the GP practice can demonstrate exceptional circumstances, that it is clinically appropriate and where resources would otherwise have been wasted.' The specification also notes expectations on the percentage of waste that would be permitted: 'Appropriate procedures must be in place to ensure stock rotation, monitoring of expiry dates and appropriate use of multi-dose vials to ensure that wastage is minimised and certainly does not exceed 5% of the total number of vaccines supplied.' Delivery sites shifted to walk-in appointments to maximise capacity and avoid waste (INQ000492335_0049). Penalties for exceeding the 5% waste threshold do not appear to have been clearly defined (see Potter, 2020).

Local vaccination services were able to vaccinate health and social care workers in any unused appointments (INQ000477608_0002; 0006-0007; 0010; 0022; 0040). GP surgeries in England invited people from the next eligible priority groups to avoid wasting vials (from around 15th January 2021, see Potter and Lind, 2021). GP teams may have kept reserve lists from the next cohort to call at the end of the day, inviting eligible people at short notice (Timmins and Baird, 2022). However, exercising clinical judgement on prioritisation to avoid waste was scrutinised (Potter and Mohamoud, 2021).

Tailored delivery pathways for underserved communities offered vaccines to people in subsequent priority cohorts when vaccine appointments remained unfilled or cancelled (Kasstan et al., 2022a). This may have meant that community-embedded delivery pathways had discretion and an opportunity to vaccinate households rather than waste doses. This approach may have benefitted ethnic and religious community settings more broadly, including those with a likelihood of multi-generational homes or social mixing. People from minoritised backgrounds are more likely to

[60] Vial packs of 10 could be thawed in refrigerators at 2-8°C and stored for up to five days.
[61] The Green Book (UKHSA, 2023b) notes that once thawed, the Pfizer vaccine vials can be stored and transported at 2C-8C for 10 weeks (within the overall shelf life).

be employed in essential services where risk of transmission was more acute e.g. public transportation or healthcare sectors.

Dispersing un-used doses

Transfer of Covid-19 vaccines between sites was known as 'mutual aid'. Key points are available from an NHS Confederation briefing dated 28th January 2021 which only reference Astra-Zeneca vaccines (Swift, 2021). The briefing notes that 'mutual aid is the option of last resort and is only permitted under specific criteria' for example, 'likely to be significant wastage through no fault of the applicant party.' Following a request for request mutual aid, 'the regional director of commissioning and the regional chief pharmacist will then either support or deny the request.' The need for such approvals indicates a reluctance to delegate approval to local levels of delivery.

Dispersing doses across delivery sites to avoid wastage was hampered by central control over roll-out, as 'national protocols did not authorise vaccine dispersal to multiple sites such as individual GP practices and community sites' (Mounier-Jack et al. 2022). This limitation may have contributed to preventable wastage and prevented the development of tailored pathways to use surplus stock: 'Outreach was described as challenging to organise because of the lack of dispersal policy to additional sites' (Mounier-Jack et al. 2022). Centralised control by the government, NHS England and DHSC was reported to have loosened to facilitate increased local-level decision-making over time, but a clear indication of timeframe is not documented in this evaluation (Mounier-Jack et al. 2022).

Northern Ireland

Waste in routine vaccination programmes ranges from 10-20% in Northern Ireland, though target waste levels for the Covid-19 roll-out programme was under 5% (INQ000474476_0019). We were notified via a request for information from the Covid-19 Inquiry that: 'There was nothing specifically issued to Trusts in terms of formal guidance about how to avoid / reduce vaccine wastage or the dissemination of doses across sites. However, the Department [of Health] were very mindful of the need to minimise vaccine wastage particularly in the early stages of the programme and this was an important reason why the Department engaged with Trusts to utilise the expertise of their hospital pharmacy departments to lead preparation of vaccine within Trust vaccination centres, as waste minimisation measures would form part of their normal practice and standard operational procedures (SOPs) for preparation of medicines within pharmacy departments.' To avoid waste, Trusts vaccinated non-front line or support staff (INQ000474249_0066-0067; 0116-0117). We recommend that processes to avoid waste should be considered as part of pandemic preparedness efforts.

