

Literature screening report

Anti-Covid-19 vaccination in Israel: what can Switzerland learn?

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Table of Contents

| | |
|--|----|
| Preamble | 2 |
| Abstract (summary)..... | 2 |
| Introduction..... | 3 |
| Methodology | 3 |
| Synthesis of information | 3 |
| Results and Findings | 4 |
| Israel's versus Switzerland's vaccination rollout strategies | 4 |
| Effectiveness and safety studies in Israel | 7 |
| Quality of included studies | 8 |
| Discussion | 9 |
| Conclusion..... | 11 |
| Conflict of interest..... | 11 |
| References..... | 12 |

Preamble

A large number of scientific publications become available on a daily basis, reflecting the rapid development of knowledge and progress of science on COVID-19 related issues. Leading authorities should base decisions or policies on this knowledge; hence they need to master the actual state of this knowledge. Due to the large number of publications shared daily, decision makers heavily depend on accurate summaries of these publications, in the different public health domains. Therefore, the authors of this report were mandated by the Swiss School of Public Health plus (SSPH+), upon request of the Federal Office of Public Health (FOPH), to inform the FOPH on recent findings from the literature.

Abstract (summary)

Covid-19 outbreak necessitates rapid vaccination rollout strategies as a potential hope to quickly getting back to a 'normal' life. Israel is one of the nations who rushed to vaccinate its residents at great speed. We reviewed the current literature to understand the strategic factors and key elements that contributed to this successful Covid-19 vaccination rollout. We found that many components contributed to such success including, but not limited to, a generous vaccine purchase compared to the target population, an advanced electronic medical record and primary care system, a national emergency preparedness involving the defence forces and internal security agencies, measures to monitor and combat vaccine hesitancy as well as motivated political leaders.

To potentially learn from the Israeli experience, we put those elements in the Swiss context and compared both vaccination strategies in Israel and Switzerland where necessary. We also reviewed the available evidence (i.e., data from Israel) on the effectiveness of vaccines in real-world settings.

Introduction

Several nations started to inoculate anti-Covid-19 vaccines into their populations at varying speed and with different national strategies¹. Among the top fast vaccination rollout strategies, Israel has been publicized as a model to follow in order to accelerate other nation's vaccination campaigns. Switzerland started the vaccination rollout on January 4th, 2021, two weeks later after Israel who started on December 20th, 2020 (i.e., nearly 15 weeks have passed by the date of writing this report)^{2,3}. It is noteworthy that Switzerland has almost a similar small population of 8.6 million people compared to 9.1 million in Israel^{4,5}. However, at first sight and apart from population size, we might expect more differences than similarities between Israel and Switzerland due to socio-political differences between the two countries. Yet, Switzerland can potentially learn from Israel's experience to apply in its relatively slow rollout efforts. In this report, we reviewed the current literature to understand the strategic factors and key elements that contributed to the claimed success of Israel's anti-Covid-19 vaccination campaign. Such understanding would hopefully help in tailoring the strategies of countries who have already started the vaccination efforts or are still planning to do so. For practical reasons, we focused on the elements and components that Switzerland can use to accelerate and improve its current Covid-19 vaccination strategy. Moreover, we reviewed the available evidence on the effectiveness and safety of used Covid-19 vaccines (namely, the Pfizer-BioNTech COVID-19 vaccine (BNT162b2/COMIRNATY®) and Moderna COVID-19 vaccine/ mRNA-1273) in real-world settings in Israel (versus often strict inclusion/exclusion criteria in clinical trials).

Methodology

Please refer to the previous reports if needed. The current report screened published data as of March 31, 2021.

Synthesis of information

We analysed the data based on the specific questions related to the vaccination rollout in Israel as per agreed protocol on March 11th, 2021.

¹ <https://ourworldindata.org/covid-vaccinations> (accessed on 30.03.2021).

² <https://www.bag.admin.ch/bag/en/home/krankheiten/ausbrueche-epidemien-pandemien/aktuelle-ausbrueche-epidemien/novel-cov/impfen.html#-1397465140> (accessed on 17.03.2021)

³ <https://www.timesofisrael.com/israel-has-spent-788m-on-vaccines-could-double-that-in-future-health-ministry/> (accessed on 18.03.2021).

⁴ <https://www.bfs.admin.ch/bfs/en/home/statistics/population.html> (accessed on 30.03.2021).

