DANUBE
INSTITUTE

V4 countries and the fight against the Covid-19 pandemic

Anton Bendarzsevszkij
Dávid Nagy
Enikő Bagoly
Péter Szitás
Tamás Orbán

January 2021

V4 countries and the fight against the Covid-19 pandemic

Abstract: *This paper analyses the efforts made by the countries of the Visegrad Group against the impact of the Covid-19 pandemic, including the respected countries' vaccination plan, contracts negotiated with other states and private companies, in order to allocate the necessary amount of vaccines for the population, research plans and also the availability of their own facilities capable of producing larger amount of vaccines if needed. Going beyond the V4 Group, we will also explore the topic of vaccine diplomacy, the situation of countries belonging to EU neighbourhood, as well as challenges faced by the developing countries. Finally, we will be analysing the future of the post-covid world – whether we have learned from the pandemic, what will be the measures taken to predict and prevent the next global pandemic, including the overall global preparedness in supply chains and stocks of medical equipment, and the potential role of AI, Big Data and Machine Learning.*

Keywords: *Hungary, Czech Republic, Slovakia, Poland, Ukraine, Balkans, developing countries, AI, machine learning, disease warning, pandemic prediction, Covid-19, pandemic.*

Table of contents

Geopolitical games in the field of life

Péter Szitás, PhD.

Even though the postmodern human feels invulnerable and lives according to this, in 2020 an unprecedented epidemic hit the world. People have died and soaring economies have turned into recession damaging complete sectors and the standard of living of millions. In the dawn of 2021, the greatest hope to overcome this dark lethal reality is the worldwide mass vaccination. In this field, however, instead of international cooperation fierce competition is taking place which will have winners but losers too. At first the object of this race referred to the vaccine development, today it is mainly associated with its distribution and procurement. Countries that manage to vaccinate their population may restart their economies shortly while others, not only the poor ones which usually lack even the medium standards in their healthcare, may drop behind. From an other perspective, being able to provide the vaccine for others also means the capability of gaining influence over them. The appearance of this virus created a unique opportunity for undue influence. Not surprisingly, the dominant players in this game – the United States, China and the Russian Federation – aim to take their chance.

Operation in every field of life

The epidemic has shown that the world is unprepared to face global challenges. Appearance of the Coronavirus created new forms of hardships but possibilities as well. It has proven again that the degree of power cannot only be measured by military force or economic power but also by the level of education, research and development.

Despite today's technological advancement the globe has proved to be unprepared to face the SARS-CoV-2 epidemic. Millions have died and the national lockdowns aiming

to slow the spread down have crippled complete sectors of economies. Scientists have been claiming that the only way to overcome the virus is the mass vaccination of the population. Experiments developing an efficient vaccine capable of protecting the individual from the virus have been ongoing almost since the outbreak. However, the number of developed and authorized vaccines are handful and the global race for their acquisition is huge. Whoever falls behind in this race can easily be dropped permanently.

Johnny-on-the-spot… from Russia

On worldwide level, the first registered vaccine against the SARS-CoV-2 was the *Sputnik V* which has officially been authorized in Russia since 11 August 2020. Apart from the Russian Federation, the vaccine's clinical trials have been announced in Venezuela, Belarus, India and the United Arab Emirates[1]. While there have been media concerns regarding the safety or efficiency of this serum, according to its official webpage, the inquiry for Sputnik V is enormous, since "requests for more than 1.2 billion doses of vaccine came from more than 50 countries."[2] The main criticism towards the product points in two directions: on the one hand the result of its 95% protection rate is based only on interim results.[3] On the other hand, many criticize the rapid pace of its development.

The manufacturer even intensifies this by naming the vaccine after the famous Soviet artificial satellite that triggered the space race of the 1950s. Despite all this the jab is widely given in Russia and since the December peak, the number of new Coronavirus cases has been falling. It is hard to tell whether it is the outcome of the vaccination or the other restrictive measures. Probably both. However, it is a fact that the demand for the product has been growing. In addition to Iran, Malaysia and Mexico, even the EU-member state Hungary has made a deal of buying large quantities of the Sputnik V.[4] This purchase will definitely open a new chapter in the traditionally controversial EU-Hungary relationship. However, Germany also offered a cooperation to Russia in the field of vaccine development and production.[5]

Vaccines on the market today

In the Western world, the cooperation of the American *Pfizer* and the German *BioNtech* resulted in the first authorized vaccine in the United States, called *Comirnaty*. The U.S.

Food and Drug Administration (FDA) greenlighted this product's emergency use for individuals 16 years of age and older on 11 December 2020.[6] A week later, on 18 December 2020 the FDA also issued the emergency use authorization for the *Moderna COVID-19 Vaccine*. This product is for individuals 18 years of age and older.[7] In the European Union, the situation is currently the same as overseas. To this day only the Comirnaty and the Moderna COVID-19 Vaccine are officially authorized by the European Medicines Agency (EMA)[8]. In the United Kingdom, which has not been under the regulations of the EMA since Brexit, three vaccines have been greenlighted. In addition to the products of the Pfizer / BioNtech and the Moderna, the *COVID-19 Vaccine AstraZeneca* has also been authorized by the National Health Service of the United Kingdom (NHS).[9] In the field of vaccination, the UK has obviously gained an advantage over her former partners since she is more successful in the procurement of vaccines than the over-bureaucratized European Union.[10] Hungary also cites the slowness of EU procurement as the main reason for her recent Russian purchase.[11] It is clearly visible that the manufacturers of the hitherto authorized vaccines will not be able to provide the required quantity of shots within the desired timeframe. This is the point where the market reality overrides the geopolitical goals of the West and the Russian and Chinese vaccines come into play.

From where it all began

The geographical location of the outbreak of the SARS-CoV-2 epidemic was in Wuhan, the capital of Hubei Province in the PRC. The local authorities from the first minute made every possible effort to slow the spread down and limit the number of new infections as much as possible. Regional lockdowns, restrictions of free movement and mandatory quarantine were ordered for millions of people. It was the National Health Commission of the PRC's role to find possible solution to the situation and initiate the research on how to prevent the further human infections. Since the Chinese scientific world has been the longest time in contact with the virus, based on the formal logic they must be in possession of the know- how. The formal logic is rarely wrong. While in Europe the news is full about the already authorized vaccines of the pharmaceutical giants of the West, China has been present on the global vaccine market with tremendous weight too.

The Beijing-based biopharmaceutical company Sinovac's new product is the vaccine named *CoronaVac.* According to the BBC, while its clinical trials in Brazil showed only 50.4% effectiveness, in Turkey the result was 91.25% and in Indonesia 65.3%.[12] The state-owned Sinopharm is also an important Chinese player in the global market. Their new vaccine's official effectivity rate is 79%, however, the in UAE the interim results speak about 86%.[13]

Political influence or humanitarian cooperation?

It can be seen that while the European and American pharmaceutical giants focus mainly on the region of their origin – where the solvency of the population is the highest – Eastern actors look much beyond their state borders and make every effort to gain political influence in exchange for the vaccine. This is not just true about hostile states to the U.S. (e.g., Iran) but her traditional allies too. Turkey, Bahrein, the UAE have recently been building strong ties to the East and this does not only refer to the cooperation in the field of medicine but goes much beyond that.[14] The same rule applies to India. Despite the need of billions of vaccines for her own population, she plans to donate millions of doses for other states of the region.[15] This can, however, be understood as humanitarian cooperation, life will show its true content.

Conclusions

The famous English proverb says that a friend in need is a friend indeed. The events of the last year has shown that in case of politics, proverbs are not always right. Even in the field of healthcare the old rules apply: everything has its price and one must be ready to pay for it. This global epidemic has proved that despite of the advancement in technology, mankind is not the absolute ruler of this universe. Global hardships are bad for everybody, however, with smart moves it may have local winners too. In the 21st century, even non-military actions can deeply change complete zones of influence.

Bibliography

- BBC: Sinovac: *Brazil results show Chinese vaccine 50.4% effective.* <01/13/2021> Access: https://www.bbc.com/news/world-latin-america-55642648 (01/22/2021)
- BBC: *Covid: What do we know about China's coronavirus vaccines?* <01/14/2021> Access: https://www.bbc.com/news/world-asia-china-55212787 (01/22/2021)
- COOK, Steven A.: *America's Vaccine Diplomacy Is AWOL in the Middle East.* <01/08/2021> In. *Foreign Policy.* Access: https://foreignpolicy.com/2021/01/08/americas-vaccine-diplomacy-is-awol-in-the-middle-east/ (01/22/2021)
- European Medicines Agency: *Treatments and Vaccines for COVID-19: Authorised Medicines.* Access: https://www.ema.europa.eu/en/human-regulatory/overview/public-health-threats/coronavirus-disease-covid-19/treatments-vaccines/treatments-vaccines-covid-19-authorised-medicines#covid-19-vaccines-section (01/21/2021)
- GALLARDO, Cristina: *8 reasons the UK leads Europe's coronavirus vaccination race.* <01/14/2021> In. *Politico.* Access: https://www.politico.eu/article/8-reasons-why-uk-leads-europe-coronavirus-vaccination-race/ (01/21/2021)
- National Health Service of the United Kingdom: *Vaccines Approved.* Access: https://www.nhs.uk/conditions/coronavirus-covid-19/coronavirus-vaccination/coronavirus-vaccine/ (01/21/2021)
- PANT, Harsh V. – TIRKEY, Aarshi: *India's Vaccine Diplomacy.* <01/22/2021> Access: https://foreignpolicy.com/2021/01/22/india-world-pharmacy-vaccine-diplomacy-compete-china/ (01/25/2021)
- RAINSFORD, Sarah**:** *Coronavirus: Sputnik V vaccine rushed out to wary Russians.* <12/08/2020> In. *BBC News.* Access: https://www.bbc.com/news/world-europe-55221785 (01/21/2021)

- Sputnik V: *General Information.* Access: https://sputnikvaccine.com/about-vaccine/ (01/18/2021)
- SZEREDY, Dani: *Milliós nagyságrendben vehet orosz vakcinát Magyarország.* In. *Index.hu* <01/21/2021> Access: https://index.hu/gazdasag/2021/01/21/koronavirus_moszkva_orosz_vakcina_millios_nagysagrend/ (01/22/2021)
- Thelocal.de: *Germany offers Russia support in Sputnik vaccine development.* <01/21/2021> Access: https://www.thelocal.de/20210121/germany-offers-russia-support-in-sputnik-vaccine-development (01/18/2021)
- The Moscow Times: *Coronavirus in Russia: The Latest News.* <01/26/2021> Access: https://www.themoscowtimes.com/2021/01/26/coronavirus-in-russia-the-latest-news-jan-26-a69117 (01/26/2021)
- U.S. Food and Drug Administration: *Moderna COVID-19 Vaccine.* Access: https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/moderna-covid-19-vaccine (01/18/2021)
- U.S. Food and Drug Administration: *Pfizer-BioNTech COVID-19 Vaccine.* Access: https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/pfizer-biontech-covid-19-vaccine (01/18/2021)

Covid-19 vaccination in the Czech Republic

Tamás Orbán

The Czech Republic's Covid-19 vaccination strategy has been seemingly finalised in the first weeks of 2021. Previously, Prague has set the goal of acquiring enough vaccines for 16 million people, as well as starting its own vaccine development project. After the first shipments of vaccine doses already arrived in Czechia, authorities have begun the four-stage vaccination program, with the goal of inoculating at least 65% of the country's population.

Vaccine procurement

Negotiations and deals

The idea of entering unilateral negotiations with vaccine manufacturer companies has crossed the minds of Czech officials as well, but was eventually dropped for a number of reasons. Small countries, such as the Czech Republic, do not have a strong enough position on the global vaccine market, and according to Czech Health Minister Jan Blatný, the country would not be able to buy enough vaccine to inoculate its entire population for the prices offered to individual countries. Instead, Czechia opted for ordering vaccines only from the portfolio that have been reserved by the European Commission, 20-40% of the prices of which are being covered by the *European Emergency Aid Instrument*.[16]

The ultimate goal of Prague is to stockpile enough vaccines for 16 million people (which, depending on the composition of manufacturers, will be around 30 million doses), or almost two times as much as the adult population of Czechia, which is around 8.5 million people. During 2020, the government already committed to buying

doses sufficient for 5.5 million people for 1.8B CZK ($83.8M), and reserved vaccines to up to another 10.6 million inhabitants for 4.5 billion crowns (roughly $210M).[17]

Altogether, the Czech government is planning to acquire the 30 million doses for seven different manufacturers. The 9 million doses, which they already signed a deal for last year, will be delivered by *Pfizer/BioNTech* (4.5 million doses), *AstraZeneca* (three million doses) and *Johnson & Johnson* (two million doses). A fourth deal, for 1.9 doses with *Moderna*, was finalised in early January,[18] bringing the total volume of doses already ordered over eleven million, enough for more than 6.9 million people. Additional deals, that are currently being negotiated include 5.1 million doses from *Curevac*, up to seven million doses from *Novavax*, and a yet to be determined number of *Sanofi* vaccines.[19]

Delivery and storage

In November 2020, during the negotiations within the EU mechanism, Czech officials announced the expected delivery rate of vaccines. According to the Health Ministry, the Czech Republic was set to receive 400 thousand courses (800 thousand doses) in December. In the first quarter of 2021, a further one million courses were expected to arrive, with an additional 2.62 million courses in the second quarter, 2.42 million in the third, and 380 thousand in the fourth quarter of 2021.[20]

Contrary to the initial expectations, the manufacturing firms could not live up to their promises, which could cause delays in the vaccination schedule. The first Covid-19 vaccine shipment of less than a thousand Pfizer doses arrived to Czechia in late December, with another 250 thousand doses promised to be delivered in January 2021. The current delivery rate is just above 80 thousand doses per week, comprised of 70 thousand doses coming from Pfizer and another 11 thousand from Moderna. with more expected in time as additional vaccines receive final approval.[21] However, due to recent announcements made by AstraZeneca, revealing that the company will cut back the target production volume of the first quarter by 60%, as well as Pfizer's unspecified intention to scale back its production,[22] the country is unlikely to receive as much vaccines in time to keep up with its vaccination plan.

Some of the Covid-19 vaccines need to be kept at extreme low temperatures before being administered. The already arriving Pfizer vaccines are being distributed to 30

different locations that can store them at -70 degrees Celsius, while the Moderna doses, which need to be held only at -20 degrees, are being delivered to a central location in Prague.[23]

Local vaccine manufacturing

Czech vaccine development

In early May 2020, the Czech Ministry of Health announced that after two months of intensive research into the behaviour of the coronavirus, the Czech Republic will begin the development of their own Covid-19 vaccine. The task was given to three directly-managed organization of the Ministry in joint cooperation, which include the *National Institute of Public Health* (NIPH), the *Institute of Hematology and Blood Transfusion* (IHBT) and the *Institute of Clinical and Experimental Medicine* (ICEM). As opposed to most of the currently existing Covid-19 vaccines, instead of being an mRNA-type jab (which modifies the human genes to produce antibodies), the Czech vaccine will be based on the traditional technology of introducing harmless, inactivated virus into the body of patients, whose immune systems will react just like in the case of 'live' virus infection, and start producing antibodies naturally.[24]

The first stage of vaccine development, the pre-clinical or animal testing phase, ended successfully in late September, with safe immune reactions observed in rodents. In order to get the new vaccine approved, developers would have had to go through three stages of clinical trials as well (with dozens, hundreds and then thousands of volunteers) before starting the manufacturing process, which would have been organized in Czechia by the *Association of Innovative Pharmaceutical Industry* (AIFP).[25]

Because of the slow development, however, in November the Health Ministry decided to terminate with the project. It would have taken at least another six months to conclude the clinical trials, not accounting for possible errors and other factors during the testing. By the time the Czech vaccine had been approved for public distribution, the country would already have been in the midst of widespread vaccination, with enough foreign doses to vaccinate everyone. That is why the Czech government dropped the development project altogether, which would have cost at least 4 million

CZK, or 185 thousand US dollars, before even manufacturing a single dose. The finished viral culture could still be used in future projects, if the need ever arises.[26]

Foreign-developed vaccine manufacturing

In the same time it started pursuing their own vaccine development project, Czechia decided to use some of its manufacturing capacity for producing foreign-developed and already approved vaccines as well. In May 2020, Czech vaccine manufacturing plant *Praha Vaccines*, part of the *Cyrus Poonawalla Group* since 2019, was sold for 3.5 billion crowns (more than $160M) to the US-based pharmaceutical company Novavax. The facility, since then renamed *Novavax CZ*, is located in Bohumil, near Prague. Novavax is expected to produce around two billion Covid-19 vaccine doses during 2021, half of which, one billion doses (with a market value of $16B) will be manufactured in the Czech plant.[27]

Vaccination plan

Vaccination schedule and centres

On January 6th, 2020, Czech Health Minister Jan Blatný presented the country's official coronavirus vaccination plan.[28] The plan is composed of four stages, with the initial phase, focused on establishing the details and conditions necessary for the vaccination, already ended. The second stage, 1A, involves inoculating the most vulnerable members of society in order to avoid overwhelming the healthcare system. The target population of stage 1A, therefore, is comprised of the elderly (over the age of 80), care home residents, healthcare and social care workers. These groups account for roughly 600 thousand people, and their vaccination – started in January – is expected to be finished in March 2021 at the latest. Registration for phase 1A vaccination started on January 15th, and just within the first hours 85 thousand seniors above the age of 80 had registered.[29] As of January 31st, 2021, more than 276 thousand vaccine doses have been administered in Czechia.[30]

The third phase, dubbed 1B, will cover the vaccination of all citizens above the age of 65, as well as other priority groups, such as essential infrastructure personnel, solders, rescue workers and teachers. People with serious underlying medical conditions,

identified as high-risk for Covid-19, will be given chance to be vaccinated in this stage as well. Phase 1B will take place in February and March.

Finally, phase 2 will start in April 2021, in which the rest of society can be vaccinated after registering online into a centralized system. The system will be responsible for organizing the priority sorting for the registered citizens, based on age, health and living conditions. Young and healthy people are expected to receive their vaccines during the summer. Registration for phase 2 inoculation will start in February.

The plans include the establishment of 164 vaccination centres across the country, mostly in selected hospital wards, with 47 of them already set up in Prague and Brno predominantly. Along the hospitals, Czechia will use the buildings of various health institutes, offices of private healthcare providers, health insurance companies and a number of mobile vaccination teams in order to avoid building entirely new centres.[31] The number of vaccination centres are also expected to be increased up to 200 during the course of 2021.[32]

Vaccine scepticism

Initially, officials worried about the high rate of vaccine scepticism as the Czechs were among the most rejective nations in Europe. November polls showed only 36% of Czechs surveyed were willing to vaccinate themselves voluntarily,[33] and the government even had to deal with large protests against the idea of mandatory vaccination, which was dropped shortly. Due to the government's persistent campaign, however, public trust in vaccines has been slowly increasing in the country, with the latest numbers show less than 40% of people surveyed who still reject Covid-19 vaccination.[34] Public health officials, therefore, are confident, that the minimal target vaccination rate of 65% will be achieved in 2021, thus reaching the (suspected) threshold of herd immunity.[35]

Conclusions

When starting to negotiate for Covid-19 vaccines, the Czech Republic opted to only acquire vaccines through the joint EU reserves, and set the goal of buying 16 million courses (about 30 million doses). It has already ordered 6.9 million courses, reserving another 9 million, from seven different vaccine manufacturers. The current delivery rate

of 80 thousand doses per week is significantly slower than expected, and may cause delays in the vaccination schedule.

Czechia also started its own vaccine development project with the involvement of three national health organizations, successfully passing the pre-clinical phase in September. However, due to advanced market competition, the government decided to terminate the project. The largest vaccine production plant in Czechia was sold instead to Novavax, which is set to produce one billion doses there in 2021.

The official vaccination plan of the Czech Republic is comprised of four stages: preparation, the inoculation of the elderly and frontline workers, followed by people with serious medical conditions and essential workers, and finally the rest of society. The first vaccination phase started in early January, and the last one is set to be finished by the end August 2021. Vaccine scepticism was regarded as a critical factor in Czechia, but as the recent polls show, the share of people rejecting the vaccine has been steadily declining, and authorities are confident the country will acquire herd immunity at a vaccination rate of 65% by the end of the year, even if significant delays occur in the initial schedule.

Bibliography

- Blatný: První vakcíny proti covidu by mohly do Česka dorazit mezi svátky. Očkovat se začne neprodleně. In: iRozhlas, 2020. 12. 16., https://www.irozhlas.cz/zpravy-domov/koronavirus-v-cesku-blatny-vakcina_2012161244_pj (2021.01.19.)
- Coronavirus: Vaccine supply fears grow amid EU export threat. In: BBC, 2021.01.27., https://www.bbc.com/news/world-europe-55805903 (2021.01.29.)
- Cumulative COVID-19 vaccination doses administered. In: Our World in Data, 2021. 01. 20., https://ourworldindata.org/covid-vaccinations (2021.01.21.)
- Czech Health Minister: COVID vaccines have been ordered. In: Expats, 2020. 11. 24., https://www.expats.cz/czech-news/article/czech-health-minister-covid-vaccines-have-been-ordered (2021.01.20.)
- Czech Republic coronavirus updates, Jan 7, 2021: Moderna vaccine approved and enroute. In: Expats, 2021. 01. 07., https://www.expats.cz/czech-news/article/czech-republic-coronvirus-updates-jan-7-2021-modena-vaccine-enroute (2021.01.20.)
- KUBANT, Vít; ŠTORKÁN, Martin: Česká vakcína na covid-19? ‚Není urgentní potřeba ve vývoji pokračovat,' míní ministr zdravotnictví Blatný. In: iRozhlas, 2020. 11. 19, https://www.irozhlas.cz/zpravy-domov/ceska-vakcina-koronavirus-v-cesku-zastaveni-vyvoje-ockovani_2011190631_vtk?fbclid=IwAR3Czbv6gZUXqie5TGvuNtmTvdWOLog5y1KGa0L6AQljRVzpN-PMvP-PEVs (2021.01.19.)
- McENCHROE, Tom: Czech Republic launches vaccine registration for over-80s. In: Radio Prague International, 2021. 01. 15., https://english.radio.cz/czech-republic-launches-vaccine-registration-over-80s-8705635 (2021.01.18.)
- McENCHROE, Tom: Czech researchers complete first stage of COVID-19 emergency vaccine. In: Radio Prague International, 2020. 09. 23., https://english.radio.cz/czech-researchers-complete-first-stage-covid-19-emergency-vaccine-8693007 (2021.01.18.)
- McENCHROE, Tom: Ministry plan envisages vaccinating high risk groups by March. In: Radio Prague International, 2021. 01. 06., https://english.radio.cz/ministry-plan-envisages-vaccinating-high-risk-groups-march-8704737 (2021.01.18.)
- PIRODSKY, Jason: One of the world's first COVID-19 vaccines is set to be manufactured in the Czech Republic. In: Expats, 2020. 08. 25., https://news.expats.cz/weekly-czech-news/one-of-the-worlds-first-covid-19-vaccines-is-set-to-be-manufactured-in-the-czech-republic/ (2021.01.18.)

