



Can digital vaccine passports potentially bring life back to “true-normal”?

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The COVID-19 pandemic has caused millions of confirmed cases and deaths globally. People were forced to physical and social distancing to prevent or decrease the spread of the disease. However, this new behavior has led to closure of working places, schools, ports, and even traditional markets. This situation caused crises in many sectors and many people lost their jobs [1]. Based on the United Nations’ Sustainable Development Goals (SDGs) report 2020, this pandemic has affected almost all indicators negatively. While some indicators already showed negative trends before the pandemic, COVID-19 even made the situation worse [2]. During the uncertainty of this pandemic, COVID-19 vaccines have been a new hope. Some countries and organizations initiated the idea of developing Digital Vaccine Passports (DVPs) as one of the potential solutions to resuscitate the global economy. However, numerous challenges confound this idea [3,4]. This viewpoint provides perspectives about DVP and its potential in bringing the life back to the “true-normal”.

Vaccine passport: definition, history, and updates

A vaccine passport is a proof that someone has tested negative for, or has been protected against, certain infections [5]. It is a new way of an old idea, because the DVPs is a digitization of the yellow card concept. The yellow card is a “medical passport” created by the World Health Organization (WHO) to prove that someone got the vaccine against certain disease like yellow fever, cholera, or rubella [6]. A study showed

that vaccination coverage was increased since individuals who would like to travel abroad were required to show their vaccination status [7]. In terms of COVID-19, individuals who possess a vaccine passport will be allowed to enter other countries as they have evidence that they have antibodies for COVID-19 from previous infection or from complete COVID-19 vaccination [3,8].

Hungary and Iceland are two countries that allowed people to enter if they can provide evidence that they have already recovered from COVID-19. However, to have a global policy, vaccine passports pose considerable scientific, practical, equitable, and legal challenges [8]. Since there are some doubts about the accuracy of “vaccine passport” as “risk-free certificate”, the WHO did not yet recommend the implementation of vaccine passports [8,9].

Why are vaccine passports so urgent?

Globally, the COVID-19 pandemic has caused physical and mental health problems, as well as socio-economic problems [1]. During the pandemic, some groups may have been more vulnerable than others to psychosocial effect. In particular, people who were infected or at high risk, such as elderly and healthcare workers, are more vulnerable to experience additional stress, anxiety and other depressive symptoms [10].

In terms of socio-economic impacts, travel restrictions not only limited people’s ability to travel, but it also has raised food insecurity issues globally. Closure of ports made products less available to some regions, especially for those countries which rely mostly on food and products

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imported from other countries. Therefore, food insecurity became a major issue. The World Bank reported that even before COVID-19 chronic and acute hunger increased, which worsened with the pandemic [11]. In the United States, the pandemic has caused the worst food insecurity crisis ever. Failure to solve this problem will cause long-term health consequences, including millions of confirmed cases and deaths. Furthermore, the COVID-19 pandemic has also contributed to a global economic crisis and recession, which also made it more difficult to achieve the SDGs' targets in 2030 [2,11,12].

Why vaccine passports have to be digitized?

Digitization is one of the ways to save time and effort in managing data. In healthcare digitization, the WHO recommends using mobile devices for birth, death and stock notifications, telemedicine, digital tracking of health status and services in specific contexts and conditions [13]. In terms of COVID-19, the WHO collaborates with some agencies in developing the Smart Vaccination Certificate. It is a trusted digital vaccination certificate to facilitate and support COVID-19 vaccine delivery and monitoring [14].

Related to vaccine passport, digitization has potential to facilitate contact tracing activity. For COVID-19, contact tracing is crucial, in order to rapidly identify cases and their contacts to prevent resurgence. It has potential because during previous ebola outbreaks, the WHO once successfully developed "Go Data", an outbreak investigation tool that can be used for case investigation, contact follow-up, and visualization of chains of transmission including secure data exchange [15]. Since the WHO has the required experience in digital systems, global recognition of DVPs will possibly be achieved in the near future.