⁵ <https://www.cbs.gov.il/en/mediarelease/Pages/2019/Population-of-Israel-on-the-Eve-of-2020.aspx> (accessed on 30.03.2021).

Results and Findings

Israel's versus Switzerland's vaccination rollout strategies

Several elements or factors contributed to the rapid vaccination rollout in Israel despite the surge of SARS-CoV-2 infections at the early phase of the vaccination campaign⁶.

Israel has a parliamentary system⁷ with a centralized government headed by the prime minister as compared to Switzerland as a federal system with three political levels sharing power (namely, the Confederation, the 26 Cantons and over 2,250 Communes)⁸. Not only such differences have an impact on who is responsible for Covid-19 vaccines procurement and distribution but also on the time needed to reach consensus or shared decisions among the executive power holders. Indeed, a key element that contributed to the success of vaccination rollout in Israel is the fact that the Israeli government ensured the supply of vaccines and nation-wide delivery mechanisms to its residents. Unlike Switzerland, the Israel's government is responsible for vaccine procurement or purchase, storage, supply, and distribution to the target population. In Switzerland, the federal government shouldered the responsibility of cantons to inject the vaccine into the arms of people while keeping the burden of purchase and supply. The delivery strategies, hence, become the main task of the 26 Swiss cantons, which may even vary from canton to canton depending on their capacity and available resources. Having a younger population than Switzerland, Israel has established an initially age-specific criteria including those aged 60+ years old and those with chronic conditions besides medical staff who comes in contact with patients compared to similar but stricter criteria in Switzerland involving those 75 years old and over, those with chronic conditions of the highest risk, and long-care home residents and their staff⁹. Unlike Switzerland, Israel has already been including other subpopulations such as high school students (16 years and over), 40 years old and over, hospitalized patients (e.g., psychiatric hospitals) and immunocompromised patients and their caregivers. In fact, Israel has reached 60.4% vaccination rate compared to approximately 10% in Switzerland which lags behind a bunch of countries but approximates its neighbours (e.g., France, Germany, and Italy) as of March 30, 2021 (see figure below).

⁶ <https://data.gov.il/dataset/covid-19> (accessed on 18.03.2021).

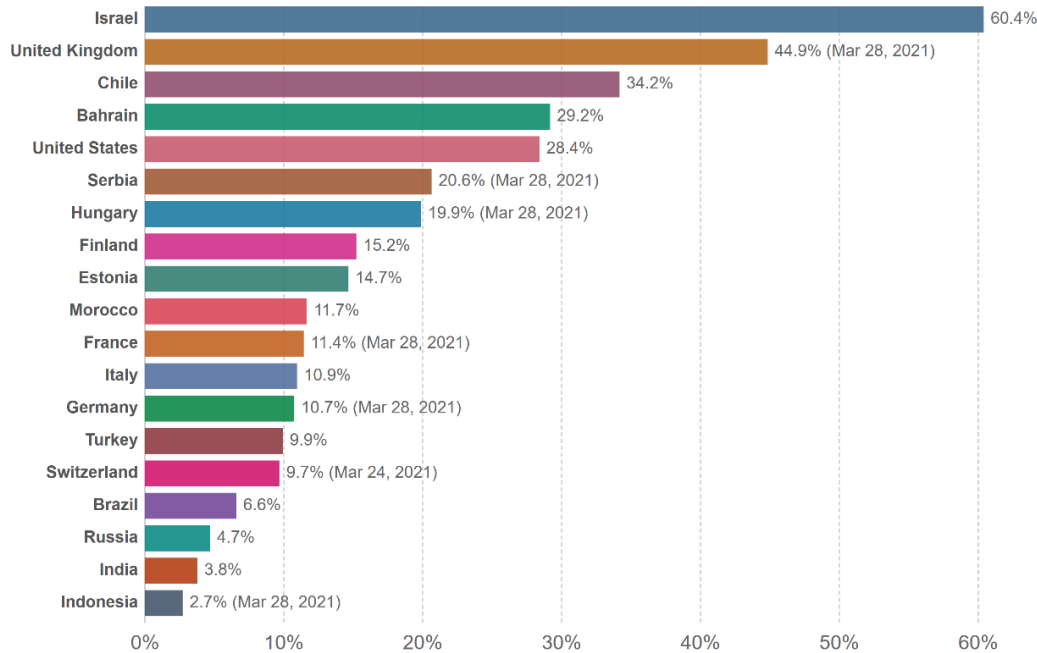
⁷ <https://mfa.gov.il/mfa/aboutisrael/state/pages/the%20state-%20political%20structure.aspx> (accessed on 31.03.2021).

