

Answers in the App Store?

Lessons from COVID-19 technologies

This briefing examines the available evidence relating to the effectiveness, public legitimacy, inequalities and governance of 'COVID-19 technologies' – contact tracing apps and digital vaccine passports. We draw insights and lessons from this evidence that should guide policymakers in their response to future public health crises. They should also support policymakers in their decisions about whether to use data and AI technologies to support public health and social care provision.

The Ada Lovelace Institute (Ada) is an independent research institute with a mission to make data and AI work for people and society. This means making sure that the opportunities, benefits and privileges generated by data and AI are justly and equitably distributed.

In April 2020 Ada produced one of the first reports on COVID-19 technologies, *Exit through the App Store?*, designed to support the UK Government in complex decision-making about uses of technologies at the outset of the pandemic.



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Findings and actions for policymakers

Effectiveness: did COVID-19 technologies work?

Contact tracing apps

- Existing evidence shows that contact tracing apps demonstrated the feasibility of digital contact tracing and produced some positive epidemiological impact, although technical issues were also documented in academic research and in the media.
- The overall impact of contact tracing apps on public health is unclear due to significant evidence gaps and lack of independent research. Limited evidence inhibits evaluation of whether these technologies reached their full potential as effective interventions in the UK's COVID-19 response strategy. These evidence gaps include, but are not limited to:
 - There is limited evidence showing the impact of these technologies on public health behaviours of users.
 - There is no comprehensive evaluation of the role and impact of these technologies from the perspective of local public health staff and authorities.
 - There is inadequate evidence about the benefits and shortcomings of these technologies compared to non-digital public health interventions. This raises the question of whether contact tracing apps were implemented at the expense of other health interventions (most notably manual contact tracing).

Digital vaccine passports

- Existing evidence demonstrates that a vaccinated person's risk of transmitting the virus is not considerably lower than an unvaccinated person, but the vaccinated person is less likely to develop severe symptoms.¹ Therefore, it is unlikely that digital vaccine passport schemes helped to reduce the rate of transmission, but they might have reduced pressures on public healthcare by helping to ensure that fewer numbers of people required medical care.
- There is no comprehensive evidence showing whether digital vaccine passports motivated people to follow other COVID-19 protection measures. However, it's plausible that digital vaccine passports could have fostered a false sense of security, which discouraged people from pursuing other measures to reduce the risk of transmission (such as wearing a face mask or getting tested).

Actions for policymakers

To build evidence around the effectiveness of these technologies as part of the wider COVID-19 pandemic response strategy.

- Support research and learning efforts to better understand the impact of COVID-19 technologies on people's public behaviours (for example, wearing face mask, getting tested or self-isolation).
- Support research and learning efforts in evaluating the impact of COVID-19 technologies by involving the perspectives and experiences of local public health teams and authorities.
- Compare the effectiveness of COVID-19 technologies to alternative (non-digital) health interventions.
- Use this impact evaluation to help set standards and strategies for the future use of technology in public crises.

To ensure the effective use of technologies in future pandemics:

- Invest in research and evaluation as soon as a pandemic is declared/identified.
- Implement a clear evaluation framework to build evidence during deployment that supports understanding of the role that technologies play in broader pandemic health strategies. This framework should:
 - define criteria for effectiveness using a societal approach that examines factors beyond technical efficacy and builds an understanding of people's experiences
 - establish how effectiveness will be measured and monitored by working closely with public health experts and local communities, and set targets accordingly
 - carry out robust impact assessments and evaluation when technologies are first deployed and over time.

1 Carlos Franco-Paredes, 'Transmissibility of SARS-CoV-2 among fully vaccinated individuals (2022) The Lancet [https://doi.org/10.1016/S1473-3099\(21\)00768-4](https://doi.org/10.1016/S1473-3099(21)00768-4)

Public legitimacy: did people accept COVID-19 technologies?

- The UK is one of the few countries that enacted adequate regulations and oversight mechanisms to govern COVID-19 technologies. However, these policies and practices were not enough to ensure that the public consistently saw these technologies as trustworthy.
- The lack of trust in government and in technologies' effectiveness, as well as poor user understanding or knowledge of how COVID-19 technologies worked, negatively impacted public legitimacy.
- There were protests against digital vaccine passports and the restrictive measures that they enabled (for example, not being able to enter venues or travel).
- Existing evidence also suggests that trust in these technologies varied significantly between different ethnic groups. The research shows that Black, Asian and minority ethnic people were more concerned about how their data would be used and therefore less likely to use these technologies than the white majority.

Actions for policymakers

- Ensure that people's rights and freedoms are safeguarded with strong regulations, oversight and redress mechanisms.
- Effectively communicate the purpose of deployed technologies, and their legislative and regulatory basis, to build public trust and social consensus.

Inequalities: how did COVID-19 technologies affect inequalities?

