



Digital Health Credentials and COVID-19

Can Vaccine and Testing Requirements
Restart Global Mobility?

By Lawrence Huang

INTERNATIONAL PROGRAM

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Executive Summary

More than two years since the COVID-19 pandemic forced a sharp drop in international movement of all kinds, digital health credentials are at the center of global efforts to restart mobility safely and efficiently. These credentials can minimize the risk of spreading the virus by verifying vaccination, testing, and/or recovery status. They also can make travel quicker and easier, since digital credentials can be automatically verified while paper credentials require manual inspection. Since early 2021, policymakers have increasingly used these credentials both for international travel, to allow people to travel with fewer or no restrictions, as well as for domestic purposes, to give vaccinated or tested residents access to certain services and venues such as restaurants and concerts. As these credentials become more common, much of their impact—for better or worse—remains to be seen.

Digital credentials offer a means to verify health records and facilitate mobility at scale, but they are not a silver bullet for restarting global mobility. Currently, these credential systems are not being used to their full potential because of ineffective border policies and supporting infrastructure, as well as underdeveloped regional and global coordination to ensure travelers are able to get their credentials verified by other

governments. If the use of such tools continues to increase, so too will the need to address their potential to exclude populations without access to COVID-19 vaccines or digital technology (such as smartphones). Ultimately, these credentials are only one tool in the pandemic response and should still be complemented by other public-health measures, from quarantine and rapid testing on arrival, to physical distancing and ventilation.

The lack of global coordination over digital health credential systems has resulted in a fragmented landscape.

The lack of global coordination over digital health credential systems has resulted in a fragmented landscape. But by late 2021, there were emerging signs of consolidation around four major credential systems: the EU Digital COVID Certificate (EUDCC); the Digital Infrastructure for Open Credentialing (DIVOC) used in India, the Philippines, and Sri Lanka; SMART Health Cards used primarily in North America; and the International Civil Aviation Organization's Visible Digital Seal (ICAO VDS) used in Australia and Japan. Yet these systems are not comprehensive, and coordination and technical integration among them is still minimal. Further consolidation seems likely in 2022, but the growing adoption of different credentials at the domestic (and even state or province) level poses its own compatibility and access issues for international travelers.

While digital health credential systems have matured, important questions remain about their ability to restart mobility and migration at scale.

- 1 **Will one credential system become the global standard?** Each major credential system has its own advantages: the EUDCC was the first regional system and covers the most countries; DIVOC covers the most people; SMART Health Cards are the leading private-sector alternative; and the ICAO VDS is the only system established by a specialized UN agency. A single global standard may not be necessary

and is unlikely in the short term, but convergence around a small number of credentials could facilitate coordination.

- 2 **Will a coordinator emerge?** Ensuring that digital credentials are compatible and available to all requires strong leadership. The World Health Organization has not led coordination on borders and mobility, while other organizations, such as the International Organization for Migration, have expressed willingness to take on this role but have not yet done so. This coordinator could resolve technical issues (such as the incompatibility between the EUDCC and ICAO VDS) and facilitate standardized approaches to policy questions (such as which vaccines should be accepted for travel purposes), but they would likely face significant political challenges to coordinating on politically sensitive topics such as border policies and data sharing.
- 3 **What stopgap measures will emerge?** While vaccinations remain unequally distributed and digital credential systems remain incompatible, countries have accepted proof of health status without digital verification. But manual (nondigital) verification creates lengthy delays: airport processing periods have doubled in the pandemic, with reports that some airports have needed to redirect flights because of these delays, which are caused in part by the lack of automated digital credential verification. Opening borders through manual credential verification is crucial to restarting global mobility, but it may also weaken the demand for global cooperation on credential compatibility and stifle a return to prepandemic volumes of travel.
- 4 **Will digital verification expand to testing requirements?** Test results may be more difficult to prove and digitally verify because testing providers are often more decentralized and privatized than vaccination providers. For example, travelers arriving with fraudulent test results reportedly led the United Arab Emirates to temporarily ban flights from Kenya. But with the spread of new, highly contagious variants of concern that are more able than previous variants to infect vaccinated people and those who have recovered from a prior infection, minimizing fraudulent test results may be an important priority for digital credential systems.

While digital health credentials promise to facilitate greater mobility, they can also pose particular challenges for people on the move, both when entering a country and when seeking to access domestic services and venues. These systems were typically designed with domestic audiences in mind, so they often exclude (intentionally or unintentionally) certain populations. In some countries, such as Germany or Italy, international travelers may be unable to access the domestic credential system, so they may be barred from domestic spaces such as restaurants and museums. This poses challenges to short-term mobility, from tourism to business travel, although some countries have processes to integrate travelers into domestic credential systems. Students and labor migrants may have support to navigate these systems, from schools and universities to employers and recruitment agencies, since these stakeholders can share costs, information, and access to vaccination and testing. Refugees, asylum seekers, and unauthorized migrants may have pre-existing barriers to health-care access, including vaccination services, that are exacerbated by credential systems. In Israel, for example, asylum seekers often only have visa numbers, while a passport or national identification number is needed to access the Green Pass digital credential system.

Strategies to more effectively include people on the move in digital health credential systems can be summarized in the following three broad policy recommendations:

- 1 **Accept unverifiable credentials in the short term but coordinate credential systems as soon as possible.** Many countries are already opening for travelers with unverifiable or paper credentials, judging the benefits of reopening to outweigh the health risks. This pragmatism may be appropriate in more countries, but it is not sustainable in the long term. Fragmented credential systems are causing bottlenecks in border and travel processes, as airline staff and border officials manually read and verify credentials. International coordination to consolidate around a limited set of credentials and ensure they are compatible with one another will be crucial to returning to prepandemic volumes of travel.
- 2 **Provide travelers with as much certainty as possible.** Systems that automatically verify digital credentials can boost confidence in travel by providing travelers tentative approval of their credentials in advance of their trip. Predeparture approval streamlines travel processes and reduces the risk that a person will be denied entry at the border. Governments can also communicate with travelers with a road map for when restrictions, such as testing or booster vaccinations, might be imposed or lifted, so travelers can be more confident that their proof of health status will comply with any potential changes in entry restrictions.
- 3 **Work with relevant stakeholders to provide access, incentives, and proof of vaccination and testing to all people on the move.** Digital credential systems too often exclude people on the move who lack standard identity or other documentation, do not speak the local language, or simply have been vaccinated in another country. Working with travel agents, universities, employers, and other entities can help to integrate these populations into domestic credential systems and incentivize vaccination and testing.

These policy recommendations aim for better coordinated and more inclusive credential systems in the short term, but these credentials may also form part of the postpandemic global mobility regime. Key principles for the long-term future of digital health credentials include equitable access, privacy protection, sustainable financing, and monitoring and evaluation to scale up good practices. Credential systems should ultimately be dormant but prepared, meaning they are on standby in case they are needed in a future public-health crisis, but people should not indefinitely need to prove their health status to travel or enter domestic venues.

Key principles for the long-term future of digital health credentials include equitable access, privacy protection, sustainable financing, and monitoring and evaluation to scale up good practices.

1 Introduction

More than two years into the COVID-19 pandemic, rising vaccination levels and widespread testing in many countries are giving governments and the public increasing confidence in international travel. A central part of these efforts to restart mobility are digital health credentials, which verify a person's vaccination, testing, and/or recovery status¹ and thus help minimize the risk that travelers will be carrying the virus or its variants.² Such digital credentials are increasingly common, both for international travel and to access domestic services and venues.

Without this coordination, many credential systems remain incompatible with each other, although some international consolidation in late 2021 is promising.

To date, these credentials remain relatively uncoordinated at the regional and international levels. Without this coordination, many credential systems remain incompatible with each other, although some international consolidation in late 2021 is promising. In some countries without a national credential, states and provinces have developed their own, often incompatible, systems. As a result, travelers moving within and between countries must often navigate a complex maze of digital systems.

One underdiscussed issue with the rise in vaccination and testing requirements is their implications for people on the move. Since health credential systems are typically designed with domestic audiences in mind, people on the move may struggle to access these systems and verify their credentials. While some, such as unauthorized migrants, may face barriers to using digital credentials, others, such as students and labor migrants, may be better equipped to navigate complex rules and digital systems, with the support of universities, employers, recruitment agencies, and more. As interest grows within the international community in strengthening the international health system and post-COVID-19 global mobility architecture, it will be essential to develop shared norms on the objectives, uses, technical architecture, and permanence of digital health credentials, among other considerations.

Despite their growing use in domestic settings and international travel, digital health credentials should not be viewed as a silver bullet that will enable migration and mobility to return to normal. Global vaccine inequality both increases the likelihood of new variants of the virus emerging and disrupting mobility, and it hinders the ability of people from less vaccinated regions to travel. These credentials reflect rather than combat vaccine and testing inequities, and vaccination, testing, and recovery status do not guarantee immunity or eliminate transmission, particularly from more transmissible variants (see Box 1). The public-health benefits of digital credentials are not always clear and significant, and they may be outweighed by their disproportionate administrative burden on some migrants and travelers. Their efficacy therefore

- 1 This report primarily focuses on proof of vaccination and testing, both because these are the most common types of digital health credentials and because recovery from prior infection is typically proven through testing, so they often overlap from a technical perspective. The World Health Organization (WHO) guidelines on proof of test results, for example, combine test results and proof of prior infection, since "both certificates will require some form of testing prior to issuance." See WHO, *Digital Documentation of COVID-19 Certificates: Test Result* (Geneva, WHO: 2022).
- 2 This report uses the term "digital health credential" over other common terms: "passports" connote international travel, missing their application to domestic venues and services; "immunity certificates" raise questions about defining immunity; and "COVID certificates" assume that these credentials will apply only in this pandemic. Since digitization is the primary innovation on earlier health credentials, this report uses the term "digital" to distinguish from paper-based credentials, which are still commonly used.

depends on the public context and the willingness of policymakers to invest in technical integration and efforts to include people on the move.

This report examines the implications of digital health credentials for international travel and domestic access to services and venues, before exploring the implications for specific groups of people on the move (tourists and business travelers, students, labor migrants, asylum seekers and refugees, and unauthorized migrants). Finally, it offers policy recommendations to facilitate mobility and minimize risks for people on the move, along with key principles that should underpin long-term planning around digital credentials.

2 Digital Health Credentials for International Travel

After cross-border mobility ground to a halt in early 2020, the need for new tools to safely restart travel quickly became clear. Digital health credentials can help governments reopen borders while managing public-health risks, but their effective use relies on effective coordination. These credentials can automatically verify a traveler's health status and thus lift bottlenecks and delays in travel processes, if governments agree on the technical and governance framework to make their systems compatible. As of late 2021, countries had consolidated toward regional credential systems, but these systems remain incompatible. The role digital health credentials will play in the future of international migration therefore remains dependent on how countries further consolidate around major credential systems, coordinate to make these systems compatible, agree on measures to open borders while this coordination unfolds, and adapt their credential requirements to new variants and public-health conditions.

A. *The Objectives of Digital Health Credentials*

Digital health credentials seek to restart travel and open up domestic economies and social life; they do so by helping to minimize fraud and automate verification. Digitization is especially important for travel, as digital credentials can reduce administrative delays through automated or predeparture verification. Paper credentials, on the other hand, must be physically read by airline staff and border officials, limiting their capacity to efficiently process large travel volumes.³ Moreover, digital verification is a key tool to manage health risks by preventing fraudulent health documentation. These credentials can be part of risk mitigation strategies, where governments minimize the spread of infections while nonetheless allowing vaccinated, tested, or recovered passengers to travel with fewer restrictions. In some less common situations, governments can also require digital credentials as part of containment strategies, working to prevent the virus's arrival in a country or territory by only allowing vaccinated or recovered travelers with a negative test to enter, often coupled with quarantine and other requirements.

