Disease Surveillance, Digital Futures, and Data-Sharing in a World 'After' COVID-19

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Abstract

Over one and a half years into the COVID-19 pandemic, Big Tech and big-data driven technologies including digital vaccine passports and return to work apps aimed at unlocking and restarting vaccinated societies are on the ascent in a 'return to normal' for COVID-safe societies. In drawing from critical and ongoing legacies of 'Big Tech' (including multinational IT, social media and mobile telecommunication corporations) experimentations during the early phases of the COVID-19 pandemic which failed as key components in national and global pandemic responses, the aim of this article is to provide a critical analysis of new digital interventions aimed at monitoring population health and the re-opening of societies in a world 'after COVID-19'. Amid calls to unlock and restart societies through these intensifying digital mediums, we discuss the opportunities, limitations, and concerns of these transformations in disease surveillance and pandemic response via a number of critical avenues: the digitisation of global actors; implications for the normalisation of ubiquitous surveillance; and equity in global health. Subsequently, in highlighting the alarming potential of these technologies to distract from traditional public health responses, and to undermine practices of social justice and equity in global health, we provide key policy recommendations to moderate and regulate the rollout of these digital interventions within the ongoing COVID-19 pandemic, and in future public health emergencies.

Policy Recommendations

- There is an urgent need for novel international governance and regulatory frameworks around access to healthcare services, and health data to protect citizens from corporate and commercial interests, especially during public health emergencies.
- More resources and powers must be given to WHO and stronger international cooperation must follow in the development of equitable practices of vaccine certification, standards setting in sharing of medical and health data, and in ensuring best practices which enable safe, and non-discriminatory mobility for all vaccinated individuals and communities globally.
- Without robust resources dedicated to resolving global vaccine inequities, digital interventions including digital vaccine passports and return to work apps to unlock societies as COVID-safe will do little to address a worsening pandemic.
- Social scientists, including anthropologists, critical race, gender, legal, and security scholars, behaviour scientists and sociologists to name a few, must continue to be at the centre of ongoing and future assessments and evaluations of these evolving technologies.
- Future public health emergencies can only be addressed through sustained, equitable and cross-societal investments in public health and pandemic preparedness.

Introduction

Over one and a half years into the COVID-19 pandemic, and amid growing rates of vaccination in high-income countries, state governments, global transportation networks, and the holiday and hospitality industries have increasingly called for initiatives to unlock national lockdowns, lift COVID-19 restrictions including on personal mobility and working from home regulations, and to re-start severely hit national and global economies under the populist memo of 'return to normal' (BBC, 2021).

In the United Kingdom in February 2021, Boris Johnson presented a roadmap for England to easing lockdown restrictions as a 'one way road to freedom', 'unlocking the economy and getting back to the life we love' (Reuters, 2021). Calls to definitively end COVID-19 restrictions in the UK have continued into late 2021, even as the UK's COVID-19 infection rate has remained one of the worst in the world, and amid continued rising infections across many parts of the globe.

Amid these calls to re-open increasingly vaccinated high-income states across the UK, the EU and North America, big-data and big tech driven approaches to population and disease surveillance have re-emerged and have been positioned as key assets for collecting and analysing data needed to track the spread of COVID-19 within vaccinated states in the new era 'after' the pandemic. As many high-income states surpass thresholds of partial or full immunisations of their populations from COVID-19, enthusiastic calls to unlock societies and to rollback public health restrictions have been paired with robust claims from Big Tech that big data driven analytics and intelligence (furnished by corporations including Google, Apple, Amazon, Palantir etc.) and unleashed at an unprecedented rate during the pandemic, will now have key roles to play in the 'post-COVID-19 world' (Google Cloud, 2021).[1]

Yet these promises by governments to unlock economies and return to 'normal', under populistic slogans such as 'Freedom Day' in reference to July 19th, 2021, in the UK (The Guardian, 2021), and the assurances provided by Big Tech that these for-profit actors possess the skills and capacities to deliver upon promises of a swift recovery and return to normality have familiar rings to them.