- PLEVÁK, Ondřej: Bez EU by si ČR vakcínu nezajistila, uznává ministerstvo zdravotnictví. In: Euractiv, 2021. 01. 06., https://euractiv.cz/section/cr-v-evropske-unii/news/bez-eu-by-si-cr-vakcinu-nezajistila-uznava-ministerstvo-zdravotnictvi/?fbclid=IwAR2K-N0nXFStC4Qh6_ii2axwbvKdimFJTBu86LDF3_dTQMxV0tL4FwYke88 (2021.01.19.)
- Poll: only a third of Czechs willing to be vaccinated against COVID-19. In: Expats, 2020. 11. 04., https://www.expats.cz/czech-news/article/poll-only-a-third-of-czechs-willing-to-be-vaccinated-against-covid-19 (2021.01.18.)
- STOJANOVIC, Dusan; GEC, Jovana: Vaccine scepticism hurts East European anti-virus efforts. In: AP, 2021. 01. 17., https://apnews.com/article/conspiracy-theories-europe-russia-czech-republic-eastern-europe-45f495d7205a7b47ae8d499ec08e0504 (2021.01.18.)
- SVOBODA, Katerina: Blatný: We should have a vaccine for up to 16 million people. In: Prague Monitor, 2020. 11. 25., https://praguemonitor.com/news/national/25/11/2020/2020-11-25-blatny-we-should-have-vaccine-16-million-people/ (2021.01.19.)
- The Czech Republic has embarked on a journey to prepare a vaccine against covid-19. In: Ministry of Health of the Czech Republic, 2020. 05. 04., https://koronavirus.mzcr.cz/en/the-czech-republic-has-embarked-on-a-journey-to-prepare-a-vaccine-against-covid-19/ (2021.01.18.)
- Vaccines for Christmas: How will distribution look in the Czech Republic and who will get it first? In: Expats, 2020. 12. 17., https://www.expats.cz/czech-news/article/vaccine (2021.01.20.)

Covid-19 vaccination in Hungary

Dávid Nagy

Although Hungary is able to acquire 19,7 million doses of vaccine through the EU, their delivery and thus inoculation is expected to be delayed. For this reason, besides domestic development, Hungary is trying to find other ways to widen its opportunities and fasten the acquisition of mass number of vaccines. Being the first among other EU members – and facing many critics – it started negotiations with China and tends to be approving vaccines that EMA has not yet greenlighted, such as AstraZeneca or the Russian Sputnik-V.

Negotiations / acquisition

In his special announcement, broadcasted on television Prime Minister Viktor Orbán articulated the goal and principle of the government regarding vaccine acquisition.[36] "We are working on that Hungary be among the firsts to have access to the vaccine. We negotiate with everyone. Neither politics nor the interests of large international companies competing with each other are taken into account. All that matters is that Hungarians can get the vaccine as quickly and safely as possible"

With these principles, Hungary tries to widen its opportunities to get more vaccines, hasten the vaccination and by this, ease restrictions as soon as possible. Some agreements have already been made, but negotiations are continuous as vaccine supplies in which the country already agreed on could delay due to high demand all over the world, and more sources should be found for the sake of the health of the people and the economy.

EU

As a member of the European Union Hungary's foremost access to large amount of the vaccines is through the EU. Financing from its 2,7 billion euro Emergency Support Instrument, the Commission started to negotiate and make agreements on behalf of the Member States with individual vaccine producers. The EU currently have contracts with *BioNTech-Pfizer, Moderna, AstraZeneca, Sanofi-GSK, Johnson & Johnson and CureVac* for almost 1,5 billion doses of vaccine, most of the contracts contain the option for further requests, giving the opportunity to get hundreds of millions more vaccines.[37] According to the EU's Vaccines Strategy vaccines have been distributed centrally based on a quota for each member country, however as the EU is exposed to the market as well, there are procurement and distribution delays.

EU-Hungary

Hungary has tied up 19,7 million doses of vaccines all through the EU, from five different vaccine producers, 4,4 million doses only from Pfizer-BioNTech. According to the data published on January 22, so far 165 000 vaccines arrived to Hungary, out of which 138 983 people have been vaccinated, so the inoculation is constantly going on. These vaccines are from Pfizer and Moderna pharmaceutical companies. Less than 100 000 vaccines arrive to Hungary from the EU every week, thus it would take ca. 30 weeks to vaccinate the most vulnerable 3 million people from the population.[38] That pace would make it totally impossible to stick to the vaccination plan, and it could endanger millions' health while delaying the return to the normal way of life. Because of the EU's cumbersome vaccine supply and distribution Hungary started to negotiate with other countries – Israel, Russia, China - and private companies to provide a continuous, secure vaccine supply in larger amounts. Negotiations with non-EU members and out of the EU is not forbidden at all, while it isn't distracting the EU's procurement.

The Hungarian legislature already made a resolution about the further procurement of the Covid-19 vaccine.[39] The resolution expresses that besides the centralized EU acquisition, the country needs to make further negotiations in order to hasten a large amount of vaccine supply. The resolution also marks the Minister of Foreign Affairs and Trade to conduct negotiations for that purpose and calls the Minister of Finance to

provide the necessary funds from the “Defense Against Epidemic Fund”. The main center of gravitation of the negotiations is in East, more specifically Russia and China are the two countries that Hungary contacted. According to the plans, Hungary could receive 2 million vaccines from China and Russia just until March, which could fit into the Hungarian vaccination plan better.

Being the first in the EU, Hungary approved the use of the British Astra-Zeneca vaccine, developed by Oxford University. Although Astra-Zeneca’s vaccine is already in use in Britain the European Medicines Agency still has not given its approval to vaccinate with it in the EU mostly because its doubtful effects especially among the age over 65, that’s why the EMA needs a more widened impact assessment. Astra-Zeneca is cheaper, and easier to transport than other vaccines like Pfizer or Moderna, which need more specific cooling conditions.[40]

China

After months of negotiations Hungarian government practically already agreed with *Sinopharm*, delivering the vaccine, up to 5 million doses, meaning 2,5 million courses as the Hungarian pharmaceutical has given its regulatory approval.[41] These 5 million vaccines would arrive to Hungary in four phases over the span of four months.[42] Hungarian medical experts already visited China National Pharmaceutical Group, which is responsible for manufacturing the Sinopharm vaccine in Beijing. The team of experts inspected the manufacturing conditions and received the production documents of the pharmaceutical product.[43] Also as firsts in the EU, Hungary’s acquisition of the Sinopharm vaccine could set a precedent, as fourteen ambassadors of EU countries called the Hungarian ambassador to Beijing to ask bout negotiations with Sinopharm.

Questions were raised if Hungary intended to buy from other Chinese vaccine producers, like the *Sinovac Biotech*, which performed inadequate results in Brasil (50,4% effectiveness[44]). But the Hungarian public were assured that the government did not and will not take any of the Sinovac.

Russia

In the end of the last year 6000 ampoules of the vaccine have also arrived from Russia to Hungary and it is being examined in laboratory after experts were able to study the process of developing and manufacturing the Russian vaccine – Sputnik V - on site in December and January. Russia have started the inoculation with its vaccine and is showing good results, but vaccines need to be authorized by the Hungarian professionals before mass use. Hungarian National Institute of Pharmacy and Food Health (OGYÉI) already has given its permission, it is just waiting for another institute, the National Center for Public Health (NNK) to get license as well. As it receives green light from all the Hungarian authorities, delivery can begin to Hungary. In January 22 FM Péter Szíjjártó announced that an agreement has been signed with the Russian State Investment Fund, which is responsible for selling the Russian vaccine. The Russian vaccine seems to be another complement in the Hungarian vaccination plan and diversification, as 2 million doses of vaccine Budapest could receive from Moscow in three parts according to the latest information, which is enough for vaccinating 1 million people.[45]

Hungarian vaccine development and manufacturing

Domestic vaccine development

Domestic research and vaccine development has a clear objective, to make Hungary less dependent of foreign producers. The self-development requires huge capacity, professional environment and an extensive staff of experts. To put it more simply, it requires financial and intellectual capital as well.

Hungary has two ongoing vaccine developments against Covid-19. One is in the cooperation framework of the Flauart Ltd., Univesity of Debrecen and National Center for Public Health (NNK). Based on its method of development it could be called a first generation vaccine, which means the vaccine will have a complete but destroyed virus which does not reproduce or infect, but is suitable to evolve protection in the immune system.[46] However, this development still in its early stage, Surgeon General of

Hungary and member of the Coronavirus Taskforce Cecília Müller has optimistically expressed her hope that the vaccine will be produced in half a year.[47]

The other vaccine development is the project of a Hungarian-Austrian cooperation between the Virology Research Group of the University of Pécs (PTE) and Austrian biotechnology company CEBINA. Unlike the previous one, this vaccine would be a second-generation vaccine, which means it would contain only a certain small protein of the pathogen, a small antigen produced under laboratory conditions. Although it is not the latest technology as the third generation, which Pfizer's or Moderna's RNS-vaccine represents, but a more advanced technology than the above mentioned first generation. The in vitro laboratory phase of this development has already been performed, animal testing phase is expected to begin in late January, early February - said Dr. Ferenc Jakab, Professor of PTE, Head of the National Laboratory of Virology.[48]

Another Hungarian aspect just to be mentioned. Katalin Karikó, a Hungarian born, later emigrated biochemist, works in the Pfizer-BioNTech's laboratory, discovered years ago that the modified ribonucleic acid-based method, the mRna could be used for healthcare purposes as a vaccine. This method is now the base of the Moderna's and Pfizer's vaccine as well, the latter was entirely developed by Katalin Karikó and her Hungarian colleagues.[49]

Domestic manufacturing

The Hungarian pharmaceutical industry is a sector with a history of more than one hundred years and plays an important role in generating the country's national income and in domestic health care.[50] Though there is no information on manufacturing any covid-19 vaccine locally or acquiring any license from foreign producers yet, but the infrastructure and capacity is given as research sites, laboratories and factories could be found in several cities all over Hungary. Domestic manufacturing could mean lower prices and faster production, secure and continuous access to a vaccine.

Although Pfizer has just clinical research resources and logistics center in the country, the French company Sanofi – which announced to help produce Covid-19 vaccines for Pfizer to meet the huge worldwide demand[51] - has its own production capacity and infrastructure in Hungary.[52] Sanofi also has its own developed vaccine on the way,

however reported a delay in its production due to unsatisfactory laboratory results. Sanofi developing its vaccine in cooperation with GSK – which has a separate vaccine manufacturing capacity in Gödöllő, Hungary as well.[53] The well-known AstraZeneca runs its own research and development laboratory in Hungary too.[54]

Realizing the importance of being self-sufficient in vaccine production as well, the Center for Public Health in cooperation with the University of Debrecen announced an extensive infrastructural investment in building a vaccine research and develop laboratory and factory in Debrecen.[55]

Vaccination plan

The order in which people will be offered the vaccine is based on the vaccination plan[56], a strategy which is often expressed in the communication of the authorities. Healthcare workers are in the first place in the plan, followed by those, working in social fields – e.g. nursing homes, then those who are above 65 and at risk because their age, followed by the members of the law enforcement.[57] After that those who are between 18-59 and have underlying illnesses, finally the critical infrastructure workers and the rest of the population who registered to get the vaccination. The purpose is clear beyond this strategy, firstly let's vaccinate those who are in the "frontline" and whose works are more essential and irreplicable in the successful defense against the virus. After vaccination the death toll could be decreased reasonably in the shortest time while the members who fight in the forefront are being protected from the beginning.

Vaccination capacity

Other details are revealed from the vaccination strategy as well. According to one scenario, if sufficient quantities are available mass vaccination could be carried out and in that case 1-1,5 million people could be inoculated in a weekend, 500 000 per day.[58] Measuring the capacity of the health care system and infrastructure is part of the preparatory work. Probably hospitals, medical stations, surgeries will be the vaccination points where vaccinating could be the most safe and professional. Secretary of State for Health, Ildikó Horváth designated 5,000 GP surgeries to increase vaccination points and to make the vaccination faster.[59]

In December 26, 2020 – a day before the EU's designated date and as firsts in the EU – Hungary started the vaccination from that less than 10,000 doses of *Pfizer/ BioNtech* vaccine which was given symbolically to all EU member states in the end of the month. Thus, healthcare workers were the first who received their first dose of the vaccine before new year. According to the vaccination plan, the aim is to vaccinate the population as quickly as possible and in larger numbers, however, the slow and intermittent acquisition of the vaccine by the EU could change and delay the plans.

Conclusion

Although Hungary has bounded 16,7 million doses of vaccine through the EU, supplies appear to be slower than expected, which could delay the inoculation and hinders the lifting of restrictions. For this reason and with the objective to make secure, continuous and diversified vaccination supplies, Hungary started negotiations regarding the vaccine acquisition with other countries who have their own self-developed vaccine. Contracts have been already signed with China and Russia under which Hungary could receive 7 million doses of vaccine, 5 million doses from the Chinese Sinopharm and 2 million doses – meaning 1 million courses - from the Russian "Sputnik V" vaccine.

In sake of diversification and to make Hungary less dependent on foreign vaccine providers, Hungary already started its own vaccine development - and would have capacity for domestic production as well. Two promising developments are underway, but its production and usage could take still more research and time. The country with its experts and infrastructure seems to be prepared to start the mass vaccination according to its vaccination plan as soon as the proper amount of vaccines are available.

Bibliography

- A lakossági tájékoztató az oltási terv alapján (kivonat) In: NNK, 2021.01.18. https://www.nnk.gov.hu/index.php/koronavirus-tajekoztato/932-a-covid-19-vedooltasra-jelentkezesi-hely-az-egeszsegugyi-es-egeszsegugyben-dolgozok-szamara?fbclid=IwAR0Apf-4Al376i5bhyZQf01RETCzJLqTLx-TJKxKkxaUnaY_oei2ILm0DYU (2021.01.22.)
- A magyar gyógyszeriparról: In: Magyosz, (2013.01.01) https://www.magyosz.org/hu/oldal/a-magyar-gyogyszeriparrol (2021.01.29)
- A Pfizer Magyarországon In: Pfizer, 2020.06.18 https://www.pfizer.hu/hu/pfizer-magyarorsz%C3%A1gon (2021.01.29)
- AstraZeneca: Hungary In: AstraZeneca, 2021.01.29 https://www.astrazeneca.com/country-sites/hungary.html (2021.01.29)
- Coronavirus vaccines strategy In: Euorpean Comission https://ec.europa.eu/info/live-work-travel-eu/coronavirus-response/public-health/coronavirus-vaccines-strategy_en (2021.01.22.)
- DOMOKOS, László: Ötmillió kínai vakcinát vásárol Magyarország - jelentette be Szijjártó Péter miniszter In: Napi.hu, 2021.01.29 https://www.napi.hu/magyar_gazdasag/kinai_vakcina_szijjarto_nagy_bejelentest_tett.722394.html (2021.01.29)
- Ezt lehet tudni a magyar vakcináról In: 24, 2021.01.14. https://24.hu/tudomany/2021/01/14/koronavirus-magyar-vakcina/ (2021.01.22.)
- Gsk: Hungary In: Gsk, 2021.01.29 https://www.gsk.com/en-gb/contact-us/worldwide/hungary/hu-hu/ (2021.01.29)
- Itt a bejelentés: gigászi vakcinagyár jön létre Magyarországon In: Pénzcentrum, 2020.05.8 https://www.penzcentrum.hu/biztositas/itt-a-bejelentes-gigaszi-vakcinagyar-jon-letre-magyarorszagon.1095000.html (2021.01.29)
- Így lesz 5000 új oltópont Magyarországon In: Portfolio, 2021.01.07. https://www.portfolio.hu/gazdasag/20210107/igy-lesz-5000-uj-oltopont-magyarorszagon-464324 (2021.01.22.)
- Kiszivárgott: a kormány már készül a tömeges koronavírus-oltásra In: Portfolio, 2021.01.09. https://www.portfolio.hu/gazdasag/20210109/kiszivargott-a-kormany-mar-keszul-a-tomeges-koronavirus-oltasra-464632# (2021.01.22.)
- Kormányinfó: a kormány kampányt indít az oltásra jelentkezés ösztönzésére, In: Tájékoztató oldal a koronavírusról, 2021.01.14. https://koronavirus.gov.hu/cikkek/kormanyinfo-kormany-kampanyt-indit-az-oltasra-jelentkezes-osztonzesere (2021.01.22.)
- Kormányinfó, 2021. január 14. In: Mediaklikk.hu, 2021.01.14. https://mediaklikk.hu/kormanyinfo/video/2021/01/14/kormanyinfo-2021-januar-14/ (2021.01.22.)

- Magyar Közlöny 2021. évi 7. szám In Magyar Közlöny, 2021.01.14. https://magyarkozlony.hu/dokumentumok/e255e1399b7aee22ffd6514a7193a42e5a4b0657/megtekintes (2021.01.22.)
- Maradhat a digitális oktatás a középiskolákban, fél-egy éven belül lehet magyar koronavírus-vakcina In: Portfolio, 2021.01.07. https://www.portfolio.hu/gazdasag/20210107/maradhat-a-digitalis-oktatas-a-kozepiskolakban-fel-egy-even-belul-lehet-magyar-koronavirus-vakcina-464336 (2021.01.22.)
- Orbán Viktor: Magyarország technikailag készen áll a tömeges és gyors oltásra In: Tájékoztató oldal a koronavírusról, 2021.01.03. https://koronavirus.gov.hu/cikkek/orban-viktor-magyarorszag-technikailag-keszen-all-tomeges-es-gyors-oltasra (2021.01.22.)
- Orbán Viktor rendkívüli bejelentése In: YouTube, 2020.12.07. https://www.youtube.com/watch?v=tX4CI3mfes8&ab_channel=Magyarorsz%C3%A1gKorm%C3%A1nya (2021.01.22.)
- Pekingben ellenőrizték a kínai vakcina gyártási folyamatait a magyar szakértők In: Mandiner, 2021.01.16. https://mandiner.hu/cikk/20210116_pekingben_ellenoriztek_a_kinai_vakcina_gyartasi_folyamatait_a_magyar_szakertok (2021.01.22.)
- PETER, Kristof: Koronavírus: Nem lenne vakcina egy magyar kutató nélkül In: Euronews, 2020.12.21. https://hu.euronews.com/2020/12/21/koronavirus-nem-lenne-vakcina-egy-magyar-kutato-nelkul (2021.01.22.)
- Russian Sputnik V, British AstraZeneca Vaccines Get Hungarian Authorities' Approval In: Hungary Today, 2021.01.21. https://hungarytoday.hu/coronavirus-astrazeneca-russian-sputnik-vaccines-hungary-approval/ (2021.01.22.)
- Sanofi to help produce 100 million Pfizer/BioNTech vaccine doses In: CNN, (2021.01.27) https://edition.cnn.com/2021/01/27/europe/sanofi-vaccine-doses-intl/index.html (2021.01.29)
- Sinovac: Brazil results show Chinese vaccine 50.4% effective In: BBC, 2021.01.13. https://www.bbc.com/news/world-latin-america-55642648 (2021.01.22.)
- Vakcina: fejlesztünk, hogy ne függjünk a külföldi gyártóktól In: Magyar Nemzet, 2020.12.31. https://magyarnemzet.hu/belfold/magyarorszag-is-beszallt-a-vakcinafejlesztesbe_a_debreceni_egyetem-9163667/ (2021.01.22.)

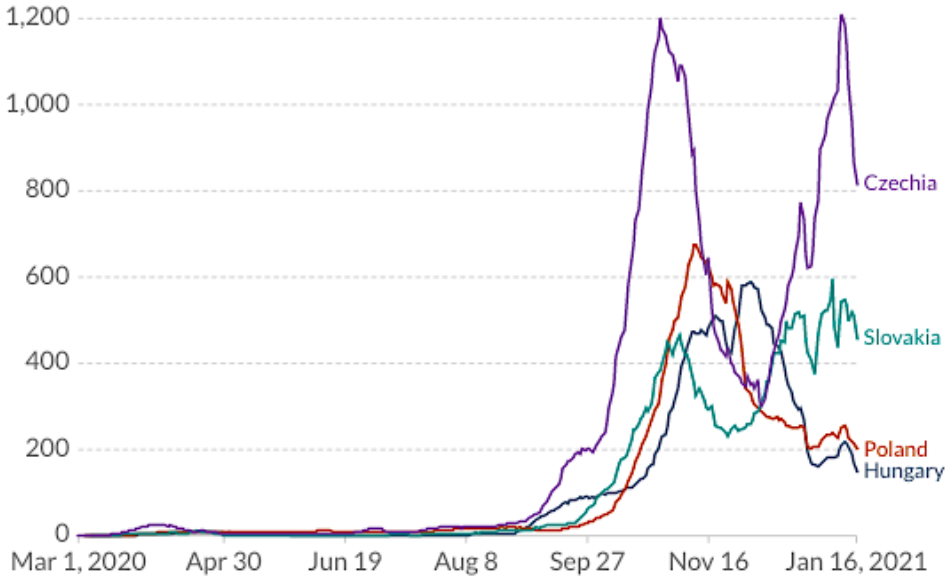
COVID-19 pandemic in Poland. Actions and challenges.

Enikő Bagoly

Poland has successfully chosen its strategy to fight the coronavirus: the country gained access to vaccines against COVID-19 in alignment with the other EU member states, furthermore, it was able to organize all aspects of inoculation of its citizens. On the other hand, defeat of the coronavirus is inconceivable without cooperation. Poland now faces an external challenge – the strongest skepticism in EU, the mistrust of vaccines and an increasing social disobedience to restrictive measures.

COVID-19 pandemic in Poland

The „zero patient" of the coronavirus infection in Poland was confirmed on March 4, 2020. A week later, Poland introduced one of the earliest lockdowns in Europe aiming to stop the spread of the epidemic, including closing the borders to foreigners, suspending international air and railway connections and introducing a mandatory 14-day home quarantine regime.[60] During the first phase of the pandemic, Poland succeeded in keeping infections low compared to other countries, however, the second wave **hit hard.** Based on COVID-19 key indicators (the numbers of infections and deaths, the share of positive test results) Poland became one of most affected **countries in Europe**.[61]



Weekly confirmed COVID-19 cases, referring to the cumulative number of confirmed cases over the previous week.[62]

Government actions against spread of COVID-19

Restrictions

From October 2020, nationwide restrictions were reintroduced and according to recor**ds** of new daily cases, additional restriction measures were launched with validity from 28 December until at least 17 January 2021. The restrictions extend among others **to the** suspension of international air connections, mandatory closure of shops except grocery stores, drugstores and pharmacies, suspension of activities of cultural institutions and sport facilities, limitations of number of people using public transport at the same time and launching hours for seniors: from Monday to Friday from 10:00 to 12:00 only people over 70 years may stay in stores, drugstores, pharmacies and post offices.[63]

Dose of hope - The National Vaccination Program

The COVID-19 vaccine gives hope to return to normal or the „new normal" after the pandemic. However, managing vaccinations **requires great** planning, organizational and logistical challenges which the health care system have faced in recent centuries in Poland. On mid-December, the Polish government adopted the National Vaccination Plan,[64] containing vaccine procurement and vaccination strategy of the country. The

document collects in chapters the most important issues, like vaccine effectiveness and safety, purchasing and financing process, distribution and logistics, medical recommendations and organization of vaccination points, and the order of vaccination.[65]

As the document states, the government does not enforce mandatory immunization. The primary goal of the Program is to deliver sufficient quantity of vaccine **in** a safe and effective way **in the** shortest possible time (till the end of 2021), also for free and in easily accessible way.