Yet health credential systems are but one tool for managing mobility and health risks, and they may pose significant challenges, especially in contexts with limited infrastructure. The policy discussion has focused on the technical aspects of digital credentials that allow more accurate verification at and across

³ International Air Transport Association (IATA) data show that, despite a huge drop in the number of people arriving at airports, average airport processing times increased from 1.5 to 3 hours during the pandemic. If these delays were extrapolated to prepandemic levels of airport travel, passengers could wait up to 8 hours at the airport. See Vinoop Goel, "IATA Travel Pass" (presentation at "The Road to BMIC6: Digital Health Certificates for Cross-Border Mobility" webinar, December 2, 2021).

borders, but highly accurate verification may have minimal benefits when the virus is already circulating in the community. Proof of vaccination or testing may also raise costs for travelers and exclude those from countries where access to vaccines is limited. Moreover, digital credential systems can pose significant costs for governments, such as financial investments in technical infrastructure and the additional time and personnel required to set up these systems. As a result, governments may not invest in these credentials until global agreement emerges on their digital formats and uses, instead prioritizing other measures, such as testing upon arrival, improving ventilation, limiting large indoor gatherings, and boosting community immunity through vaccination. The costs and benefits of digital health credentials should be evaluated for each national context, before concerns about coordination and interoperability are prioritized.

Nonetheless, requirements that international travelers provide proof of their vaccination, testing, or recovery status at borders are increasingly common. Data from the International Organization for Migration (IOM) show that almost all countries require proof of a negative COVID-19 test result to enter. Many countries have also begun to provide preferential treatment to vaccinated travelers. By the end of 2021, 28 countries required vaccination for entry, while 19 others exempted vaccinated travelers from travel bans, quarantines, or other requirements.⁴ Some countries have either lifted or signaled their intent to lift vaccination and testing entry requirements, but these are still common and will likely be reimposed if a new variant of concern emerges. Nonetheless, the World Health Organization (WHO) continues to advise against vaccine requirements, given that vaccines do not offer complete protection from infection (especially from the Omicron variant; see Box 1) and are not widely available in many countries.⁵ Some countries instead offer exemptions from vaccination requirements, allowing unvaccinated travelers to enter with a negative test or under self-isolation or quarantine rules. As more governments use vaccine and testing requirements to further open for travel, they will need systems to verify health status, prevent fraud, and mitigate health risk, but if not designed and implemented well, such systems risk replicating global vaccine inequalities by widening the gulf between those who can and cannot cross-borders.

Governments may not invest in these credentials until global agreement emerges on their digital formats and uses, instead prioritizing other measures.

⁴ Meghan Benton et al., *COVID-19 and the State of Global Mobility in 2021* (Washington, DC and Geneva: Migration Policy Institute and International Organization for Migration, forthcoming).

⁵ WHO, "Policy Considerations for Implementing a Risk-Based Approach to International Travel in the Context of COVID-19" (guidance document, WHO, Geneva, July 2, 2021).

BOX 1 The Omicron Variant

The Omicron variant, which the World Health Organization (WHO) designated a variant of concern in late November 2021, is highly mutated and therefore poses greater risk of (re)infection and transmission. As the virus is now dominant in many countries, the emerging evidence has implications for digital health credential policies.

- 1 **Vaccination** may provide considerably less protection from infection and transmission but continues to effectively prevent severe illness and death. Protection may begin to lower after the initial month postvaccination, with a more significant decline for older adults, although the degree and speed of this decline varies by vaccine type.
- 2 **Boosters** may enhance protection from symptomatic disease, but evidence is still emerging.
- 3 **Existing tests** effectively detect the variant, although there is a need for more data, as an early report found that antigen-based tests may be less sensitive in the initial stages of infection.
- 4 **Prior infection**, like vaccination, provides less protection from the Omicron variant than earlier variants, meaning there is an increased likelihood of reinfection.
- 5 **Severity** of symptoms may be lower, reducing the risk of hospitalization. The higher growth rate of the Omicron variant, however, means that more people may be infected, posing risks to health systems regardless of reduced severity.

The decline in vaccine- or infection-induced immunity from Omicron may lead to a greater focus on testing. Vaccination and recovery status, however, remain important factors when calculating risk—international travelers with vaccination- or recovery-induced immunity may have lower protection from infection and may still spread the virus, but their strong continuing protection from severe illness means they pose little additional risk of overwhelming health systems.

Sources: WHO, “[Enhancing Response to Omicron SARS-CoV-2 Variant: Technical Brief and Priority Actions for Member States](#)” (technical brief, WHO, Geneva, January 7, 2022); U.S. Centers for Disease Control and Prevention, “[Omicron Variant: What You Need to Know](#),” updated December 20, 2021; United Nations Children’s Fund (UNICEF), “[What We Know about the Omicron Variant](#),” updated January 14, 2022.

B. *The Evolution of Digital Health Credentials*

National governments initially used digital credentials through bilateral agreements on mutual recognition, followed by regional credentials and tools that can verify multiple credentials.⁶ As digital credentials have proliferated, policymakers have focused on regional coordination and interoperability, or the capacity of

⁶ Digital health credentials were first proposed as “immunity passports,” allowing people who recovered from COVID-19 to be exempt from lockdowns and other domestic restrictions. Although considered in Chile, Estonia, Germany, Italy, and the United Kingdom, among others, they were not widely implemented because of limited evidence on immunity from prior infection and the risk of perverse incentives for infection. See Rebecca C.H. Brown, Dominic Kelly, Dominic Wilkinson, and Julian Savulescu, “[The Scientific and Ethical Feasibility of Immunity Passports](#),” *Lancet Infectious Diseases* 21, no. 3 (2021): 58–63; Alexandra L. Phelan, “[COVID-19 Immunity Passports and Vaccination Certificates: Scientific, Equitable, and Legal Challenges](#),” *The Lancet* 395, no. 10237 (2020): 1595–98.

one system to technically verify a credential generated by another system. This section examines the stages of this policy evolution, starting in early 2021.

Early 2021: Proliferating Digital Health Credentials and Mutual Recognition Agreements

Digital health credentials began to take off in early 2021, with proof of health status for international travel coordinated through bilateral mutual recognition agreements. India's Digital Infrastructure for Vaccination Open Credentialing (DIVOC) was first implemented in mid-January and may be the most established national credential system, with more than 1 billion credentials issued in India alone, and more countries using the system by late 2021.⁷ International coordination came up against some early challenges. First, countries implemented digital health credentials at different times. Many countries began using these credentials to open for international travel while others still had largely closed borders. Second, countries required different information for their credentials. Israel, for example, added passport numbers to its credential, while the European Union did not. Third, there was disagreement on whether these credentials should validate vaccination alone, or vaccination, testing, and recovery.⁸ And fourth, each country recognized different types of vaccinations and tests. This initial global fragmentation forced countries to negotiate bilateral agreements to accept each other's credentials ("mutual recognition"), often without the technical capacity to digitally verify each other's credentials ("interoperability"). For example, as of January 2022, 48 countries recognized Israel's COVID-19 credential⁹ and 96 countries recognized India's DIVOC.¹⁰

Bilateral mutual recognition has also faced crucial limitations.

First, it only applies to travelers from specific countries, in effect requiring a country-by-country approach to travel restrictions and excluding people from countries without agreements. Second, mutual recognition agreements have created a complex maze of regulations for travelers, airline staff, and border officials, who must navigate the terms of different agreements for each set of countries; in the worst cases, this has forced them to manually check each traveler's credential against an ever-changing set of bilateral agreements. And third, mutual recognition agreements may be more difficult to modify if countries adapt their travel regulations as booster shots become more common, since governments could need to modify these agreements one at a time. If one country suddenly decided to require travelers to have a booster shot to qualify as fully vaccinated, those from certain other countries without available booster supply and credential systems that verify booster shots may suddenly no longer qualify. A lack of global standards or coordination (see Box 2) has exacerbated these limitations. While these limitations persisted through 2021, increasing regional convergence and consolidation has helped mitigate some of these issues.

Mutual recognition agreements have created a complex maze of regulations for travelers, airline staff, and border officials.

⁷ eGov Foundation, "Zero to 1 Billion," accessed February 3, 2022.

⁸ Some countries have developed separate credentials for domestic use and international travel. For instance, Israel's domestic credential covers all vaccination, testing, and recovery, but its international certificate only covers vaccination.

⁹ Israel Ministry of Health, "COVID Certificate," accessed January 2, 2022.

¹⁰ eGov Foundation, "DIVOC," accessed January 3, 2022.

BOX 2**The World Health Organization's Role on Digital Health Credentials**

The WHO released its *Technical Specification and Implementation Guidance* on digital proof of vaccination in August 2021 (and complementary guidance on proof of testing in March 2022). The guidance establishes the core data elements for digital credentials and workflows for common use cases, outlines data protection and ethical concerns, and provides considerations for national governance and the technical infrastructure for data storing and verification. It was developed with input from a host of governments and international organizations, and identifies the credentials used by the European Union and India as consistent with its specifications.

The guidance, however, represents a scaling down of WHO ambitions on digital health credentials. At first, the WHO proposed developing a vaccination credential and established a Smart Vaccination Certificate Working Group. But despite a pilot project in Estonia, the organization is no longer developing its own digital credential. While the WHO scaled down the scope of its work on developing credential systems or linking credentials to identity documentation, its guidance has become the standard for what should be included in a credential. The WHO has also worked at the national and regional levels to develop trust frameworks that verify who can issue credentials (see Box 3), in case Member States eventually request the WHO to develop a global trust framework. It is also beta testing a global gateway and universal app for verifying credentials, to be launched in 2022.

Sources: Participant comments during a working group meeting of the Migration Policy Institute (MPI) Task Force on Mobility and Borders during and after COVID-19, January 11, 2022; WHO, *Digital Documentation of COVID-19 Certificates: Vaccination Status* (Geneva: WHO, 2021); WHO, *Digital Documentation of COVID-19 Certificates: Test Result* (Geneva, WHO: 2022); WHO, *Interim Position Paper: Considerations Regarding Proof of COVID-19 Vaccination for International Travelers* (Geneva, WHO: 2021); WHO Regional Office for Europe, "Estonia and WHO to Work Together on Digital Health and Innovation" (news release, July 7, 2020); WHO, "Revised Scope and Direction for the Smart Vaccination Certificate and WHO's Role in the Global Health Trust Framework" (news release, June 4, 2021); Natschja Ratanaprayul, "WHO Technical Specifications and Implementation Guidance on Digital Documentation of COVID-19 Certificates (DCC)" (presentation at "The Road to BMIC6: Digital Health Certificates for Cross-Border Mobility" webinar, December 2, 2021).

Mid-2021: Regional Coordination

Given the limitations of bilateral coordination, the focus in mid-2021 increasingly turned to regional coordination, primarily through the EU Digital COVID Certificate (EUDCC). The DIVOC software first used in India was also adopted in Sri Lanka in July and the Philippines in September. Meanwhile, the African Union continued to roll out its regional digital credential infrastructure.

The EUDCC, launched in June 2021, has the widest geographic coverage of existing digital health credential systems. The EUDCC verifies vaccination, testing, and recovery status¹¹ to facilitate mobility within the European Union, while also allowing travel between the bloc and other countries. As of early 2022, 37 non-EU countries and territories had credential systems interoperable with the EUDCC system,¹² with 35 other countries interested in joining.¹³ The EUDCC is also working to allow Member States to exchange information about the rules each is using (for example, on which tests' results are acceptable and for how long), so one country's system can automatically verify that a traveler's vaccination or testing records comply with entry restrictions in another country. The European Union has also coordinated on a standard

11 The EU Digital COVID Certificate (EUDCC) is verified with a QR code that, when scanned, sends data through a gateway that verifies the digital signature of the credential issuer (e.g., a hospital, pharmacy, testing center) without accessing personal data.