In NI, GP practices work collaboratively in GP Federations, which are community interest bodies. However, individual GP practice providers are commissioned to deliver vaccination and who assume ownership of the vaccine at the point of receipt from the distribution partner. These issues meant that it was not feasible to develop a mechanism for the movement of vaccines between providers within GP Federations (INQ000474249_0087-0088).

Scotland

The Scottish Government (2021a) produced guidance dated 10th March 2021 to prevent wastage: 'Vaccination clinic appointment numbers should be planned to take into consideration the maximum number of doses possible to be extracted from a vial in order to make maximum use of available vaccine.' The pressure to vaccinate large numbers of people according to timelines may have been balanced against daily limitations on who could be vaccinated. Guidance suggested maintaining a reserve list to ensure vaccines were not wasted. Ideally this was from within the same cohort however, the guidance cited JCVI positions on flexibility to offer vaccines to subsequent priority cohorts. Reserve lists could include offering a second dose or vaccinating front-line health and social care workers. Health boards in Scotland did not have authorisation to distribute vaccines to an external legal entity, for example, GP practices and community pharmacies (UKIDM4CMO075), which would mean that dose dissemination would have been limited.

Wales

The Welsh Government (2021) published a management information update on 9th March 2021 outlining steps to prevent waste. We are unable to confirm what procedures were in place between 8th December 2020 and 9th March 2021. The procedures dated 9th March state that quotas of 50% had to be achieved before people from lower priority cohorts could be invited for vaccination, which indicates the different approaches taken across DA: Operational flexibility was considered critical to avoiding waste: 'Health boards operate their own reserve lists and short notice lists and can use their operational flexibility to ensure no vaccine is wasted, particularly if the vaccine has a short shelf life or when people cancel or cannot make an appointment at short notice.' There was a preference in Wales to prioritise offering first dose vaccination and offer second-dose vaccination when necessary to prevent waste (INQ000493687_0035; 0037; 0052; 0062). Mechanisms for dose dissemination were permitted, for example, loans of vaccines between health boards were allowed until new supplies arrived (INQ000501330_0022).

Topic 2:

Linkage of vaccination data (via NHS number) to other relevant datasets such as occupation and religion is not widely available for electronic health record data, limiting our potential to understand potentially important disparities in vaccine coverage. This issue is expanded on in more detail in this study (Tessier et al. 2023), which notes: 'Currently the data in NIMS can only be linked for individuals with an NHS number where demographic details can be populated from the GP record or hospital record data. Those without an NHS number can opportunistically receive a vaccine and an NHS number will be allocated to that individual at vaccination in the NHS Spine. These individuals' records will only contain information from their vaccine event. As such, *it is possible that some people are missing opportunities to be invited for a vaccination. Though the numbers of individuals without an NHS number is marginal (based on the population of the country compared to the number of individuals with and NHS number), the most vulnerable populations (migrants, asylum seekers, illegal immigrants) are more likely to not have an NHS number, and as such excluding them from the benefit of NIMS may exacerbate health inequalities'* [our emphasis].

Additional insights into UK-wide coverage:

Coverage by 31st December 2021 of at least one dose:

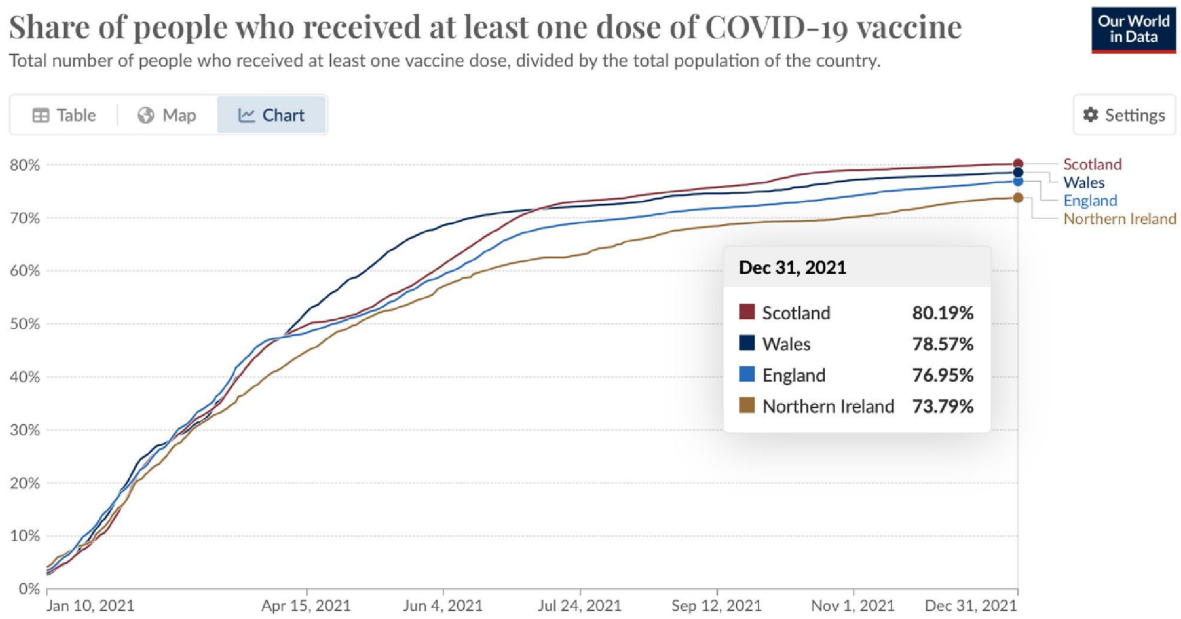

Figure 11: Proportion of people who received at least one dose of Covid-19 vaccine by 31 December 2021, across all four nations. Note that these figures include the total population not total population eligible for vaccination.

Of the full primary course:

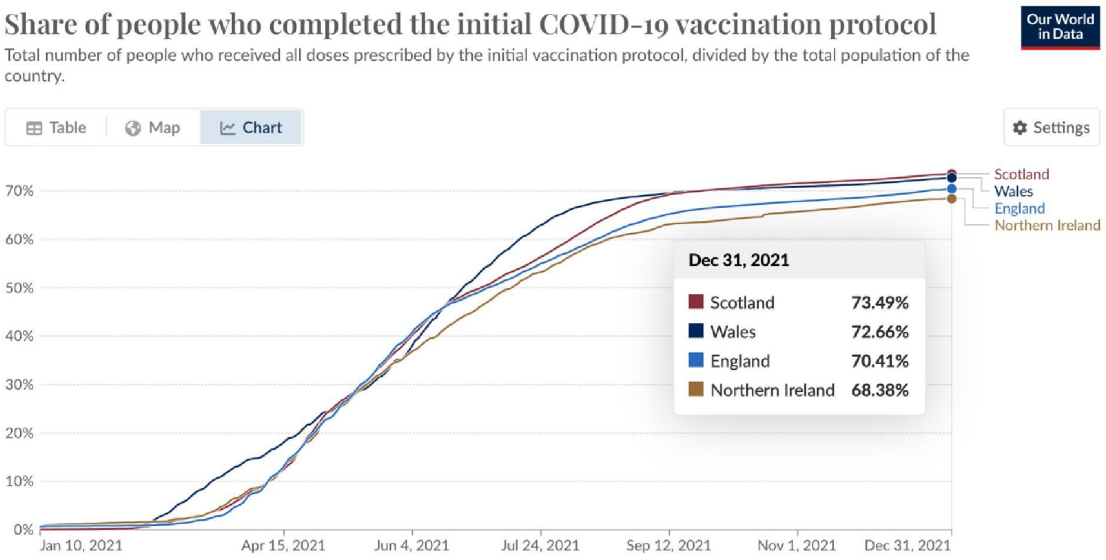

Figure 12: Proportion of people who completed the initial Covid-19 vaccine protocol by 31 December 2021, across all four nations. Note that these figures include the total population not total population eligible for vaccination.