⁸ <https://www.eda.admin.ch/aboutswitzerland/en/home/politik/uebersicht/politisches-system-der-schweiz---fakten-und-zahlen.html> (accessed on 30.03.2021).

⁹ <https://www.bag.admin.ch/bag/en/home/krankheiten/ausbrueche-epidemien-pandemien/aktuelle-ausbrueche-epidemien/novel-cov/impfen.html> (accessed on 31.03.2021).

Share of people who received at least one dose of COVID-19 vaccine, Mar 29, 2021

Share of the total population that received at least one vaccine dose. This may not equal the share that are fully vaccinated if the vaccine requires two doses.



Source: Official data collated by Our World in Data – Last updated 30 March, 11:40 (London time)

OurWorldInData.org/coronavirus • CC BY

Although Switzerland has used a single unified strategy, the delivery mechanisms still rely on tertiary care hospitals that have naturally limited capacity with some variability from Canton to Canton¹⁰. On the contrary, Israel has involved the primary care practitioners and well-trained community nurses to inoculate the target population via four national healthcare services/plans¹¹. The vaccination of residents living in long-term care homes was allocated to a national emergency medical, disaster, ambulance, and blood bank service organization¹². The Swiss Cantons have not initiated such delivery mechanism to vaccinate those residing in retirement or care homes [called, Alters-und Pflegeheim or Centre médico-social (CMS) in German and French respectively].

The identification of chronic care patients was relatively easy for Israel's residents who belong to any healthcare plan services, which provide care in normal times and is responsible to deliver the Covid-19 vaccines to their members; such identification in Switzerland is less practical and patients – those under 75 years old- are asked to visit a doctor for a medical certificate before getting vaccinated¹³.

¹⁰ <https://www.covid19.admin.ch/en/epidemiologic/vacc-doses?vaccRel=abs&geoView=table> (accessed on 31.03.2021).

¹¹ https://en.wikipedia.org/wiki/Healthcare_in_Israel (accessed on 17 March 2021)

¹² <https://www.mdais.org/en> (accessed on 17 March 2021).

¹³ <https://www.maccabi4u.co.il/1835-he/Maccabi.aspx> (Accessed on 17 March 2021)

Like many countries, there exist disadvantaged communities and particular groups that might be more reluctant to Covid-19 vaccines.

Israel has addressed and monitored vaccine uptake in such communities (e.g., ultra-orthodox Haredi Jews or Arab Israelis)¹⁴ where a stagnation¹⁵ was observed. For this purpose, several strategies have been adopted to combat vaccine hesitancy:

- Strong media coverage (e.g., videos of people queuing up to get vaccinated).
- Recruitment of religious leaders of particular groups.
- Vaccination of family doctors of those who care often of minority groups- for giving a role model - and asking them to call their patients to get vaccinated.
- Vaccination of influential figures in the community and use of culturally appropriate messages.
- Vaccination sites visits by government leaders including the prime minister.
- Availability of various ways to book an appointment (websites of healthcare providers, mobile phone apps, and call centers).
- Combatting the rumors and anti-Vax sentiments in the social media, knowing that the internal security agencies are actively involved in the campaign.
- Use of mockery [and potentially stigmatization] against anti-vaxxers and vaccine-reluctant groups¹⁶.
- Providing incentives¹⁷ (e.g., free food at vaccination sites) to young people.
- Support to effectiveness studies as people doubted the efficacy of vaccines due to a surge in infections which coincided with the vaccination campaign [1].

Of note, vaccine acceptance rate (78.1%) among doctors and nurses was relatively high in Israel, compared to some other countries [2].

Due to the geopolitical circumstances, its continuous expansion over Palestinian territories¹⁸, and the security threats it faces, Israel had set up an emergency response system and established a national emergency management authority^{19,20} that – at the strong willingness of the government - helped the country to procure and deliver quickly the Covid-19 vaccines into the arms of its residents.

To sum up, we presented in the table below the key mechanisms used in Israel that contributed to its successful vaccination campaign.

¹⁴ Boxerman A. Officials concerned by low vaccination rate among Arab Israelis: Times of Israel; 2020 [Available from: <https://www.timesofisrael.com/officials-concerned-by-low-vaccination-rate-among-arab-israelis/>] (accessed on 17.03.2021).