- The UK adopted a number of policies and practices including paper-based vaccine passports and financial help for those self-isolating to mitigate the risk of widening existing inequalities, such as differential rates of marginalisation through digital exclusion.
- However, some social groups faced barriers in their access to and ability to use COVID-19 technologies. For example, people structurally excluded from sufficient digital access or skills could not use contact tracing apps. This raises the question of whether these technologies widened health inequalities.
- The UK was one of the many countries that requested proof of vaccination from inbound travellers. Mandatory digital vaccine passport systems amplified global inequalities by discriminating against the residents of countries which could not secure adequate vaccine supply or had low vaccine uptake, for example, many African countries.

Actions for policymakers

To prevent the amplification of health inequalities:

- Create monitoring mechanisms based on criteria that specifically address the impact of technology on inequalities, particularly for social groups who are more likely to experience differentially worse health outcomes.

- Use this evidence to identify marginalised and disadvantaged communities and to establish strong public health services, interventions and social policies to support them.

To prevent the amplification of global inequalities:

- Harmonise global, national and regional regulatory tools and mechanisms to address global inequalities and tensions that could arise from the deployment of COVID-19 technologies.

Governance, accountability and regulation: were COVID-19 technologies well governed and accountable?

- The UK enacted robust regulations specifically to govern contact tracing apps and digital vaccine passports. In addition, civil society and the media played an important role as part of broader oversight mechanisms in ensuring adherence to relevant laws and regulations.
- The UK Government was reliant on private technology companies to develop and deploy these technologies, demonstrating and reinforcing industry influence and power over digital infrastructure.

Actions for policymakers

To ensure that individual rights and freedoms are protected:

- Create specific guidelines and laws to ensure technology developers follow privacy-by-design and ethics-by-design principles, and that effective monitoring and evaluation frameworks are in place for the deployment of these technologies; and ensure regulators are properly equipped to enforce these regulations.

To reverse the growing power imbalance between governments and the technology industry:

- Develop the public sector's technical literacy and ability to procure, design and create technical infrastructure. The private sector should not be excluded from developing technologies related to public health, but it is crucial to ensure that the technical infrastructure underpinning public health responses is effectively co-designed with meaningful government and civil society involvement and oversight.

Definitions used in this briefing

COVID-19 technologies: the data-driven technologies and AI tools deployed in countries around the world to support the COVID-19 pandemic response. Contact tracing apps and digital vaccine passports were the most widely deployed. Both technologies aimed to signal an individual's risk to others, and to enable or to restrict that individual's freedom of action accordingly.

There are varying definitions of these technologies. In this briefing, we define them through their common purposes and properties, as follows:

- **Contact tracing apps** aim to measure an individual's chances of being infected with COVID-19 and transmitting the virus to others, based on location or close proximity to someone infected with COVID-19. The health status of an infected person is added on the app (either by the infected person or health authorities) to alert other app-carrying people who might have been exposed. People who have received an alert are considered to be 'risky' and expected to test or self isolate for a period of time.²
- **Digital vaccine passports** provide authorised 'health information' for a particular individual, including evidence of vaccine status or antigen test results. They are used to prove an person's 'risk' to others. This is based on their COVID-19 virus test, proof of recovery or vaccine status and results in blocking or allowing access to spaces and activities (for example, travelling, leisure or work).³

COVID-19 technologies in England, Northern Ireland, Scotland and Wales

The UK National Health Service (NHS) is a devolved public service. The devolved administrations were at the forefront of the UK's response to the COVID-19 pandemic.⁴ They played a significant role in determining the technical properties, legislative frameworks and implementation policies of COVID-19 technologies.

Devolved administration	Name of the contact tracing app	Name of the digital vaccine passport
England	NHS COVID-19 app	NHS COVID Pass
Northern Ireland	StopCOVID NI	COVIDCert NI
Scotland	Protect Scotland	NHS Scotland COVID app
Wales	NHS COVID-19 app	NHS COVID Pass

2 Muhammad Shahroz and others, 'COVID-19 digital contact tracing applications and techniques: A review post initial deployments' (2021) *Transportation Engineering*. doi: 10.1016/j.treng.2021.100072

3 Ada Lovelace Institute, *Checkpoints for vaccine passports* (2021) <https://www.adalovelaceinstitute.org/report/checkpoints-for-vaccine-passports/>

4 Department of Health & Social Care. 'Technical report on the COVID-19 pandemic in the UK' (GOV.UK, 1 December 2022) ch 7 www.gov.uk/government/publications/technical-report-on-the-covid-19-pandemic-in-the-uk/chapter-7-contact-tracing-and-isolation

Introduction

Contact tracing apps and digital vaccine passports, which are the focus of this policy briefing, were two of the most widely deployed technologies during the COVID-19 pandemic. Although contact tracing apps had previously been deployed in some countries, in the UK they were novel technologies.⁵

The emergence of contact tracing apps and digital vaccine passports resulted in public anxiety about their effectiveness, legitimacy and proportionality, as well as their implications for informed consent, privacy, surveillance, equality and discrimination.