Coverage by 28th June 2022 of at least one dose

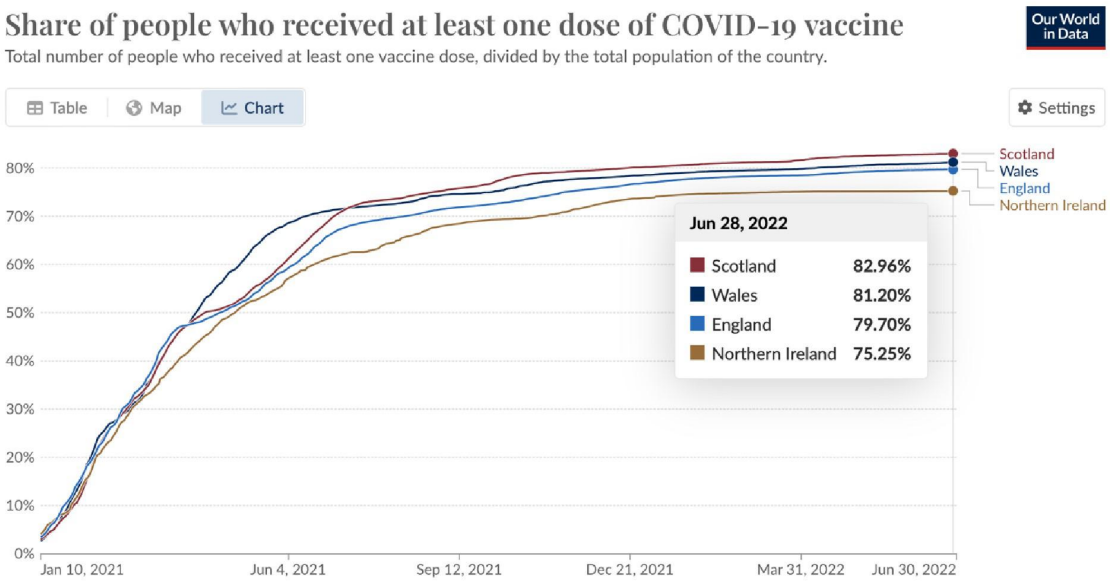

Figure 13: Proportion of people who received at least one dose of Covid-19 vaccine by 31 December 2021, across all four nations. Note that these figures include the total population not total population eligible for vaccination.

Of full primary course:

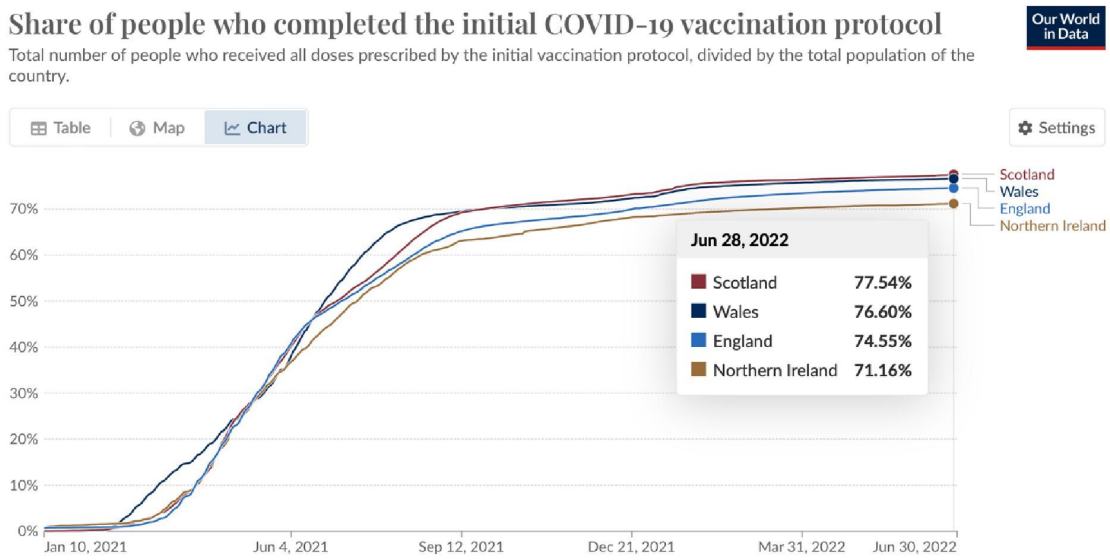

Figure 14: Proportion of people who completed the initial Covid-19 vaccine protocol by 28 June 2022, across all four nations. Note that these figures include the total population not total population eligible for vaccination.