In the early months and phases of the COVID-19 pandemic, in spring 2020, affected states and populations were emphatically reassured that new digital interventions including digital contact-tracing and the use of Smartphone-based apps would be central to controlling COVID-19 infection rates, identifying and tracing cases, and to exiting lockdowns

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[1] Within the parameters of this article, we define and refer to '**Big Data**' as distinct from previous systems of data generation, seen through the 4 Vs of 'Big Data': volume (amount of information), velocity (of data acquisition, processing and manipulation), variety (of the data from different data sources and channels), and veracity or accuracy and reliability of the data collected, as conceptualised by Cukier and Mayer Schonberger (2013). Defining Big Data within this piece also refers to the unprecedented diversity, access, and speed of contemporary data collection practices, enabled by 'Big Data pioneers' including Google, which simplify their technical complexity (Cukier and Mayer Schonberger, 2013; Rebello, 2019). Big Data analytics bring together 'heterogenous modes of knowledge, devices, institutions and methods (Aradau and Blanke, 2015:2).

imposed across states to halt the spread of coronavirus (Roberts 2020a, Samuel et al 2021; de Bengy Puyvallée and Storeng, 2021). In England, the use of digital contact tracing via an NHS app, as part of the larger Test and Trace response to COVID-19 was pitched as 'world beating' by the UK Government.

However, one year on from the unrolling of these big-data driven interventions, considered, and sold to the public as 'silver bullets' in combatting COVID-19, evidence on the effectiveness of these responses in reigning in the pandemic remains elusive. At the same time, the importance of traditional public health interventions such as locally lead risk communication, manual test and trace systems, and the often-ignored importance of 'isolating' positive contacts (which requires the provision of emotional and financial support for isolation) have again been proven as critical, yet oft-ignored elements within robust pandemic responses in driving and keeping numbers of cases down.

Now, with vaccination programmes against COVID-19 on the ascent across many states, we are witnessing a sharp new shift in the logic, use, and application of digital interventions driven by big data, to now mediate the 'unlocking' and 'restarting' of societies 'after COVID-19'. Perplexingly, these promises of a swift move to new digital futures occur even while in large swathes of the globe, particularly in many low-and middle-income countries, unvaccinated millions are still suffering the continuing and even worsening pandemic.

In drawing from the critical and ongoing legacies of 'Big Data' experimentations and contact-tracing 'silver-bullets' during the early phases of the COVID-19 pandemic which failed as key components in national pandemic responses, the aim of this article works to provide a critical analysis and commentary of new and evolving digital interventions which are now aimed at monitoring population health and re-opening societies in a world 'after COVID-19'. In the following discussion, we offer analysis on the implications of these technologies across three critical areas: the digitisation of global health actors; the normalisation of ubiquitous surveillance; and equity within present and future global health systems.

Digitisation of Global Health Actors

Throughout the ongoing pandemic, COVID-19 has become a 'prism and amplifier' for anything data (di Salvo, 2020). As the pandemic has expanded across affected regions and states, we have witnessed the unprecedented ascent of big data-driven and big tech-guided responses to collecting, sharing, and analysing data sources for tracking COVID-19. While Apple and Google have garnered global awareness as well as mounting controversy for their development of the Apple/Google API for digital contact-tracing, the true picture and depth of Big Tech's investment in this continuing pandemic is far more entrenched and nebulous and the spread of the pandemic has also witnessed the rise influence of a range of new digital actors with marked engagement and

stakes in global health responses to COVID-19 including Amazon to Facebook, to Microsoft, Alibaba, Baidu Tencent, Huawei and Palantir, to list a few. Along with more traditional public health surveillance actors including public health agencies, these Big Tech presences have become entrenched in intensifying surveillance dynamics of how 'bodies and pathogens are now being measured, tracked, predicted and regulated' within this pandemic (French and Monahan, 2020; Sharon 2020).

In addition to the ascent of Big Tech as now willing partners and providers of essential technologies and digital solutions to governments during this pandemic, responses to the spread of coronavirus in the UK have also allowed Big Tech to gain a foothold in access to health data and lucrative contracts including the heavily outsourced and privatised NHS Test and Trace, which have occurred in contexts with little public consultation or scrutiny. In 2021, after less than a full year in operation, a Public Accounts Committee of the UK Parliament stated that the UK's Test and Trace programme which had been delivered at an 'unimageable cost of £37 billion...had failed to deliver on the central promise of averting another lockdown' (UK Parliament Committees, 2021).