These technologies were high-risk measures, but the extraordinary circumstances of the pandemic meant that they were implemented quickly and without a clear consensus on how they should be designed, governed and regulated.

The Ada Lovelace Institute was one of the first research organisations to investigate the potential legislative, technical and societal implications of contact tracing apps and digital vaccine passports. This policy briefing summarises and builds on this work, identifying key findings from the existing evidence and drawing out lessons for policymakers.

We also highlight evidence gaps, which indicate that evaluation and learning mechanisms fell short when using COVID-19 technologies. Policymakers should address these evidence gaps by supporting retrospective evaluation of these technologies. This could help to improve standards and strategies for the future use of technology in pandemics, as well as in public health and social care provision.

5 Lisa O. Danquah and others. 'Use of a mobile application for Ebola contact tracing and monitoring in northern Sierra Leone: a proof-of-concept study' (2019) 19, BMC Infectious Diseases <https://doi.org/10.1186/s12879-019-4354-z>

Effectiveness, public legitimacy, inequalities and accountability have varying definitions. In this report we define them as follows:

Effectiveness: The effectiveness of contact tracing apps and digital vaccine passports is defined in terms of the extent to which they produced measurable positive effects on public health (for example, decreasing the rate of transmission or reducing strain on health services). This differs from technical efficacy, which refers to the ability of a technology to perform a technical task (for example, a digital vaccine passport's ability to generate a QR code to share data). (p. 8).

Public legitimacy: We define public legitimacy in terms of public consent for the use of contact tracing apps and digital vaccine passports. We focus also on marginalised and disadvantaged communities, whose opinions and experiences might differ. (p.11).

Inequalities: We define inequalities as new or existing health and other types of societal inequalities for disadvantaged and vulnerable groups that are potentially introduced or exacerbated by COVID-19 technologies (for example, people who could not use COVID-19 technologies due to inadequate digital access or skills). We also examine inequalities of resources, opportunities and power between countries and regions (for example, access to vaccine supplies globally). (p. 13).

Accountability: We use accountability to refer to the regulations, institutions and mechanisms that constitute the means of making governments and officials accountable for preserving civil rights and freedoms. (p.16).

Effectiveness: did COVID-19 technologies work?

Contact tracing apps

The effectiveness of contact tracing apps has not been comprehensively evaluated, as acknowledged in the Department of Health & Social Care's *Technical report on the COVID-19 pandemic in the UK*.⁶ The UK Government has not commissioned an independent study in this area.

An evaluation study conducted by the Alan Turing Institute and University of Oxford analysed anonymised, aggregated user data from the NHS COVID-19 app to estimate the epidemiological impacts in England and Wales. It found that that in its first year the app averted 1 million COVID-19 cases.⁷ While this observational study shows positive epidemiological impact, the authors recognise the limitation that it uses only available data from the app, which was anonymised, aggregated and minimal.

6 Department of Health & Social Care (n 4).

7 Michelle Kendall and others, 'Epidemiological impacts of the NHS COVID-19 app in England and Wales throughout its first year' (2023) 14(858), Nature Communications <https://doi.org/10.1038/s41467-023-36495-z>

There have not been any subsequent research efforts to examine the app's use in real-life contexts. For contact tracing apps to work as intended, users had to download the apps, keep them updated, report a positive COVID-19 diagnosis and change their behaviours.

There is evidence from the UK demonstrating that app downloads do not necessarily lead to continued use:

- In July 2021, the BBC reported that around 50,000 people had stopped using the Protect Scotland app, although the Scottish government continued to recommend its use.⁸
- Millions of people didn't activate the NHS COVID-19 app – used in England and Wales – despite downloading it to their mobile devices.⁹
- One study found that people stopped using apps after a while because they lost confidence in their effectiveness.¹⁰
- A comparative analysis of user experience of the contact tracing apps in the UK suggests user dissatisfaction due to technical issues such as high battery drainage, the perceived inefficacy to identify contacts of infected users and/or to send notifications in a timely manner.¹¹

The rapid adoption of contact tracing apps left insufficient room for discussing or assessing alternative solutions. It is possible that contact tracing apps may have been implemented at the expense of other health interventions such as manual contact tracing, which – if conducted in an effective and timely manner – can save lives, particularly for disadvantaged and marginalised communities.¹²

In England for example, the NHS Test and Trace service cost £13.5 billion, of which £35 million was spent on the NHS COVID-19 app. It is crucial to consider the effectiveness of contact tracing apps by comparing their effectiveness with non-digital interventions and to weigh up their benefits and shortcomings.

Digital vaccine passports

Digital vaccine passports demonstrate an individual's transmission risk to other people. They rely on the assumption that an individual is a lower risk to others if they have been vaccinated,

8 BBC, 'Covid in Scotland: Thousands turn off tracking app' BBC News (24 July 2021) www.bbc.co.uk/news/uk-scotland-57941343 accessed 26 April 2023.