Purchase of the vaccine(s) within EU agreements

Poland intents to purchase vaccines by contracting - under the EU agreements: on August 2020 the country has **joined the** Agreement between the European Commission and member state countries for the early purchase of vaccines against COVID-19[66] and accepted an Annex to the Commission Decision[67], **with regards** to establis**hing** a common and in advance vaccine purchasing mechanism. The Agreement allows the EU to sign Advice Purchase Agreements („APA") with vaccine manufacturers on behalf of all Member States, and the Annex includes an obligation for the Participating Member States not to negotiate separately with the same manufacturers[68]. The mechanism provide proportional size of the orders to the number of residents of the countries and the delivery schedule is expected to be the same for all countries.[69]

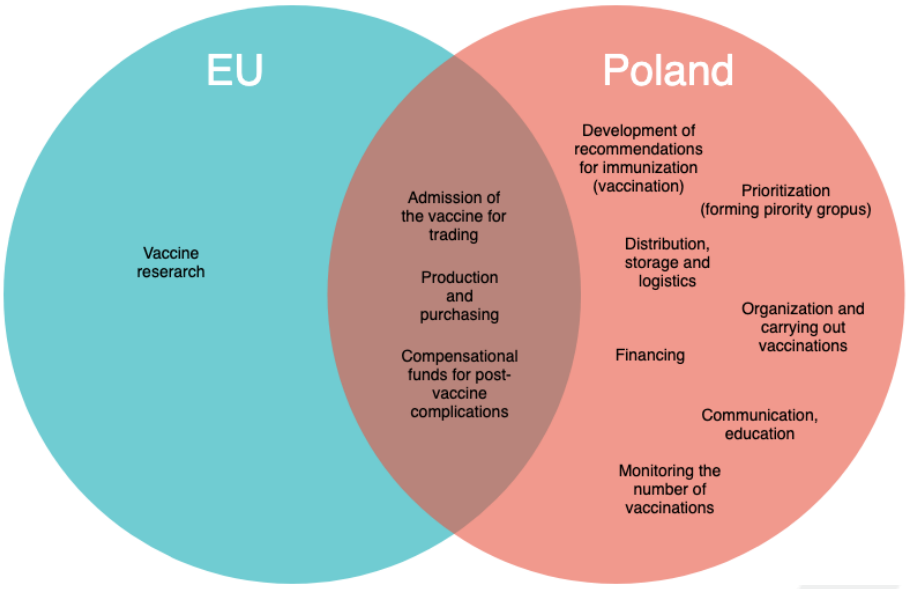
The EU Commission has signed in advance purchase contracts with six vaccine producers.[70] According to the contracts, the Poles' National Vaccination Program reviews all types of vaccines, which already received (or possibly may receive in the future) admission for trading inside the EU:

- viral vector-based vaccines: produced by Astra Zeneca, Janssen Pharmaceutical NV/Johnson&Johnson
- mRNA vaccines: produced by CureVac, Moderna, Pfizer/BioNTech
- subunit vaccine: produced by Sanofi-GSK[71]

Poland joined **all the above** mentioned agreements with intention to **purchase 62,06** million doses of vaccine, in detail:

- Astra Zeneca 16 million
- Janssen Pharmaceutical NV/Johnson&Johnson 16.98 million
- Pfizer/BioNTech 16.74 million (received authorization in the EU on 21 December, 2020[72])
- CureVac 5.65 million
- Moderna 6.69 million (received authorization in the EU on 6 January, 2021[73])

The estimated costs of purchase are between 2.4 billion zlotys[74] (5.3 hundred million euros), covered by the state budget,[75] which means the vaccination **cost which includes two doses for one** person is about 80 zlotys (18 euros).[76]



Responsibility-sharing between the EU and Poland in accordance to COVID-19 vaccination in Poland[77]

On December 25/26, the first batch of Pfizer/BioNTech vaccines (almost 10,000 doses) **has** arrived **to** Poland.[78] On December 27, (as in the most of EU countries) the vaccination process has started in Poland, the Poles' symbolic first vaccination was announced at the Central Clinical Hospital of the Ministry of Interior and Administration in Warsaw, where three medical workers received the vaccine.[79] **The** next day, 300,000 doses arrived to Poland,[80] which were transferred to 72 nodal hospitals and 250 hospitals throughout the country, **in order** to start vaccinating their medical staff. On January 4 2021, the next shipment with another 360,000 doses of the vaccine had

arrived in Poland.[81] The country by acquiring weekly 300,000 doses of vaccine [82] expects to receive 1.5 million doses of the vaccine by the end of January 2021, and 5.9 million by end-March.[83] In mid-January, based on Poland's vaccination rate (1.15 with an approximately 440,000 doses delivered)[84] the country was in the midfield among the **other** EU member states, and second - right after Hungary among the V4 countries.[85]

Vaccination points

The first stage of the registration of vaccination points against COVID-19 and also recruitment of medical staff for vaccinations has been completed, with registration of 80 percent communes in Poland to carry out vaccinations, covering 92% population of Poland. The second stage of recruitment launched also in December with the aim of establishing a vaccination point for each commune in Poland by the end of 2020. On January 2021 5,956 vaccination points were launched in the country.[86] Furthermore, regarding to organization and financing of patient transport for vaccinations, the **Polish** government has secured funds so that local governments do not have to bear the entire burden of organizing the transport of people to the vaccination points.[87]

The National Vaccination Plan proposes four types of medical vaccination points for managing the upcoming mass vaccination process in 2021: using regular health care facilities or other similar establishments, establishing mobile medical vaccination points or vaccination centers and reserve hospitals.[88]

An official COVID-19 information website has been launched gov.pl/szczepimysie, which h**as** an information function and s**erves** as a platform for registration and a 24-hour hotline (989 and 22 62 62 989).[89]

Vaccine development

On July 2020, the development of the Polish prototype against COVID-19, called CovidVax was announced by professor Andrej Mackiewicz and his team from the Medical Biology Centre of the Medical University in Poznan.[90] As Prof. Mackiewicz stated, the CovidVax is fundamentally different from the American or the **Chinese:** instead of using the concept of preventing infection of healthy people by antibodies, the CovidVax is triggering similar immune mechanisms in the body as anti-cancer

agents do, **which have been** produced **for** over 30 years by the Poles.[91] The Poles' vaccine also differs from the other products that **are** based on stem cells, which themselves produce the virus's genes and **do** not contain adjuvants like mercury or aluminum salts. Besides, the CovidVax generates two types of body response by stimulating the cellular immune system and the production of antibodies at the same time, while in comparison the Pfizer vaccine has affects only one immune response.[92]

Currently the Poles' vaccine is at stage of a two-step clinical trial: on December, the trial on animals had ended and conclusions might be published at the upcoming months by the team leader prof. Mackiewicz.[93] The clinical trial phase of the human-type vaccine might start only after the verification of expected immune mechanisms in case of mouse-type vaccine. The next step is getting approval of fast-track legalization (from the European Medicines Agency and the FDA in the US) and passing the audits in Poland by the EMA. As prof. Mackiewicz said, they already have volunteers for vaccine testing **for** people aged 18-60, who are considered as **a** target group during the trials.[94]

However, the development of the vaccine may be hampered by **a** lack of financial resources as the next stage of work requires approximately 15-20 million Zloty (3,3 million euros) investment.[95] On October 2020, it might seemed that by investment of INNO-GENE SA the costs of further development could be covered: CovidVax sp. Z oo (founded by prof. Mackiewicz) signed an investment agreement with INNO-GENE SA with amount of 10 million Zloty in exchange for the acquisition of 20% of shares and votes at the shareholders' meeting.[96] However, two months later, the investment agreement was terminated by INNO-GENE SA, claiming that „the launch of 3 commercial vaccines against Covid-19 and the commencement of population vaccinations, hinders the possibility of obtaining external financing for clinical trials and commercialization of the vaccine by COVIDVAX sp. Z oo.".[97] Currently, to provide funding for the development (clinical trials) of the Polish vaccine, The Generis Foundation is organizing a public fundraising campaign: https://pomagam.pl/covidvax.

Vaccine production capacity

Vaccine manufacturers' production limitations set back their supply capacity, which puts countries in an increasingly precarious position, as it may also have an impact on its announced national vaccination programs against COVID-19. One of **many**

possible solutions might be the involvement of external production units, even specializing them into different stages of the vaccine manufacturing process.

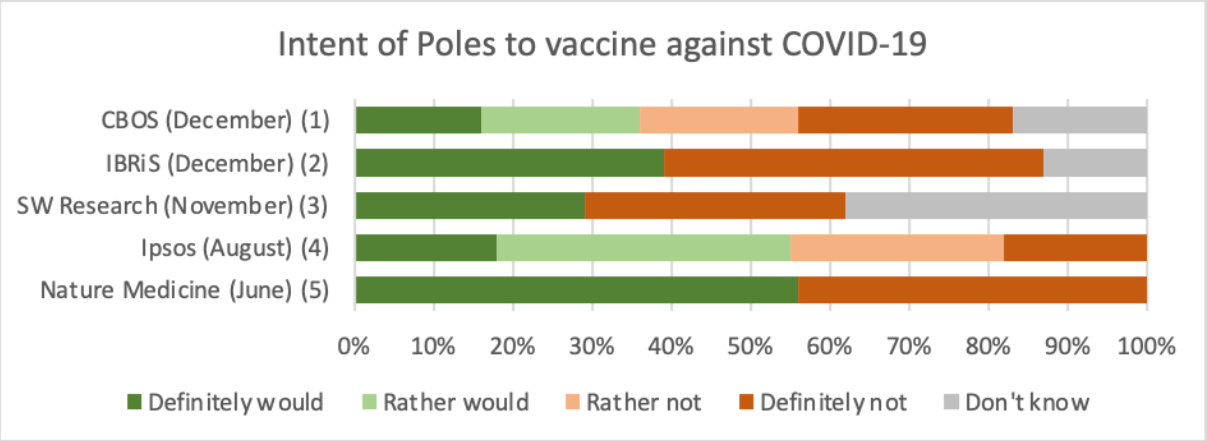
Polfa Tarchomin, a state-owned Polish pharmaceutical manufacturer, currently **is** in **a** negotiation process with **a** yet unnamed foreign supplier of COVID-19 vaccine[98]. The company is aiming to participate in the last stage of production of the vaccine.[99] Polfa Tarchomin is **preparing a new line for the production of ampoules for 40 million Zlotys (8.8 million euros), which is to be launched** in Autumn/Fall 2021. The production capacity will allow **a** daily production of 16,000 ampoules, containing a few of a dozen doses of vaccine.[100]

Social acceptance of government measures in Poland

The effectiveness of the fight against COVID-19 depends not only **on** proper actions of the government to provide all necessary means and support, but **on** the willingness of society to cooperate in realization of necessary measures, which means vaccination and observing the restrictive measures.

Vaccine hesitancy

Several surveys show a divided social reception among the Poles regarding intent to vaccinate against COVID-19. Poland is one of those countries, where the refusal from the vaccination is almost equal to the intent to be vaccinated. The reason of the skepticism toward the vaccine is mostly explained by the concerns of its side effects, which was followed by the doubts of t**he** vaccine's effectiveness and avoiding vaccinations in general.



Outcomes of international and internal polls shows divided intend to take a vaccine for COVID-19 among the Poles.[101]

Compensation fund

The leading argument for distrust of the vaccine among Poles is the concern over its side effects (69% of the reasons for refusing the vaccine).[102] The **doubts are** not at all surprising in the context of vaccine manufacturers lobby (Astra Zeneca[103] and Pfizer/ BioNTech[104]) for their exemption from liability for side-effects **for the** COVID-19 vaccine.

The Polish government reacted to the uncertainty surrounding the vaccines against COVID-19 which possibly could have had a negative impact on the success of the execution of National Vaccination Program. Furthermore, in compliance with the referring Commission decision to „financially cover certain of the companies risks to ensure that vaccines are actually available for EU citizens to protect public health"[105] on 15th of December a Compensation Fund was announced.[106] The Fund, as a part of the National Vaccination Strategy will be adopted by law in the upcoming weeks[107] with the aim to cover claims up to a certain amount (similarly to the medical malpractice commission) and ensure possibility to go to court with larger or disputed claims.[108]

The anti-lockdown movement

Launched restrictions generated tensions in the service industry, which led to a new level of social disobedience in January. It is no longer just individuals who violate quarantine rules but businesses which are reopening, considering coronavirus restrictions unconstitutional:[109] participants of anti-lockdown movement in Poland

sometimes creatively reimagine their activity to evade the rules (a gym declared itself as church, ice skating rink declared itself to be a flower shop...etc.). They actively use all social media platforms with motto #otwieraMY (#WeAreOpening), and created an „Interactive Map of Free Business".[110]

Conclusions

Success of the above presented measures of the Polish government is important not only for curbing the second wave of COVID-19 infection in Poland, but also essential to avoid the possible third wave of the epidemic, which might push the health care system to the limit of its operability in Poland. The country as an APA (Advanced Purchase Agreement) member, accessed to the joint vaccine procurement program led by the EU Commission. Poland joined **al**l existing agreements with six vaccine producers and intends to purchase of 62,06 million doses of vaccine. Despite the continuously provided supply of vaccines under concluded contracts and the announced National Vaccination Program, the fight against the coronavirus is inconceivable without **cooperation of members of society.** In this sense Poland **also** f**aces** an external challenge – the strongest skepticism in EU and mistrust about vaccines (not only) against COVID-19. The most important issue at the moment **is** that whether imposed governmental measures (the National Vaccination Program with the well-organized governmental contribution in the fight against the coronavirus, the adoption by law of the Compensational Fund and the transparent and clear communication regarding the vaccine) could be effective tools to stren**gthening** the willingness to vaccinate among the Poles.

Bibliography

- DORDEVIC, Nikola: „Covid-19 in Central Europe: No appetite for lockdown.", In: Emerging Europe, 20.11.2020., https://emerging-europe.com/news/covid-19-in-central-europe-no-appetite-for-lockdown/ (16.01.2021)
- GUARASCIO, Francesco: „COVID-19: AstraZeneca gets partial immunity in low-cost EU vaccine deal.", In: World Economic Forum, 02.10.2020.,https://www.weforum.org/agenda/2020/10/astrazeneca-partial-immunity-eu-vaccine/ (29.12.2020)
- HARPER, Jo: „Coronavirus threatens Poland's remarkable growth story." In: DW.com, 29.03.2020., https://www.dw.com/en/coronavirus-threatens-polands-remarkable-growth-story/a-52939825 (01.01.2021)
- KOPEC, Jaroslaw: „With second wave hitting hard, Poland is among the countries with the worst Covid-19 health indicators.", In: Wyborcza, 12.11.2020., https://wyborcza.pl/7,173236,26503916,with-second-wave-hitting-hard-poland-is-among-the-countries.html (29.12.2020)
- KOSC, Wojciech: „Poland's blind battle against the coronavirus." In: Politico, 20.11.2020., https://www.politico.eu/article/polands-blind-battle-against-the-coronavirus/ (27.12.2020)
- KRAKOVSKY, Roman: „Europe Versus Coronavirus – Poland, Between Reactivity and Opportunism.", In: Institut Montaigne, 07.05.2020., https://www.institutmontaigne.org/en/blog/europe-versus-coronavirus-poland-between-reactivity-and-opportunism (01.01.2021)
- PACEWICZ, Piotr: „Kogo nie zaszczepią w I kwartale? Plany rządu odbierają nadzieję nauczycielkom i 60-latkom." (Who will not be vaccinated in the first quarter? Government plans take away hope from teachers and 60-year-olds), In: OKO Press, 09.01.2021., https://oko.press/kogo-nie-zaszczepia-w-i-kwartale/ (17.01.2021)
- SIQI, Ji: „If Covid-19 vaccines cause side-effects, who pays: makers or governments?" In: South China Morning Post, 26.12.2020.,

https://www.scmp.com/news/china/science/article/3115258/if-covid-19-vaccines-cause-side-effects-who-pays-makers-or (27.12.2020)

- TILLES, Daniel: „Poland to introduce tougher lockdown, including quarantine for international arrivals." In: Notes of Poland, 17.12.2020., https://notesfrompoland.com/2020/12/17/poland-to-introduce-tougher-lockdown-including-quarantine-for-international-arrivals/ (03.01.2021)
- WADOLOWSKA, Agnieszka: „Poland announces Covid vaccine plan, aiming for 70-80% of population to vaccinate." In: Notes from Poland, 02.20.2020., https://notesfrompoland.com/2020/12/02/poland-announces-covid-vaccine-plan-aiming-for-70-80-of-population-to-vaccinate/ (03.01.2021)
- „P. Müller o odpowiedzialności za skutki uboczne szczepień przeciw COVID-19." (P. Müller on the responsibility for the side effects of COVID-19 vaccination). In: Polityka Zdowrotna, https://www.politykazdrowotna.com/68596,p-mller-o-odpowiedzialnosci-za-skutki-uboczne-szczepien-przeciw-covid-19 (12.10.2020)
- Rozporzadzenie Rady Ministrów zmieniające rozporządzenie w sprawie ustanowienia określonych ograniczeń, nakazów i zakazów w związku z wystąpieniem stanu epidemii. (Amendment the regulation on the establishment of certain restrictions, prohibitions and prohibitions due to an epidemic.) In: Dzennik Ustaw Rzeczpospolitej Polskiej, 27.12.2020., https://dziennikustaw.gov.pl/D2020000235301.pdf (30.12.2020)
- Coronavirus in Poland. 17th March 2020, 2nd wave of research 12-13. 03.2020. How the attitude of Poles towards coronavirus changed during a week? In: Ipsos, 17.03.2020. https://www.ipsos.com/sites/default/files/2020-03/coronavirus-in-poland-wave-2-en.pdf (27.12.2020)
- Questions and Answers: Coronavirus and the EU Vaccines Strategy. In: Official website of the European Union, 24.09.2020., https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_1662 (27.12.2020)
- Commission decision of 18.6.2020 approving the agreement with Member States on procuring Covid-19 vaccines on behalf of the Member States and

related procedures.
18.06.2020.,https://ec.europa.eu/info/sites/info/files/decision_approving_the_agreement_with_member_states_on_procuring_covid19_vaccines_on_behalf_of_the_member_states_and_related_procedures.pdf (29.12.2020)

- Coronavirus: The Commission signs first contract with AstraZeneca, Press release, 27.08.2020., https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1524 (29.12.2020)
- EU Strategy for COVID-19 vaccines. 17.06.2020., https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1597339415327&uri=CELEX:52020DC0245 (10.01.2021)

The fight against Covid-19 in Slovakia

Péter Szitás, PhD.

2020 was expected to be an eventful year in Slovakia since parliamentary elections were due to take place in February. The public mood had been devastating from the year 2018, when the double murder of the young journalist Ján Kuciak and his fiancée *Martina Kušnírová* had highlighted the deep intertwines between the country's political and business elite. The outcome of the elections reflected the populations' anger and desperation. However, in the beginning of the year it became obvious that a new actor, an unknown virus will form the everyday life the most. Dramatic news and horrifying live footages kept arriving since the end of 2019 from the city of Wuhan, the capital of Hubei Province in the PRC. According to them a virus started to infect humans in large volume taking victims rapidly. While in the very beginning of the year Europeans were not addressed by this issue much, the whole world realised shortly after that the optimism was naïve. How has Slovakia dealt with this issue in the limelight of a political transformation? What can be the outcome of the pandemic for this small and widely open economy?

The Coronavirus arrived to Slovakia shortly after the parliamentary elections. The initial defensive measures against the first wave were led by the stepping down prime minister Peter Pellegrini. The virus returned in the middle of August with much higher intensity. As a reaction, the new government decided to test the whole population of the country. Despite this promising attempt, the number of infections has been

rocketing since. According to professionals, only the mass vaccination may erase the disease. However, the possibilities to manufacture vaccines in Slovakia are strongly limited.

The political situation in Slovakia before the outbreak

The first wave of the SARS-CoV-2 epidemic hit the Central European region at the time of the parliamentary elections in Slovakia. The stake was enormously high since it was not yet clear whether the had been ruling socialist party SMER-SD and their allies were able to keep their power or a new, wide, liberal-conservative “hybrid” coalition could acquire it turning the country into a new direction. The cold-blooded double murder of the young journalist Ján Kuciak and his fiancée Martina Kušnírová had taken place almost exactly two years prior, drawing public attention to the intense interlacement of the political and business elite pressing Slovakia into a constant domestic political crisis. This resulted in the stepping down of the prime minister Robert Fico and the minister of interior Robert Kaliňák. The outcome of the elections reflected this public mood precisely since two, out of the three parties, members of the hitherto governing coalition could not cross the five percent threshold of the parliament and the political rambler Igor Matovič, who previously had declared his own inability for the position, became leader of the country.

The arrival of the virus

While on 29 February 2020, at the time of the elections, no detectable presence of Covid-19 infection was reported in Slovakia, it was clear that this state of grace is only momentary. The country’s preparedness to face the enormous threat of an unknown virus was highly insufficient. Prior the month February, even the basic infrastructure necessary for identifying the SARS-CoV-2 had not been present in Slovakia thus the taken samples had to be sent to Germany for laboratory evaluation.[111] Today there are 28 laboratories nationwide capable of screening it.[112] The election’s catastrophic outcome for the reigning government was clear at the time of the outbreak. However, the new government’s inauguration had not happened yet so the first wave of protection was led by the leaving prime minister Peter Pellegrini who only had days remaining in office. Maybe this was the reason why, unlike for other countries of the region, nothing was too expensive for Slovakia which, despite the relatively tiny

number of infections, was among the pioneers in Europe who closed almost the entire country down due to the virus threat. While the first verified Covid-19 infection was reported by the local newspapers on 6 March 2020[113], six days later nationwide state of emergency[114] was declared, which meant the immediate closure of all international airports, educational and sports facilities, restaurants, hotels, theatres, cinemas etc. The Ministry of Investments, Regional Development and Informatization of the Slovak Republic initiated a webpage[115], which has been providing information about the Slovakian Covid-19 situation. This site has still been on today, informing the public in seven languages, including English and the mother tongue of the local national communities. Thanks to the population's fear of the unknown threat and the professional medialization of the governmental steps, the popularity of the stepping down prime minister Pellegrini started rocketing[116].

New leadership on the deck

The new Slovak government has been in office since 21 March 2020. Despite all their efforts to continue the professional handling (and of course, medializing) of the Covid-19 situation, it was clear that the routine and consistency were both missing from their freshly set-up lines. The governmental decisions and the content of the new prime minister's almost daily held press conferences rarely matched, resulting in confusion and misunderstanding among state actors and the population too. Igor Matovič, who had gained his popularity by highlighting the corruption of the elite, has clearly been unable to reprogram the basic operation of his own character from the oppositional troll to the state's third most important public dignity. As prime minister, he kept on behaving as he had still been a member of the opposition, causing fury among even his own supporters. In addition, one of the first adopted legal acts of new government was highly controversial since it allowed the Slovak Public Health Office to monitor the cellular data of the population which is normally considered classified information. According to the government, this step was inevitable in order to be able to control the people whether they follow the quarantine rules or not. In spite of the difficulties the first wave of the epidemic was handled by the authorities successfully. The hard measures brought great results reckoning in the relatively small victim counts, however, it was obvious that the setback on the economy was going to be enormous. Around June, the life in many fields could almost completely return to its normal routine.

Nonetheless, the strict and self-disciplined Spring was followed by a licentious summer, when thousands of Slovakians roamed to Croatia for summer vacation triggering the arrival of the second wave of the contagion in the middle of August[117].

Mass testing of the population

The return of the virus has surpassed its first appearance in volume, according to the prime minister, 50 times[118]. Due to this the government on 18 October 2020 made an unprecedented step[119] even on worldwide level and decided to test the whole adult population of the country[120] for the SARS-CoV-2. The first round of the nationwide testing took place at the last weekend of October 2020, which showed 1,06 per cent infection rate on state level.[121] The next round was held a week later but only in those 45 counties where the ratio of the positive samples exceeded 0,7 per cent. The third circle took only place in 458 settlements[122] where the positive samples' ratio exceeded 1 per cent. Slovakia with this move stepped into the limelight of the international inquiry. Despite the ambitious endeavour the long-awaited results have not arrived. This is due to several factors. On the one hand, wide circles of the population in hand with the political opposition strongly blamed the government for forcing literally millions of people to stand in queues for long hours exposed to the risk of getting infected, on the other hand conflicts within the government occurred too, especially due to the insufficient procurement of the necessary number of tests. This made it impossible to go on with the state wide mass testing according to the original plan.

Country lockdown

Although these tough steps slowed the spread down, the number of new infections kept on rising. Realizing this, the government made another hard move and locked the country down from 19 December 2020. Despite many exceptions under this rule, the discipline of the population was apparently declining. The reasons were the lack of continuity and consistency in the governmental steps and the poor communication. Neither helped the case when an exception under the lockdown disregarded ski resorts. It was no secret that the Speaker of the Parliament, Boris Kollár runs and owns of one the biggest facilities in the country. As a result, huge crowds of people roamed to spend their winter holidays in the mountains where, despite the bans, long queues formed while waiting for the ski lifts giving green light for the virus to spread. Because

of this, the exception was immediately revoked, certifying again the inconsistency and ad hoc level of the decision-making.