The seasonal influenza vaccination programme offers the most pragmatic comparison with Covid-19 vaccination rates and disparities. However, the same depth of publicly-available disaggregated data does not appear to be consistently available across the UK. Data for England on seasonal influenza vaccination uptake is from GP registered patients, which may be the same UK-wide but is not explicitly noted in reports. 2019-20 data for Scotland is marked in

publicly-available reports as 'provisional data' (indicated with an *). The following tables show seasonal influenza vaccine uptake in 2018-2021 across 3 eligible cohorts: patients aged 65 and over; patients aged 16-under 65 at-risk; and pregnant women. We were unable to determine NI influenza vaccine coverage (2020-21) for the following cohorts: 65 and above; under 65 at risk; pregnant women.

The data shows a UK-wide pattern of increase of influenza vaccine uptake among the 65 and above cohort, achieving 75% WHO target in England and Wales in 2020-21.

Age 65 and above				
Year	**England**	**Northern Ireland**	**Scotland**	**Wales**
2018-19	72%	70%	73.7%	68.3%
2019-20	72.4%	74.8%	74%*	69.4%
2020-21	80.9%	Not available	79.6%	76%*

Table 27: Influenza vaccine coverage over 3-year period. indicates provisional data.*[62]

Data shows inconsistent progress UK-wide, with a tendency to increase influenza coverage among the under 65 at risk cohort in 2020-21 in England and Wales:

6m to under 65 at-risk				
Year	**England**	**Northern Ireland**	**Scotland**	**Wales**
2018-19	48%	52.4%	42.4%	44.1%
2019-20	44.9%	58.9%	42.3%*	44.1%
2020-21	50.3%	Not available	55.9%	51%

Table 28: Percentage influenza vaccine uptake among people aged 6m to 65 at risk across the UK.

Influenza vaccine uptake among pregnant women declined in England and Scotland, compared with significantly high rates in Wales that increased year on year.

Pregnant women				
Year	**England**	**Northern Ireland**	**Scotland**	**Wales**
2018-19	45.2%	44.3%	44.5%	74.2%

[62]. Data drawn from Nuffield Trust (2024); Public Health Wales (n.d.); Northern Ireland HSC Public Health Agency (n.d.); The Scottish Government (2019); Welsh Government (2021g).

2019-20	43.7%	46.3%	42.9%*	78.5%
2020-21	43.6%	Not available	53.3%	84%

Table 29: Percentage influenza vaccine uptake among pregnant women and people across the UK.

Rates of influenza vaccination among pregnant women in **Wales** were exceptionally high compared to the rest of the UK during, and prior to, the Covid-19 pandemic. We sent a request for information to the Covid-19 Inquiry to ascertain whether Public Health Wales conducted any evaluations to understand why uptake of the influenza vaccine in pregnancy did not translate to similar uptake of the Covid-19 vaccine in pregnant women and people. We were informed that '*Public Health Wales has not conducted any formal evaluations in respect of the above.'* The response also noted that 'officials can confirm that although there were various studies and communication campaigns for pregnant women going on at the time, Welsh Government do not have any recorded details specifically linked to any evaluation / research undertaken by NHS Wales or Public Health Wales.' The absence of evaluation in this area constitutes a missed opportunity to strengthen Covid-19 coverage. There remains an important opportunity to learn what drove high uptake rates of influenza vaccination in pregnancy in Wales. We encourage the Welsh DA to conduct an evaluation of the influenza vaccination in pregnancy in Wales to inform pandemic preparedness.

Vaccine uptake among pregnant women and people in **England** was higher for pertussis compared with influenza, but further disaggregation of data highlights that lower vaccine uptake was associated with increased deprivation (Walker et al., 2021). The gap in uptake between the least and most deprived quintiles was almost 10% for influenza, and almost 20% for pertussis. Lower uptake was also associated with non-white ethnicity (particularly Black ethnicities). Understanding how to ensure higher vaccination coverage in areas of increased deprivation is crucial for pandemic preparedness.