9 Sam Trendall, 'Data suggests millions of users have not enabled NHS contact-tracing app' Public Technology (30 June 2021) www.publictechnology.net/articles/news/data-suggests-millions-users-have-not-enabled-nhs-contact-tracing-app accessed 26 April 2023.

10 *ibid.*

11 Vahid Garousi and David Cutting, 'What do users think of the UK's three COVID-19 contact-tracing apps? A comparative analysis' (2021) 28(1) *BMJ* <https://doi.org/10.1136%2Fbmjhci-2021-100320>

12 Susan Landau, *People Count: Contact-Tracing Apps and Public Health* (Massachusetts: The MIT Press 2021).

or have natural immunity. In early 2021, we argued that as vaccination status does not offer clear evidence about an individual's risk of transmitting the disease, governments should pause deploying vaccine passports until the evidence becomes clear.¹³ In 2023 the scientific evidence continues to demonstrate that 'a vaccinated person's risk of transmitting the virus is not considerably lower than an unvaccinated person'.¹⁴

Despite the lack of clear evidence on vaccines' efficacy in reducing transmission, all four UK nations introduced digital vaccine passports in 2021.¹⁵ There is strong evidence suggesting that vaccines are effective in protecting individuals from developing severe symptoms (although the experts state that their efficacy wanes over several months).^{16 17} While it is doubtful that digital vaccine passports helped to decrease the rate of COVID-19 transmission in the UK society, they reduced pressure on public healthcare due to fewer people requiring medical care.

Scientific evidence suggests that a wide range of COVID-19 protection measures can reduce the risk of transmission, such as wearing face mask or getting tested. Concerns have been raised that digital vaccine passports could potentially foster a false sense of security and discourage people from pursuing other important COVID-19 health measures.¹⁸

For example, some experts argue that digital vaccine passport schemes in the EU led to more infections by increasing social contact.¹⁹ Existing studies that explore this topic are limited. They were either conducted in the early phase of the pandemic or remain narrow in their scope. This evidence gap means that we cannot fully evaluate the impact of digital vaccine passports on public health behaviours or weigh their benefits against risks in a comprehensive manner.

To address this evidence gap, we need studies that examine the attitudes of both unvaccinated and vaccinated individuals towards other COVID-19 protection measures over time (for example, longitudinal cohort studies). Evidence from this type of research could allow experts to understand whether digital vaccine passports create a false sense of security and negatively impact a person's motivation to follow other COVID-19 protection measures.

13 Ada Lovelace Institute, What place should COVID-19 vaccine passports have in society? www.adalovelaceinstitute.org/report/covid-19-vaccine-passports/

14 Carlos Franco-Paredes, 'Transmissibility of SARS-CoV-2 among fully vaccinated individuals' (2022) 22(1), *The Lancet* [https://doi.org/10.1016/S1473-3099\(21\)00768-4](https://doi.org/10.1016/S1473-3099(21)00768-4)

15 Ada Lovelace Institute, 'International monitor: vaccine passports and COVID-19 status apps' (2020) www.adalovelaceinstitute.org/resource/international-monitor-vaccine-passports-and-covid-19-status-apps/

16 World Health Organisation, 'Vaccine efficacy, effectiveness and protection' (14 July 2021) www.who.int/news-room/feature-stories/detail/vaccine-efficacy-effectiveness-and-protection accessed 12 April 2024.

17 Arthur Allen, 'Pfizer CEO Pushes Yearly Shots for Covid. Not So Fast, Experts Say' *KFF Health News* (March 21 2022) <https://kffhealthnews.org/news/article/pfizer-ceo-albert-bourla-yearly-COVID-shots/>

18 Ada Lovelace Institute (n 13).

19 Joel de Ceulaer, 'Viroloog Emmanuel Andre: "Covid Safe Ticket leidde tot meer besmettingen"' *DeMorgen* (29 November 2021) https://www.demorgen.be/nieuws/viroloog-emmanuel-andre-covid-safe-ticket-leidde-tot-meer-besmettingen-bae41a3e/?utm_source=link&utm_medium=social&utm_campaign=shared_earned accessed 12 April 2023.

Actions for policymakers

To build evidence around the effectiveness of these technologies as part of the wider COVID-19 pandemic response strategy:

- Support research and learning to understand the impact of these technologies on public health behaviours (for example, wearing a face mask, getting tested or self-isolation).
- Support research and learning to evaluate the impact of these technologies by involving the perspectives and experiences of local public health teams and authorities.
- Compare the effectiveness of these technologies to alternative (non-digital) health interventions.
- Use this impact evaluation to help set standards and strategies for the future use of technology in public crises.

To ensure the effective use of technologies in future pandemics:

- Invest in research and evaluation from the outset, and implement a clear evaluation framework that builds evidence during deployment to support understanding of the role that technologies play in broader pandemic health strategies. This framework should:
 - define criteria for effectiveness by using a people-centred approach that goes beyond technical efficacy and builds understanding around people's experiences
 - establish how effectiveness will be measured and monitored by working closely with public health experts, local public health teams and authorities, and setting targets
 - carry out robust impact assessments and evaluation when technologies are first deployed and over time.

