

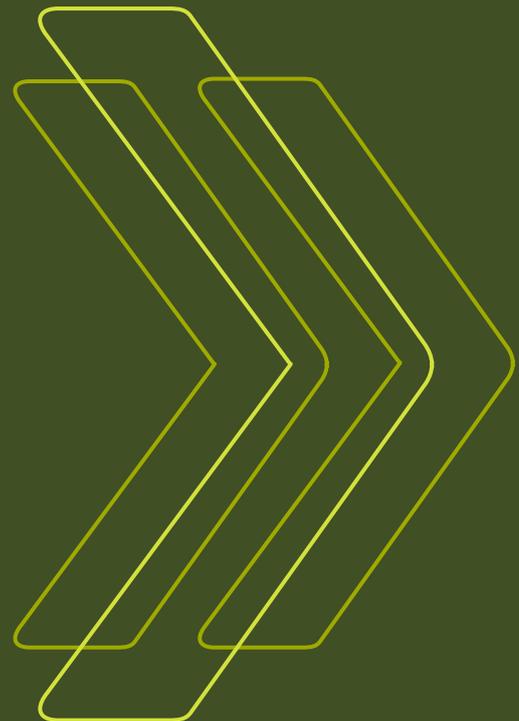
The Covid-19 vaccination programme

Trials, tribulations and successes

Nicholas Timmins

Beccy Baird

January 2022



Easily one of the best things I have ever done.

Vaccination volunteer

This stuff is liquid gold.

Emily Lawson, NHS England lead for the vaccination programme roll-out

I spoke to the Sikh Council for two and a half hours and reassured a number of people from that community about the safety of the vaccines. I spoke about the misinformation that a lot of communities receive through social media. It is a two-pronged effort. From us, nationally, to explain, but also locally, to provide reassurance and easy access.

Professor Anthony Harnden, Deputy Chair, Joint Committee on Vaccination and Immunisation (JCVI)

The arrival of the vaccine meant we GPs finally could do something. We could make a real difference. We were all totally motivated to do it.

Dr Penny Osborne

I remember in one of those early giant webinars with hundreds of GPs that someone quipped 'you do realise that this will save Boris Johnson's reputation'. Some of us winced. But we all cracked on.

Anonymous GP

Tackling the shortage of personal protective equipment (PPE) ...felt like Dunkirk. We were on the back foot and the virus had the initiative. The vaccine roll-out felt like D-Day. We were taking the initiative.

Brigadier Phil Prosser, head of army support for the vaccination roll-out

There is a huge opportunity for us to draw the community in and do much more with them around health services.

Pushpa Raguvaran, a trustee of the London Sri Murugan temple

How much of this experience can we bottle and use again?

Paraphrase of what several interviewees said about what they had learnt from the roll-out



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Executive summary

The vaccination programme has, to date, been one of the few almost unqualified successes of the United Kingdom's response to the Covid-19 pandemic. This account sets out its trials, tribulations and achievements in England up to the end of November 2021 – and points to the qualifications to its success.

The vaccine roll-out, however, has also demonstrated how the National Health Service (NHS) can operate far better in future for many parts of its services other than vaccines.

The power of data

The NHS has never used so much data so quickly and so powerfully. That did not just allow the supply and location of the vaccine and any adverse reactions to be tracked pretty much in real time. The software also made it possible to map who had had the vaccine, identifying, at near street level, where there were gaps in uptake, whether by age, gender, ethnicity, deprivation, care home, NHS site and so on. That in turn allowed much better...

Outreach

Gaps in provision could be plugged by additional sites – whether a pharmacy, place of worship, mobile van or pop-up centre. At least as importantly, however, it also made clear where more work was needed to build trust and to overcome (as far as possible) vaccine hesitancy. The outreach achieved what it did thanks to...

System-working

Joint working between the NHS, local government and the voluntary sector was a hallmark of the vaccine roll-out, but also of much of the rest of the pandemic response at local level.

One should not pretend that this happened perfectly everywhere. But, as one interviewee put it: 'I've worked in the NHS for 33 years and this is the first time



that I'd say, without doubt, everybody has just put their organisations aside and really worked together as a system. We must not lose the benefits of doing that.'

Local knowledge and delivery were crucial to this. It was local government and directors of public health who found the community champions (as many called them) to spread the word about the vaccine while helping find the most effective pop-up and other sites. As the same interviewee put it:

Where we get real traction is through very strong leadership from local government and directors of public health, and really understanding your citizens. What the NHS brings is the scale of the offer. But the interface with the citizen and the community is where local government and directors of public health really come in. We could not have done it without working together.

Thus – if it were not clear before – 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.

That should be achievable in future thanks to...

The volunteers

The value of the volunteers divides into two. First, the many tens of thousands who helped steward vaccination centres, including those who became vaccinators. How much of that voluntary effort can be retained outside of a crisis and when everyone is eventually back at work is uncertain, although as one interviewee put it: 'If we could retain only 10 per cent of that...'

The second – and possibly more lasting impact – comes from those in the faith communities and elsewhere who volunteered their vaccination sites, and who can themselves see that the outreach work, and the work to build trust in the vaccine and thus in the NHS, can be applied not just to other vaccines (such as childhood immunisations) but to a whole range of other NHS services: screening for diabetes and for high blood pressure, for example, or encouraging the uptake of cancer screening.



In other words, the combination of these factors is perhaps the key lesson from the roll-out. Far better use of data and mapping data. Improved integration between local government, the voluntary sector and the NHS – including local government’s ability to take NHS services to places they do not normally go. With all of that helping build trust and thus uptake. And with important parts of the community wanting to facilitate that.

The question is: ‘how much of that can be bottled and re-used?’

If that is the summary of what might be learnt from the roll-out, its rollercoaster ride is worth revisiting in order to grasp why those are the conclusions.



Prologue

More than an hour before sunrise on 8 December 2020, the eyes of the world's media were trained on a small corner of University Hospital, Coventry. At 6.30am, amid a blaze of flashlights, Margaret Keenan became the first person in the world, outside of a clinical trial, to be protected against Covid-19 ([BBC News 2020](#)).

She was just days short of her 91st birthday. Over the following two days, across some 50 hospitals across the United Kingdom (UK), more than 15,000 people were inoculated ([UK Coronavirus Dashboard undated](#)). The UK's Covid-19 vaccination programme was under way. Given the immense speed with which it finally had to be done, it was a near miracle of planning and execution.

Nine months later, almost to the day, the Greyswood Practice in Furzedown, south London, held an outdoor party for its many vaccine volunteers. There was a very quiet, very decorous sense of euphoria. By then, these volunteers had helped the local GPs, medical students, retired doctors and nurses, plus newly trained inoculators, deliver close to 30,000 vaccinations over more than 50 week-day and weekend sessions. They knew there was more to come – the boosters and flu jabs. But there was a powerful sense of their personal effort having made a real difference in a national emergency. 'Easily one of the best things I have ever done,' as one volunteer put it.

There was no shortage of memories. Of 80-year-old people dancing – literally dancing – with delight after they had received their jab during the long, grim days of January and February 2021 as the death toll was once again rising remorselessly. The roll-out was, after all, launched into the teeth of the second big wave of Covid-19, which saw more people die than in the first.

There were other, very different memories. Of another person who was in tears – not of joy but still of fear, despite having been vaccinated. Of another, who screamed the place down. There were touching vignettes. Of the older couple who turned up for their vaccine but were too anxious about infection to enter the hall to receive it – so a GP vaccinated them in their car. One volunteer says: 'I remember a



somewhat nervous early years medical student giving his first jab. I wondered if I should tell her [the recipient] that it was his first. But he told her himself. She was just delighted.'

And, in a perhaps peculiarly British way, almost all of them wanted to talk about 'the cake'. In the United States, the public and private sectors variously offered free lottery tickets, a free beer or even a free marijuana joint to persuade people to get the vaccine (Hunter 2021). The Greyswood Practice wanted its volunteers to be rewarded – with, as it turned out, cake to keep them going. That too was a voluntary effort – all of it baked by Charlie Thompson, the husband of Maggie, the practice's reception manager. The cake was there. Every time. 'The volunteers needed their reward,' as one GP put it. 'They were crucial.' And it was a volunteer who provided it.

At the moment that they were celebrating, the vaccination programme in England was estimated to have prevented more than 24 million infections, resulting in 105,000 fewer deaths – along with more than 230,000 fewer hospital admissions among those aged 45 years and above (Public Health England 2021a). The scale of those numbers is genuinely hard to grasp. They are now even larger.

By any measure, therefore, the vaccination programme has been a success, even if later in 2021 it stuttered somewhat.

The UK, of course, is not alone. This is not an account of British, or indeed, English exceptionalism. The UK leapt into a vaccination lead, but other countries have since caught up, and some have surpassed its vaccination rate.

But the programme to date is clearly one of the few almost unqualified successes of the country's response to the pandemic. This is particularly so given that, in many people's eyes, many other aspects of the response – including the timing of England's lockdowns – left much to be desired. We will come to the qualifications later.

So it is worth asking: how was it done? What happened that made it happen? And what lessons might there be? Not just around how the government and the NHS might respond to any future pandemic, but any lessons for the NHS's operations more generally?



Before getting going, it is worth pointing out what this account does *not* do.

It does not examine the work of the scientists and pharmaceutical companies, or the operations of the Vaccine Taskforce that provided the vaccines in the first place (for a first-hand account of its work, see Kate Bingham's Romanes Lecture) (Bingham 2021). Nor does it address, in any detail, the rapid work of the Medicines and Healthcare products Regulatory Agency (MHRA) in assessing and licensing the vaccines. The focus is on the vaccine roll-out and, specifically, on the roll-out in England, given that there were some differences in the way the rest of the UK handled the delivery. In the main, those are not examined here.

The success of the programme rested on a huge number of organisations and individuals.¹ Many of them 'moved heaven and earth', working similar inordinate hours as many NHS hospital staff had in treating patients, as did many of those in the vaccination centres, as did those who worked in and with NHS England. Not all of them, in this piece, get their fair moment in the sun.

A note about structure is needed. The programme involved a huge number of interlocking parts, which made structuring this account somewhat challenging. The solution has been to break it into five parts.

Part 1 is an account of the planning for the roll-out, and events up to the point where it really took off – essentially, but not only, what happened at the centre. Part 2 sets out some of the key underpins: the logistics, the information technology (IT), the role of the army, and the role of the volunteers and local government. Part 3 looks at what happened 'on the ground', or at least parts of it, where we address some wider issues such as debates about the equity of the programme. Part 4 returns to the timeline: what happened over the summer and autumn of 2021. Inevitably, those parts all interlock. Part 5 presents the conclusions, with a judgement made on how well the programme had done up to the end of November 2021. A postscript covers events since then.

¹ It rested not just on the vaccinators and volunteers and the outreach work by directors of public health in local authorities seeking to persuade the hesitant to trust the vaccine; beyond the Vaccine Taskforce and the MHRA, there was the Joint Committee on Vaccination and Immunisation (JCVI), the Commission on Human Medicines, the Department of Health and Social Care, NHS England and NHS Improvement, NHS Digital, NHSX, NHS Supply Chain, Public Health England, the Department for Business, Energy and Industrial Strategy, and many private sector organisations involved in the supplies, delivery and IT needed to implement the programme successfully.



Finally, a longish list of people (see 'Acknowledgements' section at the end of this report) generously found time for interviews. But the fact remains that this account, particularly when it gets down on the ground, can only be a tiny sample drawn from a massive lake of activity. There were, after all, at the peak, more than 4,000 accredited vaccination sites operating across 7 regions of the NHS and 153 local authorities. And, from the interviews we conducted, the paradox we are left with is that while everywhere was essentially the same, everywhere was, in the end, also different – in matters often small but occasionally large. Not all those differences will have been captured here.



1 Planning and the initial roll-out

A messy start

Planning started in May 2020, although it was more a case of conceptualisation than planning. After all, at this stage, there was no guarantee that any of the many vaccines being developed would work. The best guess of many of the well-informed was that, if they did, the first doses would not be available until 2021 at the earliest.

Deployment – rolling out the vaccine – was originally one of the six workstreams of the Vaccine Taskforce whose primary job was to buy vaccines.

In May 2020, according to the National Audit Office (NAO), Matt Hancock, then Secretary of State for Health and Social Care, asked Public Health England to set up a programme board, as the Department ‘considered it to be the expert in the planning and implementation of national immunisation programmes due to its key role in other vaccination programmes’ (NAO 2020a). Public Health England liaised with many others, including NHS England. A fair number of governance changes followed. These are well-charted by the NAO until, in September 2020, a ‘senior responsible officer’ – the one person charged with ensuring the roll-out – was finally appointed at NHS England (NAO 2020a).

Up to that point, as one close observer of these events put it, the governance arrangements for the roll-out were ‘all rather arcane’. The deployment workstream did not have a seat on the main Taskforce board. The Treasury had yet to agree a business case, and ‘basically, it was a mess’. Or, as one senior figure in the NHS put it, ‘the operational planning was nowhere, really,’ although, they added, ‘to be fair, this was chiefly because of the uncertainties’. In so far as anyone was in charge, up to September 2020, it was the Department of Health and Social Care.

There was never any serious question about whether the NHS would deliver the roll-out. According to one source, ‘Simon [Sir Simon Stevens, then Chief Executive of NHS England, now Lord Stevens] was determined to grip it. He was proud of



many aspects of how the NHS had handled the pandemic.² But it was clear that the eventual public inquiry into the handling of the pandemic will have questions to ask about some aspects of it – for example, the government’s decision to discharge hospital patients back to care homes untested at the start of the pandemic, a decision ‘agreed at the highest level,’ according to Matt Hancock ([Science and Technology and Health and Social Care Committees 2021](#)). And, while many patients and relatives are profoundly grateful for the life-saving treatment they received from over-worked NHS staff, there are others whose relatives died and who feel badly let down – and they are desperate to get answers.

So there were two big motives. One being that ‘if the NHS may not have done all the right things, here was an opportunity absolutely to do the right thing’; the other being that: ‘Simon sensed – well, he knew – that if you are going to get a lot of vaccine into arms quickly, the only real infrastructure in the UK that could do that was the National Health Service.’

An additional factor was that by the summer of 2020, even the government appeared to have learnt lessons from Test and Trace. It had privatised its entire operation – not just the ‘test’ part but also the ‘trace’ element – bypassing completely for months the expertise of local directors of public health who are all trained in epidemiology and have experience, on a smaller scale, of contact tracing. Test and Trace was proving hugely expensive and it was not working well ([National Audit Office 2020b](#)). A privatised approach to doing the vaccine roll-out was never an option. It was the Prime Minister’s decision at the start of September 2020 to put NHS England, rather than any other organisation, in charge.

The better parts of the early preparation

There were better parts to the early preparation, including the Joint Committee on Vaccination and Immunisation (JCVI), which, as early as June 2020, had produced its initial advice on priority groups for vaccination and, in September, produced the first list of the age-related cohorts who should be vaccinated first – those at the highest risk of death.

2 The successes include the NHS’s fast-track research programme on potential treatments, which debunked some and proved others. For example, proof that dexamethasone was effective in treating some seriously ill patients with Covid is estimated to have saved more than 1 million lives around the world.



It started with care home residents, followed by people over 80, and frontline NHS and care staff, both of whom had to be at work to cope with the pandemic and who needed their own protection to avoid infecting those they were caring for. The list then worked down the age groups while also prioritising the clinically vulnerable ([Department of Health and Social Care 2020a](#)).

The government recognised that additional vaccinators would be needed and legislated to extend the groups who could undertake that task ([Department of Health and Social Care 2020b](#)). Talks were also opened with the British Medical Association (BMA) about how GPs might be involved, and what the price for that might be. Work also started on the specifications for a vaccine centre and how it would operate, given that this vaccine would be delivered in the middle of a pandemic. Meanwhile, the Medicines and Healthcare products Regulatory Agency's (MHRA)'s teams of clinicians and scientists were working nights and weekends on the clinical trial data to ensure that, if the vaccines worked, approval for their use would be given as fast as possible ([Science and Technology and Health and Social Care Committees 2020a](#)).

The debate about how to do it

As late as September 2020, when NHS England took over and a senior responsible officer for the programme was appointed, it was still not clear whether the first vaccines would be available before Christmas. As Matt Hancock, then Secretary of State for Health and Social Care, put it in early September, 'the best-case scenario' was that they would. But 'more likely is the early part of next year – in the first few months of next year is the most likely' ([Vaughan 2020](#)).

Ministers and NHS England were, of course, being kept up to date by the Taskforce, and by the licensing body, the MHRA, about the progress of clinical trials and thus the likely approval timeline. At the very end of October 2020 it suddenly became clear – or as crystal clear as it could be – that the first doses might well arrive in December.

Over the summer of 2020 and well into the autumn there was a long debate – mostly tightly held within government and NHS England but occasionally leaking into other parts of the world: namely, while it was clear that the NHS would deliver this, just how would it do so?



The many options essentially boiled down to three. Should this be organised through hospitals, which would then cascade the vaccine out to general practice and potentially into pharmacies? Should it be done by setting up mass vaccination centres? Or should the primary route be via GP practices/surgeries?

Professor Martin Marshall, Chair of the Royal College of General Practitioners (RCGP), recalls a conversation with Simon Stevens in July 2020 when the latter said that he thought GPs would deliver a maximum of 20 per cent of the vaccines – when the reality for much of the earlier part of the programme was that GPs delivered more than two-thirds:

The thinking then seemed very much centred around hospitals and mass vaccination centres. We argued strongly that GPs have a really good track record for delivering vaccination programmes and, particularly given that this would be a new vaccine, trust was going to be extremely important. General practice is a trusted institution within communities.

It was, he recalls, ‘an interesting discussion’. Simon Stevens’ recollection differs – that it would be ‘a minimum’ of 20 per cent. At this stage, his position was, in any case, likely to be cagey, given that there would need to be negotiations with the BMA’s General Practitioners Committee (GPC) over how much GPs would be paid.

Dr Richard Vautrey, Chair of the GPs committee at the time, says that at the outset, before the vaccines became available, ‘it was all a bit difficult because there were issues around commercial confidentiality – at one point they were using submarine names for the potential vaccines. So NHS England and their partners were very guarded about what they could share with us.’ He too says that the early thinking seemed to centre around mass vaccination centres. ‘I kept making the case that practices were expert at delivering mass vaccinations, as we do for flu every year. And we should be given that chance. And we were proved right. The majority of practices did step up.’

The challenge in using GPs as the core of the programme is that there are some 7,000 GP practices in England and while some have large premises, others are very small. The vaccine was going to have to be delivered in venues that could allow



for social distancing. Initial supplies would be limited. Distributing the vaccine to 7,000 different locations as well as hospitals and, potentially, mass vaccination centres would also be a challenge – and one that came to look ever tougher as the very demanding cold chain requirements of the Pfizer vaccine gradually emerged (see ‘The logistics’ section in Part 2). Also, individual practices would only have limited numbers of people aged over 90 and over 80, and so on, and the Pfizer vaccine was to arrive in ‘pizza boxes’ of 975 doses that had to be used within 120 hours once defrosted. Individual practices would not all have enough people in each age group, which implied there could be a lot of waste.

The challenge of using hospitals was that they were under enormous and, once again, growing pressure as the more infectious Alpha variant of the virus took hold in September 2020. By October, England had gone into a second, if slightly less stringent, month-long lockdown. But even as the country emerged from that, it was already looking entirely possible – as indeed happened in January 2021 – that a third national lockdown would be on the way. With cases starting to rocket again, hospitals would have only so much capacity to vaccinate others in addition to their own staff.

Mass vaccination centres looked promising for younger cohorts when their turn came. But there would need to be a lot of them to provide any sort of decent geographical coverage and any sort of reasonable travelling time.

So, in the end, a certain inexorable logic came into play.

Mass vaccination centres did not look appealing for the very first cohorts, which included those aged over 80 and 90. Getting the more frail among them to mass vaccination sites, or indeed hospitals, would be challenging, particularly when there was not yet a national booking system available. As one of those involved put it, ‘nobody wanted 90-year-olds on public transport for any length of time, or indeed queuing outside either hospitals or vaccination centres in winter weather, while at risk of catching Covid as they did so’.

An added complication was that care homes were right at the top of the list, and the question was, who was going to get the vaccine to them?



Finally, there was a strong desire to ensure equity across the country – that, as far as possible, everyone should have equal access to the vaccine as their turn to be vaccinated came around. The goal became that, ideally, no one should be more than 10 miles from a vaccination site.³

The key that unlocked these conundrums was the primary care network (PCN). Announced in January 2019 as part of the NHS Long Term Plan ([NHS England 2019](#)), PCNs aim to provide mutual support between practices and bring some scale into the operation of general practice – the broader aim being to enable a wider range of services and better integration with other parts of the NHS and social care ([Baird and Beech 2020](#)). By May 2020, all but a handful of practices had signed up to them. There are 1,250 PCNs across the country each covering a population of roughly 30,000 to 50,000. There are mixed views among GPs about how valuable these still somewhat nascent networks have been.

For the vaccination programme, however, they proved invaluable. Pretty much the optimal size, if each PCN set up one centre or possibly two, to have the right numbers in each age cohort to make best use of the vaccine. It also meant a more manageable number of sites for delivery than if individual practices had been used – and they could operate at sufficient scale to get through the requirements for the Pfizer vaccine with its 975 delivery doses and its limited shelf-life once defrosted. Travel time for people would also be cut, compared to the use of hospitals or mass vaccination centres.

