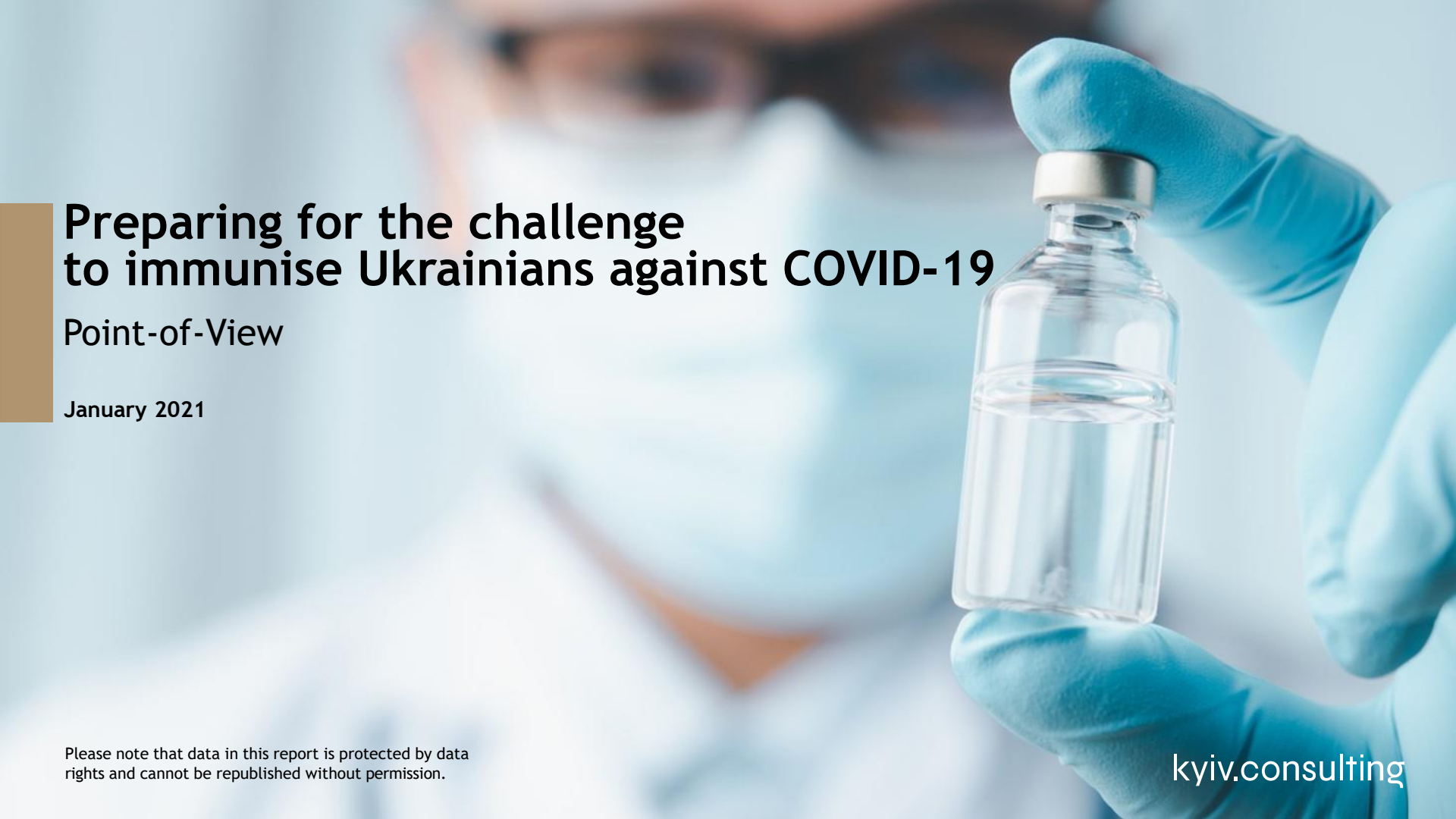
Preparing for the challenge to immunise Ukrainians against COVID-19

Point-of-View

January 2021



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27 January 2021

Dear Ukrainians

It is a great honour for the consultants team of Kyiv Strategy Consulting LLC in Kyiv to share with you our piece of work regarding the vaccination against COVID-19 in Ukraine. This document is designed to give you insights regarding the COVID-19 situation in Ukraine, vaccination challenges that may arise (beginning from the vaccination purchase and ending with the vaccination itself), as well as our understanding of possibilities how Ukraine can overcome these challenges and conduct the vaccination process effectively and quickly.