¹⁵ <https://www.timesofisrael.com/israels-vaccination-stagnation-why-weve-caught-it-how-to-cure-it/> (accessed on 17.01.2021).

¹⁶ <https://www.timesofisrael.com/israels-vaccination-stagnation-why-weve-caught-it-how-to-cure-it/> (accessed on 18.03.2021).

¹⁷ <https://www.reuters.com/article/us-health-coronavirus-israel-vaccination-idUSKBN2AG21N> (accessed on 31.03.2021).

¹⁸ <https://www.un.org/press/en/2020/gapal1432.doc.htm> (accessed on 31.03.2021).

¹⁹ https://knesset.gov.il/lexicon/eng/DeclaringStateEmergency_eng.htm (accessed on 31.03.2021).

²⁰ <https://english.mod.gov.il/Departments/Pages/NationalEmergencyManagementAuthority.aspx> (accessed on 31.03.2021).

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| <ul style="list-style-type: none"> • Key elements of the anti-Covid-19 vaccination in Israel <ul style="list-style-type: none"> ○ Generous vaccine purchase and mutual agreements with vaccine manufacturers <ul style="list-style-type: none"> ▪ Ensured supply (but with an overpayment) ▪ Close collaboration with pharmaceutical companies (e.g., Pfizer-Israel epidemiological data share agreement) ○ Broad eligibility to get vaccinated and multiple delivery mechanisms <ul style="list-style-type: none"> ▪ 60 years old and over (numerous vaccination sites) ▪ Chronic care patients (identified by care providers who are also charged of vaccines administration). ▪ Long-term care residents (vaccinated by a unique emergency medical organization²¹) <ul style="list-style-type: none"> • Current eligibility extended to other subpopulations such as high school students (16 years old and over), immunocompromised patients and their caregivers, and those 40 years and over. ○ Intensive anti-vaccine hesitancy strategies <ul style="list-style-type: none"> ▪ Enthusiastic involvement of political leaders. ▪ Participation of family doctors, intellectual figures, religious leaders as role models. ▪ Media coverage or positive propaganda and combatting rumors, myths and anti-Vax sentiments. ▪ Provide incentives (e.g., free food on the spot). ▪ Other strategies are cited in the text. ○ National emergency preparedness <ul style="list-style-type: none"> ▪ Actors have sense of urgency. ▪ Involvement of the defence forces and internal security agencies |
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Effectiveness and safety studies in Israel

As some nations, Israel has rushed to vaccinate its residents at great speed which created an opportunity to have a picture of the effectiveness and safety (e.g., rare adverse events) of currently marketed vaccines in real-world settings. Indeed, preliminary results showed that the impact of vaccination has started to be associated with less new infections and fewer hospitalizations^{22,23}, compared with an increase of SARS-CoV-2 infections and hospitalizations in Switzerland²⁴.

Several studies [1, 3-17] showed that Pfizer-BioNTech COVID-19 vaccine (BNT162b2) was effective in the Israeli population. Of those, a large-scale observational study [13] of 596,618 vaccinated individuals showed an estimated effectiveness of 94% for symptomatic Covid-19 at 7 days or more after the second dose, similar to the phase III clinical trial [18]. Single dose showed Moreover, two studies [9, 10] reported a reduction of the viral load in infected individuals that would have probably curbed the virus transmission. Interestingly, one study [3] showed no efficacy (before 3 weeks) of a single dose of BNT162b2 in disagreement to a study [4] that showed an efficacy of 51% (13-24 days follow-up) and

²¹ <https://www.mdais.org/en> (accessed on 31.03.2021).

²² <https://ourworldindata.org/vaccination-israel-impact> (accessed on 31.03.2021).

²³ <https://www.ft.com/content/733a49ca-49ed-49d7-811a-14d935813041> (accessed on 31.03.2021).

²⁴ <https://www.covid19.admin.ch/en/overview> (accessed on 31.03.2021).

another [13] of 57% (14-20 days follow-up). Re-analysis and modeling of the same Israeli data from the study of Chodick et al. [4] resulted in 90% efficacy at day 21 [6].

Of note, as per the manufacturer instructions, the vaccination information data²⁵ in the Israeli ministry of health insists on a second dose of the Pfizer-BioNTech COVID-19 vaccine (BNT162b2/COMIRNATY®) to obtain a maximal protection.