Yet, despite growing public concern for the expanding influence of Big Tech actors in responding to the pandemic in the first year, coupled with an ongoing lack of evidence of the effectiveness of employed digital solutions, the next iteration of the story has already arrived: the centrality of Big Tech industry actors in the development and rolling out of

apps, technologies and support services to ensure mobility and circulation for select populations, even as the pandemic continues in many parts of the globe.

Across countries with growing rates of vaccination, we see the charge towards new digital futures 'after COVID-19' being supported and enabled by Big Tech. In the United States, one such example is the return-to-work app **Health Pass**, a mobile app developed by airport biometrics provider **Clear**, which allows employees and clients the ability to upload COVID-19 vaccination information to an integrated digital platform which includes temperature scanning and the use of facial recognition technology to gain access to venues and locations. While the app has been readily taken up by 50 organisations and venues across the United States including the 9/11 Museum in New York and MGM resorts, scant critical focus has been allocated as to why a private-sector security and biometrics firm such as Clear, have now taken up roles as new and privatised actants in processes of vaccine status validation as states and regions begin to re-open following the imposition of public health orders and lockdowns.

Elsewhere, American multi-national **IBM** has designed its **IBM Digital Health Pass**, packaged as a 'smart way to return to society', which 'enables businesses to verify the health credentials for employees, customers and travellers' while also emphasising that 'privacy is key' (Business Traveller, 2021). The rolling out of these digital technologies amid 'fervent desires to return to normalcy' (Hall et al., 2021: e32) demonstrate a salient shift in which Big Tech and private

sector actors including from security, biometrics and digital identity firms have assumed new positions of authority and involvement in the management of vaccine status validation, with subsequent impacts on the mobility and access of select populations emerging from lockdown. What is more, while the majority of COVID-19 vaccines across countries for example have been delivered free of cost and via public health services, key post-vaccination functions including the management and storage of vaccine confirmation status, once the sole remit of public health agencies, have now unevenly splintered across evolving digital ecosystems. Critically, and by in large, these new technologies and devices are developed and managed by an expanding range of emerging and opaque actors including private sector corporations, Big Data and Big Tech firms all of which now increasingly hold stake in processes of digital verification and vaccine confirmation status in the 'new normal'.

In the United Kingdom, there has been equal enthusiasm and contestation for the launching of digital vaccine passports to 'unlock' the economy, despite extensive criticism of the government's failure to contain the pandemic via digitised responses including contact-tracing, which proved to be enormously ineffective and costly 'Big Data disasters' (Martin-Macdonald, 2016). Almost a year after the start of the UK's longsuffering digital contact tracing operations, the UK Government again was again in discussions with **NHSX** over the development of a digital vaccine passport, even following the wake of the Test and Trace revelations. On 28 April

2021, the UK government announced plans to use the existing general NHS App run by the NHS Digital arm to provide proof of COVID-19 vaccination status for international travel, despite concerns that segments of the UK population, notably poorer and older populations were still excluded over 'digital divides' (Hodes and Majeed, 2021).

In the UK, further concerns surrounding the rollout of digital health passports for COVID-19 highlighted how an over-focus on the implementation of digital vaccine passports, in absence of the availability and affordability of COVID-19 testing and vaccines risked undermining effective responses to the pandemic both in the UK and abroad (Beduschi, 2020), and that further critical consideration must be directed to assessing and considering the broader impacts that these digital interventions on individuals' human rights and mobility (Beduschi, 2021). Critically, while the UK government's recent use of the NHS App to provide proof of COVID-19 vaccination status has been presented as 'a practical and pragmatic solution' (Hodes and Majeed, 2021), aimed at re-starting international travel for inoculated citizens, it nonetheless follows upon a digital continuum of responses throughout this pandemic which have been costly, rushed, contested, and tech-focused.

Moreover, in June 2021, the UK government's plan to allow the NHS App to serve as a digital vaccine passport was dealt its first public blow when Malta refused to accept the app as proof of vaccination for incoming British travellers, stating instead that it will only accept

printed NHS letters as proof of vaccination needed for clearance into Malta, before reversing this policy (Sky News, 2021). Though Malta eventually reversed its stance on permitting digital proof of vaccination via the NHS app, the episode demonstrated the contentious and politicised status of digital vaccine passports between states, as well as a current lack of global standards and interoperability of these prototypes between and across states.