The most comprehensive publicly available dataset that disaggregates disparities in coverage by ethnicity is produced by UKHSA (**England**). Across almost all ethnic groups, uptake is lower in London compared to the national average. This means that national-level coverage rates mask inequalities according to ethnicity and region. People of the following ethnicities consistently have among the lowest levels of uptake across 3 eligible cohorts (age 65 and above; under 65 at-risk; pregnant women):

- Black or Black British: African
- Black or Black British: Caribbean
- Black or Black British: Any other Black background
- Mixed – White and Black Caribbean
- Mixed – White and Black African

People of 'White Other' ethnicities tend to have lower uptake, but not consistently and profoundly low as the above cohorts. The reasons for low coverage may not be consistent across ethnicities. 2020-21 seasonal influenza vaccine uptake by ethnicity among patients aged 65 and over is listed below. Red text denotes cohorts with the lowest uptake:

Patients aged 65 and over	London	England
White - British	79.3	**85.8**
White - Irish	75.3	**80.2**
White - Other	59.1	**65.6**
Mixed - White and Black Caribbean	52.1	**59.2**
Mixed - White and Black African	53.2	**57.4**
Mixed - White and Asian	68.7	**73.8**
Mixed - Any other mixed background	63.7	**68.0**
Asian or Asian British - Indian	76.7	**77.0**
Asian or Asian British - Pakistani	65.7	**61.8**
Asian or Asian British - Bangladeshi	73.7	**72.6**
Asian or Asian British - Any other Asian background	72.1	**72.5**
Black or Black British - Caribbean	48.9	**52.6**
Black or Black British - African	53.6	**53.0**
Black or Black British - Any other Black background	49.4	**56.2**
Other ethnic groups - Chinese	64.9	**66.2**
Other ethnic groups - Any other ethnic group	58.0	**62.5**
Ethnicity not stated	65.0	**77.2**
Ethnicity code not recorded (no code)	54.0	**73.7**
Ethnicity code is a non-2001 ethnicity code	72.7	**83.6**
All aged 65 years and over	70.7	**82.4**

Table 30: Percentage influenza vaccine uptake among people aged 65 and above by ethnicity in England, 2020-21.

2020-21 seasonal influenza vaccine uptake by ethnicity, patients aged 16 to under 65 in one or more clinical risk groups. Red text denotes cohorts with the lowest uptake:

Patients aged 16 to under 65 years in one or more clinical risk group(s) (excluding healthy pregnant women and carers)	London	**England**

White - British	50.7	**58.8**
White - Irish	49.3	**53.3**
White - Other	33.6	**35.6**
Mixed - White and Black Caribbean	27.3	**32.4**
Mixed - White and Black African	33.6	**38.3**
Mixed - White and Asian	45.0	**48.4**
Mixed - Any other mixed background	37.8	**41.2**
Asian or Asian British - Indian	54.9	**54.3**
Asian or Asian British - Pakistani	42.8	**39.2**
Asian or Asian British - Bangladeshi	56.2	**55.7**
Asian or Asian British - Any other Asian background	53.8	**53.1**
Black or Black British - Caribbean	26.5	**29.7**
Black or Black British - African	36.7	**38.1**
Black or Black British - Any other Black background	27.6	**32.6**
Other ethnic groups - Chinese	48.6	**51.0**
Other ethnic groups - Any other ethnic group	37.3	**39.1**
Ethnicity not stated	35.9	**45.0**
Ethnicity code not recorded (no code)	30.5	**45.2**
Ethnicity code is a non-2001 ethnicity code	42.7	**53.5**
All 16 to Under 65 at risk	43.3	**53.3**

Table 31: Percentage influenza vaccine uptake among people aged 16-65 at risk by ethnicity in England, 2020-21.