We understand that in these especially difficult times of COVID-19 crisis it is extremely important to support and take care of each other. That is why we are delivering this Point-of-View to you as a gift ‘Pro Bono’ work for the intellectual discussion.

This Point-of-View is provided by BDO AG (Germany) via its Ukrainian subsidiary ‘Kyiv Strategy Consulting LLC’ based in Kyiv. BDO AG Wirtschaftsprüfungsgesellschaft, a German company limited by shares, is a member of BDO International Limited, a UK company limited by guarantee, and forms part of the international BDO network of independent member firms.

Best regards,

Nicolai B. Kiskalt
Equity Partner BDO Germany,
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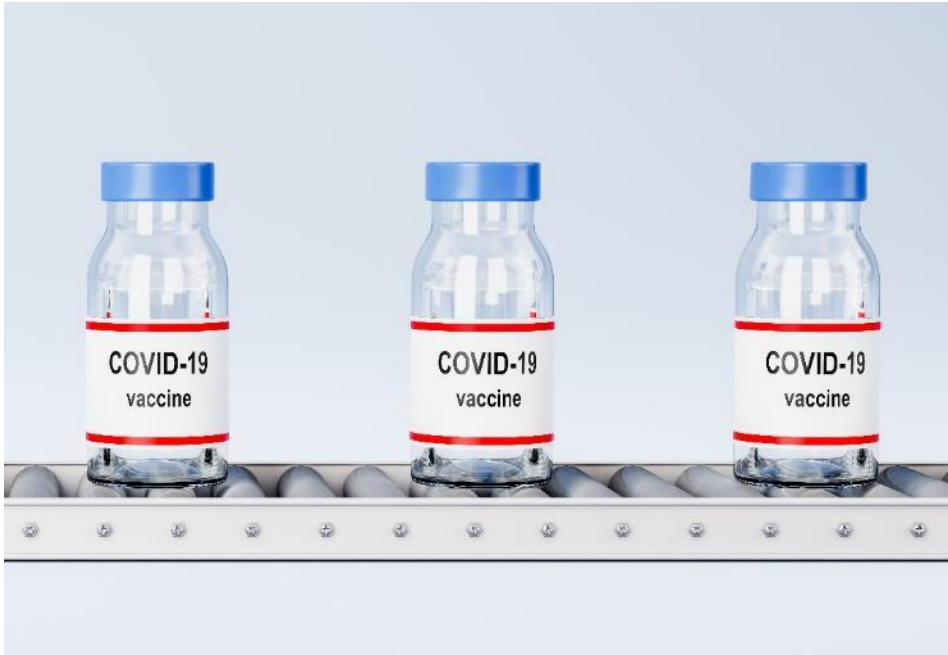

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The spread of the COVID-19 pandemic in Ukraine has resulted in both direct and indirect victims

The COVID-19 pandemic in Ukraine started from:

- **Travellers** (not only foreigners) that came to Ukraine after being abroad
- People that **worked abroad** (mainly in the EU) and **returned to Ukraine**
- People that **violated self-isolation** measures when being ill or having contacted people with COVID-19

Factors that contributed to the spread of the virus:

- **Lack of** anti-pandemic **discipline**
- Children, young people, and people without symptoms that are **silent spreaders**
- **Low level of testing**, especially at the beginning of the pandemic and in small cities and regions
- **Heavy burden** on the healthcare system

Victims

People diagnosed with COVID-19 that **die under medical observation**

People that die from other causes than COVID-19 due to time-consuming patients diagnosed with COVID-19 that are **blocking intensive care beds** and require other resources such as medical staff

People that die due to unknown consequences as the **long-term effect of COVID-19 is not clear yet**

Source: Media overview

In Ukraine, there are two human archetypes who spread the COVID-19 virus and two others who suffer from it

Spreading → Mortality

Silent spreaders	Superspreader (20-40 years old)	Responsible citizen	Elderly people (from 50 years old)
			
▪ People **without symptoms** that do not know they are infected with COVID-19 ▪ **Low-income** population ▪ **Children** and **young** people	▪ A typical **urban person** who **ignores safety measures** ▪ A person who visits public places — restaurants and clubs, as well as travels in Ukraine and abroad	▪ A responsible citizen that **takes precautions** ▪ **Stays at home** if ill not to spread the virus further ▪ **Got infected by two previous archetypes**	▪ **Got visited** by children and grandchildren ▪ Have **illnesses** that weaken the immune system ▪ Need to go to grocery store, pharmacy, hospital

Source: Media overview

More intensive care beds, lung ventilation devices, medical staff, and clear vaccination plan are what Ukraine needs