This rush to unlock societies and to resume mobility and circulation for certain populations has also seen the re-surfacing of now familiar Big Tech actors in new programmes of work as the pandemic continues. Here, both **Google** and **Apple,** now widely known for the central stakes played in the development of digital contact tracing apps in Year One of the pandemic, now have assumed roles as influential agents in the development of digital vaccine passports. In early 2021, concerns about the slow development of an operable EU-wide digital vaccine pass were also met with concern that 'Google and Apple were already offering their vaccine certificate solutions to the World Health Organization, although [Apple appears to have indirectly denied](#) any discussions with the WHO' (Ada Lovelace Institute, 2021). The development of a common EU digital **COVID-19 vaccination** certificate has again reiterated anxieties within the Bloc about the continued encroachment of Big Tech and the need for increased 'digital sovereignty' within the EU following the EU's experience with Big Tech and contact tracing apps during the first year of the pandemic (European Parliament, 2020).

Further still, Apple and Google are also gaining momentum as new ethics brokers in the defining of the terms and parameters of the development digital vaccine passports. Apple for example has produced new regulations which require developers to work exclusively 'with entities recognized by public health authorities' and throughout the pandemic has emerged as a prominent and vocal champion of user privacy in both contact-tracing and emerging digital vaccine passport apps. However, as Tamar Sharon (2020) has elsewhere questioned, even if the Apple/Google technologies do get the privacy issue just right as these tech giants expand into the development of digital vaccine passports, what other trade-offs are involved in continuing to let these for-profit companies increase influence and contributions to managing responses to the pandemic as it continues?

More troubling, not only have many of the same actors appeared to now hold stakes in processes such as vaccine status confirmation previously reserved for healthcare and government, but the lessons ushered forward, notably on the growing influence and authority of these for-profit corporations in public health emergency response, the unclear relationship many of these entities hold with populist governments, for example in the case of the UK, and key concerns over evidence of effectiveness of their digital solutions to complex global public health emergencies, all appear to continue to go unheeded as the presence of these actors and relations with governments takes further hold in the rolling out of new digital interventions to 'return to normal' within a continuing pandemic.

Implications for the normalisation of ubiquitous surveillance

Of equal importance, we assert that it is further critical to situate and consider the rapid roll-out of digital vaccine passports, mobility and return to work apps as part of ongoing and expanding global surveillance infrastructures which have ballooned in the wake of the COVID-19 pandemic, and produce implications for the ongoing surveillance of both populations and future public health emergencies.

In the first year of the pandemic the launching of digital contact tracing for example, was seen to intensify many surveillance practices by governments and further normalise the presence of dual use technologies, seen for example in Israel where the tracking of mobile phones to identify coronavirus cases was enacted using technology originally developed for counterterrorist surveillance (Roberts, 2020b). Elsewhere, in South Korea, digital contact tracing operations during the first wave of the pandemic, which were lauded by many public health officials as a model template for contact tracing, deliberately targeted non-normative behaviours and practices of Korean citizens (such as, collecting financial data and tracking mobile phone GPS), and led to the public outing of marginalised LGBT+ citizens following the identification of a number of infections linked to LGBTI+ nightclubs in Seoul (French et al. 2020; Gitzen and Chun, 2021).

In addition to these examples, digital contact tracing experiments launched during the first global wave of COVID-19

brought to the forefront critical questions about what data can and should be accessed by government or third-party respondents during a public health emergency, and for how long. Intense debate surrounded whether data storage platforms of such apps should be *centralised* or *decentralised*, with proponents of decentralised approaches arguing that the centralisation of data collected by digital contact tracing methods on a government database would over extend governmental surveillance of populations, and lend to further function creep of data surveillance after the cessation of the pandemic (Fahey and Hino, 2020).