Another study [11] in Israel reported initial trend of benefits of vaccination by comparing the timing and outcomes in vaccinated versus unvaccinated cities. Unexpectedly, no major safety data from Israel have been published so far, given the fact that there are some data from Switzerland where 597 reports of suspected adverse reactions reported by patients and doctors, including cases of 177 (29.6%) that were classified as serious and were fever (24), shortness of breath (18), COVID-19 disease (14), vomiting (11), hypersensitivity/anaphylactic reactions (19), headache/migraine (11) and reactivation of shingles (8).

Interestingly, a study [19] of 4,081 vaccinated healthcare workers in Israel observed a laboratory-confirmed Covid-19 infection among 22 (0.54%) of them. The study authors warn doctors to test patients if they developed Covid-19 related symptoms and not to ignore or consider such signs or symptoms as vaccine-related side effects.

Quality of included studies

Most currently published evidence from real-world settings in Israel is not peer-reviewed (e.g., those preprinted in MedRxiv). Hence, this precludes us from evaluating the quality of the included studies. However, the quality of some peer-reviewed studies is good enough that accounted for selection bias and potential confounding factors as the study by Dagan et al. [13]. We intend to further evaluate the quality of such studies using reporting guidelines such as STROBE [20] once more evidence becomes available.

²⁵ <https://govextra.gov.il/ministry-of-health/covid19-vaccine/en-covid19-vaccination-information> (accessed on 18 March 2021).

Discussion

Despite only two-week anti-Covid-19 vaccination timing difference between Israel and Switzerland, Israel has surpassed any other country in terms of the number of doses per capita administered where 60.4% of its residents are immunized versus approximately 10% of the Swiss population, as of March 31, 2021. Epidemiologists claim that 60 – 70% of the population gaining immunity whether by vaccination or natural infection might be necessary to achieve herd immunity but several reasons (e.g., vaccine hesitancy, the emergence of new variants and the delayed arrival of vaccinations for children²⁶) preclude such long-waiting 'event' to occur rapidly [21].

While Israel is at least maintaining its vaccination at great speed, Switzerland had to further slow down its pace due to supply issues²⁷. Although the vaccine procurement is an essential step in any vaccination rollout strategy, it has been reported that the supply is not the main reason behind a slow vaccination rollout as the case of Canada [22]. Indeed, effective delivery mechanisms remain the key element as part of the lessons learned from the Covid-19 vaccination rollout in Israel. To vaccinate the long-term care home residents, Israel resorted to an emergency organization²⁸ that was able to act quickly and effectively. According to our knowledge, there is no similar entity in Switzerland. However, there are homecare institutions^{29,30}, which often care for elderly people, that might be mobilized or at least prepared in case of future outbreaks.

Instead of heavily depending on tertiary-care hospitals, Switzerland might involve community' physicians or general practitioners (GPs) in the vaccination efforts while, of course, planning for supply and costs arrangements. Currently, chronic care patients, those under 75 years old, need to get a medical certificate before getting vaccinated. Such request may be seen as an obstacle and a potential reason for vaccine reluctance. Notably, the insurance companies possess what we call claims data that might be helpful to tailor the vaccination strategy to this subpopulation, even though diagnoses are not routinely collected by insurers but given the fact that medications are usually used as proxy to identify those patients [23, 24]. Therefore, the healthcare insurers -backed by the Federal Office of Public health (FOPH)- might be involved in the vaccination efforts transmitting to those patients key messages related to the fact that 'vaccination is free, effective and safe' to encourage them to get vaccinated.

Of note, Switzerland has been using a modest but effective Covid-19 testing and screening centres. If such facilities are used in the vaccination rollout, we can improve and accelerate the vaccine uptake very quickly.

²⁶ <https://covid19-projections.com/path-to-herd-immunity/> (accessed on 31.03.2021).

²⁷ <https://www.bag.admin.ch/bag/en/home/krankheiten/ausbrueche-epidemien-pandemien/aktuelle-ausbrueche-epidemien/novel-cov/impfen.html#1210867030> (accessed on 17.03.2021).

²⁸ <https://www.mdais.org/en> (accessed on 31.03.2021).

²⁹ http://www.avas.ch/jcms/m_7371/fr/accueil (accessed on 31.03.2021).

³⁰ <https://www.imad-ge.ch/> (accessed on 31.03.2021).

Switzerland (at least some cantons such as Neuchâtel³¹) has used the armed forces as part of the emergency response to Covid-19 crises; their use in the vaccination campaign may perhaps help speeding the vaccination rollout efforts.