Public legitimacy: did people accept COVID-19 technologies?

COVID-19 technologies required trade-offs between data privacy, human rights and public health interests. For these technologies to be effective, members of the public had to consent to share their health data (for example, data on their COVID-19 test results or vaccination status), which is considered special category personal data under the UK General Data Protection Regulation (UK GDPR).²⁰ Public legitimacy, as an important determinant of willingness to share data, was therefore key to the success of contact tracing apps.

The international evidence demonstrates that the UK is one of a few countries that enacted adequate regulations and oversight mechanisms to govern these technologies.²¹ However, these

20 Information Commissioner's Office. 'What is special category data?' <https://ico.org.uk/for-organisations/guide-to-data-protection/guide-to-the-general-data-protection-regulation-gdpr/special-category-data/what-is-special-category-data/>

21 Ada Lovelace Institute, Lessons from the App Store: Insights and learnings from COVID-19 technologies (2023) <https://www.adalovelaceinstitute.org/report/covid-19-lessons-app-store/>

policies and practices were not enough to ensure that these technologies consistently enjoyed public trust, particularly among disadvantaged and marginalised communities, and groups that historically have lower trust in the Government.^{22 23}

There were protests against digital vaccine passports and the restrictive measures they enabled across the UK.^{24 25 26 27} There is evidence to suggest that one factor contributing to lack of public trust was poor user understanding or knowledge of how contact tracing apps and digital vaccine passports technologies work. In Samuel and others' qualitative research, when asked about contact tracing apps, participants imagined apps 'being able to "see" or "visualise" their every move'.²⁸ This indicates the participants' misunderstanding (or lack of knowledge) of the infrastructure of these apps. The contact tracing apps in the UK do not collect geo-location, which means they do not track users' location in a literal sense.

The existing evidence also suggests that trust in these technologies varied significantly between different ethnic groups. Individuals and communities who encounter structural inequalities are less likely to trust government institutions and public health advice. Hence, they were less likely to use these technologies than the general population. Douthwaite and others' online survey research investigated the adoption of, and attitudes towards, the NHS COVID-19 app (used in England and Wales). The research found that Black, Asian and minority ethnic participants were more concerned about how their data would be used and therefore less likely to download the app.²⁹

Comparable studies offer similar findings for digital vaccine passports. An Ipsos MORI survey found that minority ethnic communities and those in more deprived areas were more concerned about legal and ethical issues than white respondents, and therefore less likely to use digital

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- 22 For example, there was a protest against Northern Ireland's COVID-19 certification scheme in Belfast. See: Jonathan McCambridge, 'Hundreds protest against vaccine certification regulations' Belfast Telegraph (4 December 2021) <https://www.belfasttelegraph.co.uk/news/northern-ireland/hundreds-protest-against-vaccine-certification-regulations/41118207.html>
- 23 The Ada Lovelace Institute published a tracker that summarises a wide range of studies and projects that offer insight into people's attitudes and perspectives to COVID-19, technology and inequalities. See: Ada Lovelace Institute, 'Public attitudes to COVID-19, technology and inequality: a tracker' (2021) <https://www.adalovelaceinstitute.org/feature/public-attitudes-COVID-19-technology-inequality-tracker/>
- 24 John Toner, 'Anti-Covid vaccine passport protesters take over Belfast city centre' Belfast Telegraph (5 December 2021) <https://www.belfasttelegraph.co.uk/sunday-life/news/anti-covid-vaccine-passport-protesters-take-over-belfast-city-centre/41118880.html> accessed 26 April 2023.
- 25 Will Hayward, 'Protesters against vaccines and vaccine passports march through Cardiff', WalesOnline (18 September 2021) <https://www.walesonline.co.uk/news/wales-news/anti-vaxx-protest-cardiff-covid-21608062> accessed 23 April 2023.
- 26 Tom Pilgrim, 'Anti-vaccine passport protest blocks traffic in central London' Evening Standard (28 August 2021) <https://www.standard.co.uk/news/uk/london-clapham-common-people-twitter-metropolitan-police-b952815.html> accessed 23 April 2023.
- 27 Herald Scotland Online 2021. 'Scotland Against Lockdown anti-vax marchers protest in Glasgow' The Herald (19 December 2021) <https://www.heraldscotland.com/politics/19794938.scotland-lockdown-anti-vax-marchers-protest-glasgow/> accessed 23 April 2023.
- 28 Gabrielle Samuel and others, 'COVID-19 contact tracing apps: UK public perceptions', (2021) 32(1) Critical Public Health <https://www.tandfonline.com/doi/full/10.1080/09581596.2021.1909707>
- 29 Liz Douthwaite and others. 'Public Adoption of and Trust in the NHS COVID-19 Contact Tracing App in the United Kingdom: Quantitative Online Survey Study' (2021) 23(9) Journal of Medical Internet Research <https://www.jmir.org/2021/9/e29085/>

vaccine passports.³⁰ This mirrors our own research in *The Data Divide*: people from Black, Asian and minority ethnic communities indicated higher levels of concern than white respondents (a difference of 18%) that they would be discriminated against through digital vaccine passports.³¹

This evidence clearly illustrates that technologies that combine health information with social or surveillance data should be governed with strong laws, regulations, oversight mechanisms and sunset clauses to achieve public legitimacy. Alongside regulation, consideration must be given to ensuring communication on the purpose of new technologies is clear, effective and takes into consideration the needs of everyone in society. This is particularly the case for those technologies that require active public consent and cooperation, like contact tracing apps and digital vaccine passports.