In the UK where we reside, a security analysis of the original proposed centralised contact tracing technology highlighted the potential for stored data to be used for extended surveillance purposes including providing law enforcement officials access to detailed surveillance records of interactions (Culnane, 2020). In the wake of growing public unease as well operational issues, the UK Government later abandoned the original prototype for its centralised contact tracing app which cost £11.8 million to develop, in favour of the Apple/Google decentralised model. However, whether ultimately centralised or decentralised, privacy-preserving or not - in the approach taken to digital contact tracing, a uniting hallmark feature of the early pandemic, shared across states during a period of unprecedented emergency and risk, was the rush by many governments around the world to develop and implement 'electronic surveillance systems...with minimal ethical

considerations or informed debate within their societies' (Barriga et al. 2020:4)

Over one year on into the COVID-19 pandemic the current proliferation and intensifying interests in apps and technologies to demonstrate vaccine status and to enable mobility and circulation, like earlier digital contact tracing strategies again force us to consider how these technologies might lend themselves to the extension and normalisation of ubiquitous surveillance practices long after the pandemic has ended. Comparisons have been drawn for example by many scholars between the expansion surveillance infrastructures which followed the September 11 terrorist attacks in the United States and the mushrooming of new surveillance technologies not only to track COVID-19 but to further anticipate forthcoming disease outbreaks in a world after the pandemic (Klein, 2007; Zuboff, 2018).

Considering the function and life-expectancy of these technologies are critical in considering and assessing future impacts in this area. For example, while novel digital vaccine passports, digital certificates and 'green passes' have now been launched to ensure a return to normal for vaccinated individuals, little detail or clarity has been provided on how long individuals will be expected to participate in these new systems of data upload, sharing, and confirmation in exchange for the provision of 'normality' during or after this period of global emergency has ended. As emphasised by the Ada Lovelace Institute (2021:101-103) in its assessment of digital vaccine passports '[o]nce time, resources and political capital have been invested in the

construction of vaccine passports, it is unlikely these systems and their underlying infrastructure will be rolled back once the crisis that initially justified their creation has passed.'

While many governments including the current UK Government have assured populations that digital interventions such as vaccine passports if implemented, would remain temporary measures within the set parameters of the pandemic, it is also key to underscore that advocates for the extension of such technologies into new post-pandemic surveillance infrastructures are emerging in locations of influence. This has been exemplified by the promotion of vaccine passports by the Tony Blair Institute for Global Change which stated that when properly designed 'digital health passports would also help us manage the virus and prepare for new strains and future pandemics' (Ada Lovelace Institute, 2021: 101-103; Beacon and Innes, 2021).

Concerns for the duration and presence of these digital interventions are also occurring in more progressive venues with the roll-out of new technologies. For instance, while the European Union's Digital Green Certificate has been launched with a specific sundown clause of suspension 'once the World Health Organization declares the end of the international public health emergency caused by COVID-19', the Bloc has also reserved the right to reactivate the system 'if the WHO declares a new international public health emergency caused by COVID-19, a variant of it, or a similar infectious disease' (Ada Lovelace Institute, 2021: 101-103; European Commission, 2021), again highlighting lingering

concerns regarding the life expectancy of these digital technologies once launched and the unclear boundaries which exist between the sustained surveillance of COVID-19, and new surveillance operations against yet unknown pathogens.

Further to the potential of many digital vaccine passports and data-sharing platforms to become normalised and extend in function in the future surveillance of new disease outbreaks, it is of equal importance to consider how emerging digital vaccine passports and certificates may further entrench, even if inadvertently, the stigmatisation and mistreatment of racialized communities, observed during the unrolling of digital contact tracing operations during the first year of the pandemic (French et al, 2020, Mykhalovskiy and French, 2020).

In late 2021 for example, as vaccine rates in Canada have climbed to among the highest in the world, and the country has launched a controlled re-opening, the use of the ArriveCan app requires returning Canadian travellers, international travellers and tourists to upload proof of full vaccination against COVID-19 as a pre-requisite to entry into the country. In addition, however to privacy concerns about digital vaccine certificates highlighted by the Office of the Privacy Commissioner of Canada (2021), proof of vaccination shown on the app for entry to Canada refers only vaccinated individuals who have received Pfizer-Biotech, Moderna, AstraZeneca, and Johnson & Johnson vaccines as approved by the Government of Canada. This means in future, individuals travelling to Canada from already stigmatised and racialized

regions including Latin and South America, which also have experienced vaccine shortages, and in many cases have utilised vaccines donated by Russia and China as a matter of urgency would be rendered inadmissible to Canada.