12 European Commission, "EU Digital COVID Certificate," accessed April 14, 2022.

13 European Commission, "Report from the Commission to the European Parliament and the Council Pursuant to Article 16(2) of Regulation (EU) 2021/953 of the European Parliament and of the Council on a Framework for the Issuance, Verification and Acceptance of Interoperable COVID-19 Vaccination, Test and Recovery Certificates (EU Digital COVID Certificate) to Facilitate Free Movement during the COVID-19 Pandemic" (COM [2022] 123 final, March 15, 2022).

nine-month acceptance period for vaccination credentials.¹⁴ The EUDCC complies with WHO guidance, but it is not yet interoperable with other major credentials (see Table 1).

BOX 3

Interoperability: A Key Challenge for Digital Health Credential Systems

The International Civil Aviation Organization (ICAO) defines global interoperability as the “capability of inspection systems ... to obtain and exchange data, to process data received from systems in other states, and to utilize that data in inspection operations in their respective states.” Put simply, interoperability means that one system can authenticate the credentials produced under another system. Interoperability includes at least three components:

- 1 **Data interoperability:** Digital credentials need standard or equivalent definitions of the data included in the credential (birthdate, vaccination or test type, batch numbers, etc.). Although each major credential has slightly different elements, the WHO’s *Technical Specifications and Implementation Guidance* has emerged as a potential standard, with more coordination needed to integrate booster shots in a coherent manner.
- 2 **Technical interoperability:** If two credential systems are interoperable, they are able to verify the authenticity of digital credentials issued by either system. This should be achievable, given that many credential systems are built using the same open standards, such as the World Wide Web Consortium (W3C) Verifiable Credential Standard used by the Digital Infrastructure for Open Credentialing (DIVOC) and the SMART Health Card. But in some cases, technical issues (such as the size of QR codes) require that digital formats be changed to achieve interoperability, and such changes may require both technical expertise and political will.
- 3 **Governance and operational interoperability:** Verifying interoperable credentials requires the creation of trust frameworks, which define the registry of accredited providers that can issue credentials (for example, testing facilities and pharmacies). Without such a framework, a border official cannot trust that a credential was issued by a legitimate body, even if the credential has the correct elements and format. Of the three elements of interoperability, trust frameworks have posed the greatest challenge, as there is no such framework at the global level or in many countries. Some credentials are issued by a single government body or within a private or civil-society trust framework, which may resolve issues at the domestic level. But these registries are rarely shared between countries, and the WHO has stepped back from developing a global framework due to liability issues. Without a global trust framework, many credential systems are not interoperable and digital verification is often impossible.

In the absence of full interoperability, many airlines, border officials, and domestic venues are satisfied with manual credential inspection. But interoperability, which necessitates shared trust frameworks, is vital for automated verification, and airline staff and border officials need an automated system to process prepandemic volumes of travelers at speed.

Sources: This box draws heavily on participants’ comments during a working group meeting of the MPI Task Force on Mobility and Borders during and after COVID-19, January 11, 2022, as well as the following: Dakota Gruener, “[Immunity Certificates: If We Must Have Them, We Must Do It Right](#)” (white paper no. 12, COVID-19 Rapid Response Impact Initiative, Harvard University, Cambridge, MA, 2020); ICAO, *Machine Readable Travel Documents: Introduction*, 8th ed. (Montreal: ICAO, 2021), 15.

14 European Commission, “[Report from the Commission to the European Parliament and the Council Pursuant to Article 16\(1\) of Regulation \(EU\) 2021/953 of the European Parliament and of the Council on a Framework for the Issuance, Verification and Acceptance of Interoperable COVID-19 Vaccination, Test and Recovery Certificates \(EU Digital COVID Certificate\) to Facilitate Free Movement during the COVID-19 Pandemic](#)” (COM [2021] 649 final, October 18, 2021).

The African Union's Trusted Travel platform, which verifies testing and vaccination status, predates the EUDCC, having been launched in January 2021.¹⁵ While almost all 55 AU Member States share information on entry and exit rules on the platform, only 22 have fully adopted it, including Kenya, Namibia, and Togo.¹⁶ Unlike the EUDCC, Trusted Travel is primarily a tool for verifying testing, with no capacity to verify recovery status, and vaccination status was only recently added, largely because just 16 percent of Africans have been fully vaccinated.¹⁷ The African Union's work during COVID-19 has gone beyond credentials to focus on building health capacities and digital e-health systems. For example, the African Union maintains its own trust framework of facilities that can conduct COVID-19 tests, unlike the EUDCC, which leaves this responsibility to Member States. Trusted Travel offers a different regional model compared to the EUDCC, but its potential to facilitate travel remains unknown without greater uptake from Member States.

Regional credentials have advantages over national credentials—travelers only need one credential to move between any country in the region, for example—but they also face key limitations. First, while broader than national systems, they are still limited in geographic scope. Although the credential systems of Singapore and Israel are both interoperable with the EUDCC, the Israel and Singapore credentials are not themselves interoperable. The exclusion issues regarding mutual recognition of national credentials are therefore not solved, but merely shifted. Second, cooperation is more advanced in some regions than others. There is a risk of regional cooperation becoming de facto managed by the European Union, which has the most established system and has been reluctant to alter its credential to integrate new systems, in turn compounding ethical concerns around global vaccine inequity given European countries were often first line to access vaccines. And third, regionalization may discourage innovation and competition, becoming so dominant that private-sector or national credentials with important advantages—for example, stronger privacy protections or simpler workflows—cannot gain traction.

Late 2021: Increasing Consolidation

Late 2021 saw increasing uptake of a limited set of credentials. DIVOC and the EUDCC continued to grow, while the SMART Health Card emerged as the leading credential in North America and ICAO introduced its Visible Digital Seal (VDS). The SMART Health Card, developed by a consortium of nonprofit and private-sector actors primarily in the United States, was adopted as the national credential in Canada and became the dominant credential system in the United States (see Section 3 for more on its domestic uses).¹⁸ It can also now be used to prove vaccination or testing for international travel to some countries.¹⁹ The ICAO VDS, while only used in Australia and Japan so far, is the only credential that has been developed by a specialized UN agency and that builds on an existing e-passport system.

15 Africa Centres for Disease Control and Prevention, "Kenya Adopts Trusted Travel Digital Tool for COVID-19 Test Result Verification" (news release, January 21, 2021).

16 Participant comments during a working group meeting of the Migration Policy Institute (MPI) Task Force on Mobility and Borders during and after COVID-19, January 11, 2022. See also Louise Pieterse, "Africa COVID Passports Becomes a Reality," COVID Pass Certificate, July 26, 2021; Africa Centres for Disease Control and Prevention, "Africa CDC COVID-19 Trusted Travel Portal Press Briefing," Facebook Live, October 5, 2020; Carlos Mureithi, "Africa's Covid-19 Passport Lays the Groundwork for Controlling Future Disease Outbreaks," Quartz Africa, July 27, 2021.

17 Hannah Ritchie et al., "Coronavirus (COVID-19) Vaccinations," Our World in Data, University of Oxford, accessed February 2, 2022.

18 Suzanne Rowan Kelleher, "How to Get Digital Proof of Vaccination—and Why You're Going to Need It More Often," *Forbes*, November 15, 2021.

19 For example, SMART Health Cards can be used as proof of vaccination for entry into Singapore's Vaccinated Travel Lane from Canada. See Singapore Airlines, "Vaccinated Travel Lanes (VTL)," accessed December 13, 2021.

Consolidation also occurred through private-sector tools that can verify multiple credentials and check compliance with border restrictions: the International Air Transport Association (IATA) Travel Pass, the Commons Project's CommonPass and CommonCheck,²⁰ and Daon's VeriFly app.²¹ Each system allows travelers to upload their credentials into a smartphone app or web portal, which aims to automatically verify whether the traveler fulfills testing or vaccination requirements for border entry. The system then generates a QR code, green check, or "ok to travel status" that can be shown to airline staff and border officials, reducing the burden on them to manually read the credentials. These tools vary in terms of which credentials they can verify:²² VeriFly can handle only the credentials accepted by a limited set of countries,²³ while CommonCheck and the IATA Travel Pass can verify all major credentials. They also vary in terms of their scope, with the IATA Travel Pass being trialed by some 58 airlines, CommonCheck only used so far in the Seychelles, and VeriFly used by 8 airlines.

As more countries join the big credential systems and more tools emerge to automatically verify multiple credentials, it may become easier to navigate complex cross-border mobility rules. The four credentials identified in Table 1 are either already used in mass numbers, or in the case of the ICAO VDS, holds unique legitimacy because it was developed by a specialized UN agency.²⁴ Consolidation around these four credentials, however, is not sufficient, given minimal interoperability among the four and with other national credentials. Similarly, the private-sector tools to verify multiple credentials could streamline

As more countries join the big credential systems and more tools emerge to automatically verify multiple credentials, it may become easier to navigate complex cross-border mobility rules.

international travel, but all have limited uptake so far, and data have not been shared publicly on their usage. Consolidation in late 2021 was neither complete nor sufficient to facilitate safe and at-scale international mobility. While efforts to consolidate these systems have continued into early 2022, these initiatives have not yet solved key challenges to coordinating digital health credentials across borders.

20 CommonPass can verify the SMART Health Card and testing or vaccination credentials issued by certain authorized providers. CommonCheck is able to verify all major credentials, including those in Table 1.

21 The private sector also produced principles and proposed standards for verifying international credentials, although the WHO guidelines are the most agreed-up global technical specifications. See, for example, Good Health Pass, "Interoperability Blueprint," accessed December 8, 2021.

22 Some countries, including Australia, Canada, and Germany, also require that travelers upload their credentials to travel portals before their arrival, which allows governments to keep a record of travelers' credentials and in some cases allow them to automatically verify credentials prearrival.

23 While VeriFly automatically verifies status, a manual check is still required.

24 Despite this legitimacy, the future of the ICAO VDS depends on uptake from more countries in 2022.

TABLE 1

Overview of the Primary Digital Health Credentials Used for International Travel, as of Early 2022

	EU Digital COVID Certificate (EUDCC)	Digital Infrastructure for Open Credentialing (DIVOC)	International Civil Aviation Organization Visible Digital Seal (ICAO VDS)	SMART Health Card
Status	Fully operational, 707 million issued	Fully operational, 1.1 billion issued	Fully operational	Fully operational
Developer	European Union	India (based on open-source software)	ICAO	Civil-society and private-sector consortium
Geographic scope	64 countries (27 EU Member States and 37 connected countries and territories)	India, the Philippines, Sri Lanka (Indonesia and Jamaica planned)	Australia, Japan	15 countries (including prominent users Canada, Hong Kong, Japan, Senegal, Singapore, United Kingdom, United States)
Scope of credential	Vaccination, testing, recovery	Vaccination, testing	Vaccination, testing (but only vaccination credentials are in use so far)	Vaccination, testing
Domestic and/or international use	Both	Both	International only	Both
Interoperability vs. mutual recognition	Interoperable with systems of 37 connected countries and territories, but not with DIVOC, ICAO VDS, or SMART Health Cards	Governments establish bilateral mutual recognition with other countries	Still being established (interoperability challenges with the EUDCC)	Recognition is determined by each country choosing to accept SMART Health Cards

Sources: World Travel and Tourism Council (WTTC), *Digital Solutions for Revising International Travel: The Role of Interoperability and Digital Travel Portals* (London: WTTC, 2021); Lucy Yang, "Understanding the Global COVID Certificate Landscape," Linux Foundation Public Health, October 12, 2021; European Commission, "EU Digital COVID Certificate," accessed April 14, 2022; European Commission, "Report from the Commission to the European Parliament and the Council Pursuant to Article 16(2) of Regulation (EU) 2021/953 of the European Parliament and of the Council on a Framework for the Issuance, Verification and Acceptance of Interoperable COVID-19 Vaccination, Test and Recovery Certificates (EU Digital COVID Certificate) to Facilitate Free Movement during the COVID-19 Pandemic" (COM [2022] 123 final, March 15, 2022); eGov Foundation, "DIVOC," accessed January 3, 2022; ICAO, "New ICAO VDS Delivers Important Benefits for Secure and Efficient COVID-19 Testing and Vaccination Validation" (news release, June 9, 2021); Australian Government, Department of Foreign Affairs and Trade, "How the International COVID-19 Vaccination Certificate Works," accessed December 16, 2021; SMART Health IT, "Frequently Asked Questions," accessed December 16, 2021; Vaccination Credential Initiative, "Issuers of Smart Health Cards," accessed December 16, 2021.