How do the DVPs potentially bring "true-normal" life back?

With global agreement and recognition, the DVPs may impact the people's lifestyle locally and internationally. Locally, individuals who possess vaccine passports may carry and show them before entering offices, schools, board airplanes, restaurants, movie theaters, or the gym. Internationally, vaccine passports might resume international travel without requiring quarantines. These would help boost the economy while limiting the spread of the disease. Furthermore, it will bring the life the way it used to be [3,5].

The challenges of the DVPs implementation

In health context, privacy is important to protect people from embarrassment, stigma, and discrimination. Meanwhile, vaccine passports will disclose individual's health information and it has the potential to be abused [16]. Another challenge is WHO's doubts about vaccine passports accuracy and its potential to increase the risks of continued transmission [8,9]. Therefore, reaching a global agreement will remain a challenge. Next, we need to address issues about costs, access, safety, consent, and the content of the DVPs. For example, the implementation of biometrics to create systems that are clinically safe, fraud resistant, and avoid discrimination is good but very expensive [3,4]. Moreover, almost half of the world population does not have any access to the internet and cannot afford smartphones to receive the benefits of digitization [15]. Moreover, many people will stay unvaccinated in the next few years because of the limited amount of available vaccines. The DVPs implementation might cause discrimination to unvaccinated people as they will not have freedom to work or travel, just because they cannot afford the vaccine [4].

What can be done?

To implement this system, global organizations, like the WHO, need to convince the public that this system provides more benefits than risks and costs. Then, it is also important to ensure that this system does not

conflict with the application of laws and regulations in any country. Therefore, an evaluation protocol needs to be developed to ensure legality and public trust. Firstly, it is important to ensure that the framework of the system is transparent to provide a basis for evaluation. Then, evaluation should be released to the extent allowed by privacy concerns. Lastly, evaluation methods and metrics must be thorough, robust, and interoperable across demographic groups to assess the model efficiently and allow decentralized innovation efforts [16].

Currently, there is a system called "Blockchain Technology" that is proven its security and privacy in data sharing system among Bitcoin users. In this system, everyone can see how much a particular wallet owns, the person just needs to prove the ownership of that wallet. This can be achieved simply by sending a message from your account to the person who is verifying the claim [17]. The same concept can be applied to the DVPs system. Everyone can see a person's vaccination record and COVID-19 infection history anonymously, and the owner of the record only needs to prove ownership by sending biometric authentication to the relevant official bodies such as governments, laboratories, clinics and hospitals as part of the blockchain network.

Considering that every country has different regulations, reaching a global agreement is not easy. Therefore, it is important for government of each country to develop a blockchain network. Since the blockchain network is a public digital ledger run by the official government, it provides quick and trusted verification across borders [17]. Finally, without having to wait for recommendations from the global level, even the DVPs system can be up and running once a country has established and legalized their blockchain network.

Conclusion

In the uncertainty of COVID-19 pandemic, the DVPs will positively contribute in many ways. First, the DVPs will help to accelerate and widen the vaccination coverage. Then, the DVPs will help to track people's movement which could be exposed to different strains of virus in destination countries. Next, the DVPs will make travel and shipping products easier which may contribute in rebuilding the global economy. Locally, vaccine passports will also make it possible to reopen offices, schools, and shopping centers, which is good for the physical and mental health of people as well as their socio-economic life. Although some challenges have been foreseen, the implementation of the DVPs can still be done by convincing the public that it will provide more benefits to the community. Moreover, the challenges about security and privacy in data sharing system are potentially solved by "Blockchain Technology" which has been commonly used outside the health sector. The DVPs is an early step that has the potential to bring the world back to the "true-normal" state and support achieving the SDGs by 2030