Vaccination as solution

Today it is clear that even the combination of the mass testing and the lockdown is unable to eradicate the virus thoroughly. According to scientists the only solution to get rid of it may be the worldwide mass vaccination. The first officially introduced vaccine against the SARS-CoV-2 was the Sputnik V, which was registered in Russia on 11 August 2020. In nowadays' hostile political world, it is not surprising that apart from Russia only her main military allies —Venezuela, Belarus, India— and interestingly the UAE[123] started the vaccine's clinical trials. From the region, during December, Hungary received 6000 doses of Sputnik V for assessing it.[124] In Slovakia the vaccination of the population started on 26 December 2020 with the product of Pfizer / BioNTech. The first person who received the antibody was Vladimír Krčméry, the well-known infectologist, member of the permanent central crisis staff. The president of the country, Zuzana Čaputová received her shot along with some members of the cabinet the following day.[125] It is obvious that the supreme public dignitaries want to set an example to the public on how to behave responsibly in these hard times. Especially, since in Slovakia wide ranges of the population do not trust any vaccine and many people deny even the existence of the virus. In this moment, there are 25 vaccination centres throughout the country, which is planned to be expanded to 79.[126]

Slovakia and the vaccine diplomacy

In the field of vaccine diplomacy, Slovakia does not play an important role neither on an international, nor on a European level. The country has subordinated herself to the European Union's vaccine management procedure and does not aim to procure vaccine from alternative sources. Until recently, only the Pfizer / BioNTech vaccine has been used in the country in a small number —few thousand— of cases. In the present Slovakian political situation, the usage of the Sputnik V or a Chinese alternative are unrealistic. In parallel with the beginning of the vaccination, the prime minister made a statement about the possible restart of the mass testing of the population. However, it is clear that the number of vaccines arriving to the country is insufficient.

The possibilities of vaccine production in Slovakia

The capabilities of Slovakia to manufacture vaccines of any kind is strongly limited. If the global solution to overcome the virus is the vaccination, the country will have to procure it mainly from the international market. According to the official data, there are 34 companies in Slovakia which manufacture medicinal products for human use.[127] However, in the publication *Pharmaceutical & Life Sciences Sector in Slovakia* issued by the *Slovak Investment and Trade Development Agency,* there are only 13 bigger pharmaceutical producers in the country, however, none of them focuses mainly on vaccine production.[128] Big international players of vaccine business, like the Sanofi Pasteur, are also present in Bratislava.[129] Theoretically they may be able to provide infrastructure for the Slovakian mass production, if they obtain the license for it, or invent their own antidote. On the other hand, no public data is available presenting the Slovakian manufacturing capabilities in detail. To sum up the available sources, based on the country's present infrastructure, it is impossible even to imagine a large-scale anti SARS-CoV-2 vaccine production within the boundaries of hers.

Conclusions

Slovakia has made an enormous effort in order to overcome the virus. She has been mass testing the whole adult population since the end of October 2020. For a while, the country was able to provide the lowest number of new infections, today this is not the case. The solution to eradicate the virus will be the vaccination of the population, however, the number of vaccines arriving to the country is insufficient. The government relies only on the European Commission's vaccine procurement and no deals have yet been made with alternative providers.

Bibliograpy

- E-VUC: *Výrobcovia humánnych liekov.* Access: https://www.e-vuc.sk/e-vuc/pre-prevadzkovatelov-lekarni/vyrobcovia-humannych-liekov.html?page_id=130227 (01/05/2021)
- HOLT, Ed: *Slovakia to test all adults for SARS-CoV-2.* In. *The Lancet* <10/31/2020> Access: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)32261-3/fulltext (12/28/2020)
- MACSICZA, Mark: *Megegyezett a kormány - mindenkit le fognak tesztelni.* In. *Új Szó* <10/18/2020> Access: https://ujszo.com/kozelet/megegyezett-a-kormany-mindenkit-le-fognak-tesztelni (12/28/2020)
- Ministerstvo zdravotníctva Slovenskej republiky: *COVID-19: Registrujeme 10 561 požiadaviek o očkovanie.* <01/04/2021> Access: https://www.health.gov.sk/?covid-19-laboratoria (01/05/2021)
- Ministerstvo zdravotníctva Slovenskej republiky: *Zoznam laboratórií vyšetrujúcich SARS-CoV-2.* <07/20/2020> Access: https://www.health.gov.sk/?covid-19-laboratoria (12/20/2020)
- Nový Čas: *Prvý prípad koronavírusu u nás: Vieme, odkiaľ je nakazený muž!* <03/06/2020> Access: https://www.cas.sk/clanok/953762/prvy-pripad-koronavirusu-u-nas-vieme-odkial-je-nakazeny-muz/ (12/21/2020)
- Koronavírus a Slovensko. Access: https://korona.gov.sk/ (12/21/2020)
- Korona.gov.sk: *Celoplošné a plošné testovanie na COVID-19.* Access: https://korona.gov.sk/celoplosne-plosne-testovanie-na-covid-19/ (12/28/2020)
- REUTERS: *Hungary receives 6,000 doses of Russia's COVID-19 vaccine.* <12/28/2020> Access: https://www.reuters.com/article/us-health-coronavirus-hungary-russia/hungary-receives-6000-doses-of-russias-covid-19-vaccine-idUSKBN2921JA?edition-redirect=in (12/30/2020)
- Sanofi Pasteur Slovakia. Access: https://www.sanofi.sk/sk (01/08/2021)
- Slovak Investment And Trade Development Agency: *Pharmaceutical & Life Sciences Sector in Slovakia.* p.4. <10/2020> Access: https://www.sario.sk/sites/default/files/data/sario-pharmaceutical-and-life-sciences-sector-in-slovakia-2017-11-14.pdf (01/06/2021)
- SME: *Dôveryhodnosť Peter Pellegrini od agentúry focus.* Access: https://volby.sme.sk/pref/2/doveryhodnost/s/6041/peter-pellegrini/focus (12/27/2020)
- SME: *Druhá vlna koronavírusu je už na Slovensku. Ťažkosti môže robiť v septembri.* <08/11/2020> Access: https://domov.sme.sk/c/22465581/druha-vlna-koronavirusu-je-uz-na-slovensku.html (12/27/2020)
- SME: *Plošné testovanie na Covid-19.* Access: https://domov.sme.sk/t/8497/celoplosne-testovanie-na-covid-19 (12/28/2020)

- Sputnik V: *General Information.* Access: https://sputnikvaccine.com/about-vaccine/ (12/28/2020)
- The Slovak Spectator: *First person receives COVID vaccine in Slovakia.* <12/26/2020> Access: *https://spectator.sme.sk/c/22562138/vaccines-have-arrived.html* (12/30/2020)
- Új Szó: *Matovič: Ez az utolsó próbálkozás, ha nem sikerül, az egész országot le kell zárni.* <10/11/2020> Access: https://ujszo.com/kozelet/matovic-ez-az-utolso-probalkozas-ha-nem-sikerul-az-egesz-orszagot-le-kell-zarni (12/27/2020)
- Új Szó: *Szlovákiában eddig nem igazolták a koronavírus-fertőzés előfordulását.* <02/24/2020> Access: https://ujszo.com/kozelet/szlovakiaban-eddig-nem-igazoltak-a-koronavirus-fertozes-elofordulasat (12/19/2020)
- Úrad verejného zdravotníctva Slovenskej republiky: *Opatrenia Ústredného krízového štábu SR v súvislosti s ochorením COVID-19.* <03/13/2020> Access: https://www.uvzsr.sk/index.php?option=com_content&view=article&id=4090:opatrenia-ustredneho-krizoveho-tabu-sr-vnsuvislosti-snochorenim-covid-19&catid=250:koronavirus-2019-ncov&Itemid=153 (12/21/2020)

Geopolitics of the pandemic. Run for the vaccine: The Western Balkans and Ukraine

Enikő Bagoly

While the demand for vaccines against COVID-19 worldwide exceeds the manufacturers' production capacity, small and middle-income countries struggle with securing themselves appropriate amount of vaccines. At the same time, at the geopolitical dimension the run for influence throughout vaccine diplomacy has already started, which could strongly affect the prospects and limitations for vaccine procurement in the Western Balkan countries and in the Eastern neighbours of the EU.

The Western Balkan countries – Viral hot zone in Europe

The Western Balkan countries[i] were severely affected during the first and second waves of COVID-19 pandemic. In mid-March 2020, strict lockdowns were imposed in the region to avoid overwhelming the health care system, which resulted in a rise in new cases. However, during the summer (with the start of the holiday season) the number of new infections raised sharply following an easing of lockdown. By June, all Western Balkan countries had to face not only the worsening epidemic situation but

[i] Albania, Bosnia and Herzegovina, Bulgaria, Montenegro, North Macedonia, Serbia

also rising tensions within the society: although the rates of mortality of COVID-19 were the highest among Europe[130], the society rejected reintroducing restrictions[131], especially in Serbia, where anti-lockdown protests evolved into anti-government rallies in July.[132]

The emergence of a crisis situation in the „second wave" of the pandemic in the region might originate from several factors: firstly, the traditionally present shortcomings of the healthcare system (bed and equipment shortage, low density rate of doctors)[133] remained unsolved, and second, the fragility of its economy and the rising tensions within society hindered to launch immediate and necessary restrictive measures to prevent the further spread of the virus.

Vaccine procurement possibilities

COVAX

All the six counties have signed a commitment agreement for the COVID-19 Vaccines Global Access Facility (COVAX),[134] which is a global collaboration, co-led by WHO, GAVI[135] and the Coalition of Epidemic Preparedness (CEPI)[136] aiming to speed up the development and manufacture of vaccines against COVID-19, also contributing to an equitable access to vaccines.[137]

For some countries like Albania, Bosnia and Herzegovina, Montenegro and North Macedonia, currently the COVAX might be the most favorable option for vaccine procurement.[138] Montenegro agreed to procure via COVAX 248,000 doses, paying 646,000 Euros for the vaccine. North Macedonia expects to receive 800,000 doses via COVAX in amount of 6.7 million euros, and also aims to procure the same amount of doses from the manufacturers Pfizer and Astra Zeneca.[139] However, at the end of January 2021, Bosnia and Herzegovina, Montenegro and North Macedonia still lacked of any vaccines.[140] Serious delays in inoculation of its citizens caused by a slower than expected procurement progress – might lead to growing dissatisfaction in the region.[141]

Vaccine procurement under the EU umbrella

Before the West Balkans, the EU also joined to the COVAX Facility favoring vaccine cooperation (regardless of financial resources of countries) over vaccine nationalism.[142] Supporting the participation of low and middle income economies in

COVAX, the European Investment Bank in November contributed support of 400 million Euros, which was supplemented by an additionally 100 million Euro grant by the EC.[143]

Cooperation with the European Union might be another potential option for Western Balkan countries to gain access to the vaccine: either as a beneficiary of the EU Advance Purchase Agreements with six manufacturers, or on the basis of individual agreements with those EU Member States who are willing to share a part of their own pre-allocated doses. The European Commission has approved its „privileged partners", an aid package in amount of 70 million euros[144] aiming to fund the access for Western Balkan countries to reach COVID-19 vaccines procured by EU member states.[145]

Success story of a Balkan nation – Serbia

Launching vaccination with Pfizer vaccine on December 24,[146] Serbia became the third country in Europe[147] and the first Balkan nation[148] where COVID-19 vaccinations have started. As a result of its diversified vaccine procurement strategy, the country has struck a deal for 8 million vaccines with several producers[149] (Pfizer/BioNTech, Moderna, AstraZeneca, Sputnik V and Synopharm),[150] of which 1.8 million doses will be covered through COVAX.[151]

In mid-January 2021 two vaccines were available in the country: the vaccine of Pfizer/BioNTech and Sputnik V, the number of administered doses reached 18,000.[152] Serbia received in the first shipment of Pfizer/BioNTech 4,800 doses (twice as few than the ordered 10,000 doses)[153] and in early January an additional 19,500 doses arrived to Serbia.[154] After Serbia's National Medicines Agency authorized the use of the Sputnik V, the first 20 doses arrived to country on December 4,[155] which were followed by 2,400 doses on December 30. Vaccination with Gamaleia's Sputnik V started on January 5, and the next day Russian RDIF announced a supply agreement with Serbia to a total of 2 million batches.[156] On January 16, the country received 1 million doses of Chinese Synopharm vaccine, which will be use right after receiving a permission for it. President Aleksander Vucic claimed, that the COVAX system so far was unable to provide the country with vaccine: success of the vaccine procurement in Serbia practically is the result of bilateral agreements with the US for the Pfizer/BioNTech vaccine, with the Russian Federation for the Sputnik V and with the People's Republic

of China for the Synopharm vaccine.[157] Inoculation of citizens started in Belgrade, from January 8, 110 vaccination points were set up through general hospitals in Serbia.[158] The vaccination rate In Serbia on January 28 was 0.67 with 361,830 doses delivered.

Perspectives and examples of vaccine diplomacy during COVID-19

Romania and Moldova

Romania has contracted about 13 million doses of vaccine (manufactured by Pfizer/BioNTech) under the EU procurement program, which was supplemented by another 8 million doses in 2021.[159] The country received the first batch of 10,000 vaccines on December 25,[160] in the first two weeks of 2021 a total of 450,450 doses has arrived in Romania[161,162] and it is expected that 140,000 doses will be accessed weekly in 2021.[163] The country officially started the vaccination campaign on December 27. The vaccination rate on January 4 was 0.07 (similar to Bulgaria's) when 13,200 doses were already delivered,[164] three weeks later the rate was already 3.17 as 609.396 jabs were delivered.[165] Parallelly, along with the Pfizer/BioNTech vaccine procurement, the country went into a contract with Moderna supplying about 3.4 million doses. The first batch of the Moderna vaccine (14,000 doses) arrived in January 12,[166] the planned new shipments will arrive in a 1-2 week period, as a result in the first quarter of 2021, the country might reach a maximum of 450,000 doses from this manufacturer.[167]

While countries - regardless of its economic status - struggle securing adequate amounts of vaccine for their own citizens, vaccine donations might be a real statement of intent for a strong commitment to cooperation between countries. From this perspective, Romania's offered donation of 200,000 doses of the Pfizer/BioNTech COVID-19 vaccine to Moldova – a gesture of solidarity and as an early example of vaccine diplomacy in the region, as the announcement was in connection with the results of the political changes in Moldova, with the election of the pro-Western Maia Sandu for President.[168]

Vaccine donations in the near future might be as an effective tool for the favorable shaping of allied systems. Moldova's vaccine procurement options are significantly affected by the fact that the country belongs to the intersection of competing spheres

of interest of the West and Russia. However, Russia aiming to consider Moldova to be part of its zone of 'privileged interests'[169] is also trying to get influence throughout supplying the country with its own vaccine. On December 2020, Moldovan former President Igor Dodon claimed that Moldova has filled the official request for Sputnik V vaccine,[170] and on January 2021 he reported that the Republic expects to receive approximately 130,000 doses of the Russian vaccine.[171] He also raised that Moldova plans to share some of it with Transnistria,[172] however, President Maia Sandu stated on January 2021, that the offered supply is hindered by insufficient conditions due to manufacturer's limitations and measures of liability.[173]

Ukraine – the political acrobat of the pandemic

From a vaccine procurement opportunity point of view, while Moldova currently faces the challenge of finding the balance between Western and Russian vaccine donations (and throughout it its influence), Ukraine aims to rely only Western support to solve the worsening epidemic situation in the country. In other words, while Moldova seemingly has a chance to choose its „patron", Ukraine is lagging behind: it struggles from a lack of desired support from the EU and US side to procure western-made jab, and at the same time, it rejects the Russian vaccine, considering it as a geopolitical tool.[174]

Politicized vaccine procurement

Ukraine currently intends to secure a vaccine against COVID-19 participating in COVAX and negotiating with Sinovac Biotech. Under COVAX the country reckons it will acquire 8.3 million doses of supply by the end of 2021[175] and requested to increase the supply to 16 million doses,[176]. It ordered around 1.9 million doses of Chinese vaccine, expected to be deliver early February 2021.[177] However, uncertainty of the delivery times generates serious doubts in Ukraine, the Ukrainian president already appealed for the EU for help in procuring Western-made vaccine.[178] On 6 January 2021, thirteen members of the EU (including the V4 countries, Bulgaria and Romania) urged the EU Commission to help its Eastern neighbours.[179] President Volodymyr Zelensky pointed out that "*...it is impossible to explain to Ukrainian society why not take the vaccine from Russia if America and Europe do not give you the vaccine. It is impossible to explain that to anyone who dies*".[180] The picture of Ukraine's vaccine procurement has got more nuanced, when despite the government pro-Western

commitment, Biolik (Ukrainian pharmaceutical company, backed by the pro-Russian opposition) registerered for the Sputnik V vaccine [181] and at the same time from unconfirmed sources started to circulate news about an agreement with the Russian DIF regarding the production of the vaccine on the territory of Ukraine.[182] In theory, the national vaccine manufacturer might be capable of production, however, this assumption was officially refuted by the company.[183]

Vaccine trade among neighbors – Poland

Another forward-looking example toward strengthening the cooperation between neighbors might be the Poles' gesture, offering 1.5 million doses of vaccine to Ukraine.[184]The date and the frame of the Poles' diplomatic gesture toward the Ukraine is still not determined: Poland is ready to provide Ukraine with the mentioned amount of vaccines after receiving the relevant amount of jabs by itself. [185] The first step in implementing the offer is to clarify its legal background: the EU is still working on the mechanism of vaccine trade to third parties, where the EU itself appears as intermediary in the transfer. Ukraine's ambassador to the EU stated, that under the forming agreement Ukraine undertakes the task of providing sufficient conditions for the storage of vaccines, which is essential in case of vaccines produced by Pfizer/BioNTech.[186]

Conclusions

Currently, the demand for vaccines against COVID-19 worldwide exceeds the manufacturer's production capacity. While countries struggle with securing themselves appropriate amount of vaccines, at the geopolitical dimension the run for influence throughout vaccine diplomacy has already started: The Western Balkans and the Eastern neighbors of the EU are appreciating cooperation with the West, which means they are more willing to accept „vaccines with strings attached"[187] from the Western Alliance(s). Early examples of the cooperation are already exist, demonstrated by Romania's vaccine donation toward Moldova or the EU contribution in the Western Balkans' vaccine supplementation. However, the EU needs to step up with support to Ukraine, where the vaccine procurement is so extremely politicized, that they literally would rather die from COVID-19 than be vaccinated by the Russian Sputnik V. This might be the time for the European Union to prove its increasingly questioned power

by measuring up to secure relatable solution for vaccine procurement in the mentioned regions.

Bibliography

- BUSUEV, Pavel: „Вторая волна эпидемии в Сербии: ожесточенные протесты против новых ограничительных мер.” „Serbia's second wave of epidemic: violent protests against new restrictive measures”, In: TASS Russian News Agency, 09.07.2020., https://tass.ru/mezhdunarodnaya-panorama/8918455 (03.01.2021)
- DETTMER, Jeremy: „Balkans in Eye of Viral Storm.” In: Voa News, 14.08.2020., https://www.voanews.com/covid-19-pandemic/balkans-eye-viral-storm (04.01.2021)
- DORDEVIC, Nikola: „Western Balkans to get coronavirus vaccine, courtesy of EU.” In: Emerging Europe, 28.12.2020., https://emerging-europe.com/news/western-balkans-to-get-coronavirus-vaccine-courtesy-of-eu/ (02.01.2021)
- KOLEKA, Benet: „Albania extends lockdown till end of coronavirus outbreak.”, In: Reuters, 01.04.2020., https://www.reuters.com/article/us-health-coronavirus-albania/albania-extends-lockdown-till-end-of-coronavirus-outbreak-idUSKBN21J6AZ (02.01.2021)
- MADHI, Gentiola, TRUPIA, Francesco: „Covid-19: the pandemic is testing the Balkan countries' education systems.”, In: Osservatorio Balcani e Caucaso Transeuropa, 03.12.2020., https://www.balcanicaucaso.org/eng/Areas/Kosovo/Covid-19-the-pandemic-is-testing-the-Balkan-countries-education-systems-206221 (04.01.2021)
- STOJANOVIC, Milica: „Serbia Eyes Changing Law to Make COVID-19 Vaccine Compulsory.” In: Balkan Insight, 12.11.2020., https://balkaninsight.com/2020/11/12/serbia-eyes-changing-law-to-make-covid-19-vaccine-compulsory/ (02.01.2021)
- TRENIN, Dmitry: “Joe Biden’s Foreign Policy and Russia”. In: Carnegie Endowment for International Peace, Moscow Center, 2020.11.19., https://carnegie.ru/commentary/83270 (2020.11.30.)
- TURP-BALAZS, Craig: „The EU needs to up its vaccine diplomacy game.”, In: Emerging Europe, 30.12.2020., https://emerging-europe.com/from-the-editor/the-eu-needs-to-up-its-vaccine-diplomacy-game/ (31.12.2020)

- „Serbia Leads Region in Expecting COVID-19 Vaccines Within Days." In: Balkan Insight, 21.12.2020., vaccine procurement:
- https://balkaninsight.com/2020/12/21/serbia-leads-region-in-expecting-covid-19-vaccines-within-days/ (04.01.2021)
- „What are the vaccination plans of Western Balkan countries in 2021?" In: European Western Balkans, 20.12.2020., https://europeanwesternbalkans.com/2020/12/30/what-are-the-vaccination-plans-of-western-balkan-countries-in-2021/ (31.12.2020)
- List of authorized contracts by the European Commission: https://ec.europa.eu/info/live-work-travel-eu/coronavirus-response/overview-commissions-response_en (02.01.2021)
- The COVAX AMC Group: proposed eligible economies. In: Gavi official site. https://www.gavi.org/sites/default/files/board/minutes/2020/30july/04a%20%20Annex%20B%20%20COVAX%20AMC%20Group_Proposed%20eligible%20economies.pdf (27.12.2020)
- THE COVID-19 CRISIS IN THE WESTERN BALKANS. Economic impact, policy responses, and short-term sustainable solutions. OECD Report, https://www.oecd.org/south-east-europe/COVID-19-Crisis-Response-Western-Balkans.pdf (27.12.2020)
- ОПЕРАТИВНИ ПЛАН ЗА ИМУНИЗАЦИЈУ ПРОТИВ COVID-19 У РЕПУБЛИЦИ СРБИЈИ (Operation Plan for Immunization against COVID-19 in the Republic of Serbia) http://www.batut.org.rs/download/aktuelno/operativniPlan.pdf (03.01.2021)
- „МЗ публикува хронология на очакваните количества ваксини срещу COVID-19." (The Ministry of Health has published a chronology of the expected quantities of vaccines against COVID-19.), In: Official COVID-19 portal. Official source of information on measures to combat the spread of COVID-19 in Bulgaria, including the health, economic and social consequences of epidemic., 07.01.2021., https://coronavirus.bg/bg/news/1109 (13.01.2021)

Covid-19 vaccination in developing nations

Tamás Orbán

Countries of the developing world are among the most severely affected by the Covid-19 pandemic, especially economically. Most of these countries cannot secure enough vaccine doses to immunize their population, so they need a global cooperation, COVAX, to equitably distribute affordable vaccines. COVAX, however, is unlikely to meet its 2021 goals due to lack of funding and unreserved vaccines, therefore most developing countries will have to wait years to immunize their population and restart their economy. This tendency will likely to create severe financial and humanitarian crises in the coming years, unless wealthy nations change their attitudes.