2020-21 seasonal influenza vaccine uptake by ethnicity among pregnant women and people. Red text denotes cohorts with the lowest uptake:

All pregnant women and people	London	**England**
White - British	37.6	**43.5**
White - Irish	39.8	**41.3**
White - Other	24.5	**25.6**

Mixed - White and Black Caribbean	12.7	**21.7**
Mixed - White and Black African	22.2	**29.2**
Mixed - White and Asian	31.3	**38.1**
Mixed - Any other mixed background	27.3	**31.4**
Asian or Asian British - Indian	39.0	**41.5**
Asian or Asian British - Pakistani	30.0	**28.7**
Asian or Asian British - Bangladeshi	35.3	**35.7**
Asian or Asian British - Any other Asian background	37.0	**39.7**
Black or Black British - Caribbean	11.4	**14.6**
Black or Black British - African	20.7	**27.6**
Black or Black British - Any other Black background	15.1	**20.7**
Other ethnic groups - Chinese	44.2	**46.2**
Other ethnic groups - Any other ethnic group	24.8	**29.3**
Ethnicity not stated	24.4	**34.3**
Ethnicity code not recorded (no code)	21.9	**32.2**
Ethnicity code is a non-2001 ethnicity code	30.8	**39.2**
All Pregnant Women and people	29.9	**37.9**

Table 32: Percentage influenza vaccine uptake among pregnant women and people by ethnicity in England, 2020-21.

Covid-19 vaccine uptake (two doses) in the 12-15 age cohort was lower than routine adolescent vaccination coverage rates in **England** in the year prior to the pandemic (2018-19) and the year 2021-22.[63] The Td/IPV and Men ACWY vaccines are offered in Year 9, at the age of 13-14.), though rates vary across local authority, NHS region and national levels.

Case study: Hackney	**2021-22: Y9 Td/IPV coverage**	**2018-19: Y9 Td/IPV coverage (pre-pandemic)**

[63] NHS England commissions School Age Immunisation Services to offer and deliver routine immunisations to 100% of eligible individuals, typically via educational settings or alternative pathways for those home-schooled or attending non-mainstream schools. We relay coverage rates for the tetanus, diphtheria and polio booster (Td/IPV) and Meningococcal groups ACWY. Comparing vaccine uptake across programmes should keep in mind the caveats outlined in IV: 1 due to differences e.g. in risk perceptions and delivery pathways.

England	69%	87.6%
London	67.8%	87.7%
Hackney & City of London	65.9%	81.4%
Case study: Hackney	**2021-22: Y9 Men ACWY coverage**	**2018-19: Y9 Men ACWY coverage (pre-pandemic)**
England	69.2%	88%
London	67.8%	87.8%
Hackney & City of London	65.9%	82.2%

Table 33: Percentage uptake of adolescent vaccination in Hackney, London and England. Data drawn from UK Health Security Agency (2023c).

Topic 4:

A range of roll-out processes were designed to identify and address inequalities, and these appear to have evolved over the course of the Covid-19 vaccine programme. These include:

- Development of "Vaccine equalities tool" in March 2021 to help increase equitable vaccine delivery, though effectiveness of this approach does not appear to have been substantiated in the document (INQ000474228_0017; 0025; 0088; 0099-0100; 0193).
- There was a particular focus in November 2020 in understanding the barriers to uptake in different communities and to explore the most appropriate ways of communicating with them (INQ000474228_0021). However, there was ample evidence to the issues underlying underserved communities vis-à-vis routine vaccine programmes prior to November 2020 and it is unclear how that knowledge was applied to prepare communities for roll-out.
- In Spring 2021, a 'Black African and Black African Caribbean Communities Covid-19 vaccination uptake toolkit' was developed to address evidence of low uptake among certain groups (SR1/067 [INQ000414509]).
- Equality and Health Inequality Impact Assessments ("EHIAs") were completed to identify and mitigate any factors that could impact on vaccine uptake amongst people with protected characteristics (as set out in the Equality Act 2010) and people in inclusion health groups.
- On 24 February 2021, NHS England announced a 4.2 million of funding to address local needs and increase vaccination uptake. Increasing vaccination uptake among inclusion health groups was a focus of the national funding offer, and initiatives funded include providing practical support for sex workers, rough sleepers and young people, interpreters attending vaccination clinics, clinical conversations in a range of languages in social care settings, 1:1 follow up conversations, door to door visits and community outreach programmes through trusted community voices.