So, in the end, what became an evolving programme emerged – to use all three routes. Hospitals, mass vaccination centres and GP-run ones, with the ability to flex between them as different vaccines with different characteristics became available, and as different and younger cohorts came to qualify for inoculation. Relatively early on, pharmacies were also brought on board. But the GP-run centres were to be, in the words of Simon Stevens, ‘the workhorse delivery channel’. The broad phasing of the vaccination programme was set out by Simon Stevens at a Downing Street briefing with the Prime Minister on 2 December 2020, the day the Pfizer vaccine gained UK regulatory approval ([Johnson 2020](#)).

³ NHS England claims that by the time the programme was fully up and running in March 2020, 99 per cent of the population were within 10 miles of a centre. This fluctuated a little over time.



Really getting going

The realisation, in late October 2020, that the Pfizer vaccine might be available in December brought a complete change of gear – and of personnel. In October there had been a decidedly lengthy video summit with the seven NHS regional directors and many others to go through the plans. The conclusion was that ‘this doesn’t look like we’ve got enough depth in the operational planning,’ according to one of those involved. ‘After that, things really started to ratchet up.’

At the very beginning of November, Simon Stevens dropped down from the sixth floor to the second of Skipton House, headquarters of NHS England, to say to Emily Lawson: ‘I think we need you to do this.’

Emily Lawson was Chief Commercial Officer for NHS England. Earlier in the year, while still based in Skipton House, and in what must have felt like receiving a ‘hospital pass’⁴, she had been seconded to the Department of Health and Social Care to run the programme to acquire many more ventilators and to solve the desperate shortage of personal protective equipment (PPE) at the start of the pandemic (supplies of PPE being the Department’s responsibility). By November, those tasks were essentially done.

As Emily Lawson took over, she brought in a number of key outsiders to supplement the huge amount of work on IT and supplies and contacts with GPs and others that the programme was going to require.

Thus Steve Gibb, a supply chain specialist with 20 years’ experience who had earlier worked on the PPE supply issue, was brought back in. Some already within NHS England – including Ed Waller, Director for Primary Care, and Dr Nikki Kanani, Medical Director for Primary Care – were moved full-time onto the programme. Emily Lawson asked for the army’s 101 Logistic Brigade, which had worked with her on the ventilators and the PPE shortage, to be brought back (see ‘The armed forces’ section in Part 2). And, separately, Adrian Stanbury, who runs his own consultancy, was brought in to head the IT support needed. Stanbury had led for BT on the delivery of ‘the spine’ – the key NHS messaging service that was one of the

⁴ A ‘hospital pass’ is a sporting term, usually relating to football or rugby, where a pass of the ball arrives so late that the opponent is already on to the receiver. To the point where the receiver is likely to be hit so hard that they will end up in hospital.



relatively few genuine successes of the mighty NHS IT programme in the 2000s, and which, of course, played its part in the vaccine roll-out. His other experience included being Chief Information Officer for Morrisons supermarkets.

‘One of the first things I did,’ Emily Lawson says, ‘was to read the World Health Organization report on what makes a successful mass vaccination programme. And it basically says that to be successful it has to be seen to be simple and fair.’

That reinforced the desire for equality of access. But with it came a determination – despite the pressure for speed from ministers – not to launch parts of the programme until there was confidence they would work well. ‘They had to be operationally excellent,’ she says. ‘Because if people are nervous about a new vaccine, a brilliant operational experience gives them confidence in the programme, and they tell people about it, and that feeds back to people’s perception of the vaccine itself and the programme.’ That approach was in turn to help define the sequencing in which the vaccine was rolled out.

One key tipping point was the news, late in the day, that the Pfizer vaccine, while it had to be stored longer term at -70 degrees Celsius, could in fact be kept in a medical fridge for up to five days or 120 hours once defrosted.⁵ That made it credible to put the GP-run centres at the heart of the programme. They had yet to be set up though.

On 3 November 2020, the government concluded a deal with the BMA to pay GPs £12.58 per vaccine – the oddly precise sum resulting from it being a 25 per cent increase over the amount they are normally paid for flu vaccinations. The next day, Simon Stevens said that GPs will be ‘geared up to start by Christmas if the vaccine becomes available’ (Parveen 2020).

On 9 November, the PCNs were effectively given a week – until 17 November – to choose the site for their vaccine centre, which had to meet a highly detailed specification covering (for example) vaccine storage, site safety and security, space for social distancing, workforce, and data collection and reporting. Over the following six days these were to be inspected by the local clinical commissioning group (CCG) to recommend whether the site was fit to be designated. PCNs were

⁵ Fridge storage time later became 31 days.



to be notified of the outcome no later than 23 November. The letter setting out how all this had to be completed in just two weeks noted dryly, and with some sympathy, that this would require ‘all hands to the pump’ (Kanani *et al* 2020). Some of these requirements were highly demanding. ‘We had to re-cover the floor of our site,’ one of those hit by this says, ‘because it did not come up to hygiene standards.’

Not all GPs, it should be said, were wild about this idea. The Clinical Director of one PCN says:

There was a lot of chat about finance and whether we would be making a profit. My response always was, not necessarily. But we won't make a loss. That's covered. It's insured. General practices are small businesses, and it is right that people look at them as a business. But there are times when you just have to do the right thing. I lost a lot of faith in some of my colleagues over this [their reluctance, indeed refusal, to take part in the GP-run centres].

Another GP recalls a Microsoft Teams meeting of the practices in their PCN:

... and a lot of them really didn't want to do it. By this stage they already felt knackered. And there was a lot of stuff at the time on GP social media saying 'don't touch it with a barge pole'. 'We've enough work to do'. 'It's not worth it financially' and so on. A minority, I'm sure. But a big echo chamber. We, however, and one other of our practices in the PCN, really wanted to do it.

For some, it was easier than for others. In the autumn, the NHS had already run the biggest flu vaccination programme in its history (and the most successful in terms of uptake) – an attempt to relieve the pressure on hospitals during the pandemic. Rather than bring people into the surgery for the jab, some had innovated.

For example, for the flu campaign, the Greyswood Practice in south London took over a large and airy local Baptist church hall, setting up several vaccination pods, with seating that involved social distancing, and with volunteers to help direct people, inviting them to come in to precisely timed three-minute slots. ‘That proved to be much more efficient, and it felt much safer than having people queuing up in the surgery for their flu jab,’ says Dr Penny Osborne, one of the lead GPs at the practice.



And of course, although we didn't know it at the time, it proved an excellent dry run for the Covid vaccine when it came along. So we went back to the church and said could we use it again for the Covid vaccines? And they were just delighted to help, and not least because the church hall could not be used for anything else in the lockdown.

Indeed, as the Baptist minister from that church says, 'our mission statement is "love God, love people, love life" and this fulfilled at least two of those'.

Dr Osborne and all the others in the practice were determined to take part. She no doubt speaks for many when she says:

By November we'd been through two lockdowns. We had changed the way we did things with various forms of remote consultation, but we had remained open. But the government's 'stay at home, protect the NHS' had the unfortunate side effect that people did indeed stay at home and they did not contact us when they should have done.

So while our surgeries were fully booked, we had probably been overly quiet. Furthermore, throughout 2020, there had been little that we, in general practice, could do about Covid. We had no treatments. That was all happening in hospital. But the arrival of the vaccine meant we finally could do something. We could make a real difference and have a real impact on our patients and our community. We were all totally motivated to do it.

As all this organisation was being undertaken at near breakneck speed on the ground, those at national level and in the IT and supply chain were equally working overtime to get in place a recording and booking system and much else, alongside the vast quantities of kit that the vaccine centres would need to operate safely (see sections on IT and logistics in Part 2). Treasury ministers at this point were proving decidedly slow in approving full funding for the kit and the rest of the roll-out. The Department of Health and Social Care and NHS England and NHS Improvement took the somewhat brave decision to spend the money anyway – at risk, so to speak – in the face of this national emergency. The Treasury only finally agreed the business plan at the very end of December 2020, by which time almost 1 million people had been vaccinated.



The first vaccinations

On 2 December 2020, the MHRA gave its approval to the Pfizer vaccine and the first supplies – from Belgium – arrived in the UK the next day. On 8 December, 90-year-old Margaret Keenan became the first person in the world, outside of a clinical trial, to receive it. Despite the intention now being to use a mix of vaccination routes, the hospitals went first for a number of reasons.

First, the biggest hospitals already had -70 degrees Celsius freezers to store the Pfizer vaccine, so 53 of them were designated as the first sites ([Lawson and Harriman 2020](#)). Second, they held wholesale licences, so they could be used if needed to distribute the vaccine to other centres. ‘In the end we didn’t do a lot of that, but at the time it gave us a bit more certainty in the supply chain,’ Emily Lawson says. And third, while thousands of people had received the vaccine during clinical trials, it was now to be used on a massive scale.

So starting in hospitals (which are also fully equipped to deal with any medical emergency) also made sense. The value of that was shown immediately when two NHS staff vaccinated on the first day had a poor reaction. The result was an 11.30pm phone call between Dr June Raine, Chief Executive of the MHRA, and Professor Chris Whitty, Chief Medical Officer, which resulted in a new requirement that people should be observed for 15 minutes after receiving the Pfizer vaccine ([Science and Technology and Health and Social Care Committees 2020b](#)) – thus requiring more space. One more complication to an already complicated programme.

That was to be just the first of the many hitches, most of which – certainly into the autumn of 2021 – the programme eventually overcame. Another, to set against the achievement of the very first vaccinations on 8 December, was the news on the same day that there had been a production problem with the AstraZeneca (AZ) vaccine. It was nearing its regulatory approval but had yet to receive it. The production issue meant that fewer doses than expected would be available in 2020 ([Cookson et al 2020](#)). Over this period – and, indeed, at times later – vaccine supply was going to be a key constraint. As late as the week of 8 December 2020, details were still emerging about how many times the Pfizer vaccine could safely be moved.



On 4 December, PCNs were told that the first of their sites – going with those with the highest proportion of people over 80 in their population – would be stood up on 14 December ([Kanani and Waller 2020b](#)). On 7 December, the full list of everything that would be involved reached them – from a repeat of the highly specified standard operating procedure, repeated inspection, and the planned delivery process for the vaccine ([Kanani and Waller 2020a](#)). The following evening, one of the many giant webinars that were held throughout the roll-out took place – involving at times many hundreds and, on occasion, even a couple of thousand GPs and others. Its aim was to answer the many questions that inevitably arose.

On 14 December, most of the first 400 GP-led sites did indeed start giving vaccinations, and at the same time a pilot programme was launched in six of the PCN areas to break down the 975 Pfizer doses into smaller packs: to get them into care homes and to test whether that could be done safely. Over the following week, more than 70,000 people a day, on average, were being vaccinated ([UK Coronavirus Dashboard undated](#)). Plans were also finalised, over this period, to involve pharmacies early in the new year.

The moment of ‘trauma’

The pace of the vaccination programme inevitably slowed in the immediate run-up to Christmas 2020. Nonetheless, by 30 December, just short of a million people had been vaccinated. But 30 December – in the memory of those who went through it – was to be a day of ‘trauma’. A mixture of incredibly good news, but also of a big shift in the programme that caused much trouble for hospitals, GPs and those already booked in for a second dose.

On 30 December 2020, the MHRA approved the AZ vaccine. That move increased supply. It also meant that it was far easier to get the vaccine into care homes, and indeed into the vaccination centres, because it is a less delicate product than the Pfizer vaccine. It is not frozen and can be stored at the temperature within the range of a normal medical refrigerator: between -2 degrees and 8 degrees Celsius.

At the same time, however, the JCVI had been crawling all over the increasing amount of data that was emerging (published and unpublished) on the effectiveness of the Pfizer and AZ vaccines. Both were initially two-dose products. In the Pfizer



trials, the second dose was given three weeks after the first. In the AZ trials, it was mainly given after four weeks. The data, however, showed that the first dose of both provided a high level of protection, which appeared to last for a good while, even though a second dose then increased it. In slightly guarded language, the committee advised that ‘delivery of the first dose to as many people as possible should be initially prioritised over delivery of a second dose of the vaccine,’ and that the second dose could be given up to 12 weeks later (JCVI 2020).

The four chief medical officers of the UK seized on the JCVI’s statement to declare that in order to protect the greatest number of people in the shortest possible time – thus reducing mortality and severe disease – ‘operationally this will mean that second doses of both vaccines will be administered towards the end of the recommended vaccine dosing schedule of 12 weeks’ (Department of Health and Social Care 2020c).

The result was a giant webinar with the clinical directors of the vaccination sites and many others, during which, as one of those presenting the decision put it, NHS England had to say to them ‘look guys, we’ve got news for you, it is all shifting tomorrow’. The scale of the decision was such that the webinar was fronted by Simon Stevens, Emily Lawson, Stephen Powis (Medical Director of NHS England) and others from NHS England.

Many GPs were furious. Having gone to extraordinary lengths to set up their vaccination centres and to book in those aged 80 and above, they had given them a first dose with a date three weeks or so away for their second. Now they would have to contact these older people all over again with the bad – indeed distressing – news that the appointment would be cancelled and be rebooked for some nine weeks later. Given that these people were the ones judged to be most at risk of dying from Covid-19, it felt like a breach of promise. As one of those from NHS England put it, the webinar ‘was traumatic’. A call centre was set up to help with the task of rebooking appointments. Some GPs did not cancel those due within a week, but many were left with having to contact 1,000 people over a weekend telling them that their appointment was postponed. ‘A lot of them did that,’ says Ed Waller, the primary care director at NHS England. ‘It was amazing. A heroic effort.’



However, the decision split medical and scientific opinion in the UK. The Academy of Medical Royal Colleges, including the RCGP, backed the move. The BMA, by contrast, said it was ‘unreasonable and totally unfair’ to ask health care workers to reschedule appointments already in place ([Duncan 2021](#)). Some GPs described the decision as ‘immoral’. Patients also protested ([Adler 2021](#)). There was international criticism too. The US regulator, the Food and Drug Administration, described the decision as ‘premature’ while Pfizer itself protested, saying ‘there is no data to demonstrate that protection after the first dose is sustained after 21 days’ ([Iacobucci and Mahase 2021](#)). In time, however, other countries followed suit and subsequent evidence confirmed that the longer gap actually improved protection.

England’s Deputy Chief Medical Officer, Jonathan Van-Tam, put the case most vividly: ‘If a family has two elderly grandparents and there are two vaccines available, it is better to give both 89 per cent than to give one 95 per cent protection with two quick doses, and the other grandparent no protection at all’ ([Science and Technology and Health and Social Care Committees 2020b](#)).

There were to be other bumps in the road in terms of what the vaccination teams could do on the ground. The biggest of those came in April and May 2021, when the JCVI advised that the under-40s should be offered an alternative to the AZ vaccine – because of a very few cases where younger people who had received that vaccine had experienced blood clots in the brain, and low platelet counts. It was stated that that should happen where alternatives were available ‘and only if this does not cause substantial delays in being vaccinated’ ([JCVI 2021](#)). The only upside to that was that around the same time, the first supplies of the Moderna vaccine became available ([Cameron-Chileshe 2021](#)).⁶

For all the heat that the 30 December decision generated, this was the moment when the UK’s and England’s vaccination roll-out was able to really take off. It meant that Pfizer vaccines being held back for second doses could be released for first ones. Combined with the approval of the easier-to-handle AZ vaccine, that meant that the roll-out really could accelerate. The first doses of the AZ vaccine were given five days later, on 4 January 2021.

⁶ The Moderna vaccine has its own unique handling properties, part way between the Pfizer and AZ. It needed to be stored frozen between -25 degrees C and -15 degrees C but not below -50, or on dry ice. But its transportation requirements were a bit easier than the Pfizer, and once thawed it could, from the start, be stored at between 2 degrees and 8 degrees for 30 days.



Lift-off

In the week beginning 10 January 2021, and with an online national booking system now available, the first seven mass vaccination centres began operation, one in each NHS region.⁷ Dozens more were to follow. Two hundred more GP-led centres opened, taking the total to around 1,000, with 200 hospitals also now providing the vaccine. On 14 January, the first pharmacies joined the programme. By now, some 80,000 vaccinators had been trained, although not all had been deployed ([NHS England 2021c](#)).

By 31 December 2020, more than a million people had been vaccinated. Three weeks later, on 22 January 2021, that figure topped 5 million. By 6 February it was over 10 million, and on 15 February it reached 13 million – a date of some significance (to which we will return).

Media coverage started to turn. A good chunk of it, up to mid-January, was decidedly sceptical and critical, reflecting both the attitude and complaints of some GPs, complaints from pharmacies that they had not been involved early enough ([Smyth and Blakely 2021](#); [Gibbons and Lay 2021](#)), and some teething troubles (see ‘And some teething troubles’ section in Section 3). As the programme expanded, with the booking system working, and with local authorities and others finding often imaginative ‘pop-up’ locations to make access even easier, public faith grew – by way of word-of-mouth, through social media, and thanks also to the daily publication across the media of the rapidly rising number of vaccinations. All this showed that the programme was indeed working. In other words, success started to breed success.

The ‘wobble’... and the turning point

Somewhat ironically, however, it was in the period between Christmas 2020 and the turn of the new year – just before the programme really took off – that political faith in the campaign reached its lowest ebb. There was, as one interviewee put it, ‘a political wobble’.

In the run-up to Christmas, the daily vaccination rate had tailed off slightly – although hospitals did deliver 255 doses on Christmas Day itself.

⁷ Ashton Gate in Bristol, Epsom racecourse in Surrey, the ExCel Centre in London, the Centre For Life in Newcastle upon Tyne, the Etihad Tennis Club in Manchester, Robertson House in Stevenage and Millennium Point in Birmingham.



Ministers, and the Prime Minister in particular, were demanding faster progress, despite the limited vaccine supply. As one present at the meetings put it, Boris Johnson ‘went on a bit of a rant’. Under pressure from some elements of the media and from Conservative backbenchers opposed to the third lockdown that was coming (Courea and Grylls 2021), the Prime Minister wanted vaccine centres to run 24/7 (they were already required to run from 8.00am to 8.00pm seven days a week if needed). When, slightly later on, the idea of vaccine centres running around the clock became public, two of his own health ministers, including Nadhim Zahawi (the relatively newly appointed Minister for Covid Vaccine Deployment) pointed out the sheer impracticality of trying to do that at any scale (Swinford *et al* 2021). Quite apart from staffing them, how many 70-year-olds and 80-year-olds were going to turn up at 4.00am?

According to one political source, ‘Simon Stevens very cleverly cracked that by persuading one or two hospitals to run through the night, chiefly vaccinating their own staff, which allowed us to say we had done it. It took the political steam out.’

Boris Johnson’s other solutions included, as one source put it, ‘more army’. Indeed, on 31 December 2020, Ben Wallace, the Secretary of State for Defence, said British military medics had been put on standby to deliver up to 700,000 doses a week. ‘That would be over 100,000 a day they could potentially deliver if that is requested by the NHS – and we are planning to grow that if possible,’ he said (Smyth *et al* 2020). Some army vaccinators were indeed deployed (see ‘The armed forces’ section in Part 2) – but nothing remotely on that scale.

Matt Hancock says: ‘The Prime Minister was entirely within his rights to demand faster progress, or as fast progress as possible. It’s part of his job. He was entitled to set targets. But that had to be done within the bounds of what was possible.’ In addition to targets, Boris Johnson also wanted the daily vaccination numbers published.

Simon Stevens, Amanda Pritchard (then Chief Operating Officer for NHS England), Emily Lawson and indeed Matt Hancock, who was also pushing for the fastest possible progress, were determined not to have impossible targets. They had watched what happened to Test and Trace when impossible targets were accepted, with the programme’s credibility undermined when they were inevitably missed. The vaccine supply was also so uncertain week-by-week that it was also a case of



‘don’t promise what you can’t be sure you can deliver’. One close observer of the programme says that, at least up to December 2021, ‘One of its real achievements was that it refused to accept impossible targets. The ones that were eventually set were certainly stretching. But they looked like they might be achieved – as indeed they were.’

What resolved this wobble was the 30 December announcement that the AZ vaccine had been approved, along with the decision to have a longer gap between the first and second doses of both the AZ and the Pfizer vaccine.

With much more supply likely to be available, NHS England rapidly calculated how fast it could now go. The result was the Prime Minister’s statement in his broadcast to the nation on 4 January 2021 – the same broadcast in which he announced the third national lockdown – that:

I can share with you tonight the NHS’s realistic expectations for the vaccination programme in the coming weeks. By the middle of February, if things go well and with a fair wind in our sails, we expect to have offered the first vaccine dose to everyone in the four top priority groups identified by the Joint Committee on Vaccination and Immunisation...

(Johnson 2021b)

In other words, all those aged 70 and over, the clinically vulnerable, and health and care staff.

Over the next couple of days, and in public, that ‘realistic expectation’ became a target: that it would be achieved by 15 February 2021. Or, as one political source put it with a smile, ‘he hardened the expectation up into a target’.

The following day, the Prime Minister announced that daily vaccination figures would be published from the following week. Emily Lawson says:

I was very resistant to publishing that data because, again, we’d seen what happened with Test and Trace when they had to put corrections out and I really didn’t want to do that. Our data systems were all brand new and they were creaking at the seams. So I was being quite restrictive on the data in December. I was showing it to the Prime Minister, but I wasn’t making it public.



In the first week of January, the Prime Minister said 'right, we're publishing this every day now'. And I said, 'Prime Minister, I'm worried about data quality, I'm worried about timeliness'. And he said: 'I don't care, the public needs to see it'. And he was right. Seeing the numbers going up so fast really did build confidence. But that wasn't my decision, that was his. And he was right.