Actions for policymakers:

- Ensure that people's rights and freedoms are safeguarded with strong regulations, oversight and redress mechanisms.
- Alongside regulation, effectively communicate the purpose and legislative and regulatory basis of technologies to build public trust and social consensus.

Inequalities: How did COVID-19 technologies affect inequalities?

At their emergence, one of the major risks we highlighted concerning digital vaccine passports was that mandatory digital vaccine passport schemes could lead to discrimination against unvaccinated people, and people without adequate digital access and skills.

Mandatory vaccine passport policies were adopted at different stages of the pandemic across the UK, although there were differences in implementation policies across the devolved administrations.³² All four devolved administrations created physical vaccine passports and included different forms of immunity in them.³³ It is also noteworthy that administrations financially supported people on low pay

30 Ipsos MORI 'Attitudes to vaccine passports' (2021) <https://www.ipsos.com/en-uk/majority-britons-support-vaccine-passports-recognise-concerns-new-ipsos-uk-knowledgepanel-poll>

31 Ada Lovelace Institute, *The data divide: Public attitudes to tackling social and health inequalities in the COVID-19 pandemic and beyond* (2021) <https://www.adalovelaceinstitute.org/report/the-data-divide/>

32 Helen Tatlow and others, 'Variation in the response to COVID-19 across the four nations of the United Kingdom' (2021) BSG-WP-2020/035 BSG Working Paper Series <https://www.bsg.ox.ac.uk/sites/default/files/2021-04/BSG-WP-2020-035-v2.0.pdf> accessed 26 April 2023.

33 NHS, 'NHS COVID Pass' <https://www.nhs.uk/nhs-services/covid-19-services/nhs-covid-pass/> accessed 12 May 2021.

to self-isolate, to increase adherence to self-isolation.^{34 35 36} These policies should be applauded.

However, the pandemic has shed light on striking health inequalities in the UK.³⁷ And the rapid rollout of contact tracing apps prevented a full consideration of how they would impact those existing health inequalities.

In this context, the impacts of digital exclusion on health inequalities should be investigated further. According to the 2022 Lloyds Bank Consumer Digital Index, around 14 million people in Britain – 27% of the population – struggle to operate digital tools and interact with online services.³⁸

The findings from a public attitudes survey the Ada Lovelace Institute conducted in partnership with the Health Foundation demonstrates that a fifth of respondents did not have access to a smartphone, and another 14% said they did not have access to broadband internet.³⁹ It is likely that many of these people were unable to use contact tracing apps, even if they wanted to. Therefore, it is important to understand whether those individuals faced worse health outcomes and consider what could have been alternative (non-digital) solutions for them.⁴⁰

We acknowledge that the UK is likely to build new technologies and continue using existing ones in response to diseases of pandemic potential in the future. However, it should not see technologies as a silver bullet, and ensure that effective non-digital health interventions are also in place when managing diseases in the future.

34 Welsh Government, '£500 self-isolation support payment scheme extended' (GOV.WALES, 13 July 2021)

<https://www.gov.wales/500-self-isolation-support-payment-scheme-extended#:~:text=The%20Self%2Disolation%20Support%20Scheme,or%20are%20a%20close%20contact>

35 UK Health Security Agency, 'Guidance: Claiming financial support under the Test and Trace Support Payment scheme' (GOV.UK, 12 October 2020) <https://www.gov.uk/government/publications/test-and-trace-support-payment-scheme-claiming-financial-support>

36 The Scottish Government, 'Self Isolation Support Grant' (mygov.Scot) <https://www.mygov.scot/self-isolation-grant>

37 David Finch and Adam Tinson, 'The continuing impact of COVID-19 on health and inequalities: A year on from our COVID-19 impact inquiry' (Health Foundation, 24 August 2022) <https://www.health.org.uk/publications/long-reads/the-continuing-impact-of-covid-19-on-health-and-inequalities#:~:text=Inequalities%20in%20COVID%2D19%20mortality%20by%20deprivation&text=Between%20July%20and%20December%202021,in%20the%20least%20deprived%20areas>

38 Lloyds Bank. '2022 Consumer Digital Index' (2022) https://www.lloydsbank.com/assets/media/pdfs/banking_with_us/whats-happening/221103-lloyds-consumer-digital-index-2022-report.pdf

39 Ada Lovelace Institute (n 31).

40 Department of Health and Social Care, 'NHS COVID-19 app alerts 1.7 million contacts to stop spread of COVID-19' (GOV.UK, 9 February 2021) <https://www.gov.uk/government/news/nhs-covid-19-app-alerts-17-million-contacts-to-stop-spread-of-covid-19#:~:text=There%20can%20be%20no%20doubt,to%20self%2Disolate%20since%20launch>

Global inequalities

The COVID-19 pandemic has highlighted the importance of international cooperation during global health crises.⁴¹ We would like to draw the UK Government's attention to the unintended implications of the use of digital vaccine passport schemes.