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- [1] M. Nicola, Z. Alsafi, C. Sohrabi, A. Kerwan, A. Al-Jabir, C. Iosifidis, M. Agha, R. Agha, The socio-economic implications of the coronavirus pandemic (COVID-19): a review, *Int. J. Surg.* 78 (2020) 185–193, doi:10.1016/j.ijssu.2020.04.018.
- [2] The-sustainable-development-goals-report-2020.pdf, (n.d.). <https://unstats.un.org/sdgs/report/2020/The-Sustainable-Development-Goals-Report-2020.pdf> (accessed January 31, 2021).
- [3] K.A. Bramstedt, Antibodies as currency: COVID-19's golden passport, *Bioethical Inq.* 17 (2020) 687–689, doi:10.1007/s11673-020-09996-5.
- [4] A.L. Phelan, COVID-19 immunity passports and vaccination certificates: scientific, equitable, and legal challenges, *Lancet* 395 (2020) 1595–1598, doi:10.1016/S0140-6736(20)31034-5.
- [5] What is a vaccine passport?, WebMD. (n.d.). <https://www.webmd.com/vaccines/covid-19-vaccine/vaccine-passport-covid> (accessed March 20, 2021).
- [6] WHO | International certificate of vaccination or prophylaxis, WHO. (n.d.). <http://www.who.int/ihr/ports/airports/icvp/en/> (accessed March 20, 2021).

- [7] D. Chadwick, K. Corbett, S. Mann, B. Teruzzi, S. Horner, Evaluation of a vaccine passport to improve vaccine coverage in people living with HIV, *Int. J. STD AIDS* 29 (2018) 1190–1193, doi:[10.1177/0956462418779472](https://doi.org/10.1177/0956462418779472).
- [8] What do immunity passports and vaccination certificates mean for COVID-19 restrictions?, (n.d.). <https://www.gavi.org/vaccineswork/what-do-immunity-passports-and-vaccination-certificates-mean-covid-19-restrictions> (accessed March 19, 2021).
- [9] “Immunity passports” in the context of COVID-19, (n.d.). <https://www.who.int/news-room/commentaries/detail/immunity-passports-in-the-context-of-covid-19> (accessed March 19, 2021).
- [10] B. Pfefferbaum, C.S. North, Mental Health and the Covid-19 Pandemic, *N. Engl. J. Med.* 383 (2020) 510–512, doi:[10.1056/NEJMp2008017](https://doi.org/10.1056/NEJMp2008017).
- [11] Food security and COVID-19, World Bank. (n.d.). <https://www.worldbank.org/en/topic/agriculture/brief/food-security-and-covid-19> (accessed March 20, 2021).
- [12] J.A. Wolfson, C.W. Leung, Food insecurity during COVID-19: an acute crisis with long-term health implications, *Am. J. Public Health* 110 (2020) 1763–1765, doi:[10.2105/AJPH.2020.305953](https://doi.org/10.2105/AJPH.2020.305953).
- [13] T. Jandoo, WHO guidance for digital health: what it means for researchers, *Digit Health*. 6 (2020). doi:[10.1177/2055207619898984](https://doi.org/10.1177/2055207619898984).
- [14] Smart vaccination certificate working group, (n.d.). <https://www.who.int/groups/strategic-advisory-group-of-experts-on-immunization/members> (accessed March 20, 2021).
- [15] Tracking COVID-19: contact tracing in the digital age, (n.d.). <https://www.who.int/news-room/feature-stories/detail/tracking-covid-19-contact-tracing-in-the-digital-age> (accessed March 20, 2021).
- [16] M. Krass, P. Henderson, M.M. Mello, D.M. Studdert, D.E. Ho, How US law will evaluate artificial intelligence for covid-19, *BMJ* 372 (2021) n234, doi:[10.1136/bmj.n234](https://doi.org/10.1136/bmj.n234).
- [17] A. Bansal, C. Garg, R.P. Padappayil, Optimizing the implementation of COVID-19 “immunity certificates” using blockchain, *J. Med. Syst.* (2020) 44, doi:[10.1007/s10916-020-01616-4](https://doi.org/10.1007/s10916-020-01616-4).