C. Key Questions for International Travel

Digital health credentials, like the larger global COVID-19 response, remain fragmented and imperfect, but growing commitment to digital credentials among governments, regional institutions, the private sector, and international organizations could help consolidate the current landscape and kickstart mobility. In 2022, more countries may choose to adopt one of the big four credential frameworks, while private-sector tools able to verify multiple credentials could expand to cover more airlines and countries.

One remaining question is whether one credential framework will become the standard that others work toward. As one of the most widespread frameworks, the EUDCC may become the benchmark for interoperability, despite the limitations noted above. For instance, the 37 non-EU countries and territories with credentials interoperable with the EUDCC may prioritize mutual recognition among themselves, since

While a single credential may not become the global standard, consolidation on a limited set of major systems would simplify the challenge of global interoperability.

they would meet a set of baseline EUDCC standards.²⁵ However, several countries with large and highly mobile populations do not yet have credentials that are interoperable with the EUDCC (including Brazil, China, India, South Africa, and the United States). Other regions may instead develop their own regional credentials based on the EUDCC model,²⁶ given their advantages in facilitating intra-regional travel. Meanwhile, the DIVOC

software could be replicated elsewhere in South and Southeast Asia, while the ICAO VDS will likely spread beyond Australia and Japan. While a single credential may not become the global standard, consolidation on a limited set of major systems would simplify the challenge of global interoperability.

Another question is whether there is a need for a forum or institution to coordinate credential-related efforts. The WHO stepped away from this role early in the pandemic, leaving a void that has been filled by a host of government and nongovernmental initiatives. Better coordination may have prevented the interoperability issues that have already come to light, including between the EUDCC and ICAO VDS, such as different datasets and technical specifications for QR codes (see Box 3).²⁷ Coordination could also lead to some standardization on how credential systems integrate boosters administered in a different country from where the individual was originally vaccinated, or how long vaccination is to be considered valid. International organizations, such as IOM, have signaled willingness to take on this coordinating role,²⁸ and ICAO as a specialized UN agency may have the influence to advocate for its VDS, but this mandate remains unfilled.

A third question is what stopgap measures may be needed to open borders in 2022, especially while vaccination coverage remains uneven globally and while technical and interoperability challenges risk depriving people of digital verification. It is likely many governments will err on the side of inclusion, by accepting unverified and paper-based credentials alongside serology tests (which check for the presence of antibodies) or passenger declarations, or by introducing exemptions to vaccination requirements for people

25 For instance, Singapore's Vaccinated Travel Lane (for quarantine-free travel of vaccinated air passengers) allows entry of travelers "whose countries meet EUDCC standards and have joined the EUDCC system" to apply for entry. Non-EU countries with credential systems that are interoperable with the EUDCC may therefore be eligible to enter Singapore even if there is not mutual recognition or interoperability between Singapore and said country. See Singapore Airlines, "Vaccinated Travel Lanes."

26 See, for example, Azusa Sato and Anit Mukherjee, "A Matter of Trust and Coordination: A COVID_19 Vaccination Certificate for Southeast Asia?" Center for Global Development, May 13, 2021.

27 European Commission, "Report from the Commission" (October 2021), 7.

28 The director general of the International Organization for Migration (IOM) affirmed this willingness at the 2021 IOM Council. See United Nations Web TV, "4th Meeting, 112th Session of IOM Council" (video, November 30, 2021). IOM also released recommendations for digital health credentials early in the pandemic: they should be evidence based, inclusive/have nondigital alternatives, protective of data privacy, interoperable, and migrant friendly/accessible in multiple languages. See IOM, "Covid-19 Digital Health Certificates for Cross-Border Mobility and Migration" (issue brief, IOM, Grand-Saconnex, Switzerland, August 2021).

traveling from countries with low vaccination coverage.²⁹ Many countries, including Australia, Canada, the United States, and some EU Member States, already take a pragmatic approach to digital credentials. These countries accept paper and digital, verifiable and unverifiable proof of vaccination and testing, although they usually require the vaccination or testing credential to include certain basic information (e.g., name, date, type of vaccination) and to be in certain languages or accompanied by a certified translation. Governments reflecting on the role of digital credentials in the global mobility architecture should weigh all the different options, which include (1) technically interoperable credentials; (2) mutually recognized but not technically verifiable credentials; (3) accepting any reasonable proof of vaccination, testing, and/or recovery; and (4) lifting credential requirements entirely. Crucially, travelers should not be barred from entering a country or penalized with burdensome requirements simply because their proof of vaccination or testing is not verifiable.³⁰

A fourth and final question pertains to the status of testing requirements. The Omicron variant called into question the reliance on vaccination (see Box 1), but testing poses additional credential-related issues. The trust framework (see Box 3) for testing services is more decentralized and privatized than for vaccination; tests are often provided by a wider range of private companies and laboratories, compared to the combination of governments, pharmacies, and doctors that typically provide vaccination. Even if a country establishes a registry of accepted providers issuing test results for international travel, there are logistical issues involved in ensuring that there are enough test providers to meet public demand, monitoring providers to ensure their tests meet quality control standards, and preventing providers from issuing fraudulent test results.³¹ The four major credential systems can all verify testing status, but the focus has been on vaccination credentials—no country uses the ICAO VDS for test results, and the testing credentials that can be recorded in DIVOC are not available in the Philippines or Sri Lanka. Requirements that international travelers provide verifiable, digital proof of a COVID-19 test are not yet common because of these challenges, but such rules may become more widespread as countries with lower risk tolerance aim to minimize the spread of the virus as they open their borders and as reports of fraudulent test results grow.³² Careful consideration of how countries accept proof of testing is essential. Canada, for example, has been pragmatic in accepting unverifiable proof of vaccination, but until early 2022, only accepted tests from a limited set of providers (just one laboratory in India, for example).³³ The coordination, technical, and governance issues are more complex for testing than vaccination.

29 Israel and Singapore, for example, both use serology tests to verify the vaccination status of some incoming travelers without verifiable credentials.

30 Related stopgap measures apply to countries still in the first phases of their vaccine rollouts. Without a global credential standard, countries are still developing their own credential systems using various digital formats. Regardless of the format, all countries need to create digital records of their vaccinations; interoperability issues can be addressed later, but only if a digital record of vaccination already exists.

31 Without strict regulation, COVID-19 test prices can skyrocket, especially when only certain types of tests or test providers are accepted. See Jill Ward, “U.K.’s Travel COVID Test Prices Slashed Following Criticism,” Bloomberg, August 15, 2021.

32 For example, the United Arab Emirates banned flights from Kenya because many travelers were arriving with proof of a negative test but testing positive after arrival, likely because the credentials were fraudulent. See Emmanuel Abara Benson, “Kenya Has Suspended Passenger Flights from Dubai, Just as the US Downgrades the East African Country to Level 3 Travel Advisory,” Business Insider Africa, January 11, 2022; Bonface Otieno, “Fake Covid Tests behind Dubai Kenya Flight Ban,” Business Daily, January 6, 2022. Examples also exist in other countries. See Julia Wong, “Hundreds Have Tried to Enter Canada with Fake COVID-19 Test Results, Proof-of-Vaccine Documents: CBSA,” CBC, November 30, 2021.

33 Government of Canada, “Travel Advice and Advisories for India,” updated January 19, 2022. This requirement was later lifted. See Anirudh Bhattacharyya, “Canada Removes India-Specific Covid-19 Testing Rules for Travellers,” *Hindustan Times*, January 29, 2022.

3 Digital Health Credentials for Domestic Use

The use of digital health credentials domestically, both to travel between provinces or states and to access services and venues, remains understudied from a mobility perspective. While the migration implications of digital credentials for international travel are relatively clear, vaccine, testing, or recovery credentials can also shape mobility within some national contexts. Domestic credential requirements can limit travel within a country (e.g., proof of vaccination is required to travel between some states in Australia and was considered for domestic flights in the United States),³⁴ while also making it more difficult for migrants and travelers vaccinated in one country to access certain venues and services while traveling in another country (proof of vaccination or recovery is needed to access most shops, bars, restaurants, and nonessential spaces in Germany, for example).³⁵ Credential systems for domestic use have been characterized by both innovation and fragmentation, and ensuring that people on the move are able to access these systems remains a challenge.

A. Credential Requirements and Mandates

A growing number of countries have introduced digital health credentials in the domestic context, particularly as rising vaccination rates have allowed governments to more safely open services and venues. As with credentials for international travel, these systems aim in the domestic context to decrease fraud and streamline verification, but domestic credential requirements have the added benefit of incentivizing vaccination. In some cases, countries require proof of health status to access certain services and venues (such as cafes, gyms, faith-based gatherings, or even public transit). Some countries have used this approach to encourage residents to get vaccinated; the Australian government, for example, emphasized that vaccinated people would get access to “freedoms” ranging from travel to access to pubs, even though vaccination is not strictly mandated.³⁶ In other cases, countries simply mandate vaccination. These blanket vaccine mandates, which legally require all residents, specific age groups, or workers in certain sectors to get vaccinated (unless they have a medical condition that prevents it), are less common.³⁷ Requiring digital credentials to access services and venues is more common than mandating vaccination, since credential requirements can still incentivize vaccination but are markedly less coercive than mandates.³⁸

The merits of requiring digital credentials to access services and venues, or mandating vaccination directly, are hotly contested. Requiring these credentials may incentivize vaccination uptake, reduce the spread of the virus, and help schools, hospitals, and other essential services to stay open, without the legal, ethical,

34 Virginia Langmaid, “US Government Should Consider Vaccination Requirement for Domestic Air Travel, Fauci Says,” CNN, December 28, 2021.

35 Christopher F. Schuetze, “Germany Announces Tough Restrictions for Unvaccinated People,” *New York Times*, December 2, 2021.

36 Participant comments during a working group meeting of the MPI Task Force on Mobility and Borders during and after COVID-19, January 11, 2022. See also Australian Government, Department of Health, “Spread Freedom” (news release, October 24, 2021).

37 Vaccine mandates are in place in a host of countries: Austria, Ecuador, and Indonesia for all adults; Egypt, France, and the United States for public employees; Australia, England, and Germany for health-care workers; Denmark, Italy, and Morocco for entry to certain venues such as bars, restaurants, and hotels, among others. For a full list, see Reuters, “Factbox: Countries Making COVID-19 Vaccines Mandatory,” Reuters, updated December 31, 2021.