Covid-19 challenges in developing nations

Particular challenges

The Covid-19 pandemic affects every region of the world differently and countries with different demographic, societal and economic aspects have to face its challenges to varying degrees. Solutions, that have been working in Western countries may have been proved to be futile in the third world (and even vice versa), so there is no universal model to be followed. In developing nations, fighting the coronavirus has a number of particular aspects, which I will shortly present below.

Society and healthcare

Developing nations often have very different societal norms than those of the West, and this is a very important factor to keep in mind when designing certain protective

measures. Social distancing is hardly an easy thing to maintain even in developed countries, but in most third world communities it is simply unimaginable. In Africa, for example, life is based on the fact that extended families work, live, and even dine together, often from the same 'communal bowl'.[188] This is also true for Navajo communities living in reservations in the US, where the infection rate surpassed that of New York, for instance. People living in urban areas are not that much dependant on their families, but social distancing is still virtually impossible for the most, as a great share of African, South American and South East Asian city dwellers live in overcrowded shanty towns and favellas, with no space between the houses whatsoever, or are migrant workers and have no choice but to live in packed dormitories sometimes with more than 20 more people in the room (such workers constitute around 90% of Singapore's infected, for example). And the third endangered group would be those people who lost their homes due to recent wars or other humanitarian crises, and now resort to live in temporary homes, in the outskirts of cities and different migrant encampments, mostly in the Middle East and North Africa.[189]

Similarly to these difficulties in social distancing, many developing countries have problems with other basic protective measures and even lack appropriate healthcare infrastructure to properly address the challenges of Covid-19. Adequate sanitation is still a luxury rather than the norm in many countries, more than half of the population of Ethiopia, for instance, does not have access to clean water, and most countries experience a shortage of soap. Widespread testing is also rare, resulting in a slow detection rate. Healthcare workers do not have enough protective equipment, and most hospitals lack ICU beds, oxygen supplies and ventilators (41 African countries only have two thousand ventilators between them, for example). Furthermore, hospitals have to deal with a number of other illnesses as well, such as malaria, HIV, cholera or tuberculosis, which make it harder to squeeze in the additional Covid-19 patients.[190]

Economy

The economies of most developing countries are fragile at best, even under normal circumstances, so the coronavirus poses a greater threat to them than to Western economies. The agricultural sector provides most of these countries' GDPs, and the weather conditions require a very strict timetable for activities such as sowing and

harvesting. Lockdowns or mandatory social distancing could easily disrupt this delicate process, which would, in turn, endanger whole regions' already tenuous food supply.

The closing of borders and flight routes have another, specific effect on third world countries' economies. Tourism (and especially airlines) are among the most prominent sources of hard currency in many African countries, which is essential to buy the supplies necessary to fight Covid-19. And because the costs of healthcare have already gone higher than their annual budgets, they cannot give out generous stimulus packages like Western countries do, nor to their citizens, nor to their companies to save them from bankruptcy.[191] Africa and the third world have undergone marvellous development in the last couple of decades, but it is clear that it was not enough to prepare them to deal with the virus and the economic fallout on their own.

Global responsibility

Wealthier nations bear the responsibility to help out those countries in need, not only from a humanitarian perspective, but from an obvious strategic one as well. Every nation is working towards the same goal: eradicating the virus near-perfectly, so that life can return to its ordinary course. Some countries have the money, resources and infrastructure to get it done in a couple of years, but poorer regions clearly don't. And, in a global pandemic, there could be no eradication at all, unless the virus is gone from everywhere. If developing nations cannot root it out and immunize their population along the way, the Covid-19 will infiltrate the healthy nations again and again. Therefore, solving this challenge will need a coordinated global effort.

ACT Accelerator and other initiatives

In early 2020, a number of global initiatives were launched, spearheaded by the *World Health Organization* (WHO) and the *United Nations* (UN), specifically to help developing nations defeat the virus. These initiatives include the *COVID-19 Solidarity Response Fund* and the *COVID-19 Supply Chain Task Force*, whose primary objectives are raising and distributing money and resources for nations that lack an adequate amount.[192]

The most prominent global partnership has become the *Access to Covid-19 Tools* (ACT) *Accelerator*, initiated by the G20 in April and run by the WHO, which is

responsible to form a global action plan, organize the coordination among the donors and recipients, bring together various international organizations, philanthropists, civil societies and vaccine researchers, gather and distribute every excess resource, and most importantly – under the project name *COVAX* – manage the distribution of Covid-19 vaccines among countries that cannot afford them, in order to reach global immunity and end the pandemic as soon as possible.[193]

The initial aim of the ACT Accelerator was to gather $9.5B in 2020 to be able to provide equitable and affordable vaccines for 2 billion people globally, essential and healthcare workers at first. To further the project, ACT would also need an additional $23.7B in 2021, to cover the costs of vaccinating at least 50% of the population of every country in the coming years. As of 19 January, the date of the latest update on ACT funds, not even last year's goal was met, with the organization receiving only $6B out of the initial nine and a half, with $3.9B for vaccines alone. The donations have come from 40 countries (with the UK donating more than $1B alone), 27 corporations and foundations (the *Bill & Melinda Gates Foundation* leading the list with $346M), as well as four international organizations, such as the above mentioned Covid-19 Response Fund.[194]

In late January, US President Joe Biden announced its country's intentions to participate in COVAX, something his predecessor, Donald Trump, categorically opted out of. The US' announcements came with an unprecedented pledge of $4B – as much as every other country donated between them so far –, although the actual funds are yet to arrive.[195]

The existing funds, according to WHO, will make 1.3B vaccine doses available for 92 low- and middle-income economies out of the 190 participating countries in the first half of 2021, and the ACT also promised to raise their vaccination rate up to 20% by the end of the year.[196]

Covid-19 vaccination: possibilities and risks

Global vaccine capacity

Different vaccines, prices and pledges

Since the beginning of the pandemic, out of the 239 globally, as much as 63 Covid-19 vaccine candidates entered clinical evaluation (as of January 28)[197], of which 13 have already opened up for premarket purchase commitments after seeing promising phase three testing results. By volume of 2021 target production, the biggest manufacturers are the British-Swedish *AstraZeneca* (with an initial promise of 3.2 billion doses, all of which are already reserved), the US-based *Novavax* (with 2 billion doses), the German-American *Pfizer/BioNTech* (with 1.2 billion doses), closely followed by the Chinese vaccines *SinoVac* and *CanSino* and a number of other candidates.[198] However, in January AstraZeneca announced that its production volume is likely to be cut by up to 60% in the first quarter of the year, while Pfizer also announced a cut by a currently unknown volume.[199] As of January 29, 2021, only ten vaccines are approved for public use, but it is expected that a number of others will enter the market shortly, including the AstraZeneca, which is currently only authorized in the EU.

The prices of the different vaccines range from $2.19 to $44 per dose,[200] and the cost of one particular vaccine can also vary depending on the deal and the volume of the order. The most expensive vaccine is Cambridge's *Moderna* ($33-44/dose), while the cheapest is Oxford's AstraZeneca ($2-6/dose). One Pfizer/BioNTech dose can be secured for around $20, while the Russian *Sputnik* costs only $10/dose.[201] All thirteen vaccines need to be administered twice per person, with the exception of *Johnson&Johnson* ($10/dose), and *SinoVac*, which varies from $13.50 to $30 in the world, while in China it is being sold for $60.[202] Out of the 63, the total number of candidates in clinical trial, only 12 will administered once.[203] So far only AstraZeneca had pledged to provide their vaccines on a not-for-profit basis for the duration of the pandemic, and that they will reserve 64% of their doses for low- and middle-income countries. Other firms have yet to make such commitments.[204]

Available deposits and global distribution

The reported global vaccine production volume, according to the estimates of each manufacturing firm, could reach 20 billion doses by the end of 2021.[205] This number, however, is highly unrealistic, as only a few more candidates are expected to pass medical evaluation in the first half of the year and it does not account for unexpected problems in manufacturing. The anticipated target production volume of the 13 firms, which have opened up pre-market purchases, will be around 12 billion doses (or 6 billion courses), which is clearly falling short of covering the world's population of nearly 7.7 billion.[206]

Out of the projected 12 billion doses, 9.5 billion is already secured by different countries in commitment deals, while COVAX was able to secure only 2.01 billion doses – or one billion courses – and reserved an additional one billion doses which it does not yet have the funds for.[207] The European Union along with five other wealthier nations have pre-ordered 53% of the initial global supply entering the market in 2021, despite the fact that they represent only 14% of the world's population.[208] Among those that pre-ordered vaccines, the EU, the UK, the US and Canada ordered more courses than their entire population, the latter topping the charts with nearly nine doses secured per every Canadian citizen.[209] The practice of reserving more doses than needed can lead to severe consequences in the third world. According to an Oxfam-analysis, 67 poor countries will not be able to vaccinate more than 10% of their population in 2021, simply because there would be no more left for COVAX to secure.[210] Unless the wealthy countries donate their excess doses (which is unlikely to happen before their vaccination rate deemed sufficient) and choose not to engage in "vaccinationalism" anymore, most of those countries will not reach immunity before 2023-2024.[211]

Vaccination in developing countries

Prospects and challenges of COVAX

By now it is clear that the ACT Accelerator couldn't live up to the initial expectations, especially in its ambitious plan, COVAX. As I stated above, COVAX was not yet able to reach its target funding for 2020 (with currently just above $6B out of the planned $9.5B), and much less expected to meet the 2021 target of more than $23B. And while

it was able to secure almost three billion doses in different commitment deals, the lack of funding may cause COVAX to cancel some of them.

Nevertheless, COVAX is insisting that it will be able to keep its minimal promises regarding the first 1.3 billion vaccine doses delivered to poor countries free of any charge, and also to help raising the vaccination level in the third world up to 20%. At the present rate of obtaining funds and securing doses, however, it seems unlikely that it will happen. A research published by the Duke University estimated that COVAX will deliver around 570 million doses (or less than 300 million courses) during 2021. Their long-term goal could only be met if Western nations are willing to let go of their excess doses, which may not happen this year at all.[212]

That is why ACT designed a specific funding mechanism to supplement the plan, called the *COVAX Facility*. The Facility allows wealthier nations to 'buy into' COVAX in advance, and in turn receive a number of doses proportionate to their 'investments' for the lowest price otherwise reserved for poor countries – when new vaccines enter the market in later years. This way Western nations that have already made their purchases could be encouraged to donate more funds and also give up their excess supplies during 2021 in exchange of promised future doses, like in an insurance fund.

If this plan works, and COVAX will be able to distribute the minimal target number of doses in the developing nations for free, then phase two begins in 2022, in which ACT will try to raise the global vaccination rate above immunity level in all countries. The details of this plan are not yet determined, and will depend on the number of vaccines and their prices on the 2022 market, therefore the new vaccines will likely to be cheap, but not entirely free even in lower-income countries. In any case, according to COVAX, phase two will not end before 2025.[213]

Implications of late vaccination

While the virus shows to be less infectious in most developing countries on the southern hemisphere, the economic crisis it caused impacted poorer nations substantially harder. Resetting the global economic synergies can only be achieved through widespread vaccination, the more the developing world has to wait for the vaccines the worst their crises will become.

The global economy has contracted by 4.2% in 2020, but in developing nations (where tourism and commodities are major sources of foreign exchange, and national debt is high) this figure translates into double-digit declines. According to a UNCTAD report, the increased healthcare spending combined with the collapse in earnings and pending debt payments have resulted in a $2-3 trillion gap in the budgets of many of the lowest-income countries. This will lead to 90-120 million (more) people being pushed into extreme poverty, and the number of people facing food insecurity could grow by almost 300 million (a staggering 35-40% increase from 2019).[214]

Therefore, ending the pandemic through a synchronized vaccination is crucial in order not prolong the economic devastation of the developing world. If wealthier nations are able to immunize their population years before the others, it would lead to an even faster growth of economic disparity between them and the third world. The desperation could trigger civil unrest, political and humanitarian crises, massive new waves of migration and a revival of regional conflicts.

Conclusions

Developing nations were hit especially hard by the Covid-19 pandemic. Many developing countries lack adequate healthcare infrastructure to tackle the virus alone, their societal conditions render basic precautionary measures ineffective, and their fragile economies are set to suffer an unprecedented financial crisis. If the virus is not eradicated in the poor countries, it will resurface again, causing new waves of infections globally, so wealthier countries' responsibility to help is not merely humanitarian, but strategic as well.

Most of the Covid-19 vaccines that have passed clinical evaluation are too expansive for developing nations to buy for their population. Apart from AstraZeneca, no company has pledged to offer their vaccine on a not-for-profit basis. To solve this, the WHO launched the ACT Accelerator, and its subsequent initiative COVAX, to distribute affordable vaccines for those in need, but was not able to secure enough funds to meet its goal. Moreover, the global manufacturing capacity is unlikely to surpass 6 billion courses in 2021, and the wealthier countries have already stockpiled most of the expected supply, leaving only a fraction for COVAX to procure. Out of the 1.3 billion doses it promised, COVAX will likely deliver only around 600 million.

Unless global manufacturing capacity is considerably enlarged or wealthier nations agree to donate their excess doses as well as raise more funds for COVAX, most developing countries will not be able to end their vaccination programs until 2024 or beyond. This could lead to unprecedented economic crises, which in turn could cause a range of different humanitarian catastrophes around the third world.

Bibliography

- Access to COVID-19 tools funding commitment tracker. In: WHO, 2020. 12. 23., https://www.who.int/publications/m/item/access-to-covid-19-tools-tracker (2021.01.26.)
- AHMED, Abiy: If Covid-19 is not beaten in Africa it will return to haunt us all. In: Financial Times, 2020. 03. 25., https://www.ft.com/content/c12a09c8-6db6-11ea-89df-41bea055720b?fbclid=IwAR1J3jw3ZtpsYhKKy_4DxYb0lKFmbUWOCUqeto_Q7giurKJtpiXZMZb3Xfk (2021.01.12.)
- ALAOUI, Sarah: How WHO connects the links in the Covid-19 supply chain. In: UN Foundation, 2020. 05. 07., https://unfoundation.org/blog/post/how-who-connects-links-covid-19-supply-chain/ (2021.01.12.)
- BERKELEY, Seth: COVAX explained. In: Gavi, 2020. 09. 03., https://www.gavi.org/vaccineswork/covax-explained (2021.01.13.)
- Campaigners warn that 9 out of 10 people in poor countries are set to miss out on COVID-19 vaccine next year. In: Oxfam International, 2020. 12. 09., https://www.oxfam.org/en/press-releases/campaigners-warn-9-out-10-people-poor-countries-are-set-miss-out-covid-19-vaccine (2021.01.15.)
- Coronavirus: Vaccine supply fears grow amid EU export threat. In: BBC, 2021.01.27., https://www.bbc.com/news/world-europe-55805903 (2021.01.29.)
- COVAX Announces additional deals to access promising COVID-19 vaccine candidates; plans global rollout starting Q1 2021. In: WHO, 2020. 12. 18., https://www.who.int/news/item/18-12-2020-covax-announces-additional-deals-to-access-promising-covid-19-vaccine-candidates-plans-global-rollout-starting-q1-2021 (2021.01.13.)
- COVID-19 Vaccine Market Dashboard. In: UNICEF, 2021. 01. 14., https://www.unicef.org/supply/covid-19-vaccine-market-dashboard (2021.01.29.)
- COVID-19: UNCTAD warns of 'lost decade' if countries adopt austerity. In: UNCTAD, 2020. 09. 21., https://unctad.org/news/covid-19-unctad-warns-lost-decade-if-countries-adopt-austerity (2021.01.17.)
- LEVISON, Matthew E.: COVID-19 Challenges in Developing Countries. In: MSD Manual, 2020. 08. 07., https://www.msdmanuals.com/home/news/editorial/2020/07/08/20/55/covid-19-challenges-in-the-developing-world (2021.01.12.)
- MULLARD, Asher: How COVID vaccines are being divvied up around the world. In: Nature, 2020. 11. 30., https://www.nature.com/articles/d41586-020-03370-6 (2021.01.15.)

- SO, Anthony; WOO, Joshua: Reserving coronavirus disease 2019 vaccines for global access: cross sectional analysis. In: BMJ, 2020. 12. 15., https://www.bmj.com/content/371/bmj.m4750 (2021.01.13.)
- TAN, Yvette: What do we know about China's coronavirus vaccines? In: BBC, 2021. 01. 14., https://www.bbc.com/news/world-asia-china-55212787 (2021.01.15.)
- TERRY, Mark: Comparing COVID-19 Vaccines: Timelines, Types and Prices. In: BioSpace, 2021. 01. 13., https://www.biospace.com/article/comparing-covid-19-vaccines-pfizer-biontech-moderna-astrazeneca-oxford-j-and-j-russia-s-sputnik-v/ (2021.01.15.)
- The COVAX Facility. In: WHO, https://www.who.int/docs/default-source/coronaviruse/act-accelerator/covax-facility-background.pdf?sfvrsn=810d3c22_2 (2021.01.16.)
- The COVID-19 vaccine candidate landscape. In: WHO, 2021. 01. 26., https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines (2021.01.28.)
- U.S. to Participate in WHO's COVAX Initiative Under Biden Presidency. In: FDA News, 2021. 01. 21., https://www.fdanews.com/articles/200975-us-to-participate-in-whos-covax-initiative-under-biden-presidency?v=preview (2021.01.29.)
- Why a pioneering plan to distribute COVID vaccines equitably must succeed. In: Nature, 2021. 01. 13., https://www.nature.com/articles/d41586-021-00044-9 (2021.01.16.)
- Will Low-Income Countries Be Left Behind When COVID-19 Vaccines Arrive? In: Duke Global Health Institute, 2020. 11. 09., https://globalhealth.duke.edu/news/will-low-income-countries-be-left-behind-when-covid-19-vaccines-arrive (2021.01.15.)

Predict. Prevent. Stop. Lessons learned from Covid-19 pandemic

Anton Bendarzsevszkij

In recent **years experts and officials worldwide were preparing dozens of reports and analyses, communicating that the world is not prepared for a global pandemic. Yet, here we are, the whole world living in a lockdown or other serious restrictions for almost a year now. In the middle of 2020 the overall global costs of the Covid-19 pandemic were estimated around 16 trillion USD[215], but as the pandemic continues to affect the global economy in 2021 too, these figures could be even higher. Fighting the coronavirus costs our economies five hundred times as much as the prevention measures[216]. The question is whether we have learned the lesson, and what we can do to predict and prevent similar biological threats in the future.**

"For too long the world has operated on a cycle of panic and neglect. We throw money at one epidemic and when it's over, we forget about it and do nothing to prevent the next one" – said Tedros Adhanom Ghebreyesus, Director-General of World Health Organization (WHO)[217] in his speech on 27th December, on the International Day of Epidemic Preparedness – the first of such kind.

In the last decades, despite continuous warnings of experts worldwide, we didn't do enough to prevent a pandemic on a global scale. Governments invested billions of dollars every year against terrorism, but it appears that a pandemic causes much bigger damage to our economy and society.

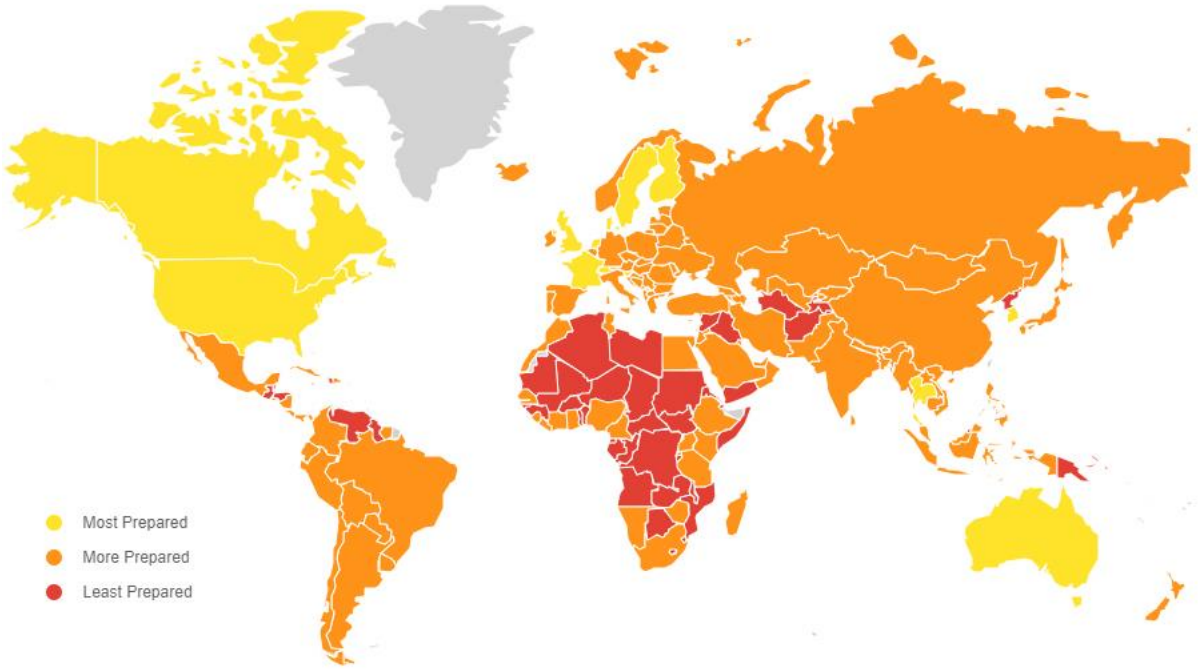
However, the Covid-19 pandemic also indicated the failure of global organizations, such as the WHO itself. The response on the threat came too late, while it lacked the necessary quick coordination. The organization was praising China for its effective measures at first, and admitted only later on, that Beijing restrained information on the spread of the coronavirus in the first weeks.

Nation states, which closed their borders and cut off their passenger traffic, did not do so as an act of selfishness, but as a final step of despair, after it became clear, that international organizations couldn't protect them and prevent the global health crisis. At the time of the current publication, over 2.1 million people have died due to the Covid-19 pandemic worldwide[218].

Global Health Security Index (GHS)

We can't say that there was no attempt to raise the question of global preparedness against a potential pandemic threat. In 2019 a so-called Global Health Security Index – a special health preparedness country ranking – was created by US John Hopkins University and Nuclear Threat Initiative. It measured and ranked countries for health security capacities. The very first assessment was released in 2019 and stated, that no country was sufficiently prepared for epidemics or pandemics[219]. According to the published report, national health security was fundamentally weak around the world, with **a** 40,2 average score out of 100[220].

The GHS initiative could help the countries with proper budget allocations, priorities and suggestions on spending decisions. However, after facing the global pandemic, we can say that it contained discrepancies and discredited itself. Countries ranked on top of the GHS list were also those, which struggled with the Covid-19 pandemic the most (USA was on the first place with 83,5 points, UK and Netherlands followed with 77,9 and 75,6 points)[221].



Global Health Security Index in 2019.

Among the Visegrad Group, Poland received the best score (55,6), getting the 32th position in the ranking, Hungary 54 points (35th place), then Czech Republic (42th) and Slovakia (52th) following. Brazil was 22th (59,7 points), China 51th and Russia scored 63th with 44,3 points[222].

The case of the Global Health Security Index indicates the failure of the expert community to properly help the states and the healthcare to prepare for a global pandemic, as their assessments appeared to be biased and wrong.

Questions of responsibility

The outbreak of Covid-19 also show us the **importance of the responsibility**. What can we expect from a country and how (and if) we can make it accountable? Currently there are already numerous rules of international law, which directly or indirectly address prevention and response to pandemics.[223]

The responsibility of the countries will only increase in the future. Potential biological hazard has to be prevented first of all on the local level, or stopped, before reaching out to the surrounding countries. Preventing is always better than curing. According to

the work of A. Coco and S.T. Dias, focus should be on the requirements of international law regarding pandemics:

"…in customary international law, the 'no-harm' principle is a rule requiring States to take reasonable measures to prevent, stop and redress significant transboundary harm emanating from their territory or jurisdiction and affecting other States or their populations"[224]. However, the "no-harm principle only obliges the states to try to the best of their abilities, but doesn't mean that they have to succeed.