As our analysis has shown, at broad level there is a need for continued vigilance and assessment of how these new digital interventions to combat COVID-19 may entrench lasting surveillance infrastructures while also blurring the lines between responding to the current global emergency, while struggling to anticipate an unclear future using hastily developed tech-fixes. More specifically, it has been shown when juxtaposed with ongoing vaccine inequities how digital vaccine passports as part intensifying health surveillance practices post-COVID-19 again appear only to promise mobility and circulation to a small and privileged segment of the global population, while denying these same rights and privileges to many in areas of the world worst affected by the impacts of inequitable or inaccessible vaccine distribution and vaccine nationalism (Renineris, 2021).

Equity in global health

Thirdly, current calls to reopen societies and unlock economies through digital responses and further data sharing platforms cannot be fully accounted for in isolation and must be situated and critiqued within larger global health ecosystems and economies of power. Here we highlight how such interventions must be assessed and appraised for their capacity to contribute to or undermine

practices of equity and social justice in continued responses to the COVID-19 pandemic.

In the race to lift public health restrictions in select countries and regions with presently high vaccine rates, it is further critical to recall 'how public health emergencies are often rooted and proliferate from endemic economic, environmental, historic, social, and political realities, far divorced from the tech corporations, data-warehouses and algorithms' (Roberts,2020b) which now support digital interventions to reopen societies and ensure mobility and access, albeit for a select few. It therefore must be emphasised that while the launching of digital technologies including vaccine passports and certifications by governments and eager Big Tech partners promise a return to seamless mobility and circulation for vaccinated individuals, the costly development and implementation of these interventions built on questionable levels of evidence of effectiveness, as we have highlighted so far ultimately do little to contribute to the cessation of the pandemic, particularly in the worst hit regions of the world.

At global levels, it is important to also consider how the current launching of these digital initiatives to unlock vaccinated societies produces segmentation and inequity across an already fragmented global health system. For example, some of the most enthusiastic countries and regions participating in the piloting and launching of digital vaccine passports and 'new normal' access, identity and status validation apps, including the United States, Canada, and the EU, also

constitute the same bulk of states which have been widely condemned by critical global health scholars for dominating access to COVID-19 vaccine stock throughout critical phases of the pandemic in 2021. The WHO has estimated that rich countries have received more than 87 percent of available COVID-19 vaccines, with low-income countries receiving 0.2 percent (UN News, 2021).

Seen through a critical global health lens then, digital vaccine passports and associated data sharing technologies to unlock societies and economies can be understood as yet another vehicle of undue privilege in a markedly unequal global health system. The design of these technologies remains within access of populations largely resident in wealthy countries, often with obscene access to vaccines. Canada for example, currently has secured enough COVID-19 vaccines to inoculate its population four times over (Bloomberg. 2020), while the same realities of enabled vaccination access, mobility, and a return a 'new normal' are precluded for individuals and groups across middle and low-income states, who are unable to access vaccines, or even demonstrate certification of the 'right vaccination'.

Beyond their promises to ensure seamless access and mobility for vaccinated individuals, the acceptance of these new digital technologies must also be viewed with scepticism and moderation when considering implications for broader global health ecosystems. As Sturm and colleagues (2021:1) have highlighted, 'efforts to contain the pandemic and to create a long-term solution to vaccines

have intersected with a range of political issues relating to healthcare systems, political representation, human rights, sovereignty mobility, and borders' and as analysis has demonstrated, the intensified interest in the rollout of these technologies across high income states and amid continuing trends of vaccine inequity ultimately fail to address, and in many cases, directly undermines practices of global health, health equity and social justice in both current and post-pandemic contexts.

Conclusion: A digital future not yet for all

This article has provided a critical analysis of the current state of play of the rollout of new digital technologies and data-sharing platforms including vaccine passports and return to work apps in countries with growing vaccination rates and has further worked to consider the implications of these new digital interventions within the contexts of the ongoing COVID-19 pandemic. We have offered an analysis of the implications of these technologies across three critical areas: the digitisation of global health actors; the normalisation of ubiquitous surveillance; and equity within present and future global health systems.