38 Mandates may be complemented by digital credential requirements, but they do not have to be. In Austria, for example, the government plans to lift its requirement to prove vaccination or recovery to access certain venues once its vaccine mandate goes into force. See Associated Press, “Austria to Ease Virus Rules after Vaccine Mandate Begins,” AP News, January 29, 2022.

and practical problems posed by mandates. Research has found that granting additional freedoms to people with proof of vaccination has a significant positive impact on vaccination rates,³⁹ larger even than some financial incentives.⁴⁰ Higher vaccination rates facilitate safer reopening of services, in turn boosting economic productivity while limiting deaths and illness.⁴¹ These consequences have implications for people on the move—higher vaccination rates allow countries to safely open for greater levels of incoming travel, from tourism and student mobility to family reunification and labor migration. Migrants have also been particularly affected by lockdowns and restrictions on economic activity, which could be lifted with higher vaccination rates. Yet credential requirements may fail to increase vaccination rates to the desired levels, leading some countries to turn to mandates.

The merits of requiring digital credentials to access services and venues, or mandating vaccination directly, are hotly contested.

Blanket mandates requiring vaccination, even with general public support, have often faced significant backlash from some groups invoking vaccine skepticism and civil liberties.⁴² In many countries, the public and their policymakers are already less willing to implement digital credential requirements for domestic rather than international use,⁴³ in part because they are associated with expanding government mandates in private spheres.⁴⁴ Since COVID-19 vaccination mandates have only been recently imposed, there is also not yet evidence on their efficacy and consequences. Moreover, more transmissible variants of the virus that causes COVID-19 may weaken the rationale behind mandating vaccination (see Box 1). The WHO recommends that mandates be a last resort because they may decrease public trust and increase vaccine hesitancy,⁴⁵ including among marginalized communities, such as racialized or poor people. In some contexts, migrants may face more barriers to accessing vaccines, especially those who are unauthorized and/or face racial or other discrimination, creating vaccine inequalities exacerbated by mandates. Incentivizing uptake and expanding access for those who encounter barriers may be more appropriate in

39 A recent study found that requiring proof of vaccination to access public venues increased COVID-19 vaccination rates, especially in countries with lower premandate vaccination rates. These effects, however, were temporary, varied by age, and were associated with mandates for entry into specific services and venues (rather than blanket mandates for all adults). See Melinda C. Mills and Tobias Rüttenauer, “The Effect of Mandatory COVID-19 Certificates on Vaccine Uptake: Synthetic-Control Modelling of Six Countries,” *Lancet Public Health* 7, no. 1 (2021): 15–22. See also Nicolas Woloszko, “Do COVID Certificates Spur Vaccination Take-Up? A Snapshot of Recent Evidence,” Ecoscope (blog), Organization for Economic Cooperation and Development, January 18, 2022.

40 Heike Klüver et al., “Incentives Can Spur COVID-19 Vaccination Uptake,” *Proceedings of the National Academy of Sciences of the United States of America* 118, no. 36 (2021): 1–3.

41 Miquel Oliu-Barton et al., “The Effect of COVID Certificates on Vaccine Uptake, Health Outcomes and the Economy” (working paper 01/2022, Bruegel, Brussels, January 2022).

42 Polling and studies found that majorities in Australia, the United Kingdom, and the United States support mandatory vaccinations, at least for some workers and to access some venues and services. Nonetheless, large protests occurred in all three countries against mandatory vaccinations. See David T. Smith, Katie Attwell, and Uwana Evers, “Support for a COVID-19 Vaccine Mandate in the Face of Safety Concerns and Political Affiliations: An Australian Study,” *Politics* (2021): 1–12; Margaret Talev, “Axios-Ipsos Poll: 60% of Voters Back Biden Vaccine Mandates,” *Axios*, September 14, 2021; Kelly Beaver, Gideon Skinner, and Anna Quigley, “Majority of Britons Support Vaccine Passports but Recognise Concerns in New Ipsos UK KnowledgePanel Poll,” Ipsos, March 31, 2021.

43 Megan Brenan, “U.S. Support for Vaccination Proof Varies by Activity,” Gallup, May 7, 2021.

44 For example, see John Clayton et al., *The Good, the Bad, & the Invasive: The Impact of Vaccine Registries, Day Passes & Passports* (Washington, DC: Surveillance Technology Oversight Project, 2021).

45 United Nations Regional Information Centre for Western Europe, “WHO: Mandatory Vaccinations Are a Last Resort” (news release, December 7, 2021).

some cases (see Sections 4 and 5 for analysis and recommendations on incentivizing vaccination for people on the move).

B. Innovation and Fragmentation at the Subnational Level

Domestic credential systems have seen considerable innovation and, at the same time, faced challenges to coordination and the inclusion of international travelers. Domestic credentials are developed by federal and state governments, the private sector, civil society, and other stakeholders, which can enable more experimentation, competition, and innovation, while credential systems for international travel are generally developed solely or primarily by national governments.⁴⁶ In the United States, the federal government has not coordinated or supported a national credential, so a host of competing private sector and state government solutions have emerged, with the SMART Health Card increasingly becoming dominant because it was one of the first to establish a registry of testing providers.⁴⁷ Competing private-sector and state-level domestic systems may allow for greater innovation, from adopting open-source software for interoperable credentials⁴⁸ and experimenting with blockchain,⁴⁹ to making the system available in multiple languages.⁵⁰ Private-sector credential tools have also emerged with their own trust frameworks and networks of registered vaccination and testing providers (see Box 3). Similar to the IATA Travel Pass but primarily for domestic use, these tools allow businesses and venues to verify multiple types of credentials.⁵¹

Innovation and competition, however, can inhibit consolidation among credential systems in different states and provinces, with implications for internal mobility. The lack of a national credential in the United States poses challenges to domestic travel; as of early 2022, most states had still not adopted the SMART Health Card, meaning a traveler from one state may be unable to use it to prove health status in another state. The federal government may also be unable to impose a vaccination or testing requirement for domestic travel because the only federal proof of vaccination is a paper card (which is easily lost or forgeable) and various state credentials are not interoperable. Other countries have implemented coherent credential systems, either directly at the national level or by coordinating the systems of their states and provinces. In Canada, each province sets its own rules on vaccination and testing, and initially each province began to develop its own credential. The Canadian government, however, worked to standardize credential formats on the SMART Health Card standard and achieved a consistent “look and feel” so each credential, while issued by the province, looks the same.⁵² Such a system allows each province to verify credentials issued by other

46 For a comprehensive (but not up-to-date) mapping of digital credential solutions, see Ada Lovelace Institute, “[International Monitor: Vaccine Passports and COVID Status Apps](#),” updated June 22, 2020.

47 Alternative credentials include Docket and MyIR Mobile, as well as applications developed by state governments. Digital credentials have also been developed for employers to verify the vaccination status of their employees and those who enter their premises: IBM produced a Digital Health Pass, Onfido developed a credential system for hotel bookings, and the National Hockey League used the Clear Health Pass services to test players and staff.

48 For example, see PathCheck Foundation, “[Paper-First Proof of Vaccination Solutions](#),” accessed December 15, 2021; Linux Foundation Public Health, “[COVID Credentials Initiative](#),” accessed December 15, 2021.

49 For example, see SICPA, “[CERTUS Digital Seal Technology](#),” accessed December 15, 2021; AOKPass, “[AOKPass](#),” accessed December 15, 2021.

50 For example, Excelsior Pass *Plus* system in New York is available in ten languages. See Government of New York State, “[Excelsior Pass Plus: Frequently Asked Questions](#),” accessed February 10, 2022.

51 See, for example, IBM, “[Digital Health Pass](#),” accessed February 2, 2022.

52 Participant comments during a working group meeting of the MPI Task Force on Mobility and Borders during and after COVID-19, January 11, 2022.

provinces. In Australia, states and territories can issue their own credentials, but a national immunization registry facilitates the integration of travelers from one state into another state's credential system.

Fragmentation at the subnational level also complicates international coordination on digital credentials and the integration of international travelers into domestic credential systems. The lack of a federal credential in the United States leaves some states, such as California and New York, working with other national governments to establish mutual recognition and interoperability between their state credential systems and the national credentials of those other countries.⁵³ This further complicates the

already complex web of mutual recognition and interoperability—coordination is difficult between national governments, let alone between national and state or provincial governments. In contrast, a common standard and design for credentials issued by Canadian provinces means that nation's government can negotiate directly and with a single voice with other countries. Moreover, different credential systems for each state and province can, in the most extreme case, entail separate processes to integrate international travelers into each system, which may hinder tourism and other forms of international mobility. Still, even if a country does have a national system, they may struggle to make them accessible to international travelers. For example, travelers to Germany with a credential not interoperable with the EUDCC "are in many cases not granted access to certain venues and events."⁵⁴ In other countries (such as France), travelers can access a vaccine equivalency health pass for domestic use,⁵⁵ but this process can be time intensive, costly, logistically challenging (especially for those who do not speak the destination country's language), and thus impractical for travelers taking short trips.⁵⁶

The lack of a federal credential in the United States leaves some states, such as California and New York, working with other national governments to establish mutual recognition and interoperability.

4 Implications for Travel and People on the Move: Key Concerns and Opportunities

Barriers to accessing digital health credentials can leave people locked out of travel and, in some countries, much of everyday life. Credential systems were first designed for residents to use domestically and therefore often have a built-in bias against people on the move, both newly arrived travelers and immigrants already in the community. Excluding these people from health credential systems can negatively affect their ability to live functioning and flourishing lives: without such credentials, some may be unable to either travel abroad to visit family, move between the country's states and provinces, as well as to access domestic services and venues that would support their integration into the community.

⁵³ Participant comments during a working group meeting of the MPI Task Force on Mobility and Borders during and after COVID-19, January 11, 2022.

⁵⁴ Missions of the Federal Republic of Germany in Australia, "Coronavirus/Covid-19: FAQ," updated January 5, 2022.

⁵⁵ Government of France, "How to Obtain a Health Pass in Case of Vaccination Abroad?," accessed September 11, 2021.

⁵⁶ For example, Israel faced problems issuing its domestic credential to foreign nationals, who often did not have an Israeli phone number, which was needed for the two-factor identification process. They therefore needed to set up call centers and help centers to help people resolve these issues. See Adam Cutler, "Enacting Policy on Verifiable COVID-19 Credential Requirements" (presentation at the National Academies of Sciences, Engineering, and Medicine online workshop "Utility, Feasibility and Ethics of Verifiable COVID-19 Credentials for International Travel," August 3–5, 2021).

Governments face a set of ethical and pragmatic challenges, including how to ensure that all people, regardless of their immigration status, can access health credentials, and how to use credentials to facilitate labor migration, business travel, and tourism to help kickstart the economic recovery. Issues around interoperability, mutual recognition, and coordination, explored in Sections 2 and 3, may create some barriers and concerns specific to people on the move, but addressing these issues could also bring opportunities—such as incentivizing travelers to get vaccinated.

A. *Tourists, Businesspeople, and Other Short-Term Travelers*

Many countries have an important economic rationale to restart tourism and business travel at scale, and efficient, coordinated health credential systems will be central to restarting this travel. International tourist arrivals in 2021 were still 72 percent lower than prepandemic levels,⁵⁷ and a survey of 150 U.S. companies found that their travel budgets dropped by 90 percent in 2020.⁵⁸ The contribution of the travel and tourism industry to global GDP almost halved in 2020,⁵⁹ with massive job losses and other economic consequences. Many countries, especially those heavily dependent on their tourism sectors or business travel, have worked to quickly restart travel, while others have deprioritized tourism as a less “essential” form of travel. But restarting tourism is vital for both economic and ethical reasons—in many cases, people can only visit family members abroad under a tourist visa.

Restarting tourism is vital for both economic and ethical reasons—in many cases, people can only visit family members abroad under a tourist visa.