Mandatory domestic and international digital vaccine schemes – for example, the requirement to prove immunity status for domestic activities and international travel – led to a race between countries for access to COVID-19 vaccines.⁴² Low and middle-income countries found it difficult to secure adequate vaccine supplies for their populations.

We acknowledge the UK Government's support for the global vaccine facility Covax.⁴³ Despite such efforts, there continues to be a significant gulf between vaccination rates in different parts of the world. Africa continues to have the slowest vaccination rate of any continent, with just 33% of the population having received at least one dose of a vaccine as of December 2022.⁴⁴ As the World Health Organization highlighted, vaccine inequity undermined the efforts to end the COVID-19 pandemic.⁴⁵ In future pandemics the Government should consider the wider global implications of its local and national digital intervention policies.

41 Editorial, 'Global cooperation for a global pandemic' (2022) 23 (519) Nature Reviews Genetics <https://www.nature.com/articles/s41576-022-00522-4>

42 Lukman Nul Hakim Md Khairi and others, 'The Race for Global Equitable Access to COVID-19 Vaccines' (2022) 10(8) MDPI <https://www.mdpi.com/2076-393X/10/8/1306>

43 British High Commission Islamabad and British Deputy High Commission Karachi, 'UK's support to global vaccine facility Covax will help Pakistan's COVID-19 vaccination programme' (GOV.UK, 15 February 2021) <https://www.gov.uk/government/news/uks-support-to-global-vaccine-facility-covax-will-help-pakistans-covid-19-vaccination-programme> accessed 26 April 2023.

44 Josh Holder, 'Tracking Coronavirus Vaccination Around the World' The New York Times <https://www.nytimes.com/interactive/2021/world/COVID-vaccinations-tracker.html>

45 Tedros Adhanom Ghebreyesus, '2021 has been tumultuous but we know how to end the pandemic and promote health for all in 2022.' (World Health Organisation, 30 December 2021) <https://www.who.int/news-room/commentaries/detail/2021-has-been-tumultuous-but-we-know-how-to-end-the-pandemic-and-promote-health-for-all-in-2022>

Actions for policymakers:

To prevent the amplification of health inequalities:

- Create monitoring mechanisms based on criteria that specifically address the impact of technology on inequalities, particularly for social groups who are more likely to experience worse health outcomes.
- Use the impact evidence to identify marginalised and disadvantaged communities, and to establish strong public health services, interventions and social policies to support them.

To prevent the amplification of global inequalities:

- Harmonise global, national and regional regulatory tools and mechanisms to address global inequalities and tensions.

Governance, accountability and regulation: were COVID-19 technologies well governed and accountable?

Contact tracing apps and digital vaccine passports had significant implications for data privacy and human rights, and hence, provoked reasonable concerns around proportionality, legality and ethics

At the emergence of COVID-19 technologies, we highlighted the importance of oversight mechanisms to ensure technical efficacy and security, as well as the enforcement of relevant data protection regulations.⁴⁶

Our comparative international research shows that the UK was able to take diligent action due to pre-existing regulatory and redress mechanisms and oversight bodies, which allowed effective safeguarding of people's data compared to many other countries.⁴⁷ All four devolved administrations enacted strong, specific regulations and oversight mechanisms when introducing contact tracing apps and digital vaccine passports.^{48 49 50} They also clarified

46 Ada Lovelace Institute (n 3).

47 Ada Lovelace Institute (n 21).

48 The Scottish Government, 'The Health Protection (Coronavirus) (Requirements) (Scotland) Amendment Regulations 2022 and the Health Protection (Coronavirus) (Requirements) (Scotland) Amendment (No.2) Regulations 2022: equality impact assessment' (gov.scot, 8 February 2022) <https://www.gov.scot/publications/health-protection-coronavirus-requirements-scotland-amendment-regulations-2022-health-protection-coronavirus-requirements-scotland-amendment-no-2-regulations-2022-equality-impact-assessment/pages/11/>

49 UK Health Security Agency, 'NHS COVID-19 app', (GOV.UK, 13 May 2022) <https://www.gov.uk/government/collections/nhs-covid-19-app>

50 Health and Social Care (Northern Ireland), 'Privacy notice – The COVID Certification Service (CCS), COVIDCERT NI app and your data' (covid-19.hscni.net, April 13 2022) <https://covid-19.hscni.net/covid-certification-service-easy-read-privacy-information/>

transparently how the governance of these technologies aligned with the existing public laws, protocols and the UK GDPR.⁵¹