Our analysis has demonstrated how in many ways, the errors, and oversights, first present in the global digital contact tracing experiments of 2020, have not been reflected upon or learned, and indeed these issues have again resurfaced in the race to unlock high-income societies using new digital identity

technologies. In analysing these ongoing transformations in data-sharing practices and processes of vaccine confirmation, we have drawn attention to the problematic and ongoing development of new nexuses of global health and public health emergency responses in which Big Tech actors readily furnish state governments with big-data driven 'solutions' to complex social, political, historic and economic issues, and where an ongoing paucity of evidence on the effectiveness of these interventions, combined with a willingness by many governments to out-source or off-load core public health functions to the private sector, continues in tandem with the pandemic. Despite the recent provision of guidance from the World Health Organization (2021) regarding digital documentation of COVID-19 certificates, set out to 'support Member States in adopting inoperable standards for recording vaccination status' to avoid inequities and 'digital divides', our analysis has drawn attention to the ongoing, uneven and fragmented roll-out of these digital interventions, driven by Big Tech in many high-income states, while vaccine inequity has continued to stall rollouts and immunisations in many middle and low-income states, further driving the pandemic.

Situated within the ongoing pandemic, the current promises of these digital interventions to 'unlock' and 'reopen' countries and regions as we have highlighted ultimately appear as narrow and myopic. Driven by industry interests and available to vaccinated populations resident in high-income states, these technologies further operate within unequal global health frameworks long

entrenched before the pandemic. Their unchecked rolling out further risks re-accentuating trends of inequality in global health whereby those who are healthy with access to healthcare, medicines, and vaccine abundancy are able to join a 'new normal' 'after COVID-19', while those already disadvantaged in terms of healthcare, mobility, and access to vaccines will be further disenfranchised by these new data-sharing and surveillance practices. In building upon ongoing critical global health scholarship during the COVID-19 pandemic (French et al, 2020:1), this piece has worked to question the capacity of these new digital technologies 'to address structural inequalities and to foster a social justice vision of global public health.' We have found that the current rollout of these digital technologies in high income states ultimately is a promise for a life 'after COVID-19' for a select few.

While the confirmation and certification of vaccine status is an essential function of public health and pandemic preparedness, the rush to these new digital technologies to ensure mobility, circulation, and access ultimately do little to address the worst accelerators of this pandemic, among them: global vaccine inequity, vaccine nationalism, stigma and racism, socio-economic determinants of COVID-19, and equitable access to healthcare. At best, they ensure mobility and resumption of 'normal' life for already privileged populations, while also further expanding the power of corporations in the public sphere (French et al, 2020:1), and also inaugurate expanding, unclear and nebulous surveillance practices increasingly powered by big data. As Mirca Madianou (2020:1) has further

signalled elsewhere, our work has also drawn important attention and focus to the outsourcing of digital public health functions which further 'consolidates the arrival of the privatized digital welfare state, which increases risks of potential discrimination...and traps disadvantaged people into precarity.'

Perhaps most perplexingly, many of the challenges present in these novel shifts toward rolling out of these digital technologies including the expansion of corporate power in global public health, the intensification of surveillance infrastructures, and global health inequalities mirror lessons which were unlearned, unobserved, and unresolved during earlier experiments with digital contact-tracing during the first year of the COVID-19 pandemic. If so, then now is the moment for critical pause and further reflection on the expectations and promises which underpin these new digitised interventions as new digital mediums in a continuing pandemic. Enthusiasm and uncritical approaches for these novel data sharing and surveillance practices must be moderated by the lessons stemming from COVID-19 'digital silver-bullets' and 'Big Data disasters' observed so far in the histories of this pandemic, Any further such development of these technologies for global health must be consistently paired with practices and understandings of social justice and health equity, both which are imperative for radically driving down and eventually controlling COVID-19.