What also mattered was that NHS England had spelt out to the Prime Minister – though not to the public – how it thought it could get to the target week-by-week. The weekly steps were not publicised for two reasons. One was that vaccine supply remained deeply uncertain – the Vaccine Taskforce's forecasts of how many doses would be available week-by-week varied repeatedly. 'The volatility was huge,' one voice from NHS England says. 'And we would literally know only a week in advance and sometimes less than that, how many vaccines we would have to administer the following week.'

The second reason was that publishing a detailed programme would reveal how many doses the UK believed it was going to get and when – leading to pressure from other countries on manufacturers to divert supplies to them (McLellan 2021). Indeed, when Scotland briefly published the number of doses it was expecting (Brooks and Stewart 2021), which meant the numbers could be scaled up to the full UK supply, that helped fuel an angry clash with European Union (EU) countries over the UK's contractual claim to first doses of the AZ vaccine (Boffey and Sabbagh 2021).

Despite the irregularity of supply, almost all of the interim steps that NHS England promised were, in fact, reached or exceeded. In one word, what this established for the politicians was credibility. Thus, when pressure for faster progress returned in the spring and summer of 2021, NHS England was able to persuade ministers that some of what they wanted could not be done, that it was undeliverable; that the organisation was setting out the very best that it believed the NHS could achieve – and, indeed, on its track record, would achieve. Which it did.

The final act in this mini-drama, the outlines of which did shortly reach the media (Neville et al 2021), came on 7 January 2021, the day the Moderna vaccine was approved.

At a Downing Street press briefing, Boris Johnson was joined by Simon Stevens and Brigadier Phil Prosser, the commander of 101 Logistic Brigade. Decidedly unusually,



Simon Stevens seemed slightly defensive. No one was more motivated than NHS staff to get the vaccine out there, he said, 'because they are living day-by-day with the tragic consequences for patients and for families and for colleagues of not having coronavirus under control'. He added that: 'I think it's fair to say that we have made a strong start,' with many times more people vaccinated than in France or Germany. A 'huge acceleration' was needed 'if we are, over the next five weeks, going to vaccinate more people than we typically vaccinate over five months during a winter flu programme'. He repeated the broad plan, and he sought to head off at the pass likely criticism that Israel had gone faster by mainly using mass vaccination centres. He said he believed that, given the geography of England, the NHS's approach of a mix of different routes 'will be the right answer'.

When it came to Brigadier Phil Prosser's turn to explain the army's role, he was effusive, saying that over the past eight weeks he had 'been working with some of the most professional, dedicated and amazing people that I have had the honour to serve alongside'. His day job, he said, was 'to deliver combat supplies to UK forces in time of war'.

But this exercise was 'unparalleled in its scale and complexity... the equivalent to setting up a major supermarket chain in less than a month, and next week we'll further increase our footprint by another 20 per cent'. While the army could offer additional vaccinators if needed, the Brigadier noted that 'everyone in this programme has stepped up to deliver professional excellence...' (Johnson 2021a).

The joint message from Simon Stevens and Brigadier Phil Prosser to the public – but also in barely coded form to the Prime Minister, who was standing between them – was that 'we can do this'. The implied 'we' being the NHS and the current level of support that the army was providing.

With the AZ vaccine and its easier handling properties now available, the drive to get jabs into care homes accelerated. GPs had already been offered before Christmas an extra £10 for each care home vaccination, in recognition that they were harder to do. They were now offered a much bigger short-term payment. For each first dose administered up to and including Sunday 17 January – four days away – they would receive an enhanced payment of £30, followed by £20 for doses delivered over the following week, and £10 for those delivered after that date but before the end of the month. The letter announcing the payments underlined



that every 20 doses administered in a care home potentially prevented one death. Shortly afterwards, GPs were offered an additional £10 to vaccinate people who were housebound.

As outlined earlier, the roll-out rocketed. The 15 February target was hit. Not only had everyone in the four top priority groups been *offered* a vaccine, as had been promised, but 13 million doses were now in people's arms. Emily Lawson says:

I didn't sleep much between November and about March. Once we hit that first deadline – and we knew about a week out that we were going to do it – that was the moment we thought, we now really do know how to do this. We've got to go again with the next cohorts. But it is going to work.

The 'we' in that statement meaning not just the top of the office, so to speak, but all the vaccinators, volunteers and others out on the ground.

The next set of targets, for April 2021, were reached a week early. In the peak week, in March, more than 3 million vaccinations took place. That is more than 35,000 a minute.⁸

⁸ Assuming all sites were working, as the specification said they had to be able to do, from 8.00am to 8.00pm. If the hours were shorter – and not all of them ran literally from 8.00am to 8.00pm – the rate per minute was even higher.



2 The underpinning

The logistics

The roll-out faced many challenges, perhaps the biggest being the logistics. In other words, getting the vaccine, once it was available, to the right place at the right time to put into the right arms – along with all the associated equipment needed for that to be done safely. Indeed it was a desire to grasp the scale of the logistical challenge that first prompted the idea for this report.

A major complicating factor was that the first vaccine to become available – the Pfizer-BioNTech version – is no ordinary vaccine. It is a fragile beast. It has to be stored at a mighty -70 degrees Celsius, and once defrosted, it cannot be refrozen. Initially, from manufacture to inoculation, it could only be moved five times, with three of those moves having taken place by the time it reached a vaccination centre, and with the definition of ‘moved’ being very tight. Unlike the flu vaccine, for example, it does not come in handy pre-loaded syringes. It comes in vials from which the individual doses have to be drawn. The vials, however, have first to be diluted with saline. They have to be turned 10 times, but not shaken, as shaking risks destroying the vaccine. Once defrosted, it could initially sit in a refrigerator for only 5 days or 120 hours.⁹ Once at room temperature, it has to be diluted within 2 hours – and then used within 6 hours. On top of that, it came in ‘pizza boxes’ of 975 doses, made up of 195 multi-dose vials.

That makes it not just clinically more challenging to handle than other vaccines, but logistically much more challenging to deliver – given that any break in the delivery cold chain risks destroying it. The second vaccine to become available, the Oxford/AZ, was much easier to handle. It is not a frozen product and is storable at refrigerator temperatures for 6 months. It does not require dilution, although the individual doses still have to be drawn down from 8-dose and 10-dose vials. It does not come in pre-loaded syringes.

⁹ The handling properties did become slightly easier. In the new year, the restrictions on movement eased somewhat and from May 2021 it became possible to store it for up to 31 days in a refrigerator, which also made it much easier to use in pharmacies where the throughput is lower.



The challenge, however, was not just the nature of the vaccines. To administer them safely, much more was needed – whether in a GP-run centre, a football stadium, racecourse, cathedral, mosque or gurdwara. Not just the vaccine and the saline and the syringes (along with sharps bins to dispose of them) but barcode scanners to keep track of who had which batch of the vaccine. Plus fridges and, in some cases, -70 degree Celsius freezers. Along with defibrillators, a couch for non-hospital and non-GP surgery settings, and anaphylaxis kits (which include adrenaline and an oxygen mask) to cope with any serious and instant adverse reactions. There had to be incredible attention to detail – including supplying extra-long syringe needles for the arms of seriously obese people who were among those at highest risk of death.

Many thousands of laptops, routers and printers also had to be bought and distributed to allow centres to easily download and upload data for the mobile, web-based ‘point-of-care’ solution (see section on IT below). There were social distancing stickers for the floors, information leaflets in assorted languages and – a nice touch – the ‘I have had my Covid vaccination’ stickers. Plus, of course, masks, gloves and other forms of PPE not just for clinicians but for the thousands of volunteers, given that the vaccination programme was launched into the teeth of the second big wave of Covid. There were some 400 different items, which, for the first deliveries, were sufficiently bulky (the fridges and freezers aside) to have to be delivered on a heavily loaded pallet.

Among the many changes and additions to personnel at the start of November 2020, Steve Gibb, who in the May had been brought in as logistics director for the supply of PPE, transferred across to be supply chain director for the vaccine deployment. With more than 20 years’ experience of supply chains, including 13 of them in what is now the giant electrical retailer Currys, he had originally been planning to take a year off. But when the call came from Emily Lawson, he says, with a smile, ‘for something like this, obviously, you can’t really say no’.

By November 2020, it was becoming increasingly clear that the first vaccine was likely to be available at the start of December – earlier than had originally been expected – although the precise details about how it would have to be handled were still emerging. ‘So we had a five-week lead time,’ Steve Gibb says. ‘Really, we did not have enough time. We had to go at enormous pace.’



The issues included not just buying equipment, and then distributing it and the vaccine. They included precisely what to buy in the first place. As Steve Gibb says:

So we were getting changing guidance from the MHRA about what was needed to handle the vaccines safely and we walked through the process with Public Health England [who play a key part in normal vaccination programmes]. We talked to industry experts and to clinicians and built up what was needed, component by component. And then when it went into the first hospitals and vaccination centres in early December we went in and literally walked the process with them to make sure all the administration and kit was right, that it was easy to track the batch numbers and so on. Getting all that right was a huge partnership.

It might be thought, at a time when the pandemic was disrupting manufacturing and delivery all around the world, that finding a load of -70 degree Celsius freezers and many hundreds of fridges at short notice might be the biggest challenge – not least because the fridges are not just any old fridge. They had to be medical standard, with kit that monitored their temperature throughout to check that they had not become too warm when not attended – which would make the vaccine unusable.

It did not help, Steve Gibb says, that this procurement was being done in November – ‘Black Friday’ time. ‘Everybody wanted their fridge or freezer, and there was a genuine shortage in the UK. So we ended up going to the Nordic countries and elsewhere to make sure we could get them.’ Given that there was both high global demand and an international emergency, he says the suppliers, and not just for the refrigeration:

... could not have been more flexible and supportive all the way through. We never got any pushback. We knew where we were in the queue, and we could push to get up the queue. I’ve worked in supply chains for 20-odd years and I have never known such a level of collaboration and support. They knew this was crucial.

In all, and at the time of writing in November 2021, the programme had delivered more than 1,100 freezers and more than 3,100 fridges – together with (just to pick a few of the headline figures) 3,300 cool boxes, 2,500 defibrillators, 30 million pairs of gloves, 114 million alcohol cleaning wipes, 175 million face masks, more than 750,000 sharps bins, 1.2 million ballpoint pens and, of course, the syringes and



vaccine and saline to deliver more than 85 million doses in England alone. Those numbers will since have risen.

The refrigeration supply, Steve Gibb says:

... did keep me awake. In the early days we were getting fridges to vaccination centres hours before they went live. Enough hours for the gases to settle and then to operate. So it was that close. But to be honest, the fridges and freezers were not in my top five.

The roll-out was launched in hospitals. One surprising discovery was that big hospitals have more than one postcode. 'I had no idea they had so many postcodes. So the biggest headache in the first two weeks before going live was getting the exact postcode and delivery point right – the right door, so to speak.' Postcodes and GPS coordinates mattered. Later on (though this is not related directly to the supply chain), a vaccination centre in Newcastle appeared to be getting no bookings, only for the IT team to discover that the GPS coordinates had been mis-typed to put it in the middle of the North Sea (NHS Digital 2021).

Then there was distributing the vaccine. In the early days, NHS England often did not know until 24 hours beforehand when a supply would definitely be on the boat from Belgium.

The whole programme operated to the mantra that Brigadier Prosser put into the public domain at a Downing Street briefing in January 2021 – that the vaccine needed to be 'in arms, not on shelves'. But, Steve Gibb says, there was a question about whether any medicine logistics company had the right licences to distribute the Pfizer vaccine with its difficult cold chain requirements. The MHRA, however, rapidly completed the necessary licensing and inspections to allow that to happen.

Public Health England had a standard delivery partner, but its warehouse was not going to be large enough to take all the vaccines. So two other health care logistics companies able to handle the cold chain were recruited. They all had to operate to precisely the same standards – ensuring, just to give one small example, that the batch numbers were all recorded and tracked in the same way so that if there were any adverse reactions, the MHRA would be notified of them. Deliveries had to be co-ordinated between the three firms, depending on supply.



So we had to get three competitors to work together and work at pace and share data. Sharing data means that they're sharing how they do their job – and that is arguably where they make their margin. So the early exchanges were interesting. But they did it. And they were good. Very good.

The anaphylaxis or resuscitation kits, and the defibrillators needed for the vaccine centres, were also a challenge.

Trying to get enough of them into the country, and so that there were second ones available to go mobile into the care homes – the care homes being a top priority. Getting that kit ahead of the delivery of the vaccine to care homes was a challenge. We had Sprinter vans standing by because we weren't quite sure when we were going to get the kit and to which part of the country it was going first.

At one point we had a load of defibrillators that were in an airport in Miami and we could not get the American couriers to shift them fast enough. I'd run out of contacts. To the point where I was calling the Vaccines Minister, Nadhim Zahawi, in the early hours of the morning to see if he knew anyone who could get them shifted. In the end we got it done through a military contact, so we got there in the end.

Making all this work involved many parts of the machine, not least the finance team:

They were there for us literally 24/7 because at times we were buying stuff in the early hours of the morning in the Far East. And, while they stuck to the processes, they accelerated things hugely. Signing things off within 24 hours rather than the more usual 4 or 5 days. That was crucial. It may sound simple. But taking 4 or 5 days out of the process really mattered.

A further early challenge was getting the Pfizer vaccine into care homes, given that it came in boxes of 975 doses: finding a safe way to split it down and get it there. Some whacky ideas were raised but not pursued – for example, commandeering ice cream vans that were unused in winter and could not operate anyway because of the lockdown. In the end, the first doses went into care homes earlier than originally seemed possible – with the task of reaching care homes becoming appreciably easier once the AZ vaccine started to arrive in January 2021. And behind all this, stitching much of it together, sat a lot of IT (see below).



In the end, supplies had to reach more than 3,500 sites, including 230 hospitals, some 1,500 GP-led centres and surgeries, more than 1,100 pharmacies, and hundreds of other places, from sports stadiums to places of worship and shopping centres, to even the odd bowls club. The supply chain continued to be tested – not least by the decision in autumn 2021 to launch vaccinations for 12–15-year-olds through the school immunisation service, which took the number of sites to over 4,000 – an exercise that ‘is actually more complex than rolling the vaccine out the first time,’ according to Steve Gibb.

Between December 2020 and September 2021, the supply chain claims to have achieved 99 per cent full deliveries broadly on time, with 91 per cent within the planned one-hour time window – with negligible doses damaged or lost in transit.

That does not mean that there has not been some waste – particularly when the MHRA advised that people under 40 should preferably be given an alternative to the AZ vaccine. At that point, supplies were already out there, and some GPs reported having to bin their supply of the AZ vaccine as the shelf-life was by then too short to send elsewhere – for instance, to other parts of the world. ‘A hard thing to do,’ as one GP put it.

Less likely to result in long-term waste but nonetheless a challenge for some practices was the decision that, to keep things simple, complete sets of the more consumable items were supplied when they needed to be renewed, rather than allowing practices to order in specific items. The result, according to one GP, was that over a goodly period of the deployment:

... if we just needed more masks, we could not order in just more masks. We’d get a full supply of consumables. In the end all, or most of it, will get used. But for some of us at least, storing it is a bit of a problem. We have cupboards full of the stuff.

In the grand scheme of things, these are minor issues. At incredible pace, those involved were able to create an entirely new supply chain, with, as Steve Gibb put it, ‘zero precedent’. At its peak there were 60 people working on it, many of them at all hours, from NHS England’s London headquarters at Skipton House. Although almost all of those people were, of course, like many, many other people at that time, working remotely from home. The supply chain delivered.



The IT and data

The NHS, it might fairly be said, does not have the world's greatest reputation for the use of IT. General practice was arguably a global pioneer in its use. It has long been computerised, for want of a better word, although the two most common systems that GPs use in England do not easily talk to each other. People do now have a very high-level summary care record that hospitals, GPs, the ambulance and community services can access. But, despite large investments, the NHS still does not have a full electronic patient record readable across hospitals, general practice and the rest of the NHS, let alone one that can exchange key information with social care.

The IT for the vaccination programme, however, worked. And, in the main, it worked well. For the non-IT literate what follows may be a stretch. But the IT was a crucial underpin of the programme.

It can be illustrated by big numbers. More than 30 different IT systems were involved ([NHS Digital 2021](#)). A national booking system had to be created which, at its peak, was handling an average of 750 bookings per minute. Between early January 2021, when it issued the first invitations, and June 2021, by which time all adults had received an invitation to their first dose, 49 million letters and 29 million texts had been despatched. There have, of course, been many more since. At the time of writing (November 2021), more than 750 million bits of kit had been ordered, allocated, delivered and recorded via Foundry, one of the programme's key tools.

The IT part of the vaccination programme had many elements. But the two core customer-facing products needed to make it work were the national booking system (initially created for the mass vaccination centres but then extended substantially) and what is known in the jargon as the 'point-of-care' solution.



The 'point-of-care'

This is the set of products that people are partly aware of as they turn up for the vaccine. With just one's date of birth, postcode and name, it uses the NHS's Personal Demographics Service to check that the person is the right Mrs Smith or Mr Patel, and that they are eligible for the vaccine (in the right age cohort, for example), while also logging who their GP is, if they have one. It was never a condition of the programme that people had to be registered with a GP.

The system contains all the questions people are asked about allergies and other conditions. It records who administered the vaccine and its batch number. From there, the data goes into the NHS's Data Processing Service (DPS), which is a hub that directs the record to 'multiple different places' in the words of Adrian Stanbury, Director for Technology and Data for the vaccination programme. It goes, for example, into the National Immunisation Management Service (NIMS). NIMS is a central repository of the vaccination status of more than 60 million people, which itself had been built earlier in 2020 off the back of a pre-existing childhood immunisation management system, to support the biggest flu vaccination programme that the NHS has undertaken. The data also goes, for example, to the MHRA so that adverse reactions can be logged. It goes, overnight, into the person's GP record; it goes into the NHS app; and it goes into Foundry (to which we return later).

In addition, GPs and pharmacies had to be paid, so each site needed a unique code on the NHS payment system. As the NHS established additional local sites, 'we had GPs using tennis clubs, pubs, even closed nightclubs,' Adrian Stanbury says. 'So we had to have an inventory of all sites to a level that we would trust to import into the national booking system. Did we have a couple of issues on that? Yes, we did.'

GP practices' existing systems could not be used as the point-of-care solution for a number of reasons – not least because they are not portable; they sit on GPs' desktop computers. It needed a web-based solution so that the point-of-care system could be used anywhere, from a cathedral to a mobile van. Hence the many thousands of computers, laptops and routers that the programme distributed. To achieve the web-based solution, the programme chiefly used Pinnacle, a system used by pharmacists for a wide range of things that include notifying GPs



automatically of patient contacts and billing the NHS for their services. GPs, however, had not used Pinnacle. That meant that in addition to everything else involved in setting up their vaccination centres, they had to learn an IT system they had not used before.

‘That didn’t go down well,’ Adrian Stanbury says. He, and indeed others, recall a decidedly challenging webinar – some recall it as very hostile – that involved hundreds of GPs who first learnt that would be the case. ‘They were very reluctant, and I can understand why,’ Adrian says. Although he adds that, while there are inevitably differing views, ‘most, I think, now like it. And it let them go mobile into other vaccination sites’ – a view that the limited number of interviews for this report confirms.

Such was the speed of the programme that the first GP-led sites got their Pinnacle log-ins on Thursday 10 December 2020, along with a step-by-step video guide on how to use it, a mere four days before they went live ([Kanani and Waller 2020a](#)).

The booking system

For GP-led sites, most GPs used their own booking arrangements, with some full of praise for the work done by accuRx, a communication tool used by 98 per cent of practices, which among other things allows them to send out text invitations. The national booking system was also used, in time, to allow people to book with them, as well as the mass vaccination centres and other sites.

At the start of November 2020, however, there was no national booking system. There were essentially three parts needed to make it work: a booking engine that allowed people to book and, indeed, amend their appointment; a means of inviting people by letter, email and text; and a rules engine that ensured that people could only book when they were entitled to a vaccine by their age or other designation.

The invitations were generated by NIMS, and a dose of rapid work went in to allow it to send postal invitations out in NHS-branded bright-blue envelopes, so that they would stand out as a priority in sorting offices in the middle of the pandemic, and when they landed in people’s homes ([Ibbotson 2021](#)). NIMS was adjusted so that only those in the right cohorts were invited and could book. And the booking engine was linked to it and to the Personal Demographics Service so that people



could enter their personal details – again, just name, date of birth and postcode – and be looked up, so to speak, to ensure they were eligible, and then to book.

It took time. As Emily Lawson, the NHS England lead for the vaccination programme, says:

Adrian joined in the same week I did at the beginning of November. And he is very realistic. He gave me a deadline and said we could have something by mid-December, but no earlier. But he added that ‘if you want something that’s really robust and scalable you need to give me until January’.

So, in line with the view that when any part of the programme was launched it had to work well, ‘we effectively made the decision in mid-November to delay the opening of the mass vaccination centres to when we knew we had a tech solution’. The booking system went live on 4 January 2021, with the first seven mass vaccination centres opening shortly afterwards.

In just one illustration of how the programme evolved, Adrian Stanbury says that at the beginning – in early November 2020 – ‘we were told that we might have maybe 20 large vaccination centres in England and that would be what the booking system had to cope with’. But as the pharmacies came on board, and as people came to be able to use it to book into hospital hubs and GP-led centres, it came to support several thousand locations by October 2021.