Many countries have worked to restart tourism and business travel through exemptions to travel restrictions and initiatives to attract tourists. Countries have exempted certain businesspeople from travel restrictions, although they are often still required to be tested and prove their vaccination status.⁶⁰ Tourists, however, have not been consistently granted exemptions, even when vaccinated, except in certain tourist-dependent countries and regions. Some of these countries, such as Costa Rica, allow unvaccinated tourists to enter, but only with a travel insurance policy that covers medical and lodging expenses in the case of COVID-19 hospitalization or quarantine.⁶¹ Other countries have piloted innovative measures to restart tourism, such as offering vaccinations on arrival to attract tourists⁶² or certifying that specific businesses and venues are taking proactive COVID-19 mitigation steps and are therefore safer for tourists.⁶³ In Thailand, the government offered tourists exemptions from quarantine requirements, so long as they stayed in

57 United Nations World Tourism Organization (UNWTO), “International Tourism and COVID-19,” accessed February 2, 2022. The data compares 2021 with 2019 levels of international tourist arrivals.

58 Peter Caputo et al., “Return to a World Transformed: How the Pandemic Is Reshaping Corporate Travel,” Deloitte Insights, August 2, 2021.

59 One estimate found that the industries’ GDP contribution dropped by 10.4 percent to 5.5 percent. See Nejc Luc and Tiffany Misrahi, *Travel and Tourism Economic Impact 2021: Global Economic Impact and Trends 2021* (London: World Travel and Tourism Council, 2021).

60 Benton et al., *COVID-19 and the State of Global Mobility in 2021*.

61 Visit Costa Rica, “Entry Requirements,” accessed February 2, 2022.

62 See, for example, Tamara Hardingham-Gill, “This Vacation Hotspot Is Offering Vaccinations to Visitors,” CNN, April 17, 2021.

63 Caribbean Public Health Agency, “Healthier Safer Tourism,” accessed December 14, 2021.

the Phuket province for two weeks before traveling elsewhere in the country.⁶⁴ These efforts balance the economic incentives to open for more travel with the need to mitigate the associated health risks.

While exemptions and targeted initiatives have begun to restart tourism and business travel, increasing use of digital credential requirements may pose new challenges. Business and tourist travelers often visit multiple countries on the same trip, so they will face considerable complexity if different, incompatible credentials are used in each country.⁶⁵ Moreover, people traveling for work may be doing so at short notice, and thus need streamlined processes (although they may also have support from their company to help them navigate travel bureaucracy). Tourists and business travelers may also need access to domestic venues and services once they arrive in a country—to enter museums, public spaces, hotels, and conference centers, for example—without waiting for a bureaucratic process to prove their vaccination or testing status and receive a recognized credential for use in their destination country. In New Zealand, citizens vaccinated abroad reported up to three-week wait times for their proof of vaccination to be approved in the domestic credential systems; such delays would presumably deter international tourists, although some countries have worked to streamline this process.⁶⁶ Even domestic tourism and business travel can be hampered by uncoordinated credential systems at the state and province level. Without interoperable credential systems at the domestic and international level, mutual recognition may be an appropriate stopgap, especially between countries in the same region and countries with significant business and tourist flows, but mutual recognition causes too many bottlenecks at borders to be scalable to prepandemic levels of travel. Providing testing upon arrival for travelers who are unvaccinated or do not hold a recognized vaccination credential, in addition to encouraging short-term travel, can also have the benefit of addressing inequity concerns for people coming from countries with low vaccination rates. Tourist and business travelers exemplify the need for low-cost, time-efficient, and standardized requirements, as well as targeted programs to encourage travel and provide opportunities for vaccination and testing.

B. *International Students*

International students make immense economic, cultural, and social contributions, but student mobility has not recovered to prepandemic levels in many countries, in part because of vaccination and digital credential policies. After a precipitous drop in 2020, student mobility to countries with more open travel policies has rebounded, while remaining limited to countries with stricter policies,⁶⁷ with direct economic consequences projected in those that previously had large international student populations but have been

64 Steve Saxon, Jan Sodprasert, and Voramon Sucharitakul, “Reimagining Travel: Thailand’s Tourism after the COVID-19 Pandemic,” McKinsey & Company, November 30, 2021.

65 UNWTO recommended early in the pandemic that vaccination certificates, as well as testing protocols and certification systems, be coordinated and standardized. See UNWTO, “8th Global Tourism Crisis Committee Meeting” (key messages document, January 18, 2021).

66 Sam Olley, “Returnees Vaccinated Abroad Stuck without Vaccine Pass: ‘It’s an Absolute Joke,’” Radio New Zealand, December 13, 2021.

67 For example, international student mobility rebounded faster in Canada, the United Kingdom, and the United States than in Australia or New Zealand. See Peter Hurley, Melinda Hildebrandt, and Rachel Brisbane, *Student, Interrupted: International Education and the Pandemic* (Melbourne: Mitchell Institute, 2021). Australia and New Zealand have announced plans to open to fully vaccinated students in 2022.

unable to reopen.⁶⁸ Vaccine mandates for university students are increasingly common, and many schools and universities have supported students in accessing proof of vaccination and testing. However, a further streamlined process to help this population access vaccination and digital health credentials relies on greater coordination between educational institutions and governments.

Schools and universities have already taken on an awareness-raising role, communicating with students to explain vaccination and testing rules and how to access digital credentials. Before the pandemic, schools regularly provided guidance on communicable diseases and required students to prove vaccination from a host of viruses and diseases. This unique infrastructure around student mobility has provided opportunities for schools and universities to guide students through the process of moving, including with information on accepted vaccines and proof of vaccination, testing requirements, and accessing domestic credentials. Universities, for example, have integrated guidance on vaccine and testing requirements for international travel into webinars and orientation for international students,⁶⁹ or communicated information on vaccination requirements for existing student visa holders. McGill University in Quebec, Canada, for example, shares information on how students vaccinated abroad can register for an appointment to have their proof of vaccination integrated into the province's credential system.⁷⁰ Other institutions of higher education, such as Georgetown University in Washington, DC, have even developed their own credential systems that require students, faculty, and staff to share proof of vaccination to access university buildings.⁷¹ For capacity and liability reasons, schools and universities should not be made legally responsible for verifying their students' vaccination, but they can be engaged to facilitate the process.

Stronger partnerships between governments and educational institutions could also provide opportunities to streamline credential systems and support students unable to prove vaccination and testing. Universities, for example, could support newly arrived students with accessing domestic credentials by guiding them through this process or bringing pharmacies or relevant government agencies to campus during orientation. They could also allow students without verifiable credentials to quarantine in the school's housing and get tested and vaccinated through the school's systems, potentially allowing them to face fewer entry restrictions at borders. These alternative systems may be particularly important for student mobility: the two biggest sending countries for international students are China and India, both of which primarily use vaccines and credentials that are not always recognized by top destination countries for students.

68 One model suggests that Australia could lose up to AUD 16 billion between 2020 and 2023 due to the impacts of COVID-19, even assuming international student levels return to prepandemic levels in 2022. See Paul Karp, "Australian Universities Facing \$16bn Black Hole as Covid-19 Student Numbers Plummet," *The Guardian*, June 3, 2020.

69 See, for example, California State University, East Bay, "Pre-departure Orientation for F-1 International Students Enrolling in Fall 2021" (webinar presentation, August 14, 2021).

70 McGill University, "Vaccine Passports and McGill," updated September 17, 2021.

71 See, for example, Georgetown University, "Instructions for Uploading Your COVID-19 Vaccination Documentation," accessed January 4, 2022.

for students.⁷² International student mobility exemplifies the added value of a whole-of-society approach to vaccines and digital health credentials.

C. *Labor Migrants and Other Visa Holders*

The initial months of the pandemic saw travel restrictions and border closures shut down labor migration, though governments moved quickly to facilitate the entry of “essential” workers such as those in agriculture and health care. Since then, many countries have worked to restart labor migration, especially in specific sectors facing labor shortages.⁷³ Governments and employers have restarted some labor migration by taking on some vaccination, quarantine, and testing costs, and helped labor migrants to access domestic health credential systems. But challenges to restarting labor migration at scale remain, from workers’ lack of access to vaccines approved in the destination country to difficulties accessing credentials for domestic use upon arrival. Taking a whole-of-society approach—engaging governments in sending and receiving countries, recruitment agencies, employers, and other stakeholders involved in facilitating labor migration—can help to ensure labor migrants have access to vaccination and affordable testing, as well as knowledge of credential requirements.

As with schools’ and universities’ involvement in student mobility, employers, governments, and recruitment agencies are involved in preparing and processing paperwork for labor migrants, and in some contexts, they already support migrants’ access to vaccination and testing prior to migration. For example, Singaporean employers must pay the full costs of COVID-19 testing and quarantine for new Work Pass holders,⁷⁴ and the Government of Bangladesh agreed to cover part of the quarantine costs for its migrant workers moving to Saudi Arabia.⁷⁵ While these official partnerships between sending and receiving countries, employers, and recruiters are often found in Asia, the Middle East, and parts of North America and Africa, similar if less formal engagement could be considered across all regions, perhaps focused on information- rather than cost-sharing. Recruitment agencies have a key role here since they often handle workers’ visa and contract paperwork and are subject to regulations specific to facilitating the travel of labor migrants. In some contexts, these agencies have even successfully advocated for prioritizing migrant workers for vaccinations.⁷⁶

Nonetheless, labor migrants continue to face issues when seeking to access approved vaccinations and, upon arrival, domestic credentials. Governments and employers can provide support in this regard, although this support may need regulation to protect migrant workers’ right to privacy. For example, employers in Singapore bring employees who have been vaccinated overseas to medical centers that can verify their vaccination status with a serology test, which is then entered into the National Immunization

72 The Sinovac and Covaxin vaccines, produced in China and India, respectively, have not received conditional marketing authorization by the EU Commission, although many Member States still recognize those vaccines. See European Medicines Agency, “COVID-19 Vaccines,” accessed December 28, 2021.

73 Kate Hooper, “Labor Shortages during the Pandemic and Beyond: What Role Can Immigration Policy Play?” (commentary, MPI, Washington, DC, October 2021).

74 Government of Singapore, Ministry of Manpower, “FAQs on Entry Approvals and SHN Requirements for Foreign Employees,” accessed January 21, 2022.

75 Rashidul Hasan and Jamil Mahmud, “Migrants Quarantine in Saudi Arabia: Govt Decides to Share Cost of Hotel Stay,” *The Daily Star*, May 30, 2021.

76 See, for example, *The Business Standard*, “Vaccine Priority for Migrant Workers,” *The Business Standard*, June 17, 2021.

Registry.⁷⁷ Employers could also walk new migrant workers through the process of accessing domestic credentials during training or orientation. Without access to domestic health credentials, migrant workers may face barriers to finding accommodation or health services, and to integrating into the community if they are barred from social venues and public spaces. Large employers have run dedicated vaccination campaigns and brought vaccine providers to their workplaces,⁷⁸ and they could also encourage and provide information or paid time off for workers to get vaccinated. Moreover, employers may work with governments to secure exemptions from vaccination requirements for entry, particularly in sectors with labor shortages or for cross-border workers. A potential model is the U.S. exemption from vaccination entry requirements for people coming from countries with vaccination rates below 10 percent, on the condition that they agree to get vaccinated within 60 days of arrival.⁷⁹ Migrant workers could also be granted exemptions from testing requirements, if employers agree to provide testing upon arrival. Such arrangements between employers and governments would require safeguards and regulations to protect workers' rights and minimize the risk of exploitation. For labor migration, as with all forms of mobility, it is in the interest of all stakeholders to provide access to opportunities for vaccination and incentivize uptake.

Without access to domestic health credentials, migrant workers may face barriers to finding accommodation or health services, and to integrating into the community.

D. Refugees and Asylum Seekers

Despite recent improvements in some contexts, many refugees and asylum seekers still face limited access to vaccines and testing. Even once vaccinated, refugees and asylum seekers may lack smartphones or the internet access needed for digital credentials, be unable or unwilling to share identity documentation to authenticate credentials, or for refugees awaiting resettlement, see this process delayed by issues related to accessing health credentials. Those without reliable access to digital credentials may face disproportionate challenges to traveling internationally and to integrating within host communities. Refugees and asylum seekers encounter different issues when accessing vaccination and digital credentials depending on their context; the challenges differ for refugees in low- and middle-income countries, asylum seekers in high-income countries, and refugees in the resettlement process.