Besides the no-harm principle there are at least three other international treaties, obliging the states to act in a specific way during events close to a pandemic. First of all, there is the **International disaster law**. It categorizes epidemics as biological hazards of natural origin, and specifies the requirements of the states, in order to respond. **International Health regulations** – a legal instrument adopted by WHO in 2005, is also applicable to interstate relations, for 196 of its member states[225]. These regulations define the duties of the states to prevent, monitor and respond to biological hazards and epidemics. At last, we can also mention International Human Rights law, which is applied not only in case of state restrictions, usage of police force, etc, but it also prescribes the human right to emergency treatment, the state operation of hospital services and the obligations of the state to prevent life threatening diseases or other risks[226].

According to the above-mentioned international regulations, nation states operating in the global environment are obliged to follow at least the subsequent measures:[227]

1. **Capacity building and preparedness** (early warning systems, stockpiling, contingency planning, dissemination of public information, advance planning).
2. **Monitoring and reporting** (data collection, surveillance, notification of international community[ii]).
3. **Response and mitigation** (obligations to contain the spread of an epidemic and mitigate its effects)
4. **International cooperation** (general obligations to cooperate in case of emergencies).

[ii] Including the commitment to notify WHO within 24 hours about „public health emergency of international concern"

We do expect states on a global level to act based on the no-harm principle and the above-mentioned ruleset, however, there are many other factors taken into account by governments, which can overwrite these obligations. Questions of political stability, threat to social and economic welfare, fundamental rights and freedoms and conflicting interests may all influence the decision making. It is also possible that a source of an outbreak or an unlikely event will be a private company, which can delay the decision making or information sharing due to financial reasons (like it happened after the Fukushima disaster in Japan).

Lessons to be learned

After one year of the pandemic, we have to summarize the mistakes, which were done, and **define the lessons, which have to be learned** to prevent such crisis in the future. When the Covid-19 pandemic is over, experts should analyse the best approach and the best measures taken by respective countries, and elaborate combined solutions for the future.

1. **Spread of the information.** It took several weeks, until China acknowledged the presence of the new disease. It took several days more, until all the information was shared and the local WHO office made official statements.

Quick and barrier-free spread of the information has to be created for events of potential global scale.

2. **Measures were taken too late.** The world was watching the events of China from distance, hoping that the new coronavirus disease will have local nature.

International, effective and clear protocols have to be implemented for cases of such biological emergency by worldwide experts.

3. Vaccine and other medicaments producing capacities were not enough on global scale.

Capacities have to be increased and harmonized with the pandemic protocols. At the same time the **creation of regional hubs is also necessary, to ensure equal and balanced dissemination of the medicaments, including masks, sanitizers, medical machines and equipment.**

4. In the first weeks of the pandemic, **the supply chains have collapsed**: the world experienced problems with stocks, storage, transportation and work force availability. According to the report of Food and Agriculture Organization (FAO), it affected animal products, fruits, vegetables, grains and other products[228]. It is important to note though, that the problems of supply chains caused by the pandemic go beyond the question of products: lack of seasonal workers caused problems for the agricultural sector, while the seasonal workers staying at home found themselves in a precarious economic situation. Financial transactions from abroad have decreased by 20% in Eastern-Europe[229], while for example in Moldova 16% of the country's GDP comes from Moldovans working abroad.

Creation of stable mechanisms to maintain the supply chains is needed. Problems of supply chains and food production have to be addressed on the local level, while the agricultural sector needs to be prepared for crisis situations.

5. The Covid-19 pandemic have also shown the **lack of global cooperation** on different levels. Several countries made prestige question of the vaccine development (like Russia with its Sputnik-V), in many cases trying to undermine the efforts of others in their propaganda. It caused lack of credibility towards each other (Western vaccine versus Chinese and Russian), and undermined the overall trust in vaccines on global level.

Fight against global pandemic is not question of prestige. Transparency, cooperation and responsibility should define the global arena in the future.

AI, Big Data, Deep Learning and Machine Learning

Maybe the solution to prevention of epidemics or other global disasters will come from machines and Artificial Intelligence (AI), rather than humans. On December 30, 2019 a small Canadian company, BlueDot alerted its clients about a potential new virus, originating from a market in Wuhan, China[230]. Established in 2013, BlueDot is an AI based start-up, operating based on Machine Learning (ML) and Big Data, to predict the outbreak and spread of infectious diseases worldwide[231]. All of its data is collected from official sources, like health care organizations, social networks, human, animal

and insect population data, worldwide movements data, local news sources, climate data, etc.

The alert coming from BlueDot preceded the official announcement from WHO by nine days, but the AI algorithm did even more: the company managed to predict those cities, where the unknown infection may spread further, based on the connections of Wuhan and the global airline ticketing data.

Big Data, Machine Learning and Artificial Intelligence could play a crucial role in the future. By combining the layers of available global data, looking for patterns and irregularities, AI may be able to do what human mind is incapable of. **Adding closed databases, like hospital data and medical records could result a real breakthrough, increasing the role of AI even more.** It could help in prediction, early diagnosis (finding potentially infected people) and even treatment (helping to prepare the cure)[232].

We can be sure, that the Covid-19 pandemic and the case of BlueDot will serve as an example for investors and entrepreneurs in the future, bringing more capital and opportunities for such data companies.

Conclusions

Despite the warnings of international experts in the last years, the world was not prepared for an epidemic. Hopefully the spread of Covid-19 will be stopped soon, and with the help of the developed vaccines we can close this chapter of human history. Now we have to draw conclusions, and learn the lessons of this crisis.

We live in a heavily regulated world. Countries not even have responsibilities before their population, but also obligations before the whole international communities, in form of international law and treaties. However, we have seen the failure of the fulfilment of such obligations and the collapse of services and supply chains of medicaments or even food supplies. **International organizations failed to prevent the pandemic and failed to effectively coordinate the global efforts to contain and counter it. Nation states had to deal with the threat on their own, according the best of their knowledge and experience.**

We can expect, that based on the experience of the Covid-19, **the responsibilities of the nation states will increase – as well as potential control on the prevention measures taken and the monitoring of the situation**.

More will be done on regional level, including the establishment of regional supply hubs, medical producing and research centres. etc. We can also expect the outsourcing of vital production to return to the respected countries, where the risks of shortages will overweight the potential benefits of cost reduction and cheap workforce.

We can also already see an increase in international efforts to prevent and control global emergency situations in the future. **One Health approach**, which aims to treat life on Earth as one integrated system – human health, animal health and plant health combined – is being promoted by the United Nations (UN) and WHO on a growing scale.

Private charities and foundations are also working on solutions together with governments: in September 2020 the prime minister of United Kingdom, Boris Johnson announced a plan in cooperation with Bill and Melinda Gates Foundation and Welcome Trust[233]. According to the plan these organizations will create **a global network of "zoonotic hubs**", to identify dangerous pathogens before they spread from animals to humans. It would help with **establishing a global pandemic early warning system and improving the ability to collect and analyse samples in time**. United Kingdom will host the next G7 summit in 2021, and according to Boris Johnson, they will promote this program during the summit[234].

Another hope for the future is the **evolution and role of the Big Data, Machine Learning and AI**. Based on the available public data, including medical records, commercial airplane circulation, statistics of insect and animal population, weather data, social networks, etc – and combining it with data of human interactions, age, social habits, local measures, etc, it could predict the future presence and spread of a new infectious disease. We should focus on the most promising areas, learning from the mistakes of the past, and investing into the preventive measures in the future.

Bibliography

- 2019 Global Health Security Index, https://www.ghsindex.org/ (2021.01.24.)
- BOWLES, Jerry: “How Canadian AI start-up BlueDot spotted Coronavirus before anyone else had a clue”. In: Diginomica, 10 March 2020, https://diginomica.com/how-canadian-ai-start-bluedot-spotted-coronavirus-anyone-else-had-clue (2021.01.25.)
- COCO, Antonio; DIAS, de Souza Talita: “Prevent, Respond, Cooperate. States’ Due Diligence Duties vis-à-vis the covid-19 Pandemic.” In: Journal of International Humanitarian Legal Studies. 9 December 2020. Volume 11, Issue 2. https://brill.com/view/journals/ihls/aop/article-10.1163-18781527-01102001/article-10.1163-18781527-01102001.xml (2021.01.22.)
- CORONADO, Martinez; ESTHER, Maria: “The International Response to Disease Outbreaks: The Relevance of Epistemic Communities in International Cooperation”. Carleton University, 2020. https://curve.carleton.ca/315424d1-7ebc-431d-9374-9840df4a1869 (2021.01.22.)
- “Coronavirus: UK pledges £500m to global vaccine-sharing scheme”. In: BBC, 2020.09.26., https://www.bbc.com/news/health-54303061 (2021.01.21.)
- “Global cooperation is our only choice against COVID-19, says WHO chief”. In: United Nations News, https://news.un.org/en/story/2020/08/1069702 (2021.01.21.)
- HEAVEN, Will Douglas: “AI could help with the next pandemic—but not with this one”. In: MIT Technology Review, 2020.03.12., https://www.technologyreview.com/2020/03/12/905352/ai-could-help-with-the-next-pandemicbut-not-with-this-one/ (2021.01.24.)
- HONG, Zhonghua; FAN, Ziyang; TONG, Xiaohua, ZHOU, Ruyan; ZHANG, Yun; HAN, Yanling; WANG, Jing; YANG, Shuhu; XU, Lijun; LUAN, Kuifeng; XIE, Huan; FENG, Yongjiu; LIU, Shijie; CHEN, Peng; JIN, Yanmin; XU, Xiong; LIU, Sicong; WEI, Chao; WANG, Chao: „Cooperation or confrontation? Prediction of COVID-19 pandemic situation via deep learning”. In: Research

Square, 28 December 2020., https://assets.researchsquare.com/files/rs-128767/v1_stamped.pdf (2021.01.24.)

- „How machine learning is powering collective pandemic intelligence". In: International Telecommunication Union (ITU), 2020.09.30, https://www.itu.int/en/myitu/News/2020/09/30/15/06/AI-for-Good-Breakthrough-Days-Machine-learning-powering-collective-pandemic-intelligence (2021.01.24.)
- "International Day of Epidemic Preparedness, 27 December", In: United Nations, https://www.un.org/en/observances/epidemic-preparedness-day (2021.01.21.)
- International Day for Epidemic Preparedness: speech of WHO Director-General Dr. Tedros Adhanom Ghebreyesus, 2020.12.26., https://youtu.be/sMnhWcptYp8 (2021.01.21.)
- "Implications of COVID-19 on food and agriculture in Europe and Central Asia and actions taken by FAO" (Последствия COVID-19 для производства продовольствия и ведения сельского хозяйства в Европе и Центральной Азии и предпринятые ФАО меры). In: Food and Agriculture Organization (FAO), Regional FAO Conference on Europe. 2-4 November 2020. http://www.fao.org/3/ne001ru/ne001ru.pdf (2021.01.22.)
- RAVI, Sanjana J; WARMBROD, Kelsey Lane; MULLEN, Lucia; MEYER, Diane; CAMERON, Elizabeth; BELL, Jessica; BAPAT, Priya; PATERRA, Michael; MACHALABA, Catherine; NATH, Indira; GOSTIN, o Lawrence; JAMES Wilmot; GEORGE Dylan; NIKKARI, Simo; GOZZER, Ernesto; TOMORI, Oyewale; MAKUMBI, Issa; NUZZO, B Jennifer: „The value proposition of the Global Health Security Index". In: BMJ Global Health, 8th October 2020, https://gh.bmj.com/content/5/10/e003648 (2021.01.22.)
- SCHMITT, Markus: „How to fight COVID-19 with machine learning", In: Data Revenue, https://www.datarevenue.com/en-blog/machine-learning-covid-19 (2021.01.24.)
- SCHWAB, Jeremy: "Fighting COVID-19 could cost 500 times as much as pandemic prevention measures". In: World Economic Forum, 3rd August

2020., https://www.weforum.org/agenda/2020/08/pandemic-fight-costs-500x-more-than-preventing-one-futurity/ (2021.01.25.)

- TRAVIESO, Florencio: „How Data Intelligence Will Be Crucial for Predicting the Next Pandemic". In: Health Management, Volume 20, Issue 7, 2020. https://healthmanagement.org/c/healthmanagement/issuearticle/how-data-intelligence-will-be-crucial-for-predicting-the-next-pandemic (2021.01.24.)
- "WHO: Learn from COVID Pandemic, It Won't be the Last", In: VOA News, 2020.12.26., https://www.voanews.com/covid-19-pandemic/who-learn-covid-pandemic-it-wont-be-last (2021.01.21.)
- Worldometer statistics, https://www.worldometers.info/coronavirus/ (2021.01.25.)

Endnotes

[1] Sputnik V: *General Information.* Access: https://sputnikvaccine.com/about-vaccine/ (01/18/2021)
[2] Ibid.
[3] RAINSFORD, Sarah**:** *Coronavirus: Sputnik V vaccine rushed out to wary Russians.* <12/08/2020> In. *BBC News.* Access: https://www.bbc.com/news/world-europe-55221785 (01/21/2021)
[4] The Moscow Times: *Coronavirus in Russia: The Latest News.* <01/26/2021> Access: https://www.themoscowtimes.com/2021/01/26/coronavirus-in-russia-the-latest-news-jan-26-a69117 (01/26/2021)
[5] Thelocal.de: *Germany offers Russia support in Sputnik vaccine development.* <01/21/2021> Access: https://www.thelocal.de/20210121/germany-offers-russia-support-in-sputnik-vaccine-development (01/18/2021)
[6] U.S. Food and Drug Administration: *Pfizer-BioNTech COVID-19 Vaccine.* Access: https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/pfizer-biontech-covid-19-vaccine (01/18/2021)
[7] U.S. Food and Drug Administration: *Moderna COVID-19 Vaccine.* Access: https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/moderna-covid-19-vaccine (01/18/2021)
[8] European Medicines Agency: *Treatments and Vaccines for COVID-19: Authorised Medicines.* Access: https://www.ema.europa.eu/en/human-regulatory/overview/public-health-threats/coronavirus-disease-covid-19/treatments-vaccines/treatments-vaccines-covid-19-authorised-medicines#covid-19-vaccines-section (01/21/2021)
[9] National Health Service of the United Kingdom: *Vaccines Approved.* Access: https://www.nhs.uk/conditions/coronavirus-covid-19/coronavirus-vaccination/coronavirus-vaccine/ (01/21/2021)
[10] GALLARDO, Cristina: *8 reasons the UK leads Europe's coronavirus vaccination race.* <01/14/2021> In. *Politico.* Access: https://www.politico.eu/article/8-reasons-why-uk-leads-europe-coronavirus-vaccination-race/ (01/21/2021)
[11] SZEREDY, Dani: *Milliós nagyságrendben vehet orosz vakcinát Magyarország.* In. *Index.hu* <01/21/2021> Access: https://index.hu/gazdasag/2021/01/21/koronavirus_moszkva_orosz_vakcina_millios_nagysagrend/ (01/22/2021)
[12] BBC: Sinovac: *Brazil results show Chinese vaccine 50.4% effective.* <01/13/2021> Access: https://www.bbc.com/news/world-latin-america-55642648 (01/22/2021)
[13] BBC: *Covid: What do we know about China's coronavirus vaccines?* <01/14/2021> Access: https://www.bbc.com/news/world-asia-china-55212787 (01/22/2021)
[14] COOK, Steven A.: *America's Vaccine Diplomacy Is AWOL in the Middle East.* <01/08/2021> In. *Foreign Policy.* Access: https://foreignpolicy.com/2021/01/08/americas-vaccine-diplomacy-is-awol-in-the-middle-east/ (01/22/2021)
[15] PANT, Harsh V. – TIRKEY, Aarshi: *India's Vaccine Diplomacy.* <01/22/2021> Access: https://foreignpolicy.com/2021/01/22/india-world-pharmacy-vaccine-diplomacy-compete-china/ (01/25/2021)
[16] PLEVÁK, Ondřej: Bez EU by si ČR vakcínu nezajistila, uznává ministerstvo zdravotnictví. In: Euractiv, 2021. 01. 06., https://euractiv.cz/section/cr-v-evropske-unii/news/bez-eu-by-si-cr-vakcinu-nezajistila-uznava-ministerstvo-zdravotnictvi/?fbclid=IwAR2K-N0nXFStC4Qh6_ii2axwbvKdimFJTBu86LDF3_dTQMxV0tL4FwYke88 (2021.01.19.)

[17] SVOBODA, Katerina: Blatný: We should have a vaccine for up to 16 million people. In: Prague Monitor, 2020. 11. 25., https://praguemonitor.com/news/national/25/11/2020/2020-11-25-blatny-we-should-have-vaccine-16-million-people/ (2021.01.19.)
[18] Czech Republic coronavirus updates, Jan 7, 2021: Moderna vaccine approved and enroute. In: Expats, 2021. 01. 07., https://www.expats.cz/czech-news/article/czech-republic-coronvirus-updates-jan-7-2021-modena-vaccine-enroute (2021.01.20.)
[19] Vaccines for Christmas: How will distribution look in the Czech Republic and who will get it first? In: Expats, 2020. 12. 17., https://www.expats.cz/czech-news/article/vaccine (2021.01.20.)
[20] Czech Health Minister: COVID vaccines have been ordered. In: Expats, 2020. 11. 24., https://www.expats.cz/czech-news/article/czech-health-minister-covid-vaccines-have-been-ordered (2021.01.20.)
[21] McENCHROE, Tom: Czech Republic launches vaccine registration for over-80s. In: Radio Prague International, 2021. 01. 15., https://english.radio.cz/czech-republic-launches-vaccine-registration-over-80s-8705635 (2021.01.18.)
[22] Coronavirus: Vaccine supply fears grow amid EU export threat. In: BBC, 2021.01.27., https://www.bbc.com/news/world-europe-55805903 (2021.01.29.)
[23] McENCHROE, Tom: Czech Republic launches vaccine registration for over-80s. In: Radio Prague International, 2021. 01. 15., https://english.radio.cz/czech-republic-launches-vaccine-registration-over-80s-8705635 (2021.01.18.)
[24] The Czech Republic has embarked on a journey to prepare a vaccine against covid-19. In: Ministry of Health of the Czech Republic, 2020. 05. 04., https://koronavirus.mzcr.cz/en/the-czech-republic-has-embarked-on-a-journey-to-prepare-a-vaccine-against-covid-19/ (2021.01.18.)
[25] McENCHROE, Tom: Czech researchers complete first stage of COVID-19 emergency vaccine. In: Radio Prague International, 2020. 09. 23., https://english.radio.cz/czech-researchers-complete-first-stage-covid-19-emergency-vaccine-8693007 (2021.01.18.)
[26] KUBANT, Vít; ŠTORKÁN, Martin: Česká vakcína na covid-19? ‚Není urgentní potřeba ve vývoji pokračovat,' míní ministr zdravotnictví Blatný. In: iRozhlas, 2020. 11. 19, https://www.irozhlas.cz/zpravy-domov/ceska-vakcina-koronavirus-v-cesku-zastaveni-vyvoje-ockovani_2011190631_vtk?fbclid=IwAR3Czbv6gZUXqie5TGvuNtmTvdWOLog5y1KGa0L6AQljRVzpN-PMvP-PEVs (2021.01.19.)
[27] PIRODSKY, Jason: One of the world's first COVID-19 vaccines is set to be manufactured in the Czech Republic. In: Expats, 2020. 08. 25., https://news.expats.cz/weekly-czech-news/one-of-the-worlds-first-covid-19-vaccines-is-set-to-be-manufactured-in-the-czech-republic/ (2021.01.18.)
[28] McENCHROE, Tom: Ministry plan envisages vaccinating high risk groups by March. In: Radio Prague International, 2021. 01. 06., https://english.radio.cz/ministry-plan-envisages-vaccinating-high-risk-groups-march-8704737 (2021.01.18.)
[29] McENCHROE, Tom: Czech Republic launches vaccine registration for over-80s. In: Radio Prague International, 2021. 01. 15., https://english.radio.cz/czech-republic-launches-vaccine-registration-over-80s-8705635 (2021.01.18.)
[30] Cumulative COVID-19 vaccination doses administered. In: Our World in Data, 2021. 01. 20., https://ourworldindata.org/covid-vaccinations (2021.01.21.)
[31] McENCHROE, Tom: Czech Republic launches vaccine registration for over-80s. In: Radio Prague International, 2021. 01. 15., https://english.radio.cz/czech-republic-launches-vaccine-registration-over-80s-8705635 (2021.01.18.)
[32] Blatný: První vakcíny proti covidu by mohly do Česka dorazit mezi svátky. Očkovat se začne neprodleně. In: iRozhlas, 2020. 12. 16., https://www.irozhlas.cz/zpravy-domov/koronavirus-v-cesku-blatny-vakcina_2012161244_pj (2021.01.19.)
[33] Poll: only a third of Czechs willing to be vaccinated against COVID-19. In: Expats, 2020. 11. 04., https://www.expats.cz/czech-news/article/poll-only-a-third-of-czechs-willing-to-be-vaccinated-against-covid-19 (2021.01.18.)

[34] STOJANOVIC, Dusan; GEC, Jovana: Vaccine scepticism hurts East European anti-virus efforts. In: AP, 2021. 01. 17., https://apnews.com/article/conspiracy-theories-europe-russia-czech-republic-eastern-europe-45f495d7205a7b47ae8d499ec08e0504 (2021.01.18.)
[35] McENCHROE, Tom: Ministry plan envisages vaccinating high risk groups by March. In: Radio Prague International, 2021. 01. 06., https://english.radio.cz/ministry-plan-envisages-vaccinating-high-risk-groups-march-8704737 (2021.01.18.)
[36] Orbán Viktor rendkívüli bejelentése In: YouTube, 2020.12.07. https://www.youtube.com/watch?v=tX4CI3mfes8&ab_channel=Magyarorsz%C3%A1gKorm%C3%A1nya (2021.01.22.)
[37] Coronavirus vaccines strategy In: Euorpean Comission https://ec.europa.eu/info/live-work-travel-eu/coronavirus-response/public-health/coronavirus-vaccines-strategy_en (2021.01.22.)
[38] Kormányinfó: a kormány kampányt indít az oltásra jelentkezés ösztönzésére, In: Tájékoztató oldal a koronavírusról, 2021.01.14. https://koronavirus.gov.hu/cikkek/kormanyinfo-kormany-kampanyt-indit-az-oltasra-jelentkezes-osztonzesere (2021.01.22.)
[39] Magyar Közlöny 2021. évi 7. szám In Magyar Közlöny, 2021.01.14. https://magyarkozlony.hu/dokumentumok/e255e1399b7aee22ffd6514a7193a42e5a4b0657/megtekintes (2021.01.22.)
[40] Russian Sputnik V, British AstraZeneca Vaccines Get Hungarian Authorities' Approval In: Hungary Today, 2021.01.21. https://hungarytoday.hu/coronavirus-astrazeneca-russian-sputnik-vaccines-hungary-approval/ (2021.01.22.)
[41] Kormányinfó, 2021. január 14. In: Mediaklikk.hu, 2021.01.14. https://mediaklikk.hu/kormanyinfo/video/2021/01/14/kormanyinfo-2021-januar-14/ (2021.01.22.)
[42] DOMOKOS, László: Ötmillió kínai vakcinát vásárol Magyarország - jelentette be Szijjártó Péter miniszter In: Napi.hu, 2021.01.29 https://www.napi.hu/magyar_gazdasag/kinai_vakcina_szijjarto_nagy_bejelentest_tett.722394.html
[43] Pekingben ellenőrizték a kínai vakcina gyártási folyamatait a magyar szakértők In: Mandiner, 2021.01.16. https://mandiner.hu/cikk/20210116_pekingben_ellenoriztek_a_kinai_vakcina_gyartasi_folyamatait_a_magyar_szakertok (2021.01.22.)
[44] Sinovac: Brazil results show Chinese vaccine 50.4% effective In: BBC, 2021.01.13. https://www.bbc.com/news/world-latin-america-55642648 (2021.01.22.)
[45] Orbán Viktor: Magyarország technikailag készen áll a tömeges és gyors oltásra In: Tájékoztató oldal a koronavírusról, 2021.01.03. https://koronavirus.gov.hu/cikkek/orban-viktor-magyarorszag-technikailag-keszen-all-tomeges-es-gyors-oltasra (2021.01.22.)
[46] Vakcina: fejlesztünk, hogy ne függjünk a külföldi gyártóktól In: Magyar Nemzet, 2020.12.31. https://magyarnemzet.hu/belfold/magyarorszag-is-beszallt-a-vakcinafejlesztesbe_a_debreceni_egyetem-9163667/ (2021.01.22.)
[47] Maradhat a digitális oktatás a középiskolákban, fél-egy éven belül lehet magyar koronavírus-vakcina In: Portfolio, 2021.01.07. https://www.portfolio.hu/gazdasag/20210107/maradhat-a-digitalis-oktatas-a-kozepiskolakban-fel-egy-even-belul-lehet-magyar-koronavirus-vakcina-464336 (2021.01.22.)
[48] Ezt lehet tudni a magyar vakcináról In: 24, 2021.01.14. https://24.hu/tudomany/2021/01/14/koronavirus-magyar-vakcina/ (2021.01.22.)
[49] PETER, Kristof: Koronavírus: Nem lenne vakcina egy magyar kutató nélkül In: Euronews, 2020.12.21. https://hu.euronews.com/2020/12/21/koronavirus-nem-lenne-vakcina-egy-magyar-kutato-nelkul (2021.01.22.)