Again, the vaccination programme learnt from Test and Trace. In September 2020, when demand exceeded capacity, people were being offered Covid tests literally hundreds of miles away from where they lived. For example, people in south London were offered tests in Aberdeen, Dumfries and Cardiff. Perhaps the most extreme example is one Plymouth mother looking for a test for her son, who was offered one in Inverness, more than 600 miles away (see, for example, [Keay 2020](#); [Schraer 2020](#)). So when the booking system was first opened up, and the number of mass vaccination sites was still very limited, individuals were only offered a slot up to 30 miles away. That meant – until the growing number of sites allowed its use to widen – that many people could not book. And it did have the effect that in some cases, people living on one side of a street could book, but not those living on the other side. However, as Adrian Stanbury says, wherever the line was drawn ‘we were always going to get a few of those’.



The booking system had an additional function. It was, in Adrian Stanbury's words:

... part of the capacity engine for the vaccination sites and pharmacies. So to run a vaccination site you have to have a supply of the vaccine, you have to have a workforce, and you have the physical capacity of your site – and then you need a bunch of customers waiting for their slot. These things have to be in balance.

So, particularly early on, we had hours of conversation, some of it quite tense, with NHS England regional people, saying 'you've got to put capacity into the system, because at the moment we've got people going in the front door of the national booking system and they can't book a slot because there's no capacity in the system'. And they were saying, 'well, we're not going to put capacity in the system because we don't know how many people want a slot'. It was a real chicken and egg conversation.

We had to build the confidence with the sites to say, 'look, put the capacity into the system because they will come. We can show you how many people are out there in this cohort that are yet to book.' But they also needed the confidence that they could get the workforce and have confidence that the vaccine would be available, which was down to the logistics.

This was not a battle between the centre and the regions. It was all of us trying to find the right balance in a brand new system, and for the different age cohorts as they came along – all of whom acted in different ways.

We got pretty good at that as a team, but it was a huge team effort involving much more than just the IT. I take my hat off to them.

In terms of the difficulty of the IT, he has a nuanced view. As Adrian says:

This isn't putting a man on the moon. This isn't artificial intelligence. This is data capture, data integration, large volume, resilience. So someone could look at this and go, 'well, that's eminently doable', and I think they'd have a point, to be honest. But it felt quite testing at the time, because of the speed and the volume and the last-minute requirements.

Requirements that included, for example, the increased emphasis on GP-led centres, the December 2020 change to the 12-week dose schedule, and the almost endless addition of other sites.



As Adrian sums up, 'Up to January 2021 it was the most compressed software delivery scenario that I have been involved in. It was very challenging. But in terms of the overall operation, I would not argue that the IT is the most complicated element of what has been done.'

Mapping

One of the key aims of the programme was to get vaccines into the right arms in the right order (according to priority groups), and for travelling time to vaccination centres to be reasonable all around the country. This meant that NHS England needed to be able to map the location of centres as PCNs offered them up, and as sites for larger vaccination centres were chosen. The initial mapping software was provided by the army because, as Emily Lawson says, 'they had much better mapping software than we did'.

But in time, something much more sophisticated was added – a vaccine equality tool. That was developed by the health care consultancy Carnall Farrar, which had already done some work on the flu programme. It married the data from the vaccination programme – that is, who had been vaccinated – with demographic data that could be mapped down almost to street level: to a population of around 1,500 that is known, in the jargon, as a Lower Layer Super Output Area. For those reading this report who may be concerned about privacy, it operated with what is known as 'small number suppression' so that individuals could not be identified. Access to this tool was tightly controlled. Over time, directors of public health could see it, as could the NHS regional offices and authorised figures in CCGs and PCNs.

The vaccine equality tool, built within Foundry, reached the programme in January 2021 and became much more developed by March 2021. It showed who had been vaccinated and where – by age, gender and ethnicity, and by GP practice where people were registered with a GP. Ethnicity included all the 16 census categories, from white British to white other to black Caribbean to Indian, Pakistani, Bangladeshi, black African, and Chinese, among others. It mapped uptake by health and care staff, the clinically vulnerable, and care home residents. And all of that could be tied into the Index of Multiple Deprivation, which measures the parts of the country that are the most and least deprived.



That allowed the programme to see how it was doing not just nationally or regionally but down to a very local level. In other words, to see where extra effort was needed by way of pop-up vaccination sites, mobile vans or other activity to encourage those who had not yet had the vaccine to get it. Thus, by way of illustration, a town in the south-east was able to see that its low take-up was among the Chinese and Bangladeshi communities but not among the Indian or white communities, while the south-west could identify towns with low uptake and establish additional centres, including using a mobile van.

Furthermore, the tool allowed different parts of the country, with particular characteristics, to compare how they were doing with similar areas as measured by deprivation or ethnicity or age. So, for example, not just the leafier parts of the country (which tended to have faster uptake) could see if they were doing as well as they thought. The more deprived areas, with highly ethnically mixed populations, in London or in the Midlands, could compare their numbers and vaccination rates by age, by deprivation, by ethnicity and so on, with similar areas in the north – an approach that allowed at least some of them to draw down ideas about what was working well in one place that could be used in another. And a fair dose of that happened.

All of this is presented not just in tables and charts but in highly visual ways, including heat maps, which made the data easy to grasp and interpret and thus act upon. Ed Waller, Director of Primary Care at NHS England says, ‘we did not have this at the beginning, but it became pretty sophisticated. So you could see where uptake was low and then see the difference when a local pharmacy or other site went into action.’

The integration – Foundry

Everything so far described, and much else, also fed into a product called Foundry. The ‘much else’ included all the data for the logistics. So, just by way of example – where the vaccine was, when it was likely to arrive, to whom it had been sent, how much had been used and where, with the same applying to the ordering and distribution of all the many consumables needed, from syringes to PPE. Some 37 apps, to do these and other tasks, were built within it, mainly off the back of templates that it already contained. Foundry pulled together some 350 different



sources of data, with feeds from wholesalers and distributors, the national booking system, immunisation record systems, systems for workforce planning and daily reporting by the thousands of vaccination sites. By November 2021, it held more than 200 terabytes of data.

Foundry has been a key tool in the NHS's biggest ever exercise in operational data integration (Gould *et al* 2020). It provided, in the repeated words of a number of those interviewed, 'a single source of truth' for what was happening within the vaccine roll-out. From where supplies were, to who had been jabbed, and where uptake was low. Based on that information, decisions could be taken and indeed options could be modelled.

'It meant,' as one interviewee put it, 'that the data that could be seen by the vaccination sites, was the same version of the truth as was being seen by Skipton House [NHS England's headquarters] by No 10 and by the Department of Health and Social Care'. Or, as one of those out in the field put it, 'we weren't all looking at different spreadsheets and arguing about whose figures were right, as has happened in the past'. As Alison Tonge, NHS England's Regional Director of Commissioning for the Midlands, says, 'everyone looking at the same data in the same way was really, really powerful'.

Foundry came into the NHS in March 2020 just ahead of England going into its first lockdown. Palantir, the company that owns the product, was called into a meeting at No 10 Downing Street along with a clutch of other consultancies and software providers, including Amazon, Google, Facebook and Babylon (Wright 2021). Without being entirely clear what it wanted, No 10 was aware that to tackle the pandemic most effectively, it needed data integration. To be able to tie modelling being undertaken for the Scientific Advisory Group for Emergencies (SAGE) on the possible course of the pandemic to supplies of PPE, to give just one example.

Foundry was first used for the ventilator programme – helping work out where ventilators were, what new ones were coming on stream, and which hospitals needed them most. It was then also used to tackle the PPE crisis. It is an off-the-shelf product, or more accurately a set of products developed over many years that can be plugged together like Lego bricks. It can pull data from existing systems that would not otherwise talk to each other. It makes it relatively easy to



clean that data up, and it then presents it very visually, relating data from many different sources each to the other.

One way of putting it might be that it allows everything that is happening everywhere to be seen in one place and interrogated and then adapted – although only by those authorised to see the relevant level of data that they need.

As Emily Lawson says, ‘I had seen the power of what Foundry could do for us on the ventilator and PPE programmes. So when it came to the vaccine roll-out, I called up Joanna Peller, Palantir’s lead for us on that, and said “Come and work on this”’.

To understand the power of these tools – Foundry itself and, for example, the vaccine equalities and supply chain apps that sit within it – they really need to be seen in action.

Foundry was far from the only part of the IT spend for the vaccination programme. But it is worth noting that the NHS’s two-year licence for the off-the-shelf but adaptable product (which is already used for more than just the vaccination programme) is just under £25 million ([Contracts Finder 2020](#)). By contrast, according to the National Audit Office, Test and Trace spent £155 million in 2020–21 alone, commissioning bespoke digital and data services that struggled to produce the desired outcome in what is a simpler exercise than tying together the many data sources needed for the vaccination programme ([NAO 2021](#)).

One of the reasons the IT worked well, according to Simon Stevens, then Chief Executive of NHS England, was that the design principle was:

Build off the best of what you have already got,¹⁰ and if you have not got it, keep it really simple. Trying to design something completely from scratch that was over complicated – we avoided that. Designing in resilience was a key part of this.

¹⁰ By the time the vaccination programme was launched, NHS England was already using Foundry.



The armed forces

The armed forces did many things over the course of the pandemic in what became their most sustained home operation in peacetime. More than 5,000 personnel were deployed over the first 18 months and more in January 2022. They helped with testing, including the first big testing surge in Liverpool, and with testing hauliers crossing the Channel ([Health and Social Care and Science and Technology Committees 2021](#), paragraphs 41–42). They built mobile testing labs, helped set up vaccination centres, and even provided some vaccinators (for other examples of their contribution, see [Army 2021](#)).

But probably the army's most crucial role in the vaccine roll-out was the support provided by 101 Logistic Brigade at NHS England's Skipton House headquarters. That began with the ventilator and PPE programmes at the start of the pandemic. According to Brigadier Phil Prosser, the brigade's then commander, that resulted initially from a recommendation from Sara Hurley, Chief Dental Officer at NHS England.

Prior to taking up that post, Sara, as a full colonel, had been the army's Chief Dental Officer. And as the Department of Health and Social Care struggled to solve the PPE shortage, she said that to help with the logistics, 'you need the army'. So the request was made and Brigadier Prosser and a team from 101 Logistic Brigade was brought in to Skipton House, with more than 400 soldiers helping sort out the warehouses where PPE was stocked, and helping distribute it. The Logistic Brigade, in what became a five-month secondment, also helped rebuild a supply chain of PPE, with Prosser working alongside Emily Lawson, whose task that was.

Emily says that when she took over the vaccine roll-out, 'I said I needed the same support from the army, and, again, they sent me Phil'. He acted, she says, 'as my Chief Operating Officer, but more than that'.

Brigadier Prosser was in a windswept tent on a muddy Salisbury Plain at the end of a major exercise that was putting his brigade to the test when his phone went. He was told 'you need to be in London again'. So in mid-November 2020, he was back, along with some 40 others from the Logistic Brigade (the numbers fluctuating a little over time). This had the great advantage that Prosser and Lawson had worked together before, as indeed they had with some others who were crucial to the roll-out, such as Steve Gibb in logistics.



Dr Nikki Kanani, the Medical Director for Primary Care for the vaccination programme, describes the army's role as 'bringing glue to the programme. I've never met a group of people who were just so conscientious, so utterly committed to making sure the roll-out would be successful.'

Members from the Logistic Brigade, usually with their own specialist knowledge, were embedded with the lead of each of the programme's many workstreams – logistics, IT, primary care, workforce, vaccine site approval, and so on (about a dozen workstreams in all). And a rhythm that had been adopted for the PPE shortage was established.

An 8.30am meeting of all the Skipton House leads and many others. As many as 60 on a Teams call – with Phil Prosser usually chairing that on Emily Lawson's behalf, even though she was there. A smaller 5.00pm meeting of the senior leadership. With the army then holding its own separate meeting at 7.15pm to go through what needed to be done the next day.

'So they would all be sitting having dinner on the other side of the floor,' Emily Lawson says, 'and they would know what was going on in every team and Phil would pull that together, helping me know where the problems were and what we had to solve next.'

What the army was exceptional at, according to all those involved, was helping work out what had to be done today, what needed to be done tomorrow, what did not need to be done immediately but had to be done by a certain date. So that the main focus could be on what needed to be done immediately, but with work starting on what was further away.

This may sound obvious and simple. But it was clearly really hard to do well amid the huge swirl of events, and indeed of repeatedly changing circumstances, as the vaccine roll-out was got off the ground and then hugely expanded.

Brigadier Phil Prosser references Stanley McChrystal, the US general:

... who talks about a team of teams, and that's what this was. And one of the patterns he talks about is having a purpose, having a set of data that allows you to co-ordinate your mission, and then about a battle rhythm that holds it all together.



So we had a purpose – a mission statement that Emily wrote. Namely ‘To deliver the maximum available doses of vaccine, combined with high uptake in priority groups, in order to minimise morbidity and mortality as much as possible, as soon and as safely as it is feasible to do so, and equitably across the country.’ We had ever-improving data. And we established a battle rhythm.

In the army, when we go into operations, we bring order to chaos. So we’ve got processes, because you’ve got to synchronise all your activity, up, down and sideways. We aim to bring discipline, tempo, diversity of thought, and resilience.

In a crisis, everyone wants to do everything – and nobody can do everything. So working out who is best placed to do what and when – the sequencing – is important. ‘Analyse, choose and execute,’ that’s one of our mantras.

One of the other big challenges, according to Brigadier Phil Prosser, was the use of Emily Lawson’s time:

She is being dragged left, right and centre. Reporting to the Prime Minister and the health ministers. Talking to Chris Whitty (the Chief Medical Officer). Working with the JCVI. Much else. So she has to know where all the teams have got to. But she then brings information from those meetings, and that has to be conveyed to the rest of the teams. Which can mean a change of plan. And there are people, every day, saying ‘we need Emily’s decision on this, we need her decision on that’.

So helping work out what needed to be done today, what could in fact await her decision until the next day, helping making sure the information flowed up, down and sideways, and that people knew what they needed to know but were not burdened with what they did not need to know...

The army also brought in the military’s ‘red team’ approach – where an outside team challenges what an operational team is doing. So there was a moment, particularly at a time when worries were worst that London was going too slowly, when that happened. A senior civil servant and a general came in to run the ruler over the roll-out, to judge whether it was working well.



Phil Prosser says that one other contribution the army may have made was around wellbeing:

This whole exercise was full of uncertainty. Repeated uncertainties. And people are not designed to live like that. The NHS is a big-hearted organisation, full of big-hearted people. And people would not just dedicate themselves, they would risk exhausting themselves. I am sure not just in the senior leadership of this but out on wards and in the field. There were a lot of tired people on those calls. And the army is quite good at that – knowing when to stop. That if you are exhausted you are likely to take bad decisions.

You have sometimes to get people to the point of saying to them, ‘it can wait until next week’. And they say, ‘no, it can’t’. And you have to reply – because this decision depends on something else – ‘what can you do now? Nothing. So, let’s talk about it next Monday’. And they say, ‘but I am still worrying...’

So I would sometimes give what I dubbed my ‘war talk’. That I’d been to war three times, and this is fine, we are doing well here. It might not all make sense right now. But we’re doing well. Just believe in it. The fog will clear.

And people really do have to look after themselves. The army trains to optimise performance and push the boundaries, but also to recognise the pitfalls of decision-making when you are exhausted. The NHS doesn’t really get that training. So, I think the strain on people in the midst of huge uncertainty... you’ve got to design resilience. Resilience just isn’t character, it’s about a design solution. And I do worry that the NHS must be knackered.

The army’s other main contribution to the roll-out was vaccinators. Twenty-one teams of six, each with at least two fully qualified clinicians, with the others trained vaccinators. Three teams of six to each of the NHS’s seven regions, which could themselves be split, with the regions deciding where and when to deploy them, sometimes in consultation with the centre.

Phil Prosser argues that the army presence – seeing soldiers in fatigues helping set up some of the vaccination centres and, indeed, doing the vaccinating – was reassuring to many people. But he acknowledges there are parts of the community where the obvious presence of soldiers, or other members of the armed forces,



might be less helpful. 'So we did try to ensure, as far as we could, that where they went into multicultural areas that they included someone from that culture, and the regions and local areas chose whether the soldiers were in fatigues or not.'

Where the military were deployed, they were clearly much appreciated. Karen Livingstone, Chief Executive Officer of Newham Health Collaborative, says:

At the very beginning we did have the military medics. And they were brilliant, filling in the gaps when we were short of vaccinators somewhere, for whatever reason. They weren't in fatigues. We suggested that they shouldn't be because that might put off some of our residents. But they were great. Really useful. And they rotated around, in our borough, in Tower Hamlets and other parts of London.

For a brief period, the army deployed 42 of these teams, but as the roll-out took off, the extra numbers proved not really to be needed. Particularly early on, the armed forces vaccinators were a key resource. But the scale of the roll-out was such that by November 2021, they had delivered barely 0.1 per cent of all vaccinations.

One final reflection, not so much on the roll-out but on the army's role more generally: Phil Prosser says that the earlier PPE recovery exercise:

... felt like Dunkirk. We were on the back foot and the virus had the initiative. The vaccine deployment felt like D-Day. We were taking the initiative. And it may sound weird, but when I think of the PPE process and being in Skipton House [NHS England headquarters], it was always raining outside. Whenever I think of the vaccine, it's sunny.

The volunteers

Without the volunteers to help marshal people, reassure them, keep an eye on them during the 15-minute post-Pfizer vaccination wait, and indeed in some cases vaccinate them, the roll-out could not have been done at the same speed and scale.

When the government appealed for volunteers via the Royal Voluntary Service in early April 2020, it was overwhelmed. More than 750,000 people signed up, 400,000 of them on one day – so many, in fact, that some were to complain that they were not used.



At this stage, the vaccination programme was little more than a dream and the volunteers fulfilled many roles – delivering medicines and food to people who were isolating, calling people who were lonely, and, when the vaccination programme got going, stewarding the sites, driving people to them and much else (NHS England 2021a). As one senior figure at NHS England put it, this showed very clearly ‘the convening power of the NHS’.

For the vaccination programme itself, some 80,000 additional vaccinators were trained, 30,000 by St John Ambulance. One of the early niggles was the unbelievable bureaucracy, involving a 21-point training module that retired doctors and nurses had to go through to be allowed to vaccinate, including modules on preventing radicalisation and child safeguarding, when for months it would only be older adults they were vaccinating (Nachiappan and Knowles 2021). The ‘preventing radicalisation’ bit was insisted on by the Home Office, before it was removed and most of the rest of the issues were also sorted (Lind 2021).

Mark Radford, Deputy Chief Nursing Officer at NHS England, ran a workforce programme, complete with modelling of what would be needed all around the country. That provided a pool of volunteers that the local NHS could draw on, both for vaccinators and for the many other roles, including setting up centres, cleaning, stewarding and handing out those ‘I have had my Covid vaccination’ stickers.

Many GPs recruited their volunteers locally via social media and word-of-mouth. But the national volunteer pool played an important part for the hospital hubs and for the mass vaccination centres in particular.

All sorts of community leaders, from imams to church ministers and playgroup leaders, spread the message about getting the vaccine and helping build trust in it, while some volunteered their community halls, scout huts and other premises for use as vaccination sites even before they were asked.

For many volunteers, it was a liberating experience. By the time the bulk of them were helping with the vaccine deployment, they had been through two lockdowns and were into a third. Suddenly, as one put it, ‘we were able, legitimately, to socialise. Meet some of our friends, make new ones. And what we were doing was just so rewarding.’



And it is worth pointing out that, certainly at the beginning, most were younger than 70 or 80 years of age, and not due a vaccine until the lower age cohorts were reached. Despite the provision of PPE, and despite social distancing in the vaccination centres, what they were doing was not without risk.

Ed Cole, a London GP, no doubt speaks for many when he says that working with the volunteers was uplifting. 'They had a whale of a time, and it was just wonderful to see the community hunker down with us at a time when it was needed.'

A senior figure at NHS England says: 'There was this sense that we were all in it together. The whole country coming together to get people vaccinated. So to say it was a team of teams is an understatement.'

How far that spirit and approach can be bottled for future use and for other purposes is one of the more interesting questions to come out of the pandemic. Maggie Thompson, one of the staff at the Greyswood Practice in south London, is optimistic. 'I am sure some of them will carry on. They have got a taste for it. They can see the difference they made. So I'm sure some of them will, maybe not always in health but in other areas.'

Directors of public health, and local government

The fifth great underpin for the programme was local government in general and the directors of public health in particular. They could have come first in this list.

For many parts of central government's pandemic response, the directors of public health were an underexploited resource. Since 2013, they have sat within local government rather than the NHS and, indeed, at the start of the pandemic, parts of the Department of Health and Social Care appeared almost to have forgotten their existence.¹¹ There is no doubt that directors of public health did much sterling work over the course of the pandemic (Ross *et al* 2021, pp 56–58). But much of it was despite central government rather than with support from it.

¹¹ Both the Association of Directors of Public Health and the Faculty of Public Health say that early on they had to supply up-to-date contact details to the Department.



Test and Trace bypassed them completely – only finally beginning to involve them in tracing contacts many months in. Education ministers had no interest in their opinion during 2020 when decisions on school closures and openings were taken entirely at the centre. Indeed, when some local authorities took the advice of their public health director in December 2020 to close schools early ahead of Christmas, Gavin Williamson, then Secretary of State for Education, threatened to sue them (Timmins 2021).

For the vaccination programme, it was very different.

Integrated care – which includes integration with local government and its services – has been a central goal since the *NHS five year forward view* of 2014 (NHS England et al 2014). And whether one wants to call what happened during the vaccination programme ‘integration’ or merely a very high level of co-operation and co-ordination, local government and the directors of public health were key to the roll-out.