Data from Israel have shown a strong drop in SARS-CoV-2 infections, hospitalizations, and mortality [1, 12-16]. However, it is not excluded that the impact of vaccination has been confounded with the strict lockdown imposed in Israel in January 2021, which was relaxed early March. This might explain the differences in estimations of the effectiveness of vaccines under study. Moreover, the reported increase in the incidence of Covid-19 cases by roughly 35% in the general population³² and the ease of protective measures (e.g., social distancing) by the vaccinee population may have underestimated the effectiveness of the used vaccines.

Despite the apparent success of the Israeli vaccination rollout, there are several caveats and ethical issues of which we mentioned below some. First, the ensured supply of vaccines was reportedly due to overpayment and data-sharing deals³³. The costs³⁴ were initially undisclosed to the public and hence it will take time to evaluate the impact on the economy or any cost-benefit analysis. The data sharing with drug manufacturing companies poses ethical problems and needs further investigation.

Second, the vaccination campaign, according to experts³⁵, should be extended to the other occupied Palestinian's regions and territories (e.g., the West bank) or even Gaza strip [25, 26], given the fact that the probability to get covid-19 vaccine is 60 times more in Israel than Palestine³⁶.

Third, despite the shortage of nurses exist beyond the Covid-19 crisis, nurses were still moved from caring to chronic patients to be involved in the vaccination rollout efforts. Such tasks shift would not be without harm but how much this influences the health system needs to be evaluated.

Fourth, while the administration of vaccines by unusual health staff after a rapid law amendment (e.g., medics and paramedics) can be viewed as a simple proof of the urgency response, such step would be important to investigate further by interested researchers.

Fifth, the vaccination of people who do not meet the time-being criteria has probably inflated the number of doses per capita administered, however, it was part of a strategy to recruit more people who are reluctant to get vaccinated or sometimes to avoid the disposal of unused doses³⁷.

Sixth, ineligible children (aged 12 to 15 years old) were vaccinated despite the absence of efficacy and safety data in such population³⁸. Whether this was part of the Pfizer-Israel agreement or not is still

³¹ <https://www.ne.ch/medias/Pages/20200503-appui-armee-ems.aspx> (accessed on 18 March 2021).

³² <https://data.gov.il/dataset/covid-19> (accessed on 18.03.2021).

³³ <https://www.bloomberg.com/opinion/articles/2021-01-25/covid-19-vaccine-inequality-is-about-data-not-just-doses> (accessed on 18 March 2021).

³⁴ <https://www.timesofisrael.com/israel-has-spent-788m-on-vaccines-could-double-that-in-future-health-ministry/> (accessed on 18 March 2021).

³⁵ <https://www.theguardian.com/world/2021/mar/03/denmark-under-pressure-to-drop-plans-to-work-with-israel-on-vaccines> (accessed on 17 March 2021).

³⁶ <https://www.msf.org/stark-inequality-covid-19-vaccination-between-israel-and-palestine> (accessed on 18.03.2021).

³⁷ <https://www.timesofisrael.com/hundreds-of-covid-vaccines-thrown-away-as-inoculation-push-said-out-of-control/> (accessed on 18 March 2021)

³⁸ <https://www.theguardian.com/society/2021/mar/10/israel-says-600-children-given-covid-jab-had-no-serious-side-effects> (accessed on 16 March 2021).

unknown or simply pushed by the fact that 1 out of 4 is under 16 years old. Seventh, the creation of green pass^{39,40} or 'anti-Covid-19 vaccine passport' may have contributed to the success story but this may have generated a discrimination toward still a waiting list of unvaccinated people or those unwilling or unable to get vaccinated.

Conclusion

Despite the strategic differences between Switzerland and Israel, it appeared that many lessons can potentially be learned from the Israeli's Covid-19 successful vaccination rollout efforts. For instance, ensuring timely vaccine procurement and effective delivery mechanisms into the arms of eligible population, monitoring and combatting vaccine hesitancy, involving key stakeholders, and being always prepared for an emergency response.

Conflict of interest

The current report expressed solely the opinion of the author and, therefore, does not have any link to the affiliated employers.

³⁹ <https://corona.health.gov.il/en/green-pass/> (accessed on 18 March 2021).

⁴⁰ <https://govextra.gov.il/ministry-of-health/covid19-vaccine/en-covid19-vaccination-information> (accessed on 18 March 2021).

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