Nevertheless, we acknowledge the major role civil society and the media played in challenging the UK Government to be more transparent and accountable in retention of data and working with the private sector. Open Rights Group (ORG)'s report on the Information Commissioner's Office (ICO)'s role in relation to key COVID-19 health programmes confirms this point. By providing extensive evidence and analysis, the ORG argues that the ICO failed to act over minor data breaches, and it was left to civil society and the media to challenge the Government over its adherence to data protection law.⁵²

The role of the private sector

The COVID-19 pandemic demonstrated growing reliance on large technology companies like Apple and Google, which hold significant power over digital and data infrastructure. In the early phase of the pandemic, the UK Government planned to roll out a contact tracing app with a centralised system for England and Wales. Centralised systems store users' data on a central server accessible to public health authorities. It favoured a centralised system to allow policymakers and experts to access users' data for research, analysis and policymaking purposes.

However, many privacy, data security and human rights researchers and activists highlighted the risks created by user data being accessible to third parties through a centralised server. These included potential risks like infringement of privacy, repurposing data and increased surveillance.

In this context, proposals emerged for technical protocols that would enable 'decentralised contact tracing', designed to be 'privacy preserving' by enabling users' data to be stored on mobile smartphones rather than on a centralised server. The Scottish and Northern Ireland governments preferred a decentralised systems while the Westminster government continued to pursue a centralised system approach for England.⁵³ However, this approach was eventually abandoned due to technical failings in an initial trial in the Isle of Wight in May 2020.⁵⁴

51 Ada Lovelace Institute (n 21).

52 Open Rights Group, 'Data Privacy and the Information Commissioner's Office during a Crisis' (25 May 2023) <https://www.openrightsgroup.org/press-releases/org-report-finds-that-ico-failed-to-hold-the-government-to-account-over-use-of-public-health-data-during-pandemic/> accessed 31 May 2023.

53 Department of Health (Northern Ireland), 'StopCOVIDNI App' (health-ni.gov.uk) <https://www.health-ni.gov.uk/stopcovidni-app>

54 Andrea Downey, 'Timeline: What happened with the NHS Covid-19 app' digital health (7 April 2020) <https://www.digitalhealth.net/2020/04/timeline-what-happened-with-the-nhs-covid-19-app/> accessed 26 April 2023.

For centralised apps to work, Apple and Google, which own the two main operating systems on smartphones (iOS and Android), would have needed to update their systems. Instead they developed an alternative assistance technology known as GAEN API. The GAEN API works only if the data server is decentralised, which prevents public health authorities from accessing users' data. The UK Government followed Scotland and Northern Ireland by adopting the GAEN API for its NHS COVID-19 app. Apple and Google, therefore, dictated the technical design of one of the most important digital interventions of COVID-19, which cost the taxpayer approximately £35 million.⁵⁵

The influence of the private sector in the management of the COVID-19 pandemic – and in public health in general – raises important questions for future pandemics, public health and social care provision. This does not mean that the private sector should be excluded from playing a role in digital interventions built to support public health objectives, but it is crucial that the UK Government addresses the growing power imbalance by building a multistakeholder approach between the public sector, civil society and private industry.⁵⁶

Actions for policymakers:

To ensure that individual rights and freedoms are protected:

- Create specific guidelines and laws to ensure technology developers follow privacy-by-design and ethics-by-design principles, and that effective monitoring and evaluation frameworks are in place for the deployment of these technologies; and ensure regulators are properly equipped to enforce these regulations.

To reverse the growing power imbalance between governments and the tech industry:

- Develop the public sector's technical literacy and ability to create technical infrastructure. This does not mean that the private sector should be excluded from developing technologies related to public health. However, it is crucial to ensure that the technical infrastructure and governance are effectively co-designed by government, civil society and private industry.

55 FULL FACT, 'Labour MP wrongly claims £37bn spent on Test and Trace app' (fullfact.org, 18 November 2022) <https://fullfact.org/health/karl-turner-37-billion-test-trace-app/> accessed 27 April 2023.

56 Mallory Knodel, 'Public Health, Big Tech, and Privacy: Multistakeholder Governance and Technology-Assisted Contact Tracing' (National Endowment for Democracy, January 2021) <https://www.ned.org/wp-content/uploads/2021/01/Public-Health-Big-Tech-Privacy-Contact-Tracing-Knodel.pdf>

Lessons from the App Store: Insights and learnings from COVID-19 technologies

Read our research report, which consolidates our work on COVID-19 technologies since 2020 by synthesising evidence on contact tracing apps and digital vaccine passports from across the world.

This report identifies cross-cutting findings and lessons we should learn from the use of COVID-19 technologies by using a wide range of sources, including academic and grey literature, policy papers, media news, workshops with experts and public deliberation research.

<https://www.adalovelaceinstitute.org/report/covid-19-lessons-app-store/>

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