On her first day in the job, Emily Lawson set up a call with the Local Government Association to make clear that their role was crucial, and one of the earliest NHS circulars on the deployment strategy was addressed not just to the NHS but to council leaders, setting out ‘what the NHS and Government will provide nationally, and what we expect the NHS working with local government and other partners locally to deliver’ (Lawson and Harriman 2020). Eleanor Kelly, the Chief Executive of Southwark Council, was seconded into the senior vaccine team at NHS England as a key liaison with councils and mayors.

While there were doubtless variations around the country, those interviewed here say the relationship worked well. Dr Muhammad Waqqas Naqvi, who has his criticisms of the programme, says of the borough in which he works as a GP (Newham) that they’ve ‘been real diamonds’ in supporting the programme and helping get people in to be vaccinated.

Local authorities did many things, from the seemingly small – for example, suspending yellow lines and parking bays outside vaccination centres – to finding vaccination sites, supporting mobile vans, and leading big drives to build trust in the vaccine and spread the word.



Ruth Tennant, Director of Public Health in Solihull, is typical when she says:

We had been developing our outreach work throughout Covid. So when it came to the vaccine we could, pretty much at the drop of a hat, get together 200 community leaders of all sorts on a webinar, from people running playgroups and community centres to faith leaders, and tell them 'this is what we know about the vaccine, this is how it has been developed, and why it has been done so quickly' and do some early myth-busting while encouraging them to use their networks to get the vaccine message out there and build trust. And that sort of infrastructure the NHS does not really have.

When it came to extra clinics, local authorities and our teams are very good at knowing places and people and wards. So the potential locations that have high footfall, or to reach groups with low uptake, we could say 'you should open up something here', or for mobile vans knowing that you need to go in this car park if you want to get that group. So providing that sort of intelligence through to our NHS colleagues. People have recognised that there's a set of skills that you've got to bring together across NHS and local government.

Karen Livingstone, CEO of Newham Health Collaborative, which represents the 46 general practices in that London borough, says the same happened there. And, by way of further example, she says that with social care being a council-commissioned service, the local authority helped provide access to care homes and help with getting people's consent.

She also says:

Where someone is just a bit hesitant we can line them up with a clinician. But sometimes they want to speak to a neighbour, or a peer, and the council helps us do that, as well as the outreach work that has got us into mosques, temples and other venues.

And they do all the comms. So the borough website has the venue for all the pop-up clinics and when they are open. And there is constant rolling communication between us. So when we have a problem about uptake in one part of the borough, we discuss what can be done, through jointly chaired weekly or bi-weekly meetings.



In conjunction with the local authority, we have gone out door-knocking. We have a roving team of specialist nurses who will go to the market and set up a stall. And they will do some vaccinations. But a lot of it is education and advice and building trust.

I consider the public health team to be part of mine, and I would like to think they consider us as part of theirs. And we have a direct line to the mayor and the councillors who have all been keen to make sure we do this as well as we possibly can.

Alison Tonge, NHS England Regional Director of Commissioning for the Midlands, says:

Where we get real traction is through very strong leadership from local government and directors of public health, and really understanding your citizens. What the NHS brings is the scale of the offer. But the interface with the citizen and the community is where local government and directors of public health really come in. We could not have done it without working together.



3 On the ground

Speed

The speed with which the GP-led PCN sites had to be set up has already been referred to, but it's worth just one example for that to be grasped more fully.

Karen Livingstone, Chief Executive of Newham Health Collaborative, says most of its practices are too small to have the social distancing space needed:

But we did have some empty space in the Ludwig Guttmann health centre on the Olympic Park. But it was literally a concrete shell. So we had to get the NHS team in to redo the floor and totally equip it from scratch in eight days. And then we had to work out how to ferry several hundred a day of 80-plus-year-olds from different parts of the borough at the height of the pandemic. We didn't want them getting on buses, and many of them anyway had some mobility challenge. We didn't really want them on any sort of public transport at this stage. So we taxied them across the borough, and we had to vet and DBS check all our taxi drivers and you name it – to bring a level of safety. It had to be a very careful, very caring service.

'That first week was quite incredible,' Karen Livingstone says:

It really sticks in my memory because there was almost a sense of euphoria for both staff and patients. So staff who hadn't seen each other for getting on for a year, GPs from right across the borough coming to do this, and then obviously the folks that were coming in for their jabs. We had one 104-year-old. It really felt quite momentous.

Such was the urgency, and the challenge of assembling all the kit, that the first PCN sites received only 24 hours' notice of when their huge pallet of ancillary kit was arriving and a separate 24 hours' notice that their fridge was on the way. They usually also only received 24 to 48 hours' notice of their vaccine supply arriving – with the need to book in 1,000 people over the next few days to ensure that the Pfizer 'pizza boxes' of doses would not be wasted. At least one GP walked the streets on a Sunday night to hand-deliver invitations to people he knew did not have phones or use email, when the notice was too short to use the post.



Interviewees from across the country had tales to tell. Not just the 80-year-olds already referred to who danced with delight at being vaccinated but others who had barely been out of the house for a year dressing up for the occasion – arriving in dinner jackets and ballgowns. One 84-year-old man arrived in giant Dr Martens boots and told the vaccinators that he had not been out of the house for a year. But he brought with him a packet of Rich Tea biscuits for the staff. Much later on, there was the armed police officer who arrived in his full body armour – it taking quite a while to get enough clothing off to reach his arm for the jab. Of course, there were those for whom this was much harder. The people who had barely, if at all, been out of their homes for a year who suffered panic attacks when in a room that was not crowded – social distancing was in place – but was still a room full of people.

This account has so far focused heavily on the PCN-led sites. But pharmacies – the very first of which came on stream in January 2021 – faced all the same challenges in terms of set-up, vaccine and kit supply, while taking most people in via the national booking system. The same applied to the mass vaccination centres and hospital hubs.

GPs and pharmacists rapidly discovered that they could often get 6 doses out of the 5-dose Pfizer vials, and, in January, that they could also often get an extra dose out of the 8-dose and 10-dose vials that the AZ vaccine arrived in – thereby further increasing the supply.

Some parts of the country raced away. Dr Mark Porter, the Gloucestershire GP who writes for *The Times*, reported as early as 21 December 2020 that ‘booking 1,000 people (particularly if they are all over 80) into a three-day window with just 24–48 hours’ notice, on top of the day job running a busy GP surgery, has proved a huge challenge’. But ‘the roll-out of the programme has gone more smoothly than any of us dreamt’ (Porter 2020). After just one week, the practices he worked with had immunised almost 5 per cent of the local eligible population.

The north-east as a region also got off to a flying start. But that produced hostile headlines and bitter complaints from Members of Parliament (MPs) as well as GPs, when the region was told its supply of vaccine would be restricted in order to ensure that places such as London and East Anglia, which were further behind, could catch up. Ed Waller, Primary Care lead for the programme, says ‘one of the more complicated bits of this was making sure that everyone in the first four cohorts got offered a vaccine by the mid-February deadline’.



'If we had just let people race away, as they entirely understandably wanted to, we would have had people who were 50 in one part of the country being vaccinated while in others those over 70 still would not have had their first jab.' As he puts it, with mild understatement, 'this was not uncontroversial'.

Richard Vautrey, Chair of the BMA's GPs committee at the time, says that that decision was one of two big causes of frustration among GPs. But, he says, NHS England 'wanted to ensure that everybody had equal opportunity, wherever they were in the country, to be vaccinated at the same rate'. And he says, with the benefit of hindsight, 'rightly so'.

The 'push' model

The other, and related source of early frustration was that NHS England adopted a 'push' model to distribute the vaccine – precisely because it was in such short and, at times, uncertain supply. For the many childhood immunisations, GPs usually order up what they know they need for their practice – a 'pull' model. For the Covid vaccine, it was 'push'. Sites were told what they were going to get and when, and, particularly earlier on, at very short notice. With the benefit of hindsight, almost everyone interviewed for this report acknowledges that it was the right approach. As Dr Vautrey put it: 'Really, there was no alternative.' By the time the programme reached booster doses, vaccine supply was sufficient to allow a reversion to a 'pull' model.

And some teething troubles

There were, inevitably, teething troubles. Ed Waller says: 'There were sites where things did not arrive on time because by mid-January we had delivery drivers going to 1,500 new locations.' Some GPs whose delivery did not arrive inevitably branded the situation 'a shambles' (Mahase 2020).

'There was the odd site that got two boxes of vaccine by accident,' Ed Waller says...

And we'd have people ringing us up to say 'we're really sorry we can't take the box of vaccine you are due to send us tomorrow', because of some problem they'd hit, such as a Covid outbreak among their staff. That was clearly distressing for those who had been booked in. But in an exercise this big, things like that are bound to happen.



In January 2021, it was discovered that 1 of the first 53 hospitals had been using paper records rather than entering its vaccinations into the digital system, so someone had to be found to type in some 5,000 records. The Newcastle centre that had its coordinates in the North Sea has already been mentioned. By contrast, one very small site with capacity for about 150 appointments a day accidentally booked in almost 5,000 for its first week. The account is that everyone rallied round and no one had to be cancelled ([Higgott 2021](#)).

And, decidedly on the plus side, the government's strong message about 'don't call us, we will call you' – put in place for fear that GP surgeries would be overwhelmed with calls – was, in the main, taken to heart by the public. There were, however, some attempts to jump the queue.

Queue-jumping

Queue-jumping is a somewhat pejorative term. With Covid cases running at more than 50,000 daily and deaths, at times, well over 1,000 a day in January 2021, there were a lot of very frightened people – not least those who still had to work in customer-facing roles during the lockdown but were too young to qualify for the vaccine.

How far there was queue-jumping, or attempts at it, seems to have varied enormously around the country and by site. Certainly, it became known that hospitals might, at the end of the day, have some doses left over, with some prepared to use them up for those who were prepared to queue.

Ash Soni, a south London pharmacist who is a former president of the Royal Pharmaceutical Society, complained at the time that people were turning up claiming to be frontline NHS or social care staff, having lied on the national booking system. With sites required to check eligibility, he said, 'we are having to police that, and that's not a nice place to be. We're not the police.' Some people became aggressive, he said, 'and I do know colleagues who had to call the police to turn them away' ([Lynn 2021](#)).

This was, he says, 'particularly prevalent in some communities as word was shared on how to get around the system. In some cases, these were very vulnerable and frightened people working in what they considered high-risk environments. So you can imagine how difficult those conversations were.'



Getting jabs into the right arms

NHS England had two mantras. That the JCVI's age-related cohorts should be followed and that the vaccine – dubbed 'liquid gold' in Skipton House¹² – should not be wasted. 'The cardinal sin was waste,' Ed Waller says, 'because every dose was making a difference.'

Guidance from NHS England was 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' (NHS England 2021b).

Given that a vial, once opened, could not be put back into storage, GPs tended to keep reserve lists from the next cohort to call at the end of the day. Particularly at the beginning, when many of the elderly were desperate to be immunised, 'we'd call people and say "can you get here in half an hour?", and you'd get a whoop of delight and the answer "I'm pulling me boots on";' Dr Helen Andrews, a London GP, says. Centres also resorted to calling the local police station, local school or local fire station to use up doses. Ensuring that the final dose was used, however, sometimes saw a vaccination team waiting until 10.00pm for the final person, having started a session at 8.00am.

This did have its lighter moments. Further into the roll-out, London pharmacist Ash Soni recalls three police vans turning up at once at the end of one day, leaving passers-by staring into the pharmacy and wondering what on earth was going on.

Some sites undoubtedly pushed the guidelines. It should be added, however, that when any particular site stepped too far away from the priority categories, it received a severe 'slap on the wrist' from NHS England. In mid-March 2021, by which time people over 50 qualified for the vaccine, the organisation was warning sites that 'there is currently no contract in place' for vaccinating below that age, 'so you **must not** do so' (NHS England 2021e).

NHS England and the JCVI were under repeated pressure to adopt a different roll-out. With the infection rate rocketing during January 2021, many an assorted

¹² 'Liquid gold' because it was life-saving and not just because the list price for a shot of the Pfizer vaccine was £15, rising later to £18, against £3 for the AZ, the company having said it would not seek to make a profit during the pandemic.



voice was calling for teachers, the police, bus drivers, supermarket check-out staff – anyone with a customer-facing role, so to speak – to be vaccinated first, regardless of age. Four former health ministers put in a plea that terminally ill people should be at the top of the list ([Andersson 2021](#)).

But, sticking to the mantra that the roll-out had to be both simple and fair, NHS England and the JCVI – with a few exceptions, to which we will return – stuck to their guns, and thus to the original priority list.

Professor Anthony Harnden, the JCVI's Deputy Chair, explained it like this to MPs in February 2021, just after the first four cohorts had successfully been offered their vaccine, with the vast majority taking it:

One of the key reasons that the programme has been so successful is that it has been simple, it has been deliverable, it has been rolled out very quickly, and people understand it. If you start picking out certain groups, it will make it more complicated, and the risk of doing that is slowing the programme down. If you slow the programme down, it may be that some people will be exposed to virus and actually suffer harm who would not have otherwise.

([Science and Technology Committee 2021](#))

Even so, there was to be an ongoing debate about the equity of the programme, an issue to which we will return.

Getting the vaccination sites right

Not everyone felt that the initial allocation of vaccine sites was right. The London Borough of Newham was one part of the country that struggled hardest with uptake while putting a huge amount of effort in to combat that. Its nearby mass vaccination site was the mighty 100-acre ExCel, the Exhibition and Conference Centre in London's Royal Docks, which on occasion has hosted summits of the world's prime ministers and presidents.

It was not intended only for people living in Newham. But the borough's 370,000 population is young – median age 33. The largest single part of its population, as classified by the census, is white. But 'white' makes up only just over 27 per cent of the population, and roughly half of that is 'other white' – chiefly Europeans, and



many of those from countries that were once behind the Iron Curtain such as Poland, Romania and Bulgaria. The next largest group is of Indian heritage, although that group comprises less than 15 per cent of the population, followed by those of Bangladeshi and Pakistani heritage, followed in turn by groups from a wide range of African-Caribbean and African backgrounds, and indeed a mix of all those categories. Well over 100 languages are spoken within the borough.

Local GPs, and Jason Strelitz, Newham's Director of Public Health, were clear from the very beginning when the ExCel Centre was being mooted as a mass vaccination site that it was not going to work for much of its population. It has excellent public transport links into and out of central London, but poor links northwards into the bulk of the borough of Newham.

'For much of our population you can only get to ExCel by car,' Jason Strelitz says:

But over half our population does not have access to a car. Lots of people in our borough do not see a place like the ExCel as a place for people like them. They would never have gone to it before. It's a big scary site. It's just not on their radar. And when you are trying to build something like a mass vaccination programme, it is ease, convenience, and trust-building that get you there. And the ExCel site did not represent any of those things.

That point was underlined as GPs in the borough discovered (as did many of their colleagues in other boroughs) how reluctant some people were to travel only a relatively short distance for what was a potentially life-saving inoculation. Professor Martin Marshall, Chair of the RCGP and who practises in Newham, says, 'that might sound extraordinary to many people. But it came back to us from the focus groups and community meetings that the council was running. "Your centre is a mile away." That might not seem a big deal to us. But it was a big deal to them.' Karen Livingstone, CEO of Newham Health Collaborative, says 'Newham is only four miles wide. But you'd hear it frequently. People would genuinely say: "Oh, I wouldn't go over there. They're not like me." They felt excluded. So we had to deal with the reality of that.'

Muhammad Waqqas Naqvi, the GP popularly known as 'Dr Wax', who was Chair of Newham CCG, says that as a result, 'we had to go everywhere, into temples, mosques, synagogues, churches, all sorts of pop-up centres'. As the vaccination



programme moved down the age groups, Newham found that one highly effective centre was a council sports hall. ‘People would come in for a gym session and get jabbed,’ Karen Livingstone says:

And we ran some women-only clinics, where we put in some additional support so that their children could be entertained while they got their jab. That was a really lovely service, and it wasn’t just the Muslim community that came. A lot of Eastern Europeans, other South Asian and some East African.

And later, many walk-in centres and pharmacies. ‘Booking an appointment didn’t work well for many of our residents,’ Karen Livingstone says:

There is a suspicion of authority. So it turned out that lots of people were happier just to turn up and queue when it suited them. Quite a few did not have a GP, so we registered a lot of patients that way, although some still did not want to be registered. Some, we suspect, didn’t have a right of residence and wanted to stay under the radar.

And Newham, like some other parts of the country, had to cope with a huge number of languages. Translation tools were used. And Karen Livingstone says the staff are reasonably reflective of the local community, so languages such as Urdu and Punjabi were pretty easy:

We kept a record of all the staff languages. So if we needed someone who spoke Farsi to talk someone through booking or hesitancy we could find that. We had a Chinese patient with no English and a Chinese doctor who said ‘Well, I don’t speak the right dialect, but we can probably get through this’.

Reaching the right arms was not, of course, just an urban problem. In Lincolnshire, teams went out on to farms to vaccinate East Europeans and others who were fruit-picking. ‘That got combined with a broader health programme, about how to register with a dentist or a GP, and advice on healthy living,’ says Alison Tonge, NHS England Regional Director for Commissioning for the Midlands.

Some big employers rallied round. As the younger cohorts were reached, for example, Primark – still unable to use its changing rooms during the pandemic – turned them into walk-in vaccine clinics in Birmingham, Bristol and parts of London. In Solihull,



the local GPs and University Hospital Birmingham took the vaccine to Jaguar Land Rover's giant plant with its eight assembly lines. They used the plant's occupational health centre, but also put mobile facilities at the end of its enormous production line so that staff could have a walk-in jab as they came off shift. More than 4,500 staff and contractors took up the vaccine.

There were moments of imagination, and ones of frustration. One woman in her mid-30s who had just returned from two years in the United States found that while she still had an NHS number, it had been deactivated, and as she had only just returned, she was not yet re-registered with a GP. When she went for the vaccine she was initially, inaccurately, told she could not have it. She asked if that could be checked with someone more senior, whose response was 'Oh, just put her down as homeless'. There were huge apologies after a junior doctor turned up with her baby to be vaccinated and was initially turned away. Some felt that people with learning difficulties – who were at high risk – were not sufficiently prioritised. The JCVI did, at least in part, respond to that in February 2021 ([Public Health England 2021b](#)).

And there were inconsistencies. Pushpa Raguvaran, a trustee of the Sri Murugan temple in Newham, which was used by a wide variety of people to get their vaccination (not just Hindus), says that when it came to marginal decisions, it could depend on which clinician was there. 'So you would get someone who was, say, within three months off the eligible age, and one week they'd do it, and the next week they wouldn't. Or a clinician in one booth would, and in another would not. That created some tension.'

And much imagination – and experimentation – went in to finding easy-to-access sites to get the vaccine out there. Many have already been mentioned. GPs in St Albans took over a huge nightclub that had gone into administration. 'We did our first jabs on Tuesday 15 December,' Mike Walton, one of the GPs involved, says ([Sabbagh 2021](#)). 'That morning we had no lights, no running water, no central heating. It was only with the help of the council that we got the lights on at 1.00pm, a couple of hours before we started work.' Coventry used its Transport Museum. Penwortham in Lancashire its Cricket Club. Salisbury, Blackburn and London used cathedrals. The use of big football stadiums is well known. But when Leamington Football Club (FC) played a Coventry City team, a vaccination site was set up there. Mobile vans played their part, although some learnt that it was far better to send



them to a similar site regularly – with social media and other advertising that they would be there – rather than just putting them in a location and inviting passers-by.

The vaccine equality debate

Pretty much throughout, the government stuck to the JCVI's advice about priority groups, broadly based around age. But not everyone agreed with that. Dr Muhammad Waqqas Naqvi (known as Dr Wax by many of his patients) describes the age cohorting as 'a disaster for a borough like Newham' with its very young population. People under 40 did not become eligible until May 2021.

So we had this long period when the virus was allowed to fly around the borough, and we could potentially have saved some of those who died in that period. It was a case of death by area.

We have a lot of multi-generational households. So we have households where the over-80s might be vaccinated but there are people in their 60s and much younger living in it. The local authority did offer to put people up in separate houses to try to reduce the mortality in those multi-generational households. And we did start vaccinating in some of them and then persuaded NHS England to allow us to run a pilot programme to do whole households. I think it proved more effective in Newham than the other areas that piloted it.¹³ But the age-based approach did not work well here.

Jo Cummings, a GP in east Leeds, makes a similar point.

During the first vaccination wave, in the more leafy suburbs, appointments were just being snapped up. But we struggled from the beginning, partly because a good bit of this was initially designed for people who have smartphones and speak English, and that just isn't our population. And we don't have that many over-80s. Here, people die 10 or 15 years younger. So all the time we were pushing up against the age guidelines, while not being allowed to drop down to a population that we knew were in need.

¹³ Pilots were conducted in Luton, Slough, Liverpool, Oldham and Newcastle as well as Newham but an evaluation (not in the public domain) concluded that they 'did not result in significant uptake within multi-generational households, nor conversion of individuals who would not have already presented themselves for vaccination, nor did it increase vaccination of ethnic minority groups'.



And then there were the homeless. We were being told that they were not at particular risk and if they got Covid they should go home and isolate, and we were saying 'but they don't have a home'. So there was a bit of a battle over that, and we as a PCN said 'well, we're just going to do it because it is the right thing to do. We've got to be able to sleep at night.' And that did drive a change, so we were allowed to.

And, indeed, in March 2021, the JCVI recommended that homeless people be prioritised ([Public Health England 2021c](#)).