In many low- and middle-income countries, refugees, asylum seekers, and other displaced people may face barriers to accessing and obtaining proof of vaccination and testing. Some governments have prioritized vaccinations for refugees and asylum seekers. By mid-2021, 123 out of 126 countries had included or committed to including refugees in their vaccination plans.⁸⁰ Serbia and Bangladesh, among others, had

77 Government of Singapore, Ministry of Manpower, "Advisory to Employers: Updated Vaccination Policies and Ingestion of Overseas Vaccination Records for Migrant Workers," updated February 16, 2021.

78 See, for example, Mariama Diallo, "US Immigrant Farm Workers Line Up for Covid-19 Vaccines," Voice of America, January 29, 2021.

79 Joseph R. Biden Jr., "A Proclamation on Advancing the Safe Resumption of Global Travel during the COVID-19 Pandemic" (presidential proclamation, U.S. White House, October 25, 2021). This exemption applies to all nonimmigrant visa holders arriving by air, a group that includes temporary labor migrants. In some cases, it may be appropriate to consider such an exemption specifically for labor migrants coming from certain countries.

80 United Nations High Commissioner for Refugees (UNHCR), "UNHCR Calls on States to Remove Barriers to Access to COVID-19 Vaccines for Refugees" (news release, June 24, 2021).

implemented targeted vaccination campaigns in asylum centers and refugee camps.⁸¹ And in Jordan, vaccinated refugees were even provided cash compensation to meet transportation and other costs.⁸² Nonetheless, barriers to vaccine access persist. These can include administrative barriers (identity, residency, and insurance requirements), lack of proficiency in the host-country language or digital literacy, the costs of traveling to vaccination sites, and limited availability of vaccines in some host countries.⁸³ More broadly, refugees may be excluded from accessing care through health systems in the low- and middle-income countries where so many live; in a 2020 study, 18 of 48 surveyed countries did not fully include refugees in their national health plans.⁸⁴ When credential systems are tied to national health systems, refugees and asylum seekers may also be unable to secure such credentials. Even where refugees are able to get vaccinated, they may still lack a smartphone or similar device and reliable Wi-Fi coverage to receive and display digital health credentials.⁸⁵ For now, however, the most significant global barrier is the limited supply of vaccines in many low- and middle-income countries, which host most refugees and asylum seekers.⁸⁶ As long as host countries continue to face insufficient vaccine supply, refugees will be insufficiently vaccinated. Once vaccine supply grows, however, vaccinating refugees against COVID-19 may be accelerated through its integration into existing registration processes handled by the United Nations High Commissioner for Refugees (UNHCR) or national governments.⁸⁷

When credential systems are tied to national health systems, refugees and asylum seekers may also be unable to secure such credentials.

In high-income countries, asylum seekers may lack or be unwilling to share identity documentation needed to verify proof of vaccination or have less access to vaccination or testing, depending on their legal status in the country. In Europe, the Dublin Regulation may deter some asylum seekers from presenting documentation that could also determine their nationality or show that they transited over a certain route, for fear it may have an impact on the outcome of their asylum determination process. To avoid these types of documentation-related issues, governments could provide asylum seekers with vaccination or use

81 Mirjana Milenkovski, “Serbia Vaccinates Refugees against COVID-19” (news release, March 30, 2021); UNHCR Asia Pacific, “COVID-19 Vaccinations Begin in Bangladesh’s Rohingya Refugee Camps” (news release, August 11, 2021).

82 UNHCR, *Global COVID-19 Response* (Geneva: UNHCR, December 20, 2021), 2.

83 For a comprehensive overview of the barriers to refugee access to COVID-19 vaccinations, see Charlotte Greener, “A People’s Vaccine for Refugees: Ensuring Access to COVID-19 Vaccines for Refugees and Other Displaced People” (briefing paper, Oxfam Policy and Practice, Oxford, UK, 2021).

84 UNHCR data from January 2020 also show that, of these 48 surveyed countries, 2 do not provide essential vaccines free of charge for refugees, and 2 only provide partial access to primary and secondary health-care facilities. See UNHCR, “Inclusion of Refugees into National Health Systems,” accessed December 28, 2021.

85 A 2016 report found that “65 million forcibly displaced refugees and internally displaced people are living without reliable internet and mobile connectivity.” See Alan Vernon, Kamel Deriche, and Samantha Eisenhauer, *Connecting Refugees: How Internet and Mobile Connectivity Can Improve Refugee Well-Being and Transform Humanitarian Action* (Geneva: UNHCR, 2016), 8.

86 As of 2019, 85 percent of refugees were being hosted in developing countries, where vaccine supply is consistently lower than in wealthy countries. Of the National Vaccination Development Plans submitted to the COVAX facility, only around half explicitly include refugees and asylum seekers. See WHO, “COVID-19 Immunization in Refugees and Migrants: Principles and Key Considerations” (guidance document, WHO, Geneva, August 31, 2021); UNHCR, “Refugee Data Finder,” accessed December 28, 2021.

87 UNHCR and host governments already provide certain vaccinations to refugees and asylum seekers. For example, in Europe, WHO, UNHCR, and the United Nations Children’s Fund (UNICEF) recommend that polio and measles, mumps, rubella vaccines be prioritized and that “governments should consider providing each vaccinee or child’s caregiver with documentation of vaccines given.” See WHO, UNHCR, and UNICEF, “Joint Statement on General Principles on Vaccination of Refugees, Asylum-Seekers, and Migrants in the WHO European Region” (statement, November 2015).

serology tests to verify immunity status, or else provide testing on arrival.⁸⁸ For example, asylum seekers were offered vaccinations when they filed asylum application in France.⁸⁹ Moreover, asylum seekers in a country on a temporary or bridging visa with leave to remain may have limited access to public-health benefits or not be registered in the national health system while their applications are processed. Most high-income countries have developed systems to extend COVID-19 vaccines to these asylum seekers (e.g., Greece used to require a social security number to book a vaccine appointment but has since developed an alternative temporary identity documentation system),⁹⁰ but they may nonetheless be excluded from domestic credential systems.⁹¹ In Israel, asylum seekers reportedly could not access the domestic Green Pass because they only had visa numbers, rather than passport or Israeli identification numbers.⁹² Excluding refugees from credential systems can, as in Indonesia, can leave them unable to use public services and transit systems, or even encourage them to consider delaying vaccination until credential systems are made more inclusive.⁹³

Finally, while refugees can usually access COVID-19 vaccinations as they are preparing to be resettled or on arrival in their destination country, this may risk additional delays in the resettlement process. Refugees routinely undergo health screenings and mandatory vaccinations before resettlement, with vaccination programs existing before the pandemic and already adapted to include COVID-19 vaccinations.⁹⁴ Even during the last-minute evacuation after the Taliban takeover in Afghanistan, arrivals in the United Kingdom were offered vaccinations.⁹⁵ While the pandemic bottlenecks in refugee resettlement generally relate to suspended processes (e.g., visa services, interviews, biometrics collection), COVID-19 health protocols may further delay resettlement, as refugees wait to access vaccinations and credentials, and additional health screening and testing requirements stress the limited capacity of resettlement agencies. For example, refugees must be vaccinated to be resettled in Australia, but not all have access to approved vaccines. As of December 2021, only 11 percent of the population in Iraq (which hosts the highest number of people granted Australian refugee and humanitarian visas) was vaccinated, with many vaccinated with the Sputnik vaccine, which is not recognized for travel to Australia.⁹⁶ Nonetheless, refugees not vaccinated before resettlement may be given exemptions to travel without vaccination and vaccinated upon arrival.

88 A pre-pandemic study of 32 European countries' vaccination policies for newly arrived migrants, refugees, and asylum seekers found that 18 countries considered someone without a vaccination record to be unvaccinated, and 2 recommended serology testing before vaccination. More evidence is needed on whether to vaccinate and/or provide serology tests for asylum seekers during the pandemic. See Sofanne J. Ravensbergen et al., "National Approaches to the Vaccination of Recently Arrived Migrants in Europe: A Comparative Policy Analysis across 32 European Countries," *Travel Medicine and Infectious Disease* 27 (2019): 33–38.

89 Julia Dumont, "COVID-19 Vaccination Offered to Asylum Seekers at French Immigration Office," *InfoMigrants*, January 7, 2022.

90 Platform for International Cooperation on Undocumented Migrants, "The COVID-19 Vaccines and Undocumented Migrants in Greece," updated November 2021. While asylum seekers and refugees in government facilities had access to government vaccination drives, those outside these facilities must have some documentation to book an appointment.

91 Many credential systems require identity documentation, either when someone applies for the credential or when they use the credential to travel or access a venue or service. In such cases, asylum seekers unable or unwilling to produce identity documentation need clear alternative systems. For instance, asylum seekers in Australia on temporary visas may be unable to access the domestic proof of vaccination because they are not covered by Medicare, the national health insurance scheme. See Claire Loughnan and Sara Dehm, "A COVID 'Vaccine Passport' May Further Disadvantage Refugees and Asylum Seekers," *The Conversation*, February 25, 2021.

92 Shanna Fuld, "Vaccinated Asylum Seekers and Migrant Workers in Israel Struggle to Receive Green Passport," *Haaretz*, July 27, 2021.

93 Devianti Faridz, "Thousands of Refugees in Indonesia 'Shut Out' from Public Facilities," *Voice of America*, March 11, 2022.

94 For example, IOM and the U.S. government provide COVID-19 tests and health screenings to refugees before resettlement. See Cultural Orientation Resource Exchange, "Refugee Resettlement during COVID-19 FAQ," accessed January 4, 2022.

95 Greg Heffer, "Afghanistan: All Those Arriving in UK after Fleeing Taliban to Be Offered COVID Vaccine," *Sky News*, August 20, 2021.

96 Refugee Council of Australia (RCA), "Facilitating Humanitarian Arrivals in the Context of Global Vaccine Inequalities" (brief, RCA, Surry Hills, Australia, February 2022).

They can directly receive proof of their vaccination upon arrival in a recognized digital format, while those already vaccinated before resettlement can also be supported to convert their proof of vaccination into a recognized format.

E. Unauthorized Immigrants

Without a clear firewall prohibiting immigration enforcement authorities from monitoring or entering vaccination or testing sites or from accessing data in credential apps and systems, unauthorized migrants may be wary of seeking vaccination or testing and using digital credentials. High-profile examples of police and immigration authorities arresting visa overstayers and accessing contact tracing data in Singapore and Taiwan⁹⁷ may increase vaccine hesitancy and reluctance to provide the necessary identifying information to access these credentials. Even when identity documentation is not legally mandated, vaccine providers in practice may require documentation that both authorized and unauthorized immigrants lack, just as digital health credential system developers may unintentionally exclude migrants by assuming all people have standard identity documentation. These barriers risk both disincentivizing vaccination and preventing unauthorized migrants from accessing work, services, and public spaces that require proof of vaccination or testing.

Even when identity documentation is not legally mandated, vaccine providers in practice may require documentation that both authorized and unauthorized immigrants lack.