[50] A magyar gyógyszeriparról: In: Magyosz, 2013.01.01 https://www.magyosz.org/hu/oldal/a-magyar-gyogyszeriparrol 2021.01.29.
[51] Sanofi to help produce 100 million Pfizer/BioNTech vaccine doses In: CNN, 2021.01.27 https://edition.cnn.com/2021/01/27/europe/sanofi-vaccine-doses-intl/index.html (2021.01.29.)
[52] A Pfizer Magyarországon In: Pfizer, 2020.06.18 https://www.pfizer.hu/hu/pfizer-magyarorsz%C3%A1gon (2021.01.29.)
[53] Gsk: Hungary In: Gsk, 2021.01.29 https://www.gsk.com/en-gb/contact-us/worldwide/hungary/hu-hu/ (2021.01.29.)
[54] AstraZeneca: Hungary In: AstraZeneca, 2021.01.29 https://www.astrazeneca.com/country-sites/hungary.html (2021.01.29.)
[55] Itt a bejelentés: gigászi vakcinagyár jön létre Magyarországon In: Pénzcentrum, 2020.05.8 https://www.penzcentrum.hu/biztositas/itt-a-bejelentes-gigaszi-vakcinagyar-jon-letre-magyarorszagon.1095000.html (2021.01.29.)
[56] A lakossági tájékoztató az oltási terv alapján (kivonat) In: NNK, 2021.01.18. https://www.nnk.gov.hu/index.php/koronavirus-tajekoztato/932-a-covid-19-vedooltasra-jelentkezesi-hely-az-egeszsegugyi-es-egeszsegugyben-dolgozok-szamara?fbclid=IwAR0Apf-4Al376i5bhyZQf01RETCzJLqTLx-TJKxKkxaUnaY_oei2ILm0DYU (2021.01.22.)
[57] Orbán Viktor: Magyarország technikailag készen áll a tömeges és gyors oltásra In: Tájékoztató oldal a koronavírusról, 2021.01.03. https://koronavirus.gov.hu/cikkek/orban-viktor-magyarorszag-technikailag-keszen-all-tomeges-es-gyors-oltasra (2021.01.22.)
[58] Kiszivárgott: a kormány már készül a tömeges koronavírus-oltásra In: Portfolio, 2021.01.09. https://www.portfolio.hu/gazdasag/20210109/kiszivargott-a-kormany-mar-keszul-a-tomeges-koronavirus-oltasra-464632# (2021.01.22.)
[59] Így lesz 5000 új oltópont Magyarországon In: Portfolio, 2021.01.07. https://www.portfolio.hu/gazdasag/20210107/igy-lesz-5000-uj-oltopont-magyarorszagon-464324 (2021.01.22.)
[60] Koronawirus: informacje i zalecenia. Działania rządu: Zamykamy granice przed koronawirusem. In: Official COVID-19 site of Poland. 13.03.2020., https://www.gov.pl/web/koronawirus/zamykamy-granice-przed-koronawirusem (27.12.2020)
[61] KOPEC, Jaroslaw: „With second wave hitting hard, Poland is among the countries with the worst Covid-19 health indicators.", In: Wyborcza, 12.11.2020., https://wyborcza.pl/7,173236,26503916,with-second-wave-hitting-hard-poland-is-among-the-countries.html (29.12.2020)
[62] Source: https://ourworldindata.org/coronavirus (17.01.2021)
[63] Koronawirus: informacje i zalecenia. Aktualne zasady i ograniczenia. In: Official COVID-19 site of Poland. 15.01.2021., https://www.gov.pl/web/koronawirus/aktualne-zasady-i-ograniczenia (15.01.2021)
[64] Coronavirus Information and Recommendations, Government actions. Rząd przyjął Narodowy Program Szczepień – plan powrotu do normalności po pandemii. 16.12.2020: https://www.gov.pl/web/koronawirus/rzad-przyjal-narodowy-program-szczepien (19.12.2020)
[65] Narodowy Program Szczepień przeciw COVID-19. (The National COVID-19 Vaccination Program.) 17.12.2020.: https://www.gov.pl/web/szczepimysie/narodowy-program-szczepien-przeciw-covid-19 (19.12.2020)
[66] COMMISSION DECISION approving the agreement with Member States on procuring Covid-19 vaccines on behalf of the Member States and related procedures. 18.06.2020., https://ec.europa.eu/info/sites/info/files/decision_approving_the_agreement_with_member_states_on_procuring_covid-19_vaccines_on_behalf_of_the_member_states_and_related_procedures.pdf (22.12.2020)
[67] Annex to the Comission Decision on approving the agreement with Member States on procuring Covid-19 vaccines on behalf of the Member States and related procedures. 18.06.2020.,

https://ec.europa.eu/info/sites/info/files/annex_to_the_commission_decision_on_approving_the_agreement_with_member_states_on_procuring_covid-19_vaccines_on_behalf_of_the_member_states_and_related_procedures_.pdf (19.12.2020)

[68] Annex to the Comission Decision on approving the agreement with Member States on procuring Covid-19 vaccines on behalf of the Member States and related procedures. 18.06.2020., page 2., https://ec.europa.eu/info/sites/info/files/annex_to_the_commission_decision_on_approving_the_agreement_with_member_states_on_procuring_covid-19_vaccines_on_behalf_of_the_member_states_and_related_procedures_.pdf (19.12.2020)

[69] Coronavirus vaccines strategy of the EU. https://ec.europa.eu/info/live-work-travel-eu/coronavirus-response/public-health/coronavirus-vaccines-strategy_en#what-the-eu-proposes (10.01.2021)

[70] Questions and Answers: COVID-19 vaccination in the EU. https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_2467 (22.12.2020)

[71] Narodowy Program Szczepień przeciw COVID-19. (The National COVID-19 Vaccination Program.) 17.12.2020., https://www.gov.pl/web/szczepimysie/narodowy-program-szczepien-przeciw-covid-19 page 6., (19.12.2020)

[72] „Pfizer and BioNTech Receive Authorization in the European Union for COVID-19 Vaccine." In: Pfizer news, 21.12.2020., https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-receive-authorization-european-union (22.12.2020)

[73] European Commission authorises second safe and effective vaccine against COVID-19. 06.01.2021., https://ec.europa.eu/commission/presscorner/detail/en/ip_21_3 (13.01.2021)

[74] Uchwała w sprawie przyjęcia Narodowego Programu Szczepień przeciw COVID-19. (Resolution on adopting the National COVID-19 Immunization Program), 15.12.2020., https://www.gov.pl/web/premier/uchwala-w-sprawie-przyjecia-narodowego-programu-szczepien-przeciw-covid-19 (22.12.2020)

[75] Narodowy Program Szczepień przeciw COVID-19. (The National COVID-19 Vaccination Program.) 17.12.2020., https://www.gov.pl/web/szczepimysie/narodowy-program-szczepien-przeciw-covid-19 page 12., (19.12.2020)

[76] PACEWICZ, Piotr: „Kogo nie zaszczepią w I kwartale? Plany rządu odbierają nadzieję nauczycielkom i 60-latkom." (Who will not be vaccinated in the first quarter? Government plans take away hope from teachers and 60-year-olds), In: OKO Press, 09.01.2021., https://oko.press/kogo-nie-zaszczepia-w-i-kwartale/ (17.01.2021))

[77] Narodowy Program Szczepień przeciw COVID-19. (The National COVID-19 Vaccination Program.) 17.12.2020., https://www.gov.pl/web/szczepimysie/narodowy-program-szczepien-przeciw-covid-19 pp. 33., (19.12.2020)

[78] „W Polsce ruszyły szczepienia przeciw COVID-19 – „to historyczny moment"." (Vaccination against COVID-19 has started in Poland - "this is a historic moment".), In: Official site of The Government of Poland, 27.12.2020., https://www.gov.pl/web/szczepimysie/w-polsce-ruszyly-szczepienia-przeciw-covid-19--to-historyczny-moment (29.12.2020)

[79] Ibid.

[80] „Rusza szeroka dystrybucja szczepionki przeciwko COVID-19 – 28 grudnia do Polski przyleciało 300 tysięcy kolejnych dawek." (The widespread distribution of the COVID-19 vaccine begins - on December 28, 300,000 more doses arrived in Poland.), In: Official site of The Government of Poland, 28.12.2020., https://www.gov.pl/web/szczepimysie/rusza-szeroka-dystrybucja-szczepionki-przeciwko-covid-19--28-grudnia-do-polski-przylecialo-300-tysiecy-kolejnych-dawek (02.01.202)

[81] „360,000 more doses of COVID-19 vaccine arrive in Poland: official", In: Polskie Radio, 04.01.2021., https://www.polskieradio.pl/395/7989/Artykul/2651644,360000-more-doses-of-COVID19-vaccine-arrive-in-Poland-official (15.01.2021)

[82] „First Covid-19 vaccines to reach Poland by December 26.", In: PAP Polish Press Agency, 23.12.2020., https://www.pap.pl/en/news/news%2C780943%2Cfirst-covid-19-vaccines-reach-poland-dec-26.html (02.01.2021)

[83] „Poland to receive 5.9 million doses of vaccine by end-March.", In: The First News, 07.01.2021., https://www.thefirstnews.com/article/poland-to-receive-59-million-doses-of-vaccine-by-end-march-18906 (17.01.2021)
[84] Raport szczepień przeciwko COVID-19. (Vaccination report against COVID-19) In: Official site of Ministry of Poland, 17.01.2021., https://www.gov.pl/web/szczepimysie/raport-szczepien-przeciwko-covid-19 (17.01.2021)
[85] COVID-19 vaccine doses administered per 100 people, Jan 17, 2021., In: Our World in Data, 17.01.2021., https://ourworldindata.org/covidvaccinations?country=HUN~AUT~BEL~BIH~BGR~HRV~CYP~CZE~DNK~EST~FRA~DEU~GRC~ITA~LVA~LTU~LUX~MNE~NLD~POL~SRB~SVK~SVN~ESP~SWE~MLT~ROU~FIN~IRL (17.01.2021)
[86] PACEWICZ, Piotr: „Kogo nie zaszczepią w I kwartale? Plany rządu odbierają nadzieję nauczycielkom i 60-latkom." (Who will not be vaccinated in the first quarter? Government plans take away hope from teachers and 60-year-olds), In: OKO Press, 09.01.2021., https://oko.press/kogo-nie-zaszczepia-w-i-kwartale/ (17.01.2021)
[87] „Dowóz osób na szczepienia. Rząd wesprze samorządy." (Transport of people for vaccinations. The government will support local governments), In: Niezalezna, 16.12.2020., https://niezalezna.pl/369541-dowoz-osob-na-szczepienia-rzad-wesprze-samorzady (18.12.2020)
[88] Narodowy Program Szczepień przeciw COVID-19. (The National COVID-19 Vaccination Program.) 17.12.2020., https://www.gov.pl/web/szczepimysie/narodowy-program-szczepien-przeciw-covid-19 page 4., (19.12.2020)
[89] Trwa rejestracja punktów szczepień przeciwko COVID-19 oraz nabór na szczepienia kadry medycznej. Coronavirus Information and Recommendations, Government actions. 16.12.2020, https://www.gov.pl/web/koronawirus/trwa-rejestracja-punktow-szczepien-przeciwko-covid-19-oraz-nabor-na-szczepienia-kadry-medycznej (19.12.2020)
[90] WITKOWSKA, Monika: „'We'll have killer virus vaccine in less than two months', says expert.", In: Science in Poland, 29.07.2020., https://scienceinpoland.pap.pl/en/news/news%2C83305%2Cwell-have-killer-virus-vaccine-less-two-months-says-expert.html (02.01.2021)
[91] WITKOWSKA, Monika:„Prof. Mackiewicz: mamy prototyp polskiej szczepionki na SARS-CoV-2." (Prof. Mackiewicz: we have a prototype of the Polish vaccine against SARS-CoV-2), In: Nauka w Polsce, 18.09.2020., https://scienceinpoland.pap.pl/aktualnosci/news%2C83904%2Cprof-mackiewicz-mamy-prototyp-polskiej-szczepionki-na-sars-cov-2.html (02.01.2021)
[92] TROCHALA, Adam: „Inno-Gene chciało szczepionki. Teraz rozwiązuje umowę." (Inno-Gene wanted a vaccine. Now the company is terminating the contract), In: Bankier.pl, 10.12.2020., https://www.bankier.pl/wiadomosc/Inno-Gene-chcialo-szczepionki-Teraz-rozwiazuje-umowe-8017866.html (03.01.2021)
[93] Ibid.
[94] WITKOWSKA, Monika: „Prof. Mackiewicz: mamy prototyp polskiej szczepionki na SARS-CoV-2." (Prof. Mackiewicz: we have a prototype of the Polish vaccine against SARS-CoV-2), In: Nauka w Polsce, 18.09.2020., https://scienceinpoland.pap.pl/aktualnosci/news%2C83904%2Cprof-mackiewicz-mamy-prototyp-polskiej-szczepionki-na-sars-cov-2.html (02.01.2021)
[95] Ibid.
[96] „Podpisanie umowy inwestycyjnej ze spółką COVIDVAX sp. z o.o.." (Signing an investment agreement with COVIDVAX sp.z o.o.), In: Official site of INNO-GENE, http://www.inno-gene.pl/komunikaty/podpisanie-umowy-inwestycyjnej-ze-spolka-covidvax-sp-z-oo (02.01.2021)
[97] TROCHALA, Adam: „Inno-Gene chciało szczepionki. Teraz rozwiązuje umowę." (Inno-Gene wanted a vaccine. Now the company is terminating the contract), In: Bankier.pl, 10.12.2020., https://www.bankier.pl/wiadomosc/Inno-Gene-chcialo-szczepionki-Teraz-rozwiazuje-umowe-8017866.html (03.01.2021)
[98] MOKRZYCKA, Katarzyna: Polska fabryka weźmie udział w produkcji szczepionki na Covid-19. Trwają negocjacje. ("The Polish factory will take part in the production of the Covid-19 vaccine. Negotiations

are ongoing.), In: 300 Gospodarka, 20.01.2021., https://300gospodarka.pl/news/produkcja-szczepionki-na-covid-19-w-polsce-polfa (29.01.2021)

[99] "COVID-19 vaccine will leave Polish factory in autumn?" In: Healthcare Market Experts, 22.01.2021., https://healthcaremarketexperts.com/en/news/ma-and-investments/covid-19-vaccine-will-leave-polish-factory-in-autumn/ (29.01.2021)

[100] "Produkcja szczepionki na koronawirusa częściowo w Polsce? Trwają negocjacje." ("Coronavirus vaccine production partially in Poland? Negotiations are ongoing.") In: Money.pl, 20.01.2021., https://www.money.pl/gielda/produkcja-szczepionki-na-koronawirusa-czesciowo-w-polsce-trwaja-negocjacje-6599344633346944a.html (29.01.2021)

[101] Sources of the diagram: (1): „Do Poles want to be vaccinated against COViD-19?" In: CBOS Public Opinion Research Center, Polish Public Opinion, https://www.cbos.pl/EN/publications/reports/2020/154_20.pdf (28.12.2020), (2): BARBARA, Rogala: „Sondaż IBRiS dla WP: Polacy boją się powikłań po szczepionce na koronawirusa", In: 300 gospodarka, 14.12.2020., https://300gospodarka.pl/live/sondaz-ibris-dla-wp-polacy-boja-sie-powiklan-po-szczepionce-na-koronawirusa (02.01.2021), (3): BARTKIEWICZ, Artur: „Sondaż: Jak wielu Polaków chce się zaszczepić przeciwko COVID-19?", In: Rzeczpospolita, 09.11.2020., https://www.rp.pl/Covid-19/201109490-Sondaz-Jak-wielu-Polakow-chce-sie-zaszczepic-przeciwko-COVID-19.html (28.12.2020), (4): DARRELL, Bricker: „Three in four adults globally say they'd get a vaccine for COVID -19." In: IPSOS, 01.09.2020., https://www.ipsos.com/en-ca/news-and-polls/Three-in-Four-Adults-Globally-Say-They-Would-Get-Vaccine-For-COVID-19 (05.01.2021), (5): LAZARUS, J. V., RATZAN, S. C., PALAYEW, A., GOSTIN, L. O., LARSON, H. J., RABIN, K., KIMBALL, S., EL_MOHANDES, A.: „A global survey of potential acceptance of a COVID-19 vaccine." In: Nature and Medicine, 20.10.2020., https://doi.org/10.1038/s41591-020-1124-9 (04.01.2021)

[102] CBOS Public Opinion Research Center: „Do Poles want to be vaccinated against COViD-19?", In: Polish Public Opinion, https://www.cbos.pl/EN/publications/reports/2020/154_20.pdf (29.12.2020)

[103] BURGER, Ludwig, ARIPAKA, Pushkala: „AstraZeneca to be exempt from coronavirus vaccine liability claims in most countries.", In: Reuters, 30.07.2020., https://www.reuters.com/article/us-astrazeneca-results-vaccine-liability-idUSKCN24V2EN (29.12.2020)

[104] LINTERN, Shaun: „Coronavirus vaccine: Pfizer given protection from legal action by UK government.", In: The Independent, 02.12.2020., https://www.independent.co.uk/news/health/coronavirus-pfizer-vaccine-legal-indemnity-safety-ministers-b1765124.html (29.12.2020)

[105] Questions and Answers: COVID-19 vaccination in the EU. https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_2467 (22.12.2020)

[106] WADOLOWSKA, Agnieszka: „Poland to create compensation fund for Covid vaccine side effects.", In: Notes from Poland, 31.12.2020., https://notesfrompoland.com/2020/12/31/poland-to-set-up-compensation-fund-for-covid-vaccine-side-effects/ (31.12.2020)

[107] Uchwała w sprawie przyjęcia Narodowego Programu Szczepień przeciw COVID-19. (Resolution on adopting the National COVID-19 Immunization Program), 15.12.2020., https://www.gov.pl/web/premier/uchwala-w-sprawie-przyjecia-narodowego-programu-szczepien-przeciw-covid-19 (22.12.2020)

[108] „Rząd uspokaja ws. szczepionek na COVID-19 i tworzy specfundusz." (The government calms down on COVID-19 vaccines and creates a special fund.), In: Business Insider, 16.12.2020., (https://businessinsider.com.pl/wiadomosci/szczepienie-na-covid-19-fundusz-kompensacyjny/p6knhkv (28.12.2020)

[109]MALECKI, Mikolaj: „Poland's coronavirus restrictions are unconstitutional, unlawful and risk years of legal chaos.", In: Notes from Poland, 18.04.2020., https://notesfrompoland.com/2020/04/18/polands-coronavirus-restrictions-are-unconstitutional-unlawful-and-risk-years-of-legal-chaos/ (17.01.2021)

[110] WILCZEK, Maria: „Map shows Polish businesses reopening in defiance of "illegal" lockdown.", In: Notes from Poland, 15.01.2021., https://notesfrompoland.com/2021/01/15/map-shows-polish-businesses-reopening-in-defiance-of-illegal-lockdown/ (17.01.2021)
[111] Új Szó: *Szlovákiában eddig nem igazolták a koronavírus-fertőzés előfordulását.* <02/24/2020> Access: https://ujszo.com/kozelet/szlovakiaban-eddig-nem-igazoltak-a-koronavirus-fertozes-elofordulasat (12/19/2020)
[112] Ministerstvo zdravotníctva Slovenskej republiky: *Zoznam laboratórií vyšetrujúcich SARS-CoV-2.* <07/20/2020> Access: https://www.health.gov.sk/?covid-19-laboratoria (12/20/2020)
[113] Nový Čas: *Prvý prípad koronavírusu u nás: Vieme, odkiaľ je nakazený muž!* <03/06/2020> Access: https://www.cas.sk/clanok/953762/prvy-pripad-koronavirusu-u-nas-vieme-odkial-je-nakazeny-muz/ (12/21/2020)
[114] Úrad verejného zdravotníctva Slovenskej republiky: *Opatrenia Ústredného krízového štábu SR v súvislosti s ochorením COVID-19.* <03/13/2020> Access: https://www.uvzsr.sk/index.php?option=com_content&view=article&id=4090:opatrenia-ustredneho-krizoveho-tabu-sr-vnsuvislosti-snochorenim-covid-19&catid=250:koronavirus-2019-ncov&Itemid=153 (12/21/2020)
[115] Koronavírus a Slovensko. Access: https://korona.gov.sk/ (12/21/2020)
[116] SME: *Dôveryhodnosť Peter Pellegrini od agentúry focus.* Access: https://volby.sme.sk/pref/2/doveryhodnost/s/6041/peter-pellegrini/focus (12/27/2020)
[117] SME: *Druhá vlna koronavírusu je už na Slovensku. Ťažkosti môže robiť v septembri.* <08/11/2020> Access: https://domov.sme.sk/c/22465581/druha-vlna-koronavirusu-je-uz-na-slovensku.html (12/27/2020)
[118] Új Szó: *Matovič: Ez az utolsó próbálkozás, ha nem sikerül, az egész országot le kell zárni.* <10/11/2020> Access: https://ujszo.com/kozelet/matovic-ez-az-utolso-probalkozas-ha-nem-sikerul-az-egesz-orszagot-le-kell-zarni (12/27/2020)
[119] HOLT, Ed: *Slovakia to test all adults for SARS-CoV-2.* In. *The Lancet* <10/31/2020> Access: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)32261-3/fulltext (12/28/2020)
[120] MACSICZA, Mark: *Megegyezett a kormány - mindenkit le fognak tesztelni.* In. *Új Szó* <10/18/2020> Access: https://ujszo.com/kozelet/megegyezett-a-kormany-mindenkit-le-fognak-tesztelni (12/28/2020)
[121] SME: *Plošné testovanie na Covid-19.* Access: https://domov.sme.sk/t/8497/celoplosne-testovanie-na-covid-19 (12/28/2020)
[122] Korona.gov.sk: *Celoplošné a plošné testovanie na COVID-19.* Access: https://korona.gov.sk/celoplosne-plosne-testovanie-na-covid-19/ (12/28/2020)
[123] Sputnik V: *General Information.* Access: https://sputnikvaccine.com/about-vaccine/ (12/28/2020)
[124] REUTERS: *Hungary receives 6,000 doses of Russia's COVID-19 vaccine.* <12/28/2020> Access: https://www.reuters.com/article/us-health-coronavirus-hungary-russia/hungary-receives-6000-doses-of-russias-covid-19-vaccine-idUSKBN2921JA?edition-redirect=in (12/30/2020)
[125] The Slovak Spectator: *First person receives COVID vaccine in Slovakia.* <12/26/2020> Access: *https://spectator.sme.sk/c/22562138/vaccines-have-arrived.html* (12/30/2020)
[126] Ministerstvo zdravotníctva Slovenskej republiky: *COVID-19: Registrujeme 10 561 požiadaviek o očkovanie.* <01/04/2021> Access: https://www.health.gov.sk/?covid-19-laboratoria (01/05/2021)
[127] E-VUC: *Výrobcovia humánnych liekov.* Access: https://www.e-vuc.sk/e-vuc/pre-prevadzkovatelov-lekarni/vyrobcovia-humannych-liekov.html?page_id=130227 (01/05/2021)
[128] Slovak Investment And Trade Development Agency: *Pharmaceutical & Life Sciences Sector in Slovakia.* p.4. <10/2020> Access: https://www.sario.sk/sites/default/files/data/sario-pharmaceutical-and-life-sciences-sector-in-slovakia-2017-11-14.pdf (01/06/2021)
[129] Sanofi Pasteur Slovakia. Access: https://www.sanofi.sk/sk (01/08/2021)
[130] REKA, Blerin Dr: „Relevance beyond the crisis: Pandemic geopolitics in the Western Balkans." In: Geopolitical Intelligence services, 14.07.2020., https://www.gisreportsonline.com/relevance-beyond-the-crisis-pandemic-geopolitics-in-the-western-balkans,politics,3243.html (03.12.2020)