'We did go down the cohorts a little bit quicker,' Jo Cummings says:

I do understand both sides of the argument. It wouldn't be fair if people in one part of the country were getting the vaccine in their 60s where elsewhere people in their 80s were still not vaccinated. But then the argument is that in one part of the country people in their 80s are out on the golf course. In another, people are not living to that age.

This debate, or a version of it, became most public and heated in May 2021 when the much more infectious Delta variant arrived. Both SAGE and the JCVI debated the complex issues involved ([Scientific Advisory Group for Emergencies 2021](#)). Unlike Alpha, the first significant variant that started in the south-east and London and spread north, Delta started in the north and then spread everywhere – probably the result of a delay in the travel ban to and from India, where it is thought to have emerged ([Gregory et al 2021](#)). Blackburn with Darwen, which traced its first case of the Delta variant back to 7 April, became, along with Bolton, the country's biggest Covid hotspots with rapidly rising infections. The army was sent in to support a huge surge in testing, with council staff knocking on doors to hand out test kits.

Both towns upped their vaccination rate and received additional supplies. But when they started vaccinating some people as young as 17 and 18 in their worst-affected areas, there was a clash with NHS England ([Macpherson 2021](#)). And when the NHS initially declined to supply yet more additional vaccine, Dominic Harrison, Blackburn with Darwen's Director of Public Health, said that would lead to avoidable deaths – that it was 'unfair, unjust and avoidable' ([Pidd 2021](#)). Sadiq Khan, London's Mayor, said younger people should be vaccinated where the Delta variant was on the rise ([Johnston and Blakely 2021](#)), and Andy Burnham, the Mayor of Greater Manchester



(of which Bolton is a part), made the slightly subtler case for its supply to be 'brought forward' (Williams 2021).

Some academics, along with Blackburn with Darwen, had been making the case to government for a more place-based rather than age-based approach since February 2021 (Watkinson and Sutton 2021). The argument was essentially three-fold.

First, that the virus was likely to spread faster in close-crowded areas of deprivation – where, in addition, there are more multi-generational households regardless of ethnicity, among the white population as well as among minority ethnic groups. Second, those in work in the more deprived areas were more likely to have to work in premises or on transport during the lockdowns than those doing office-based jobs – and thus were more likely to be exposed to the virus. 'During 2020, we probably had something like 80 per cent of our employed adults out in frontline work. They were in transport, food production, health and social care, and manufacturing. Whereas places like Richmond on Thames had almost the opposite. They had about 70-something per cent who were working from home,' says Dominic Harrison. And third (and related to the first two arguments), while the risk of serious disease and death was clearly heavily age-dependent, there should, according to Dominic Harrison, be another factor – the risk of being infected in the first place.

So, as he put it:

In February 2021, the south-west, with a much older population, had a much smaller cumulative case rate than Blackburn with Darwen. And in May 2021 they did not have the Delta variant. So while it is true that if you are over 75 your risk of dying is the same, the risk of getting the virus in the first place is very different.

The arguments against the big vaccine surge that Bolton and Blackburn wanted included the point that where a large surge in infections is under way, the vaccine is not the immediate best way to tackle it, as it takes a couple of weeks for the vaccine to give full protection. Test and isolate is a more immediately effective approach.¹⁴ Diverting limited supplies to one place could only come at the expense of another. And while parts of the country such as the south-west had lower

¹⁴ This report does not discuss the argument that there was insufficient financial support for those who were under huge pressure to work and could not afford to self-isolate.



cumulative infection rates, that also meant that they had lower levels of natural immunity. Very good for them in some ways, less good in others, as the new, more infectious variant arrived.

But the government stuck to what remained the JCVI's view – that the age-related approach was the best way to reduce severe disease and mortality; that focusing on occupational groups risked slowing the programme down; that an approach 'designed to protect the population primarily through interruption of transmission would afford modest benefit at best'; and that 'a simple age-based programme is considered the keystone of rapid vaccine deployment... operationally, simple and easy-to-deliver programmes, are critical for rapid deployment and high vaccine uptake' (Department of Health and Social Care 2021c).

Despite the country still not being awash with supplies, some additional vaccines were made available, not just to Bolton and Blackburn, but to Burnley, Hounslow, Kirklees and Leicester, where the Delta variant was also surging (Hansard 2021). But Matt Hancock, then Health and Social Care Secretary, refused to extend vaccinations to those under the age of 35 – the cohort that was reached in mid-May – on the grounds that the message about who should be vaccinated and when was 'crystal clear' (Hansard 2021).

Speaking in September 2021, out of the immediate heat of the debate, Dominic Harrison's view remains that the JCVI got it wrong:

My view remains that a place-based approach, one that included a view about the risk of being infected in the first place, would have been better. There are arguments on both sides, and I do acknowledge that. And I acknowledge the goodwill of everybody in the argument. But my responsibility as the Director of Public Health in an area that entered the pandemic with some of the worst life expectancy and healthy life expectancy in the country, which then, of course, got massively made worse by the pandemic... my responsibility as the Director of Public Health was to put the case for my population.

To which a senior figure in NHS England says: 'I totally understand that. If you are optimising for Blackburn or Bolton or somewhere similar, that is your argument. But we were seeking to optimise for the whole country.'



Vaccine hesitancy

There has been much academic (*see, for example, Osama et al 2021*), practical (*Wellings 2020*) and political debate around vaccine hesitancy, and a full exploration of it is beyond the reach of this report. It was present in all parts of the community, including among the white population, for reasons that often varied but were sometimes the same. And there was, of course, the work of the anti-vaccine movement on social media and elsewhere (*see 'The anti-vaccine movement' section*).

Winston Morgan, Professor of Toxicology but also of Equity and Inclusive Practice at the University of East London, says that among the African-Caribbean and black communities, there is knowledge of the way they had been unethically experimented upon in the past, particularly in the United States, but with the occasional example in the UK as well.¹⁵

He adds that deaths from Covid were higher among the Black and south Asian ethnic communities during the first Covid wave, leading some to believe that their lives were less valued. The month-long delay in publishing Public Health England's report into the reasons for this higher death rate also diluted trust (*Public Health England 2020*). Uptake of routine childhood vaccines tends in any case to be lower among Black, Asian and minority ethnic communities, the NHS being less good at reaching them (*Forster et al 2017*). And, Professor Winston notes, the murder of George Floyd by US police in May 2021, which prompted the Black Lives Matter movement and its challenge to authority and to structural racism, coincided with the vaccine starting to reach younger age groups.

He and others also note that hesitancy over a new vaccine is not all unreasonable. Questions about whether it is halal or kosher (as opposed to claims that it is not) or whether it might affect fertility (as opposed to claims that it does) are reasonable.

¹⁵ For example, the Tuskegee experiment in the US, entitled 'untreated syphilis in the negro male', started in 1932. The 600 black men in the study were not offered penicillin when it became available to treat it. The study was halted in 1972 when news of its profoundly unethical nature broke, and President Clinton offered a formal apology in 1997. In the UK in the 1980s there were both concerns and evidence that the injectable contraceptive Depo-Provera was being given to black women without their informed consent.



As one Director of Public Health put it:

It is new. So some people naturally want reassurance. Someone like me, a privileged white male – I trust the scientists and the regulators. But parts of our population have the sense that institutions have not always been good to them, and some are just not engaged. That is particularly true of our East European population, for example, who are among the least engaged. And the risk calculus for a hesitant 30-year-old is different to a hesitant 70-year-old. Their personal risk from the disease is different.

Hesitancy was tackled in all sorts of ways. Nationally, the government started in August 2020, well ahead of when a vaccine would be available. The Cabinet Office team that deals with Daesh propaganda online was harnessed to tackle online anti-vaccine activists. As time went on, a range of personalities – from the naturalist and broadcaster David Attenborough to well-known Black and Asian people – volunteered to help spread the message. It is invidious to highlight names, but among them were Lenny Henry, actors Chiwetel Ejiofor and Adjoa Andoh, the author Malorie Blackman, the musician KSI, the multi-talented Meera Syal, Adil Ray (the actor and *Good Morning Britain* presenter), as well as the England cricketer Moeen Ali and many others. They wrote open letters and made videos endorsing the vaccine and tackling myths. Local parts of the NHS and local government used these and, indeed, created their own videos, in different languages.

Sadiq Khan, London Mayor and a Muslim, made sure the cameras were there to witness his first dose so that he could spread the message and, equally admirably, turned up quietly for his second dose, just like anyone else. Local authorities harnessed what many called ‘community champions’ to spread the word. Not just faith leaders, but those who led any sort of community organisation that could reach both younger and older people. And they learnt from experience.

Alison Cartwright, Chief Delivery Officer for South Warwickshire CCG, says:

We make assumptions don't we? Or at least I did. So we asked some of the black community about what was putting them off coming. And there were the very strict rules for drawing down the Pfizer vaccine, which was being done by a separate team, effectively behind a screen. We were just walking towards people with a filled syringe. So preparing it more openly, letting people see the vial... in some areas that helped.



It is also the case that many GPs and others were endlessly phoning people who had yet to get the vaccine. That worked in many cases – one Leicester practice reporting that they had converted into appointments some 70 per cent of those they had called (Mohamoud 2021). But that experience was not universal. Dr Zahid Ghufloor, along with his wife who is a care assistant, was among those phoning up the reluctant among their local community. Both speak Punjabi, Hindi and Urdu. ‘But it can be very difficult to shift people, once they have made up their minds,’ he says:

They’ve read stuff on WhatsApp and other social media and to persuade them that is wrong is not easy. I even had trouble persuading my parents who told me about material that they’d seen on WhatsApp, with me telling them that what they had read was simply not true.

It is worth noting that not all the effort that went into new vaccination sites worked. One GP remembers that:

... having, so to speak, exhausted the phone calls to the point where people were getting angry with us for calling again, we thought we’d try something different. So we went to a New Testament Baptist Church, which has a large Afro-Caribbean congregation. The minister had volunteered to organise that. Done lots of sermons to encourage people, and the CCG and the local health and wellbeing team had done lots of work promoting it through all sorts of social media and what have you. And we got no one. No one. We got some passers-by, mainly white, who saw the huge sign outside and popped in. But no one from the Afro-Caribbean community. I’ve got colleagues locally who did some mosques, and they went much better. This one didn’t.

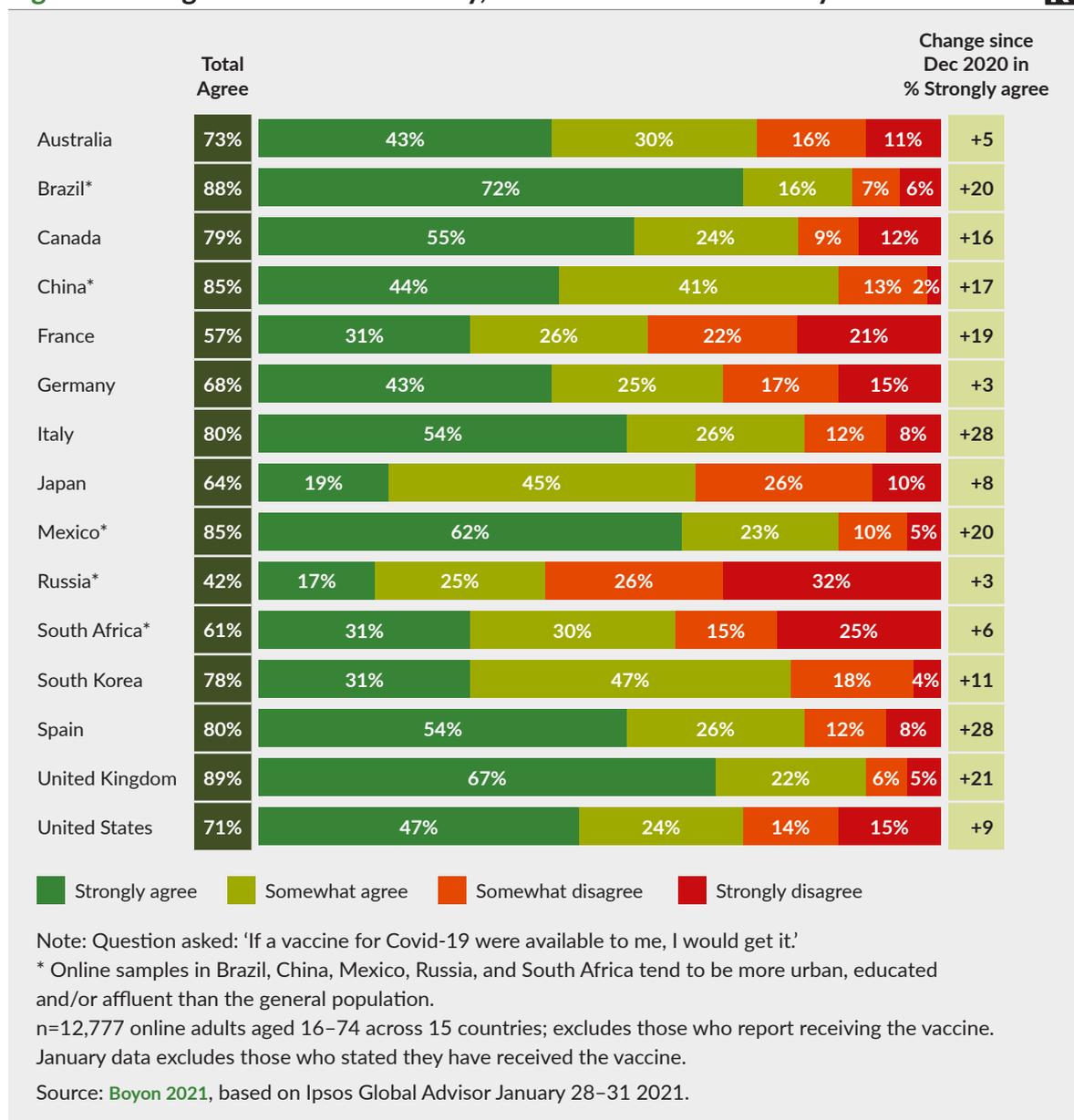
What can be said is that all this effort, at some level, worked.

Figure 1 comes from the Organisation for Economic Co-operation and Development’s (OECD) tracking of vaccine trust internationally, the work being undertaken by Ipsos MORI for the World Economic Forum. It compares answers to the question ‘If a vaccine for Covid-19 were available to me, I would get it’. The question was first asked in December 2020, when the UK and Israel were about the only countries to have the vaccine. It was asked again for a February 2021 publication.



It shows that as early as January 2021, in the UK only 11 per cent somewhat disagreed or strongly disagreed with the statement, ‘If it were available, I would get it.’ – one of the smallest proportions of ‘hesitancy’ among the 15 countries surveyed. And over the six weeks between the polls, there had been a 21 percentage point shift upwards in the UK among those who ‘strongly agreed’ that they would get the vaccine – one of the biggest country shifts (Boyon 2021).

Figure 1 Changes in vaccine hesitancy, December 2020 to January 2021 **K**





Ipsos MORI's longer-term polling within the UK showed that the percentage of people asked 'Would you take the vaccine?' shifted in England from 82 per cent in December 2020 to 94 per cent by June 2021 – in terms of whether people would definitely or probably take it, had already had it, or had an appointment booked. The same polling shows all age groups becoming more willing, although the level of acceptance is roughly 10 percentage points lower among 16–34-year-olds than for those aged 65 and over. Among that older group, the proportion had reached 99 per cent by June, although the uptake figures do not quite match that (see 'Conclusions' section and 'Appendix'). The polling also shows the same improving trend among the white population and among minority ethnic groups – but, as with age, again a gap between them. By June 2021, among minority ethnic Britons, 10 per cent were still saying that they would not, or probably would not, get the vaccine, down from 22 per cent in December 2020. Among white Britons, that proportion had fallen to 4 per cent by June (Quigley *et al* 2021).

There are two final points to illustrate how complex the issue of vaccine hesitancy is.

First, GPs and others related how it was sometimes sceptical or actively hostile younger people who were discouraging their parents from having the vaccine. But equally, as the vaccine reached the younger cohorts, it was sometimes the young who would bring their hesitant parents and grandparents with them. The last of those underlines the value of what the NHS dubs its 'evergreen' offer: that no matter how far down the age cohorts the vaccination programme has moved, those who missed the vaccine first time round will still be vaccinated.

Second, as Ash Soni says (Ash has pharmacies in Stansted and in London's Streatham and Docklands) about vaccine hesitant people, that despite social media, 'you have to understand that their concerns are their concerns, not anybody else's'. He continues:

We do a vaccine bus in Lambeth and people come in just to talk about it. They raise their concerns and we try to answer them, and they either have the vaccine or they go away – which is fine – but a proportion of them then come back. It takes time. It is very personal, very personalised care.



And it is the same at the pharmacy. People come in and say 'I am not sure I want to have it'. The volunteers are great. They talk to them and if they are still worried they say 'well, have a chat with the vaccinator'. And I've heard everything. That it causes infertility. That it will put a microchip in me. Or that you will leave the needle behind when it's done. Everything under the sun.

But some of this is actually needle phobia. All these reasons are there to hide the fact that they are frightened of the needle. So you need to understand that. And I can sympathise.

I've now done about 9,000 vaccinations personally. But I had my booster about two weeks ago. I wasn't scared. But I don't like needles when they are put into me, and I could feel myself getting a bit warm and sweaty, for no good reason. So, in those cases, I can say 'I'm no different, it is all right'.

And I am sure there are illegal immigrant communities that we've touched. We're very clear that we're not interested in identifying who they are. We don't need the name of the GP. You don't need to be registered with the NHS. We will still vaccinate you. We have had a few. And then we have had one or two who have then brought in others because it has worked for them.

And on a visit to his Streatham pharmacy in early November 2021, where half the display shelves have been cleared away to create three vaccine pods, it was clear that the 'evergreen' offer plays on, with a mix of all ages walking in to be jabbed. A continuation of the theme that success bred further success for the programme.

As Ash Soni says:

We still now get some older people who have not had their first dose. And while I cannot prove it, I am pretty sure that I have vaccinated some anti-vaxxers. We always say to people 'tell your friends'. But there are those who say, 'Oh no. I don't want anyone to know I have had it'. I can't prove they are anti-vaxxers... but...



The anti-vaccine movement

Just as a full examination of vaccine hesitancy is beyond the reach of this report, so is a proper analysis of the impact of the anti-vaccine movement. It was clearly poisonous. A proportion of those interviewed for this report received not just abuse but death threats. Marches and protests were held around the country, including a big rally in London's Trafalgar Square. Matt Hancock and Michael Gove were just two of the politicians who found themselves threateningly jostled on the street.

Out on the ground, most of our limited number of interviewees reported little or no real direct trouble. The Greyswood Practice in south London recalls a lone protester with a placard turning up for one day, standing quietly across the road, and going quietly away, never to be seen again.

By contrast, a protest in Brighton shut down one of its vaccination centres for several hours, and a march in London did the same at the Science Museum. When the vaccine was extended to 12–15-year-olds in the autumn of 2021, some of the behaviour was even more despicable. Handing out leaflets to children outside the school gates telling them the vaccine would do long-term damage or kill them, and even threatening teachers with legal action ([Association of School and College Leaders 2021](#)).

The impact of the actions of anti-vaccine activists is hard to gauge. One should not underplay it. But:

- given that there are understandable reasons for a degree of hesitancy,
- given that hesitancy has declined (as outlined above), and
- given that the vaccine rate in the UK has continued to be at the higher end of international comparisons...

... it is possible to overstate the impact.

Matt Hancock's perhaps typically bullish view is that the anti-vaccine activists were routed. Speaking in November 2021, some four months after he resigned as Health Secretary, he says:

There was an almighty battle with the anti-vaxxers and they comprehensively lost. They lost the intellectual argument. They lost the argument that some made, that



transparency about the data would lead to them being able to seize on bad data. Whereas transparency about the vaccination rate persuaded people.

It was an almighty battle. But certainly in terms of the adult population [at this point the schools' programme was still fully getting going] they were routed. Uptake rates in the key groups are way over 90 per cent.

He makes the point that no one in parliament was anti-vaccine:

Zero. And that was really important. One Nigel Farage-like anti-vax figure in the Commons could have been a real problem. And once it was clear that it was working, almost all the media were onside. And it was the NHS working around the clock to save lives. So the counter-narrative was very strong, and ultimately very effective.



4 Summer into autumn 2021

In the middle of June, the NHS reached what Simon Stevens dubbed a ‘watershed moment’ when the vaccination programme was opened up to anyone over the age of 18. By then, more than 60 million doses had been delivered in just six months (NHS England 2021d). The NHS had beaten by a month ministers’ target that all adults should be offered a vaccine by the end of July. By then, more than 95 per cent of people aged 50 and over had received a first dose and most of those had had a second. Although the programme was only just being opened up to the very youngest adults, some 76 per cent of those aged over 18 had received a first dose, and 52 per cent a second (Smyth 2021).

London was still lagging behind the rest of the country. Uptake among many minority ethnic communities remained a problem. But, outside of the very smallest territories, the UK had the highest percentage of its population vaccinated of anywhere in Europe. It is hard to imagine that anyone completing an account of the vaccination programme at the end of July 2021 would have judged it to be anything other than a pretty unalloyed success.

However, over August and September and into October, the programme began to stutter.

With hindsight, the warning signs were there at the very end of July. As the programme had been opened up to each new cohort under the age of 50, the initial uptake of the vaccine from the most enthusiastic had been almost as rapid as for the older age groups. But while the proportion taking the vaccine carried on rising among all age cohorts, among younger adults the rate then slowed, cohort-by-cohort – among people aged 40–49, people aged 30–39, then people aged 18–29.