Many countries have vaccinated all residents regardless of status, as the public-health benefits of community-wide vaccination and testing are clear, but they have focused less on providing proof of vaccination and testing in a way that is inclusive of all residents, including unauthorized migrants. In some cases, excluding unauthorized immigrant residents has been intentional. The EUDCC, for example, explicitly only covers non-EU nationals with legal residence, although EU Member States have their own credential policies for unauthorized migrants. In others, a lack of medical insurance or national identity numbers has prevented unauthorized migrants from accessing proof of vaccination or testing. In the United States, many vaccine providers have required identity or health insurance documentation, even though such documentation was explicitly not required by the federal government.⁹⁸ One report found that unauthorized migrants in ten European countries faced barriers to accessing vaccines. Some of these countries required identity documentation, social security numbers, or health insurance; some doctors and pharmacies required such documentation even when not legally required; and in the Netherlands, vaccines were offered to people with a registered address, which many unauthorized migrants lack.⁹⁹ These barriers extend to proof of vaccination. For instance, unauthorized immigrants in Italy often have a temporary card number that allows them to access health care, but this card number is not always recognized in the domestic health credential system. Advocates have also expressed concerns that proof of vaccination may

97 For example, police arrested a person who overstayed her visa at a vaccination site in Taiwan and had access to contact tracing app data in Singapore. See Guo Shiu-an-wen, Chang Ming-hsuan, Wu Hsin-yun, and William Yen, “Officials Try to Reassure Migrants on Vaccination after Arrest Blunder,” *Focus Taiwan*, December 8, 2021; Andreas Illmer, “Singapore Reveals Covid Privacy Data Available to Police,” *BBC News*, January 5, 2021.

98 Akilah Johnson, “For Immigrants, IDs Prove to Be a Barrier to a Dose of Protection,” *Washington Post*, April 10, 2021.

99 Sarah Haque and Laura Margottini, “4m Undocumented Migrants, Red Tape, and the Vaccine,” *EUObserver*, September 6, 2021.

be required to enter the offices that grant these temporary card numbers, in effect requiring migrants to have proof of vaccination in order to get the card number they need to apply for proof of vaccination.¹⁰⁰ Some countries have developed alternative systems to provide credentials to unauthorized migrants. In Sweden, for instance, unauthorized migrants often lack the personal number needed for the domestic credential system, but they can access the system with an alternate “coordination number,” which has no proof of residency requirement.¹⁰¹ If such credential systems are to be widely used by immigrants regardless of status, however, these alternatives must still be complemented by consistent assurances that data provided to access credentials will not be used by immigration enforcement.

Digital health credential requirements for international travel may also affect the future of people smuggling and unauthorized entry. The pandemic has already affected smuggling operations, with an initial drop in 2020 followed by a resurgence in some routes.¹⁰² If vaccination and associated credentials are not readily accessible, growing use of vaccination mandates for access to travel and domestic services and venues is likely to bring an increase in fraudulent credentials.¹⁰³ The need for fraudulent credentials may drive up the price of smuggling, change smuggling routes toward places with less strict credential verification, and change the profile of the migrants being smuggled toward higher-income people able to purchase credentials. Vaccine or testing credential requirements may also heighten vulnerability of unauthorized migrants, both if they are dependent on smugglers to procure fraudulent documentation and, upon arrival, on employers to help integrate their fraudulent credentials into the domestic credential system.

Public-health principles, which should be paramount in a pandemic, are clear that vaccinating and testing all people, regardless of status, is critical to reducing community transmission. Providing access to digital proof of vaccination and testing to unauthorized migrants, without fear of immigration enforcement or identity documentation requirements, is therefore a matter not only of equity and inclusion, but also of public health.

5 Recommendations for the Future of Digital Health Credentials

At this point in the pandemic, the socioeconomic consequences of limiting international travel and locking down domestic movement are widely recognized. Further delays in opening borders and lifting lockdowns should have clear benefits to justify those costs. With almost all countries experiencing high levels of community transmission, aiming to ensure virtually zero added cases from international travelers is not practical or worth the costs.

100 Alyna C. Smith, “COVID-19 Policies Need to Be Inclusive of Undocumented People,” *Al Jazeera*, January 2, 2022; Rebecca Ann Hughes, “Loophole: Italy’s Vaccinated Migrants Can’t Get Covid Pass,” *EUObserver*, September 20, 2021; Emma Wallis, “Italy: Rights Groups Sound Alarm over ‘Green Pass Paradox’ for Undocumented Migrants,” *InfoMigrants*, February 8, 2022.

101 See, for example, Platform for International Cooperation on Undocumented Migrants, “COVID-19 Vaccines and Undocumented Migrants in Sweden,” updated November 23, 2021.

102 Meghan Benton, Jeanne Batalova, Samuel Davidoff-Gore, and Timo Schmidt, *COVID-19 and the State of Global Mobility in 2020* (Washington, DC, and Geneva: MPI and IOM, 2021), 29.

103 For a discussion on this topic, see Meghan Benton, “Moving beyond the Pandemic: Human Smuggling in an Age of Pandemic” (podcast, MPI, Washington, DC, October 21, 2020).

While digital health credentials are likely to play an important role in reopening mobility safely in the short term, it is unclear whether they are here to stay. Some credential systems have legislative end dates, or sunset clauses after which data will be wiped and the technical infrastructure dismantled. Others are more open-ended, with the potential of continuing past this pandemic. The medium-term future of these credential systems will depend on the emergence of new variants, vaccination rates, and other public-health considerations, but they are likely to persist through 2022, at least for international travel if not domestic use. Digital health credentials' long-term future, however, remains much more in doubt. Any explicit attempt to make them permanent, mandatory, and global in scope is likely to meet strong criticism on ethical and privacy grounds, though a future public-health crisis requiring vaccinations and new credentials is a real possibility.¹⁰⁴

The medium-term future of these credential systems will depend on the emergence of new variants, vaccination rates, and other public-health considerations, but they are likely to persist through 2022.

Going forward, policymakers should consider the following recommendations for rolling out digital health credentials in response to the COVID-19 pandemic and ensuring this infrastructure can be utilized for future public-health crises.

A. *Take a Flexible Approach to Credential Verification While Working to Coordinate Credential Systems*

- 1 Accept multiple types of proof in the short term.** Some countries have already taken a pragmatic approach to credential verification, accepting paper and unverifiable proof of vaccination and testing. This pragmatism allows countries to open up in the short term and addresses digital inclusion concerns. Strict verification may result in less fraud, but the public-health benefits may not outweigh the costs of waiting until credential systems are interoperable. Nonetheless, interoperability is essential to address problems of scale.
- 2 Consolidate and coordinate credential systems.** Both consolidation on a limited set of credential systems and interoperability between these systems are crucial to restarting mobility at scale. Fragmented and incompatible systems are causing unsustainable delays at airports and borders, as airline staff and border officials manually verify credentials. Returning to prepandemic volumes of travel will depend on automated verification processes, which in turn rely on strong international cooperation with the political will to resolve technical issues.

B. *Provide Travelers with as Much Certainty as Possible*

- 1 When possible, (tentatively) approve health credentials before travel.** Some private-sector tools (e.g., IATA Travel Pass, VeriFly) not only authenticate credentials from multiple systems, but also verify that a person's vaccination record or test results fulfill entry requirements at destination. This

¹⁰⁴ Temporary emergency measures have become permanent before, such as the transformation of border management after the attacks on September 11, 2001. See Meghan Benton and Demetrios G. Papademetriou, "Covid-19 Is Becoming a '9/11 Moment' for Borders and Health," *Health Affairs* 40, no. 7 (2021): 1162–69.

verification can be automated and generate a preapproval in a smartphone application (while leaving final determination to border officials), which provides travelers with greater confidence they can enter the country, reduces burdens on airlines to verify if a person fulfills entry requirements, and speeds up and streamlines the travel process.

- 2 **Communicate a clear timeline for lifting and (re)imposing vaccine and testing requirements.** Providing confidence that migrants and travelers will be able to enter the country, access venues and services, and leave the country without unexpected and undue burdens could help restart mobility, especially tourism, business travel, and other forms of short-term mobility. Publicly communicated criteria or risk metrics for imposing additional testing requirements or for changing the definition of fully vaccinated (to include booster shots, for example) could help to assure travelers that their credentials will fulfill entry requirements for the foreseeable future. Such metrics should not be binding, as policymakers need flexibility to respond to new variants, but they could indicate what level of increase in hospitalizations or deaths could lead a government to seriously consider new restrictions.

C. *Cooperate to Provide Access, Incentives, and Proof of Vaccination and Testing to All*

- 1 **Provide vaccine incentives, opportunities, and alternatives for vaccination.** Vaccination should not be the lone factor that determines whether or not someone can move. Vaccination should generally not be mandated at the international or domestic level. Instead, vaccines and negative tests should exempt people from travel restrictions and lockdown measures, and incentives and opportunities for vaccination should be provided throughout the journey.
- 2 **Engage with relevant stakeholders to ensure all communities can access and prove vaccination and testing.** Different groups of people on the move engage with different stakeholders (e.g., refugees with resettlement agencies, tourists with travel agencies), so a context-specific approach is needed to facilitate vaccination and testing of mobile populations. In many cases, nongovernmental actors such as recruitment and travel agencies have closer contact with migrants and travelers, and engaging those stakeholders to raise awareness of vaccination and testing requirements, opportunities, and health credential systems may reduce administrative, linguistic, and digital burdens and allow for easier and more efficient mobility.

D. *Create a Long-Term Plan to Maintain Digital Credential Infrastructure for Future Public-Health Crises*

- 1 **Ensure equitable access for all.** In the long term, provisions for including marginalized and vulnerable groups need to be standardized. These should include multilingual credentials, rather than requiring certified translations; more efficient nondigital alternatives, rather than mailing paper test results and vaccination credentials; and access to credentials without identity or residency documentation.

- 2 Safeguard data privacy.** Digital credentials already face legal and ethical criticism on privacy grounds, especially for domestic use. Initiatives to use blockchain or minimize data transfer may mitigate some of these concerns. Nonetheless, both new technologies and new privacy concerns will arise, and encouraging privacy-conscious innovation in the short term could help to address these long-term concerns.
- 3 Finance credential systems sustainable and equitably.** Governments, the private sector, and international organizations should seek to build a sustainable model for financing the digital health credential infrastructure. International credential systems, for example, might be funded by small increases in visa or airline fees, while domestic credentials should become integrated into the funding model of national immunization campaigns. But lower-income countries will likely need targeted technical and financial support to develop and sustain credential systems.
- 4 Monitor and evaluate credential systems.** In the medium to long term, data collection on public and private credential systems and robust evaluations will be needed to identify which credentials should become permanent and which are merely redundant. Evaluating which credentials have been most reliable, commonly used, or cost-effective may support the scaling up of good practices and investment in a permanent but passive infrastructure.
- 5 Build a dormant but prepared infrastructure.** In the long term, digital health credentials should not be required for travel or access to domestic services and venues. Before the pandemic, governments generally required vaccinations for very few diseases, often only for travelers from certain regions or under certain visas, and without requirements for digital proof of vaccination. These requirements pose financial and administrative burdens for travelers, transport carriers, and governments, and after the pandemic ends, their active use will likely offer minimal public-health benefit. Nonetheless, the infrastructure for digital credentials should be maintained for future public-health crises. These credentials could become normalized as part of the regular vaccination process, but not required for everyday life. This could involve converting vaccination histories that are currently in paper form into digital credentials and digitalizing national immunization registries in the long term. In this approach, proof of vaccination would not be required for travel or domestic movement, but such registries and systems would exist as a foundation for the response to the next pandemic.

Digital tools hold immense promise for mobility management. They can empower governments to safely open borders, allow airline staff and border officials to streamline health status verification, and help people to find work and reunite with family abroad or access restaurants and public spaces at home. But digital tools cannot function without strong coordination among national governments, subnational authorities, airlines, vaccination and testing providers, and other relevant parties. Digital health credential systems will be a feature of international travel for at least the medium term, and addressing the technical and political challenges they face will be critical to tapping into their promise and mitigating potential risks. Efficient, streamlined, and inclusive credential systems will be central to restarting mobility and opening borders during and after the COVID-19 pandemic.

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