Policy recommendations on the challenges presented by these digital interventions for global health practices during and after the COVID-19 pandemic:

1. **A strong argument for increased international governance:** There is an urgent need for novel governance and regulatory frameworks around access to healthcare services and health data to protect citizens from corporate and commercial interests, especially during public health emergencies. However, as we have argued in our analysis, part of this intensifying problem is the current rise of populist governments, which have demonstrated not only an incompetence in responding to this pandemic, but a willingness to outsource, privatise, and award public health contracts, critical surveillance operations and data-sharing practices to Big Tech in absence of ethical review or public consultation. What is needed is an international governance framework including enforceable standards to enable inoperability in digital ecosystems, lead by established health authorities i.e., WHO and other key public health players to regulate the dominance of 'disaster capitalism' in healthcare, market grabs by Big Tech and for-profit use of healthcare data at international level, during this pandemic and in future public health emergencies.

2. **The indispensability of WHO in guiding future practices:** More resources and powers must be given to WHO and stronger international cooperation must follow in the development of equitable practices of vaccine certification, standards setting in sharing of medical and health data, and in ensuring best practices which enable safe, and non-discriminatory mobility for all vaccinated individuals and communities globally. The ongoing outsourcing of these core public health functions to Big Tech, weak public-private partnerships and absences of regulatory frameworks at international levels, undermines practices of social justice in global health and has been shown to widen already entrenched global health inequities entrenched by colonialism, racism, stigma, and economic exploitation.

3. **Vaccinations, not distractions:** As our analysis has highlighted, certification of vaccine status is an established core public health function and an indispensable factor in reducing infections and deaths from COVID-19. However, an unregulated fixation with re-opening highly vaccinated societies via the digital interventions described in this piece ultimately misses an understanding of the broader contexts and realities which continue to accelerate global infections. Vaccine inequity is

above all, the key driver of deaths and of an unacceptable lack of access to health for much of the world where the pandemic continues to spread and worsen. Moreover, as populations in many areas continue to remain unvaccinated and exposed to COVID-19, the probability of the emergence of new virus variants will undermine vaccine progress and infection reduction on all fronts. At present, the rush to launch these digital interventions amid a continuing pandemic marked by vaccine inequity represents the latest in a series of *technology theatres* playing out during the COVID-19 pandemic*,* in which new technologies are presented as silver-bullets serve as a public distraction 'instead of focusing on a holistic solution to address complex policy issues' (Martin-McDonald, 2020). Without robust resources dedicated to resolving global vaccine inequities, digital interventions to unlock societies as COVID-safe will do little to address a worsening pandemic.

4. **The role of social and behaviour scientists in continued evaluations of digital technologies for disease surveillance:** In navigating ongoing challenges ushered forward by the digitisation of disease surveillance and responses to public health emergencies, safety and effective assessments of

the novel technologies described in our analysis from lone biomedical or technical standpoints will not be sufficient in understanding the implications of these interventions, and in mitigating potential impacts (Erikson, 2018;2020). Social scientists, including anthropologists, critical race, gender, legal, and security scholars, behaviour scientists and sociologists to name a few, must continue to be at the centre of ongoing and future assessments and evaluations of these evolving technologies and in considering their impacts on individuals, groups, and communities. The role of social science inquiry in this ongoing body of work will also be key in helping to understand and chart how 'critical elements of trust, compliance, and resistance within populations may shape the outcome, uptake, and effectiveness of digital practices during health emergencies' (Roberts et al. 2021).

5. **Investments in preparedness and capacity building before pandemics**: COVID-19, like preceding public health emergencies has caught the world critically unprepared. The emergency has brought to light an appalling underinvestment into public health services, limited availability of well-tested digital tools for surveillance, early-warning and response channels, and lack of training and capacity

building in high income as well as low-income countries. In addition to a marked lack of preparedness shown by high-income states in this pandemic, subsequent response measures, including digital contact tracing operations and digital vaccine passports have been rolled out amid questionable contexts and with limited evidence of effectiveness in reducing infections and deaths. COVID-19 continues to show the inability for governments and states to 'Big Data the way out of a pandemic', and the addressing of future public health emergencies can only be achieved through sustained, equitable and cross-societal investments in public health and pandemic preparedness. Equally, the continued development of digital technologies to assist and support with responses to outbreaks, epidemics, and pandemics must occur within robust and inclusive cultures of public, political and scientific scrutiny of their impacts and effectiveness in ongoing surveillance operations of Covid-19, and in considering the onset of future public health emergencies.

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