One official at NHS England says:

We did a lot of planning for the autumn, and we foresaw the difficulty of getting 18–29-year-olds excited about the vaccine. But if I was being self-critical, I would



say we didn't sound enough alarm bells in government about how difficult that would be. The sort of youths who think they're invincible, and the fact that we were only going to get to them at a time when the restrictions were ending.

A full analysis of why it began to stutter is beyond the reach of this report. But the following factors came into play.

The end of lockdown

On 19 July 2021, the government reached the end of its 'roadmap' out of lockdown, lifting the final legal restrictions on group activity and mask-wearing. Limits on the numbers of people who could meet indoors were lifted. Cinemas, theatres and nightclubs fully reopened. People were encouraged cautiously to return to their workplaces and social distancing ceased to be mandatory. The government did urge caution. London Transport sought to maintain mask-wearing, and a fair number of big venues did ask for a negative test or evidence of vaccination. A complex list of countries to which travel was or was not permitted remained, with assorted quarantine requirements on return. But foreign holidays and business trips became more possible. After six months of various restrictions – almost nine months if one includes the partial lockdown of autumn 2020 – life returned to something closer to normal.

Government messaging

The government's messaging around the vaccine – which, up to now, had basically been 'get it' – became more muddled. Some other countries decided on various versions of a vaccine passport for access to venues, not least as an incentive to younger people to get vaccinated. In England, the message about whether the government would adopt a passport had been all over the place for months and it only got worse over the summer. Ministers variously hinted that a passport was on the way, was not, might be, might not, and, in September, when the idea was finally ditched, only to be revived in December 2021, ministers still said that it would be held 'in reserve' (Jackson 2021).



Jabbing school children: ‘will we, won’t we?’

The vaccine was extended to 16–18-year-olds. But the question of whether 12–15-year-olds would be vaccinated rumbled on and on, adding to the more mixed messaging.

The JCVI had been admirably bold in the early part of the programme – for example, extending the gap between doses. But since April it had been considering whether those over 12 should be included ([Department of Health and Social Care 2021c](#)). Time after time, ministers said they expected a decision soon. In August, the President of the Royal College of Paediatrics and Child Health said the position was ‘frankly shambolic’ ([Elgot and Adams 2021](#)).

The United States started vaccinating children aged over 12 in June, while Canada and Israel were among countries doing the same. The MHRA had approved the vaccine for this age group in the same month. The JCVI, however, did not reach its final view until early September. It supported immunisation for clinically vulnerable children, and said that it was ‘of the opinion that the benefits from vaccination are marginally greater than the potential known harms’ while acknowledging that ‘there is considerable uncertainty regarding the magnitude of the potential harms’ ([Department of Health and Social Care 2021d](#)).

But, in what was clearly a split opinion, its ‘overall’ conclusion was that ‘the margin of benefit, based primarily on a health perspective, is considered too small to support advice on a universal programme of vaccination of otherwise healthy 12–15-year-old children at this time’. It did, however, also note – in a ‘get-out-of-jail’ card, so to speak – that it was not within the JCVI’s remit to consider ‘wider societal impacts’ and that the government might wish to consult with the four Chief Medical Officers of the UK ([Department of Health and Social Care 2021d](#)).

Clearly losing patience, the government did just that, and the Chief Medical Officers unanimously recommended the move. They took into account ‘wider public health benefits’, primarily the impact on education and mental health from pupils being off school, either because they had caught Covid or because they were having to isolate when someone in their class did. They also noted that the impact of educational disruption ‘has been especially great in areas of relative deprivation which have been particularly badly affected by Covid-19’ ([Department of Health and Social Care 2021e](#)). A week later, on 30 September 2021, that part of the roll-out began.



The aim was to inoculate the majority of children by the October half-term – assuming parental consent, which itself made this addition more complicated. Scotland opened these vaccinations by any route. But, much to the frustration of GPs and pharmacists in England, who were having to turn parents and their children away, the initial decision in England was to do this only through the schools immunisation service. The delay in taking this decision meant that the service had only a week to get going. And given that it was the Pfizer and Moderna vaccines that were being used for these age groups, the set-up in schools was appreciably more challenging than for the childhood and human papillomavirus (HPV) vaccines normally handled by the school service. Scotland leapt ahead with its vaccination rate while the programme in England lagged. A subsequent decision was taken to allow GPs and pharmacists in England to also vaccinate this age group, producing much more rapid uptake.

The whole programme was getting more complex

As this account makes clear, the first six months or so of the vaccination programme were anything but simple. A huge number of interlocking elements all had to work well. If any one of them had significantly faltered – the logistics, the IT, the work of the vaccinators and volunteers and of local government and public health – the programme would have run much more slowly.

All that said, however, for the first six months or so, the focus had been on administering first and second doses. Now it involved continually trying to persuade those who had not taken up either dose to do so. It involved sending supplies to many more sites (schools). And, by early October 2021, it involved the booster programme for people over 50, along with third doses for clinically vulnerable people.

With a major flu vaccination programme also due to start, some GPs withdrew from helping in their PCN sites, instead referring people registered with them to the national booking system – sending them to the pharmacies and other vaccination sites. That increased the burden on the many GPs who remained in the PCN sites.

As September turned into October, schools were back. The furlough scheme, which had allowed people not working to volunteer, had ended. Others who had worked from home, but who had still found time to volunteer for a part-day during the



week, were back in their workplace. As time went by, that made it harder to find volunteers for the PCN sites and pharmacies, leading to some postponements ([BBC East of England News 2021](#)). The withdrawal of some GPs also led to an increased burden on the national booking system, which had to direct people to services that were available, and then suddenly – as some GPs withdrew – were not.

The result was complaints, including that the booking service was offering people appointments for booster doses at sites many miles away (see, for example, [Joynson 2021](#)). The booking service had also initially only called people in for a booster after the full six months from their previous vaccine had passed. That slowed progress. As with the change to the school programme, that was also altered so that people could book their booster once they were five months past their second dose ([Marsh 2021](#)).

Other issues

As of mid-November 2021, the NHS app did not always record vaccinations given as part of clinical trials – disadvantaging those who had taken part in them. For complex reasons, some other vaccinations were not instantly showing up. Both of these issues caused problems for those who needed proof of immunisation for international travel. Vaccinations received in other countries (including other parts of the UK) and vaccines not approved for use in the UK were not visible. A resolution service was launched to tackle some of these problems ([NHS.UK 2021](#)), and it became possible, although not easy, to capture international immunisations in the app in early December ([NHS England 2021f](#)).

Perhaps, however, the most controversial area over the summer and autumn was the decision to make immunisation compulsory for both frontline NHS staff and those working in social care – save where the vaccine is contra-indicated. In the NHS, there is a precedent for this. As part of health and safety requirements, surgeons (for example) have to be vaccinated against Hepatitis B. There is no similar precedent for social care staff.

Compulsory vaccination was enforced for those working in care homes – and for health staff and tradespeople visiting them – from November 2021 ([Department of Health and Social Care 2021b](#)). That led to fears that thousands of staff in a sector already plagued by vacancies would leave. Resistance appears to have been driven



by fears over fertility and pregnancy, and the fear that staff on zero hours contracts might have to take a day or two off work post-vaccination (Hunt 2021). The requirement for care staff working in people's own homes and for frontline NHS staff to be vaccinated was put off until April 2022 amid fears that NHS staff too might leave – although the promise to enforce it came at a time when 93 per cent of NHS staff had had a first dose and 90 per cent a second (Lee and Jackson 2021).

Changes to the senior leadership

At the end of April 2021, Brigadier Phil Prosser (head of the army's 101 Logistic Brigade) left Skipton House (NHS England headquarters) and the support from the armed forces at the centre reduced in scale. In June 2021, Matt Hancock resigned as Health Secretary. In July, Emily Lawson, the programme lead at NHS England, moved to No 10 Downing Street to head the Prime Minister's new Delivery Unit. The same month, Simon Stevens stood down as Chief Executive of NHS England. In September, Nadhim Zahawi, the Vaccines Minister, was promoted to Education Secretary as part of a Cabinet reshuffle. As one interviewee put it, 'However good their replacements, and however good the other leads were, change at that scale is almost bound to have an effect.'

It may also not have helped that Sajid Javid, the new Secretary of State for Health and Social Care, quickly got into an angry battle with GPs over the use of remote rather than face-to-face consultations, threatening to publish league tables of their performance.

Amanda Pritchard, Simon Stevens's successor as Chief Executive of NHS England, announced on 22 October that Emily Lawson was being brought back from No 10 to once again head the vaccination programme. Along with the changed decisions about booking for boosters and making school children's vaccinations available more widely – correcting the two mis-steps, so to speak – the programme again picked up pace.



'They think they are bomb-proof'

The biggest single cause of the stutter, however, looks to be the invulnerability felt by many younger adults. They did not come forward fast enough in the ideal numbers. That, along with the continued failure – or indeed refusal – of some people in the older age groups to take the vaccine.

The bulk of our interviews were conducted in September and October 2021 and just a selection of quotes tells that story. As one interviewee put it, younger people 'are not biting the hand off the vaccinator to get done in the same way as the earlier cohorts'. Another says: 'We know that they think "if I get Covid I'm not going to get really seriously ill anyway". And we are unlocked, now, so it's not like "if I get my vaccine I can be unlocked". There is no hook. So we are seeing it tail off. Definitely.' A Director of Public Health says too many younger people 'think they are bomb-proof. So we have lost an edge.'

More people were back in their workplace, making it less easy to pop in for a vaccine. And for the booster doses, GPs and pharmacists both report that some older people felt less of a sense of urgency, saying the equivalent of 'oh, I will get it next week'.

A degree of complacency had set in. As Jonathan Van-Tam, England's Deputy Chief Medical Officer put it, in early November, 'too many people believe that this pandemic is now over' ([Therrien 2021](#)).

All this despite the fact that after July 2021, the seven-day average for cases never dropped below 20,000 and frequently ran into the 30,000–40,000 range in England. Throughout September, October and November, there were always at least 6,000 patients in hospital with Covid and, at times, more than 7,000. Deaths over that period averaged around 80 a day – the equivalent of more than a jumbo jet's worth of deaths a week ([UK Coronavirus Dashboard 2021](#), UK Summary). Almost all of the patients in intensive care were unvaccinated, leading to something close to despair among some of those treating them ([Anonymous 2021](#)).

Against that background – and with Northern Ireland reintroducing some restrictions towards the end of November – ministers did work harder to push the message that unvaccinated people needed to take the jab, and that those needing boosters should take them too.



And that appeared to be working. As one Director of Public Health put it in November 2021:

This is very anecdotal, but now the boosters are on stream, the word 'booster' seems to be triggering something. So some people are going, 'well, I want to have a booster', and the GP or the pharmacist is going, 'yeah, but you haven't had your second one yet'. And a few first dosers are still coming in. So something may be happening. We will continue to get people on the margins who will change their mind, which is why the 'evergreen' offer, which is essentially that 'it is never too late to get it', matters.



5 Conclusions

There can only be an interim conclusion on the vaccination roll-out – after all, it is far from over. Even as this report was being finalised, Sajid Javid, the Health and Social Care Secretary, was indicating that booster jabs might be offered to all adults, not just people over 40. A fourth, even a fifth dose may yet come in 2022.

It is also important to recognise that the moment at which a judgement is made can affect that judgement.

It has already been stated that if a conclusion were reached at the end of July 2021, it would have been that the vaccination programme was a pretty unalloyed success. If a judgement were made in early-to-mid-October, when the programme was stuttering, it would have been less positive. At the end of November, the endpoint for the main body of this report, the conclusion would again be more generous as the pace picked up. It is entirely possible, as the roll-out continues, that things will go wrong or go even better. A new variant, one that evades the current vaccines, could change everything.

However, a judgement has to be made. And it is the authors' judgement that, to date, the programme has been a largely unqualified success. The qualifications include that uptake among minority ethnic groups, despite a huge amount of effort, has lagged behind that of the white population (see Appendix for a breakdown). It has proved harder to persuade some of the younger cohorts that the vaccine is not just good for them, but good for others – that it provides protection all round. Uptake is also lower in more deprived areas.

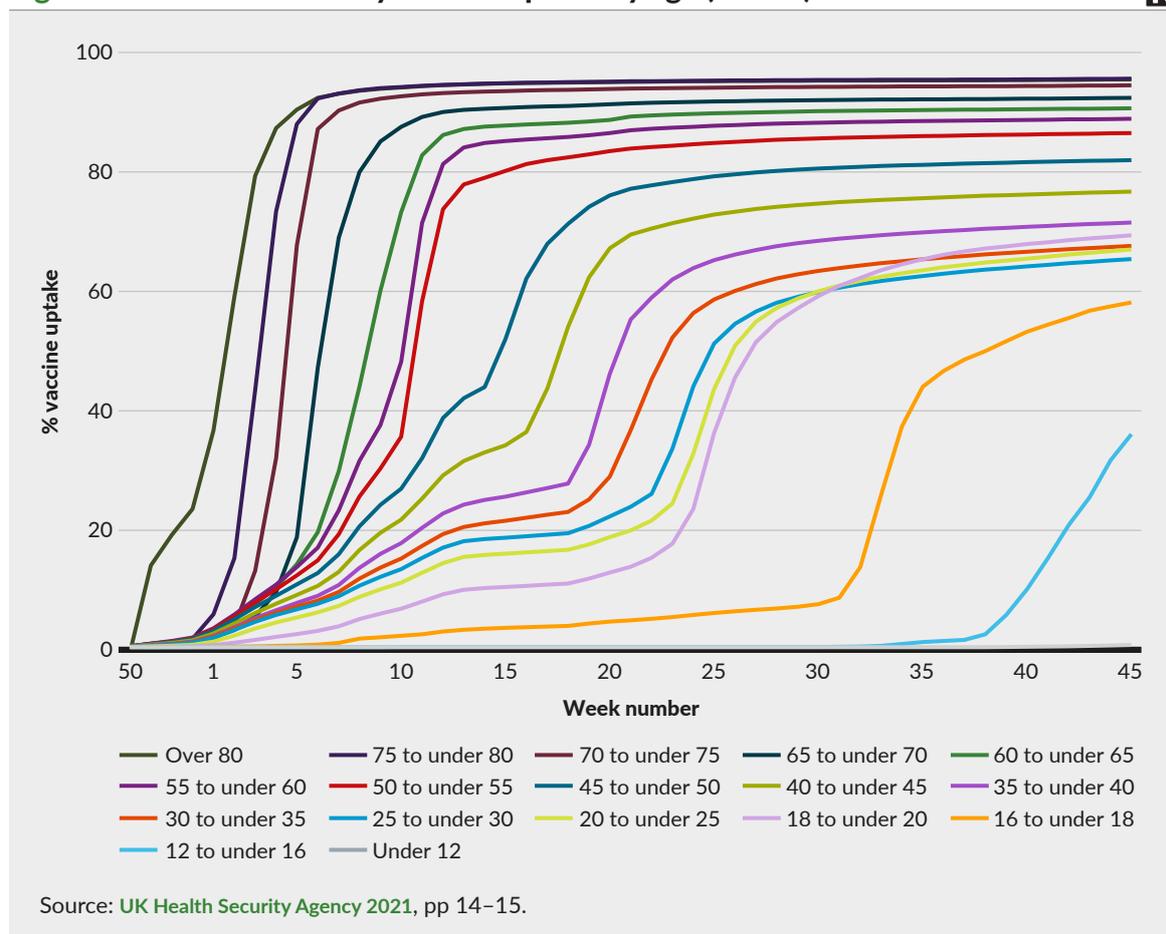
At the time of writing, the programme had not been sufficiently successful to prevent hundreds of deaths every week from Covid-19, or to prevent intensive care units (ICUs) in particular, but also hospitals in general, remaining under enormous pressure – the cause of those deaths and the pressure on ICUs being almost entirely people who are unvaccinated.



The UK Health Security Agency – the part-successor to Public Health England – has stopped updating the models quoted in the ‘Prologue’, estimating that up to 24 September 2021, the vaccines had prevented more than 24 million infections and more than 105,000 deaths.¹⁶

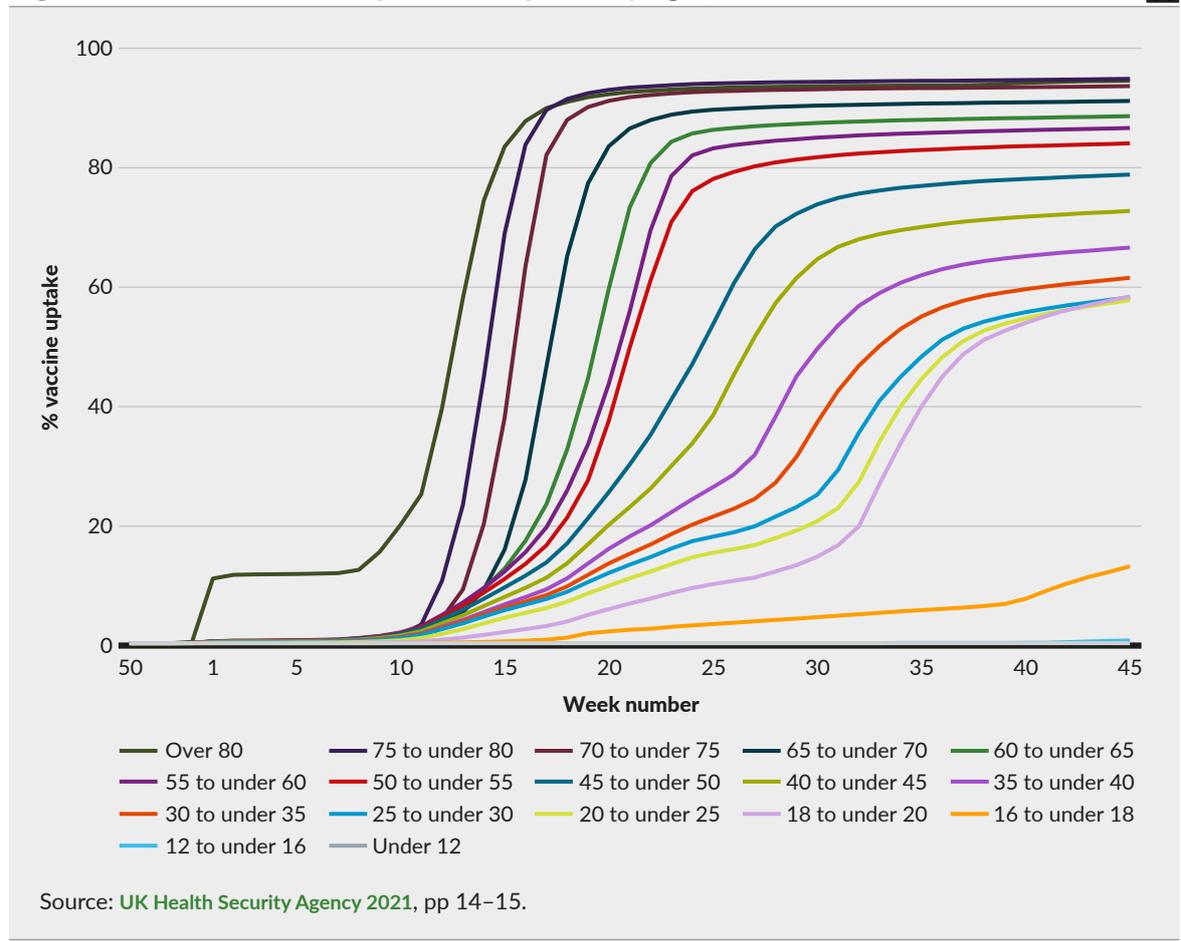
But any programme that has reached the levels of penetration for first and second doses shown in Figures 2 and 3 has to be a success. Particularly when the various vaccines being used were providing between 90 per cent and 99 per cent protection against both hospitalisation and death (UK Health Security Agency 2021).

Figure 2 Cumulative weekly vaccine uptake by age (dose 1)



16 For the reason that the longer the pandemic goes on, the harder it becomes to allow for interventions that would have been or might have been implemented in the absence of vaccination – which might include, for example, very prolonged full-blown lockdowns. See UK Health Security Agency 2021, p 10.

Figure 3 Cumulative weekly vaccine uptake by age (second dose) K



What else might be concluded?

Leadership

The King’s Fund does a lot of work on leadership, and has produced many reports on it ([The King’s Fund undated](#)). And good leadership was present at all levels of the vaccination programme. This list is not exhaustive. But, as illustrated above, there were the faith leaders and others who offered space for additional vaccine sites even before they were asked. The volunteers who recruited yet more volunteers. The directors of public health, and the NHS managers and hospital staff, and the GPs and pharmacists who seized the opportunity really to work well together. The private sector companies who put aside their competitive instincts to help make



this work. The employers who turned their workplaces into vaccinations sites. And, of course, the team at NHS England, who, at least in the eyes of ministers, held the ultimate operational responsibility.

Emily Lawson says: 'I am very much not a touchy-feely person. But I decided for this that we really did need a mission statement.' It read: 'To deliver the maximum available doses of vaccine, combined with high uptake in priority groups, in order to minimise morbidity and mortality as much as possible, as soon and as safely as it is feasible to do so, and equitably across the country'.

And that did define what happened. The equity part meant that when a community was not being reached, local initiative and national and regional suggestion all went into reaching them via a new site (sometimes however small), rather than just providing more vaccine to an existing one. And it meant that when people – from MPs to councillors to mayors, clinicians and many more – yelled loudly for additional local doses, as they understandably did, applying pressure to everyone from the Prime Minister down, and through the media, the allocation system almost entirely made sure supplies remained with those areas where a significant part of the eligible population still had to be vaccinated.