[131] BURDEAU, Cain:„Eastern Europe Struggles to Contain Virus and Protests." In: Courthouse News Service, 09.07.2020., https://www.courthousenews.com/eastern-europe-struggles-to-contain-virus-and-protests/ (07.12.2020)
[132] „Thousands join anti-government protest in Serbian capital." In: Reuters, 11.07.2020., https://www.reuters.com/article/us-health-coronavirus-serbia-protests/thousands-join-anti-government-protest-in-serbian-capital-idUSKCN24C0TR (12.12.2020)
[133] AFP: „'Catastrophic': Balkan healthcare overwhelmed by virus surge." In: Bangkok Post, 29.11.2020., https://www.bangkokpost.com/world/2027215/catastrophic-balkan-healthcare-overwhelmed-by-virus-surge (12.12.2020)
[134] Commitment agreements As of 15 December 2020, the following countries have signed commitment agreements to the COVAX Facility, 15.12.2020., https://www.gavi.org/sites/default/files/covid/pr/COVAX_CA_COIP_List_COVAX_PR_15-12.pdf (17.12.2020)
[135] Gavi Alliance About: https://www.gavi.org/our-alliance/about (13.12.2020)
[136] Coalition for Epidemic Preparedness Innovations (CEPI), https://cepi.net/, (13.12.2020)
[137] HASSOUN, Nicole: „What is COVAX and why does it matter for getting vaccines to developing nations?" In: The Conversation, 02.10.2020., https://theconversation.com/what-is-covax-and-why-does-it-matter-for-getting-vaccines-to-developing-nations-146284 (12.12.2020)
[138] VLADISAVLJEVIC, Anja, BAMI, Xhorxhina, MARUSIC, Sinisa Jakov, KAJOSEVIC, Samir, KOVACEVIC, Danijel Kovacevic, BARBERÁ, Marcel Gascón, TODOROV, Svetoslav, DRAGOJLO, Sasa: „Balkan States Race to Secure COVID-19 Vaccine Supplies.", In: Balkan Insight, 16.12.2020., https://balkaninsight.com/2020/12/16/balkan-states-race-to-secure-covid-vaccine-supplies/ (20.12.2020)
[139] Ibid.
[140] OZTURK, Talha: "Serbia: Europe's 2nd-fastest COVID-19 vaccine rollout. Media outlets describe President Aleksandar Vucic as 'Robin Hood' of COVID-19 jabs.". In: Anadolu Agency, 28.01.2021., https://www.aa.com.tr/en/europe/serbia-europes-2nd-fastest-covid-19-vaccine-rollout/2126629 (29.01.2021)
[141] „Serbia is only Balkan nation to have started inoculating its citizens." In: Euronews, 07.01.2021., https://www.euronews.com/2021/01/07/serbia-is-only-balkan-nation-to-have-started-inoculating-its-citizens (07.01.2021)
[142] „State of the Union Address by President von der Leyen at the European Parliament Plenary." 16.09.2020., https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_20_1655 (13.12.2020)
[143] „EU increases its contribution to COVAX to €500 million to secure COVID-19 vaccines for low and middle-income countries." 12.11.2020., https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2075 (13.12.2020)
[144] „Commission adopts €70 million package for early access to EU COVID-19 vaccines in the Western Balkans.", 28.12.2020., https://ec.europa.eu/commission/presscorner/detail/en/IP_20_2539 (04.01.2021)
[145] „What are the vaccination plans of Western Balkan countries in 2021?" In: European Western Balkans, 20.12.2020., https://europeanwesternbalkans.com/2020/12/30/what-are-the-vaccination-plans-of-western-balkan-countries-in-2021/ (31.12.2020)
[146] DORDEVIC, Nikola: „Western Balkans to get coronavirus vaccine, courtesy of EU." In: Emerging Europe, 28.12.2020., https://emerging-europe.com/news/western-balkans-to-get-coronavirus-vaccine-courtesy-of-eu/ (02.01.2021)
[147]„Serbia has started vaccination against coronavirus." In: European Western Balkans, 24.12.2020., https://europeanwesternbalkans.com/2020/12/24/serbia-has-started-vaccination-against-coronavirus/ (27.12.2020)

[148]„Serbia is only Balkan nation to have started inoculating its citizens." In: Euronews, 07.01.2021., https://www.euronews.com/2021/01/07/serbia-is-only-balkan-nation-to-have-started-inoculating-its-citizens (07.01.2021)
[149]„Serbia launches platform for citizens to apply for vaccination.", In: N1, 10.01.2021., https://rs.n1info.com/english/news/serbia-launches-platform-for-citizens-to-apply-for-vaccination/ (10.01.2021)
[150] „Jut vakcina a migránsoknak is: Szerbiában három szakaszban oltanak, a migránsok a harmadik szakaszban kerülnek sorra." In: Balk Magazin, 11.01.2021., https://balk.hu/sr/2021/01/11/oltas-jut-vakcina-a-migransoknak-is-szerbiaban-harom-szakaszban-oltanak-a-migransok-a-harmadik-szakaszban-kerulnek-sorra/ (11.01.2021)
[151] DORDEVIC, Nikola: „Western Balkans to get coronavirus vaccine, courtesy of EU." In: Emerging Europe, 28.12.2020., https://emerging-europe.com/news/western-balkans-to-get-coronavirus-vaccine-courtesy-of-eu/ (02.01.2021)
[152] „COVID-19 vaccination doses administered per 100 people, Jan 14, 2021.", In: Our World in Data, 14.01.2021., https://ourworldindata.org/covid-vaccinations?country=ROU~BGR~SRB~ALB~MKD~MDA (14.01.2021)
[153] „Serbia to launch vaccination with Russia's Sputnik V on Jan. 5." In: TASS, 04.01.2021., https://tass.com/society/1242193 (04.01.2021)
[154] DUROVIC, Jovana: "Vakcinacija u Srbiji: „Otpor prema nepoznatom i nepoverenje u državu." („Vaccination in Serbia: "Resistance to the Unknown and Distrust in the State."), In: Glas Amerike (VOA), 08.01.2021., https://www.glasamerike.net/a/vakcinacija-u-srbiji-otpor-prema-nepoznatom-i-nepoverenje-u-dr%C5%BEavu-/5730339.html (29.01.2021)
[155] „Serbia Gets First Batch of Russia's Sputnik V for Vaccinating Citizens Against COVID-19.", In: Sputniknews, 30.12.2020., https://sputniknews.com/world/202012301081612197-serbia-gets-first-batch-of-russias-sputnik-v-for-vaccinating-citizens-against-covid-19/ (31.12.2020)
[156] „RDIF to supply 2 million doses of Sputnik V vaccine to Serbia.", In: Sputnik V vaccine official portal, 06.01.2021., https://sputnikvaccine.com/newsroom/pressreleases/rdif-to-supply-2-million-doses-of-sputnik-v-vaccine-to-serbia/ (06.01.2021)
[157] „Serbia receives one million doses of Chinese Sinopharm COVID-19 vaccine." In: Official site of The Government of the Republic of Serbia, 16.01.2021. https://www.srbija.gov.rs/vest/en/166281/serbia-receives-one-million-doses-of-chinese-sinopharm-covid-19-vaccine.php (16.01.2017)
[158] „More than 110 vaccination points throughout Serbia from tomorrow." In: Official site of The Government of the Republic of Serbia, 07.01.2021., https://www.srbija.gov.rs/vest/en/165954/more-than-110-vaccination-points-throughout-serbia-from-tomorrow.php (13.01.2021)
[159] MARICA, Irina: „COVID-19: Romania receives first batch of Moderna vaccines.", In: Romania Insider, 13.01.2021., https://www.romania-insider.com/first-moderna-vaccines-romania (14.01.2021)
[160] „COVID-19 vaccination kicks off in Central, Eastern Europe.", In: Balkan Insight, 28.12.2020., KICKS OFF IN CENTRAL, EASTERN EUROPE https://balkaninsight.com/2020/12/28/covid-19-vaccination-kicks-off-in-central-eastern-europe/ (30.12.2020)
[161] ZAY, Éva: „Romania gets another 150,000 COVID-19 vaccines", In: Transylvania now, 11.01.2021., https://transylvanianow.com/new-batch-of-covid-19-vaccines-arrived-in-romania/ (12.01.2021)
[162] „The fourth tranche of vaccine, 150,150 doses, distributed in the country", In: Official COVID-19 site of Romania, 11.01.2021., https://vaccinare-covid.gov.ro/a-patra-transa-de-vaccin-150-150-doze-distribuita-in-tara/ (12.01.2021)
[163] CHIRILEASA, Andrei: „Romania starts anti-COVID vaccination campaign.", In: Romania Insider, 28.12.2020., https://www.romania-insider.com/romania-first-vaccines-anti-covid (29.12.2020)

[164] TIDEY, Alice: „Coronavirus: Which European country is fastest at rolling out the vaccine?", In: Euronews, 04.01.2021., https://www.euronews.com/2021/01/03/coronavirus-which-european-country-is-fastest-at-rolling-out-the-vaccine (05.01.2021)
[165] „COVID-19 vaccination doses administered per 100 people, Jan 15, 2021" In: Our World in Data, 15.01.2021., https://ourworldindata.org/covid-vaccinations?country=ROU~BGR~SRB (15.01.2021)
[166] „The Moderna Vaccine arrives in Romania." In: Official COVID-19 site of Romania, 12.01.2021., https://vaccinare-covid.gov.ro/vaccinul-moderna-ajunge-in-romania/ (12.01.2021)
[167] VASILE, Roxana: "Second vaccine to arrive in Romania." In: Radio Romania International, 12.01.2021., https://www.rri.ro/en_gb/second_vaccine_to_arrive_in_romania-2629891 (29.01.2021)
[168] TANAS, Alexander: „Romanian president donates 200,000 Pfizer vaccine doses to Moldova.", In: Reuters, 29.12.2020., https://www.reuters.com/article/us-moldova-romania/romanian-president-donates-200000-pfizer-vaccine-doses-to-moldova-idUSKBN2931A2 (30.12.2020)
[169] MESEZNIKOV, Grigorij: „Maia Sandu's Undisputable Victory.", In: Visegrad Insight, 23.12.2020., https://visegradinsight.eu/moldova-maia-sandus-undisputable-victory/ (02.01.2021)
[170] „President Dodon expects Moldova to receive Russian vaccine soon.", In: TASS Russian News Agency, 05.12.2020., https://tass.com/world/1231695 (10.01.2021)
[171] „Moldova to begin to inoculate residents against coronavirus in February.", In: TASS Russian News Agency, 11.01.2021., https://tass.com/world/1243557 (13.01.2021)
[172] „Moldova to begin to inoculate residents against coronavirus in February.", In: TASS Russian News Agency, 11.01.2021., https://tass.com/world/1243557 (13.01.2021)
[173] „Sandu said that Moldova is not against vaccination of Transnistrian residents with "Sputnik V"." In TASS Russian News Agency, 16.01.2021., https://tass.ru/obschestvo/10476435 (16.01.2021)
[174] „Kuleba against use of Russian COVID-19 vaccine in Ukraine.", In: Ukrinform, 12.01.2021., https://www.ukrinform.net/rubric-polytics/3169388-kuleba-against-use-of-russian-covid19-vaccine-in-ukraine.html (15.01.2021)
[175] HABRICHT, Jarno, PIVEN, Natalia: „Maintained essential services, Ukraine." In: COVID-19 Health System Response Monitor., https://www.covid19healthsystem.org/countries/ukraine/livinghit.aspx?Section=3.3%20Maintaining%20essential%20services&Type=Section (15.01.2021)
[176] „Ukraine seeks 16 million COVID vaccine doses under COVAX scheme.", In: Reuters, 31.12.2020., https://www.reuters.com/article/us-health-coronavirus-ukraine-vaccine-idINKBN29517Y?edition-redirect=in (15.01.2021)
[177] VARENIKOVA, Maria: „In Vaccine Geopolitics, a Great Game Played With Ukrainians' Health.", In: The New York Times, 09.01.2021., https://www.nytimes.com/2021/01/09/world/europe/covid-vaccines-ukraine.html (14.01.2021)
[178] „EU gets vaccine boost as WHO dampens herd immunity hopes." In: Euractiv, 13.01.2021., https://www.euractiv.com/section/health-consumers/news/eu-gets-vaccine-boost-as-who-dampens-herd-immunity-hopes/ (14.01.2021)
[179] „EU member states, including Latvia, urge vaccine help for eastern neighbors.", In: The Baltic Times, 06.01.2021.,https://www.baltictimes.com/eu_member_states__including_latvia__urge_vaccine_help_for_eastern_neighbors/ (14.01.2021)
[180] POLITYUK, Pacel, ZHEGULEV, Ilya: „Ukrainian firm applies to make Russia's COVID-19 vaccine, sparking political dilemma." In: Reuters, 06.01.2021., https://www.reuters.com/article/health-coronavirus-ukraine-russia/ukrainian-firm-applies-to-make-russias-covid-19-vaccine-sparking-political-dilemma-idINL8N2JH1BU?edition-redirect=in (12.01.2021)
[181] https://biolik.com.ua/
[182] „Харківська «Біолік» подала на реєстрацію в Україні російської «Спутник V»." („Kharkiv's Biolik applies for registration of Russian Sputnik V in Ukraine".), In: Ukrinform, 05.01.2021.,

https://www.ukrinform.ua/rubric-society/3166438-harkivska-biolik-podala-na-reestraciu-v-ukraini-rosijskoi-sputnik-v.html (14.01.2021)
[183]Information message regarding the Sputnik V production by Biolik, 08.12.2020., https://biolik.com.ua/informpovidomlennya/ (14.01.2021)
[184] "COVID-19: Poland to provide Ukraine with 1.5 million doses of the vaccine.", In: Poland In, 30.12.2020., https://polandin.com/51575747/covid19-poland-to-provide-ukraine-with-15-million-doses-of-the-vaccine (29.01.2021)
[185] Ibid.
[186] „Poland 'a potential intermediary in vaccine deliveries to Ukraine': official." In: Poland In, 21.12.2020., https://polandin.com/51434864/poland-a-potential-intermediary-in-vaccine-deliveries-to-ukraine-official (17.01.2021)
[187] BALAZS-TURP, Craig: „The EU needs to up its vaccine diplomacy game.", In: Emerging Europe, 30.12.2020., https://emerging-europe.com/from-the-editor/the-eu-needs-to-up-its-vaccine-diplomacy-game/ (31.12.2020)
[188] AHMED, Abiy: If Covid-19 is not beaten in Africa it will return to haunt us all. In: Financial Times, 2020. 03. 25., https://www.ft.com/content/c12a09c8-6db6-11ea-89df-41bea055720b?fbclid=IwAR1J3jw3ZtpsYhKKy_4DxYb0lKFmbUWOCUqeto_Q7giurKJtpiXZMZb3Xfk (2021.01.12.)
[189] LEVISON, Matthew E.: COVID-19 Challenges in Developing Countries. In: MSD Manual, 2020. 08. 07., https://www.msdmanuals.com/home/news/editorial/2020/07/08/20/55/covid-19-challenges-in-the-developing-world (2021.01.12.)
[190] Ibid.
[191] AHMED.
[192] ALAOUI, Sarah: How WHO connects the links in the Covid-19 supply chain. In: UN Foundation, 2020. 05. 07., https://unfoundation.org/blog/post/how-who-connects-links-covid-19-supply-chain/ (2021.01.12.)
[193] BERKELEY, Seth: COVAX explained. In: Gavi, 2020. 09. 03., https://www.gavi.org/vaccineswork/covax-explained (2021.01.13.)
[194] Access to COVID-19 tools funding commitment tracker. In: WHO, 2020. 12. 23., https://www.who.int/publications/m/item/access-to-covid-19-tools-tracker (2021.01.26.)
[195] U.S. to Participate in WHO's COVAX Initiative Under Biden Presidency. In: FDA News, 2021. 01. 21., https://www.fdanews.com/articles/200975-us-to-participate-in-whos-covax-initiative-under-biden-presidency?v=preview (2021.01.29.)
[196] COVAX Announces additional deals to access promising COVID-19 vaccine candidates; plans global rollout starting Q1 2021. In: WHO, 2020. 12. 18., https://www.who.int/news/item/18-12-2020-covax-announces-additional-deals-to-access-promising-covid-19-vaccine-candidates-plans-global-rollout-starting-q1-2021 (2021.01.13.)
[197] The COVID-19 vaccine candidate landscape. In: WHO, 2021. 01. 26., https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines (2021.01.28.)
[198] SO, Anthony; WOO, Joshua: Reserving coronavirus disease 2019 vaccines for global access: cross sectional analysis. In: BMJ, 2020. 12. 15., https://www.bmj.com/content/371/bmj.m4750 (2021.01.13.)
[199] Coronavirus: Vaccine supply fears grow amid EU export threat. In: BBC, 2021.01.27., https://www.bbc.com/news/world-europe-55805903 (2021.01.29.)
[200] COVID-19 Vaccine Market Dashboard. In: UNICEF, 2021. 01. 14., https://www.unicef.org/supply/covid-19-vaccine-market-dashboard (2021.01.29.)
[201] TERRY, Mark: Comparing COVID-19 Vaccines: Timelines, Types and Prices. In: BioSpace, 2021. 01. 13., https://www.biospace.com/article/comparing-covid-19-vaccines-pfizer-biontech-moderna-astrazeneca-oxford-j-and-j-russia-s-sputnik-v/ (2021.01.15.)

[202] TAN, Yvette: What do we know about China's coronavirus vaccines? In: BBC, 2021. 01. 14., https://www.bbc.com/news/world-asia-china-55212787 (2021.01.15.)
[203] The COVID-19 vaccine candidate landscape. In: WHO, 2021. 01. 26., https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines (2021.01.28.)
[204] MULLARD, Asher: How COVID vaccines are being divvied up around the world. In: Nature, 2020. 11. 30., https://www.nature.com/articles/d41586-020-03370-6 (2021.01.15.)
[205] COVID-19 Vaccine Market Dashboard.
[206] SO; WOO.
[207] COVID-19 Vaccine Market Dashboard.
[208] Campaigners warn that 9 out of 10 people in poor countries are set to miss out on COVID-19 vaccine next year. In: Oxfam International, 2020. 12. 09., https://www.oxfam.org/en/press-releases/campaigners-warn-9-out-10-people-poor-countries-are-set-miss-out-covid-19-vaccine (2021.01.15.)
[209] MULLARD.
[210] Campaigners warn […].
[211] Will Low-Income Countries Be Left Behind When COVID-19 Vaccines Arrive? In: Duke Global Health Institute, 2020. 11. 09., https://globalhealth.duke.edu/news/will-low-income-countries-be-left-behind-when-covid-19-vaccines-arrive (2021.01.15.)
[212] Why a pioneering plan to distribute COVID vaccines equitably must succeed. In: Nature, 2021. 01. 13., https://www.nature.com/articles/d41586-021-00044-9 (2021.01.16.)
[213] The COVAX Facility. In: WHO, https://www.who.int/docs/default-source/coronaviruse/act-accelerator/covax-facility-background.pdf?sfvrsn=810d3c22_2 (2021.01.16.)
[214] COVID-19: UNCTAD warns of 'lost decade' if countries adopt austerity. In: UNCTAD, 2020. 09. 21., https://unctad.org/news/covid-19-unctad-warns-lost-decade-if-countries-adopt-austerity (2021.01.17.)
[215] SCHWAB, Jeremy: "Fighting COVID-19 could cost 500 times as much as pandemic prevention measures". In: World Economic Forum, 3rd August 2020., https://www.weforum.org/agenda/2020/08/pandemic-fight-costs-500x-more-than-preventing-one-futurity/ (2021.01.25.)
[216] Ibid.
[217] International Day for Epidemic Preparedness: speech of WHO Director-General Dr. Tedros Adhanom Ghebreyesus, 2020.12.26., https://youtu.be/sMnhWcptYp8 (2021.01.21.)
[218] Worldometer statistics, https://www.worldometers.info/coronavirus/ (2021.01.25.)
[219] Lawrence; JAMES Wilmot; GEORGE Dylan; NIKKARI, Simo; GOZZER, Ernesto; TOMORI, Oyewale; MAKUMBI, Issa; NUZZO, B Jennifer: „The value proposition of the Global Health Security Index". In: BMJ Global Health, 8th October 2020, https://gh.bmj.com/content/5/10/e003648 (2021.01.22.)
[220] 2019 Global Health Security Index, https://www.ghsindex.org/ (2021.01.24.)
[221] Ibid.
[222] Ibid.
[223] COCO, Antonio; DIAS, de Souza Talita: "Prevent, Respond, Cooperate. States' Due Diligence Duties vis-à-vis the covid-19 Pandemic." In: Journal of International Humanitarian Legal Studies. 9 December 2020. Volume 11, Issue 2. https://brill.com/view/journals/ihls/aop/article-10.1163-18781527-01102001/article-10.1163-18781527-01102001.xml (2021.01.22.)
[224] Ibid.
[225] Ibid.
[226] Ibid.
[227] Ibid.
[228] "Implications of COVID-19 on food and agriculture in Europe and Central Asia and actions taken by FAO" (Последствия COVID-19 для производства продовольствия и ведения сельского хозяйства в Европе и Центральной Азии и предпринятые ФАО меры). In: Food and Agriculture Organization

(FAO), Regional FAO Conference on Europe. 2-4 November 2020. http://www.fao.org/3/ne001ru/ne001ru.pdf (2021.01.22.)
[229] Ibid.
[230] BOWLES, Jerry: "How Canadian AI start-up BlueDot spotted Coronavirus before anyone else had a clue". In: Diginomica, 10 March 2020, https://diginomica.com/how-canadian-ai-start-bluedot-spotted-coronavirus-anyone-else-had-clue (2021.01.25.)
[231] Ibid.
[232] HEAVEN, Will Douglas: "AI could help with the next pandemic—but not with this one". In: MIT Technology Review, 2020.03.12., https://www.technologyreview.com/2020/03/12/905352/ai-could-help-with-the-next-pandemicbut-not-with-this-one/ (2021.01.24.)
[233] "Coronavirus: UK pledges £500m to global vaccine-sharing scheme". In: BBC, 2020.09.26., https://www.bbc.com/news/health-54303061 (2021.01.21.)
[234] Ibid.