It may sound a little like 'motherhood and apple pie'. But at the centre Emily Lawson really did build 'a team of teams' with a similar approach applying in many places on the ground. Few public programmes have involved so many interlocking parts where, if any one of them went wrong, the whole programme would have slowed and could even have stalled. From the logistics to the IT, to the volunteers, to the availability of vaccinators, let alone to the vaccine supply, and that list is not exhaustive. Brigadier Prosser says Emily Lawson had a great phrase: 'assume positive intent. That no one gets out of bed to undermine what we are doing. So when people hit problems and it appeared things could not be done, ways were found to help them do it.'

The programme held large-scale webinars, often with many hundreds of participants, at least weekly during the earlier stages and, at times, more frequently. Some of these were decidedly tetchy and even hostile. But it meant that problems and frustrations got aired in order that solutions could be sought – and there were plenty of frustrations, as this report has illustrated.



But NHS England did not just prescribe solutions and throw them over the wall. So, for example, the IT and logistics teams both went out into the field early on to see their operations working. And again, by way of example, when the issue of how to get the vaccine safely into care homes arose, Dr Nikki Kanani joined one of the pilots to understand first-hand what was involved. Lessons were learnt from that.

And then, of course, there were the ministers who, acting on the advice of NHS England, the JCVI and Chris Whitty (England's Chief Medical Officer), had to take key decisions. These included when the next cohort should join, agreeing the extended dose interval for the vaccines, and accepting the advice about which age groups the AZ vaccine should be used for (despite their desire to go as fast as possible). And subsequently deciding that the programme should be extended to 12–15-year-olds.

For many months, there were weekly Tuesday meetings with the Prime Minister, and pretty much daily contact with health ministers. The Prime Minister repeatedly – for some, infuriatingly, but that was part of his job – pressed for ever-faster progress. But, at least until December 2021, he ultimately accepted that the NHS would do what NHS England said it could do. In this, according to at least some of those involved, the then Health Secretary, Matt Hancock (after an initial and early wish to go far faster than the vaccine supply would allow) also played a part in keeping the targets for uptake stretching but achievable, and in the face of the Prime Minister's demands.

Questions can indeed be asked about the decision initially to only use schools to vaccinate school children, and about the initial booking system for booster doses. But that does not detract from a judgement that most of the decisions over the vaccine roll-out taken by the central leadership appeared to be broadly right. At least to date.

And the mantra that the programme should be both simple and fair was crucial throughout – making it as easy as possible to get vaccinated, while working hard to reach those least in touch with health care and who were least trusting of government and of the vaccine.



The power of the NHS

This can be brief. But as one of those involved put it, the programme did show ‘the convening power of the NHS’. The way volunteers flooded in, community and faith leaders rallied round, the way the private sector too travelled extra miles to make this work... No doubt that was not unique to the UK. But it happened.

This was the NHS... but...

Both for those who hold the simplistic view that ‘public is good, private bad’, and for those who hold the opposite view (that only the private sector is capable of innovating and delivering), the vaccine roll-out should deliver a dose of humility. This was an NHS and local government operation, supported by the army, and it involved much innovation, not least locally. But it was underpinned by strong support from the private sector, which, as described earlier, played a crucial role in the IT and logistics for the roll-out. And in both cases, businesses that normally compete instead co-operated to make the programme possible.

Luck and judgement

A pandemic was, of course, predictable. It was, after all, at the top of the government’s risk register. Its timing, however, was not. Had it happened 10 years ago – and, for some elements, even five years ago – the roll-out would have been far harder.

A decade ago, the messenger RNA (mRNA) technology that produced the Pfizer and Moderna vaccines might have been sufficiently advanced. But it is unlikely that it would have got to a Covid vaccine as quickly. The genome sequencing of the virus would have been slower and the IT that also underpinned the vaccine’s development would have been slower.

The ability of IT systems to pull data out of existing legacy systems and then repurpose it was in its infancy compared to the way in which the programme was able to use it. The cloud – which, merely by way of example, allowed the non-hospital vaccination sites to be set up so that they could check people’s eligibility and record vaccinations in real time – was also young a decade ago. Amazon Web Services launched in 2006. But the market for cloud services



took time to develop. Apple and Microsoft's equivalent products date only from 2011. Zoom was launched in 2013 and Teams in 2014, both being, at that stage, cruder products. Adrian Stanbury (lead for the programme's data and technology) recalls acquiring a dedicated data warehouse in 2016 that had to be on site, with the floor reinforced to take it. So in earlier years, 'the analytic capability would have been very difficult,' he says. 'The ability to analyse huge amounts of data and act on it, and to do it on a laptop, all that is much, much easier.'

Other elements of luck – or perhaps judgement – involve the NHS's super-structure. The last big reorganisation of the NHS, which took effect in 2013, did away with its regional structures and fragmented much of its operations. In place of three organisations at its head there was, by 2020, one organisation in the shape of NHS England.¹⁷ In 2017, NHS England created the missing middle – seven regional offices. In 2019, PCNs were announced and, indeed, established by the time of the pandemic. Both were key to the programme. Without them, it would still have happened. But almost certainly less smoothly.

One voice from the centre says 'the regions, and the regional commissioners in particular, were crucial'. Another, out in the field, that they proved 'a powerful transmission belt between the centre and the ground', while there are GPs who say 'without the primary care network we could not have done it'.

Much has been made here of the importance of the physical delivery chain for the vaccine and kit. But we also heard that the policy delivery chain over what needed to be done – from the centre to the regions to the PCNs and pharmacies – also, on the whole, worked well. Not just conveying things from the centre but playing back up to the centre the real-world position on the ground. There are those who say that Amanda Pritchard, as the Chief Operating Officer for NHS England, played an important role in that.

Against that, there are complaints that NHS England was very cautious – over-cautious – in sharing data locally at the beginning, not just within the NHS but with local government. It is widely acknowledged that this improved over time.

¹⁷ At the top, the NHS Trust Development Authority and Monitor had, by 2020, merged into NHS Improvement, and NHS Improvement had progressively been merged – de facto if not yet de jure – into what is still technically known as NHS England and NHS Improvement. The current Health and Care Bill 2021–22 aims to make those mergers formal.



And while the PCNs were crucial, the roll-out also produced strains among and within GP practices, where some were reluctant or even declined to assist. The effects of that are still being felt in places.

It is also worth noting that, while everyone would have liked a vaccine even earlier, when the first doses arrived, the bulk of a big autumn flu vaccination programme had already been completed, thus freeing up capacity. Also, the programme was launched not into a lull in the pandemic but into rapidly rocketing cases. For those most at risk – the older cohorts – that in itself provided a huge incentive to get vaccinated. The fact that people came forward in vast numbers, and the fact that the NHS then delivered, created momentum. Success built further success. And while none of our interviewees are directly quoted to this effect, several said that ‘we had a bit of luck’ – on matters both large and small.

Central versus local

The ever-evolving balance between centralisation and local initiative and discretion is the history of the NHS since 1948. For the roll-out, it was a mix of the two. Much was specified centrally. The precise requirements for a vaccination site, for example, given the nature of the new vaccines. NHS England did its very best to make sure the essentially age-based approach was adhered to. But there were huge amounts of local innovation. Both the central bit and the local bit flexed as different cohorts with different characteristics came along, as the vaccine supply varied, and as new ways were found of seeking to build trust in the vaccine.

System-working

The point has already been made that the roll-out achieved what it did because, in many parts of the country, the NHS and local government worked hand-in-glove – the NHS providing the vaccine, local government harnessing community champions to help build trust in it (see, for example, [Strelitz and Bowers 2020](#)), providing additional sites, and much else. Alison Tonge, NHS England Regional Director of Commissioning for the Midlands, says, ‘I’ve worked in the NHS for 33 years and this is the first time that I’d say, without doubt, everybody has just put their organisations aside and really worked together as a system. And we must not lose the benefits of doing that.’



Dominic Harrison, Director of Public Health in Blackburn with Darwen, says that not just the vaccine roll-out but the entire experience of managing the pandemic:

... has been transformational in the way that NHS and local government works together. Just understanding each other's business. And over the next six months we have to create place-based partnerships within our integrated care system, and the people doing that know each other personally now. We have had arguments together and we have done lots of positive things together. So it has moved that on dramatically, and we've probably got the best chance in a generation of making some of that work.

Again, it should be said, not all such co-operation was universal. Just how much of it can be bottled and applied outside the crisis of a pandemic is one of the most intriguing and unanswerable questions that the pandemic has raised.

Outreach

Getting to those who normally have little or no contact with the health service, and who lacked trust, may in fact be the biggest lesson from the vaccination roll-out, and the biggest opportunity it has created. Almost all of our interviewees said so – while recognising that it will not necessarily be easy outside of the crisis of a pandemic.

Dr Nikki Kanani, Medical Director for Primary Care at NHS England, says she hopes the experience:

... fundamentally changes our relationship with the community. Because if they can trust us to come and talk to them, and build up a relationship, and give them a new vaccine that they then take, that does so much for how we deliver health care in the future. And not just vaccinations. We want that embedded in everything we do.

It is wanted on the ground as well as by those from the NHS and in public health. Pushpa Raguvaran from the Sri Murugan Hindu temple in Newham, London, says the use of the temple's hall as a vaccine centre has shown what can be done:

We've been feeding this back. There is a huge opportunity for us to go beyond the work that we do in a religious way, to draw the community in and do much



more with them around health services. Not just around mental health issues, but around blood pressure checks, diabetes, all sorts of things. The infrastructure we have created for this would be very useful, making the community feel that they are involved in health, being looked after, with a central point they can go to.

The lesson from this, as several interviewees put it, is that it is not enough for the NHS just to offer a universal service. It has to offer equal access, taking it to places that allow that to happen. Or, as one interviewee put it, ‘delivering equal services won’t deliver equal outcomes, because what works for the white population won’t work for the black or the Bangladeshi population’.

Pharmacies played a growing part in the vaccination programme – by November 2021 they had delivered around 16 per cent of all doses, compared to 55 per cent for the GP-led sites. And it is clear some people preferred to access the vaccine that way. Pharmacists do deliver the seasonal flu vaccine, but not childhood immunisations. And while efforts are being made to not only allow but encourage pharmacists to do more – the areas in which they are now paid for various forms of screening and prescribing have recently been extended ([Department of Health and Social Care 2021a](#)) – more undoubtedly looks possible. For such things to happen at scale, the way the money flows around the NHS will have to change further, along with changes to make it easier for pharmacists to become prescribers.

As Ed Waller, Director of Primary Care at NHS England, says:

We’re trying to get primary care pharmacies and GPs to reach out into communities that aren’t normally in touch with the health system, to try and find those people. And I think we’ve learned quite a lot in Covid, about how you persuade people to engage. The challenge will be, can we make this business-as-usual, and not just something that happens in a crisis?

Value for money

Making a judgement about this is beyond the reach of this report. There will have been some waste, as outlined earlier. In a national emergency, when everything has to be thrown at it, that is inevitable. The National Audit Office will no doubt provide a view on value for money in time.



Running the NHS 'hot'

In the main, this issue is also beyond the scope of this report. Many have made the point that, with fewer doctors and nurses per head, fewer beds and fewer intensive care beds than many European countries – thus running the NHS 'hot' pretty much all the time – the NHS had little spare capacity when the pandemic struck ([Health and Social Care and Science and Technology Committees 2021](#), paras 46–57). Where it does apply directly to the roll-out is in the supply chain, including the provision of PPE and other predictable consumables. Steve Gibb, the head of logistics for the programme, says that rather than hold a stockpile – it was insufficiently renewed so some supplies were found to be out of date when needed – it would be better to run the supply chain fatter. 'Going from, say, 8 weeks' cover to 20 weeks' is not the end of the world in any inventory,' he says – while keeping track of where it all is and that it is being used in turn.

The power of data

The NHS has never used so much data so powerfully – and certainly never so fast – to operationalise a programme. That meant not just that the supply of kit and of the vaccine was managed in real time – where it was, where it was needed. It meant the programme could establish, at a remarkably local level and remarkably fast, which places were lagging, which groups were proving harder to reach, where more trust had to be built, and where new sites were needed. The booking system worked with relatively few glitches, and the NHS app, despite some problems (as noted earlier), came into its own (indeed, it was even the most downloaded app on iPhone in 2021). Those are not skills that should be put back in a box. They should be exploited further.

As Simon Stevens has pointed out, here and elsewhere ([Pym 2021](#)), the combination of powerful data and working with local government:

... is exactly how early diagnosis of cancer, diabetes and all the screening programmes should be running. The ability to track uptake and then pretty agilely develop different ways to interact with people in order to reach them for preventive services. This is exactly what it means to talk about integrated care and moving the NHS on to an anticipatory basis, with population health as an organising principle.



Postscript

This account had to draw the line somewhere. Just as it was being finalised at the end of November 2021, the yet more infectious Omicron variant emerged in South Africa. It was not immediately clear how far – if at all – the new variant would escape the current vaccines.

There was a brief travel ban from a number of African countries to buy a little time for extra immunisations. Mandatory mask-wearing was reintroduced in England, first on public transport and in shops, and later, on an advisory basis, for secondary schools. Working from home was again advised, but not mandated. For larger venues a pass became needed – proof of vaccination, or a negative lateral flow test. Scotland, Wales and Northern Ireland applied appreciably more stringent restrictions.

The JCVI advised that clinically vulnerable 5–11-year-olds should be vaccinated and that 12–15-year-olds should be given a second dose. It continued to consider whether the younger children should be vaccinated more widely. For adults, the interval between second and third doses was shortened from six to three months. At the very end of November 2021, the Prime Minister promised that all adults in England would be offered a booster jab by the end of January – adding 14 million to those already entitled. It was a challenge that looked to be on a similar scale to the original roll-out, given that a degree of exhaustion among both vaccinators and volunteers had set in. But it looked as if it might be achievable in terms of jabs in arms.

Steps were taken to increase the number of vaccination sites currently operating – just under 2,900 at the end of November 2021. The 15-minute wait after the Pfizer jab was relaxed. Additional payments were offered to pharmacists and GPs, including for doses delivered on Sundays and to those unable to leave their house. An initial 400 armed forces personnel, later boosted to 750, were deployed to help in various ways with the immunisations.

On Sunday 12 December 2022, however, Boris Johnson advanced the target for boosters by an entire month, promising the offer of a third or booster dose by the end of December. NHS England appeared to receive next to no notice of this decision and the booking system initially struggled to cope.



There are two ways to view that decision. One is that it was ‘boosterism’ to encourage the population to take a booster or third dose in the face of rapidly rising infections. The other is that for the first time in the roll-out the NHS had been set an impossible task. The peak performance in England, back in March, had been just over 756,000 immunisations in a single day. The ‘end of December’ target implied the delivery of a million doses a day, day after day, up to and including Christmas.

The NHS in England did top 900,000 doses on 18 December and for a week the rolling seven-day average was more than 700,000. But a million jabs in a single day, let alone daily, proved unachievable – not least because the highly infectious new variant had its own say about how achievable that was.

The government was able to claim that by the end of the month that it had ‘offered’ a booster, by text, email or call, to all eligible adults. Not all adults were, however, in a position to receive one. Some were within three months of their second dose. More significantly Omicron was so much more infectious that cases across the UK briefly surged to more than 200,000 a day – way higher than the daily infection rates for the peak of the Delta variant. The infections took out hospital staff, GPs, pharmacists and volunteers, plus their contacts, all of whom were expected to isolate, and by the turn of the year, 1 in 15 in England were estimated to have Covid – 1 in 10 in London.

Those who contracted the virus had to wait 28 days before being vaccinated. The combined effect of infections and isolations was that thousands of slots that the NHS was still able to offer went unfilled, and staff absence meant that there was not much of the promised surge in additional sites. As a result, the booking system in some cases was able only to offer slots further away than was ideal.

Despite all that, over December, more than 13 million boosters were delivered, along with 70,000 first doses and almost 91,000 second ones. The proportion of the population aged over 12 who had received a booster or a third dose jumped from 34 per cent at the start of the month to 59 per cent by the end, with only 10 per cent of those aged over 50 – those more at risk – yet to receive one.

This missed the political target of a million jabs a day. But it was, yet again, and in the circumstances, no mean achievement. The booster programme was clearly, however, set to run on well into January and beyond, with, at the start of the year,



50 per cent of 12–15 year olds still to receive a first jab – at least in part because over the end of the previous school term and on into the start of the new one the virus spread rapidly through schools, with the 28-day wait to then have a jab again slowing up take.

The silver lining was that while the Omicron variant was plainly more infectious it appeared to cause less severe disease and the vaccines continued to reduce hospitalisations and deaths. The fact that it appeared to cause less serious disease may also, for some people, have reduced their sense of urgency about getting a booster. Or even of getting a first one for those yet to do so – despite the fact that those in intensive care with Covid were overwhelmingly the unvaccinated.

Omicron’s arrival, however, underlined that a fourth or even a fifth dose was more than likely, at least for the most vulnerable – as an aide to helping the country to live, longer term, with the virus. In December the government ordered an additional 114 million doses of the Pfizer and Moderna products in order to make a fourth dose possible.

That raised once again what was to be the original postscript to this report.

Namely, that this account does not address a key ethical issue – should the UK and other countries be doing boosters, and possibly further doses beyond that, when so many people across the world have yet to receive a first dose? With other variants possible, and maybe even nastier ones, there is a strong case that both individually and globally we are not safe until we are all safe, or as safe as we can be.

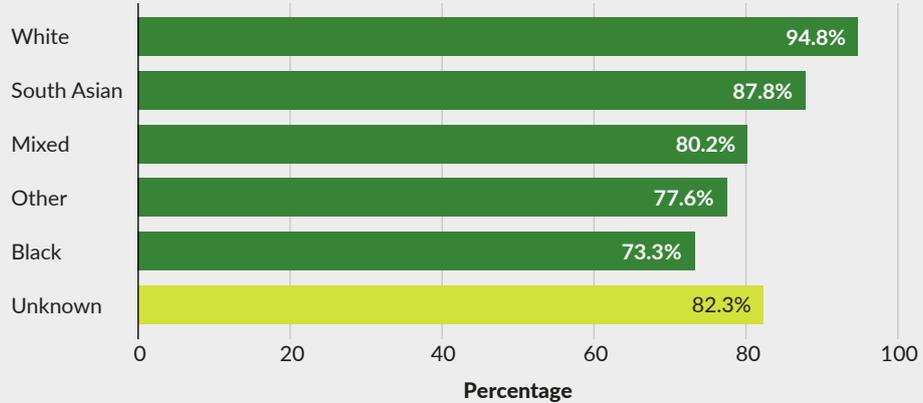


Appendix

Figure 4 Vaccine coverage is lower among ethnic minorities



Percentage of those aged 50 and over vaccinated, by ethnicity

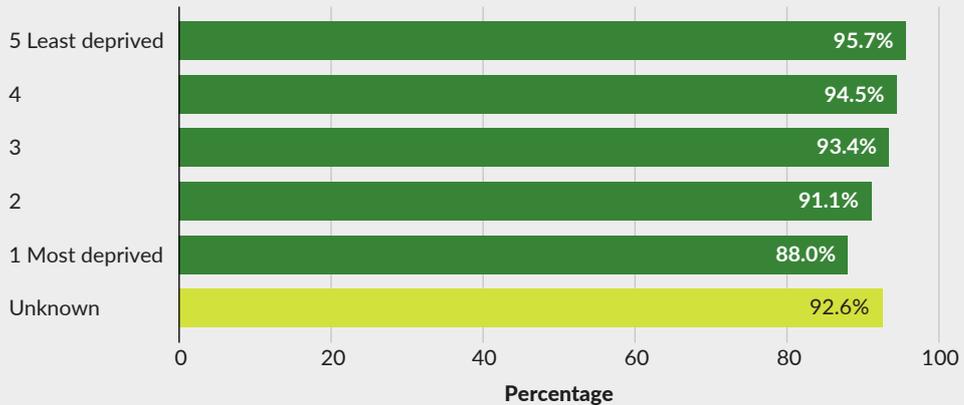


Notes: People receiving at least a first dose of Covid-19 vaccine. Data covers approximately 40 per cent of the general population in England, from general practices that use TPP electronic health record software. Source: OpenSAFLY analysis of NHS data in England. Data to 15 December 2021.

Figure 5 People living in poorer areas are less likely to have had the vaccine



Percentage of those aged 50 and over vaccinated, by deprivation level



Notes: People receiving at least a first dose of Covid-19 vaccine. Data covers approximately 40 per cent of the general population in England, from general practices that use TPP electronic health record software. Source: OpenSAFLY analysis of NHS data in England. Data to 15 December 2021.



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The vaccination programme has, to date, been one of the few almost unqualified successes of the United Kingdom's response to the Covid-19 pandemic. But how did it happen, and what lessons can we take from it?

Drawing on conversations with those involved on the ground and at the centre of the health service, this report captures the story of the vaccine roll-out and highlights the factors that enabled its success.

- Powerful use of data and the right software made it possible to map who had had the vaccine, identifying gaps in uptake to almost street level.
- Outreach efforts used that data to plug gaps in provision and reach communities that may have been hesitant towards the vaccine.
- System-working brought together the scale of the roll-out with the local knowledge of local government, directors of public health and the voluntary sector to take NHS services to places they wouldn't normally go.
- Volunteers played a vital role – not just in acting as stewards at vaccination sites, but also in terms of community outreach and building trust in the vaccine and in the NHS.

The authors conclude that some of the many factors that contributed to the successes of the roll-out – powerful use of data, including mapping data, joint working between the NHS and local government, and thus outreach to those the NHS can find harder to reach – should be applied to other services, for example childhood immunisations, and screening for cancer, diabetes and high blood pressure.