What Ukraine needs

Intensive care beds (not regular hospital beds)

- The biggest issue is patients who not only need oxygen but also **need intensive care**
- **4.296 intensive care beds** in Ukraine[1]
- In November 2020, bed **occupancy for intensive** care beds was the highest — **3,42**[2]. In April 2020, for example, it was 0,51

Artificial lung ventilation devices, including spare parts and a generator

- Ukraine needs **high-class ventilation devices** with intelligent mode, O_2 and CO_2 control, the possibility of lung recruitability assessment, two-phase ventilation modes, non-invasive ventilation
- **4.386 artificial ventilation devices** in Ukraine[1]

Professionally trained nursing staff available 24/7

- The average medical personnel availability was **77,9%**[3] across 535 hospitals
- The average availability of protective equipment for personnel is **67,21%**[1]
- In November 2020, the **medical team workload was 27 people per team**, while the estimated workload should be 20 people

Plan for vaccine logistics and vaccination process

- A lot of Ukrainians are **not willing to get vaccinated**
- With current vaccine contracts, it will be **not enough to vaccinate even 30% of the population**
- As vaccines require low temperatures, it poses **significant logistics challenges**

Source: National Health Service of Ukraine website; Cabinet of Ministers of Ukraine website; Media overview
Notes: (1) As of 11 January 2021; (2) Occupancy for beds is measured as beds / patients ratio; (3) As of 22 December 2020

The vaccine protects a person by lowering the chances of getting COVID-19, yet the risk of being infected still exists

What the COVID-19 vaccine can do

The vaccine makes a person **resistant to an infection** from the virus or, at least, enables a person who becomes infected to have a shorter course of the disease or **not as many complications**.

Getting vaccinated also might help **protect other people** around from COVID-19, particularly people at increased risk of severe illness from COVID-19.

The vaccines are expected to be **more effective than natural immunity**, however, this is still the area of ongoing research.

The first shot of the vaccine (Pfizer-BioNTech and Moderna vaccines) starts building protection, while **the second shot** is needed to get the most protection the vaccine has to offer.

All approved vaccines are **considered safe**. Like all medicines, vaccines can cause side effects. These symptoms are temporary and are in line with side effects from other vaccines.

What the COVID-19 vaccine cannot do

It is not yet clear how much protection vaccines might give in terms of **stopping people from spreading COVID-19**.

It takes a few weeks for a body to build immunity after getting a COVID-19 vaccination. As a result, **it is possible to become infected** with the virus that causes COVID-19 before or after being vaccinated.

Continuing with precautions such as **mask-wearing and physical distancing** is still important.

Scientists are still studying **the new strains of the virus** (the Kent strain and the South African strain) and how effective the vaccine is against these strains.

In addition to typical vaccination reactions, there may be also **individual cases of sometimes severe side effects** after vaccination, such as allergic shocks.

Source: BBC website; AARP website; Mayo Foundation for Medical Education and Research website; British Heart Foundation website; Centers for Disease Control and Prevention website

Executive summary

	1. Getting the vaccine	2. Transportation & Storage	3. Vaccination of population
Key challenges	Identifying **the most optimal** vaccine option for an **adequate price** and with **appropriate logistics** efficiency **Allocating** a part of **the state budget** to procure additional vaccine batches in case of necessity	**Ensuring safe transportation of the vaccine** from the manufacturer warehouse to vaccination centres in Ukraine Providing **enough storage spaces** for the vaccine, with the **appropriate** storage **equipment** and at the required **temperature** level	Decreasing ability to cover the priority groups in full due to **the lack of proper vaccine storage spaces and conditions** in rural areas Dealing with **no or incorrect awareness** of people about the vaccination aim, process, and effects
Possible solutions	Develop a **differentiated vaccine portfolio**, negotiate **the prices and possible discounts** with vaccine suppliers and delivery service providers Request the COVAX initiative for the opportunity to receive **more batches of vaccines free of charge**, and encourage **large-size business to sponsor** the purchase of vaccine doses	Develop a **detailed transportation plan** taking into account the **successful experience of other countries** in transporting large doses of vaccine Buy **necessary equipment** for the vaccine storage, build **special storage spaces** with all the conditions required	Develop a separate vaccination plan for remote and rural areas involving **social workers** and **mobile vaccination stations** with enough storage space for vaccines **Familiarise** people with the **principles and details** of the vaccination process using **different communication channels,** build trust among the population in the safety of the vaccine for human health

1. Snapshot of COVID-19 across Ukraine

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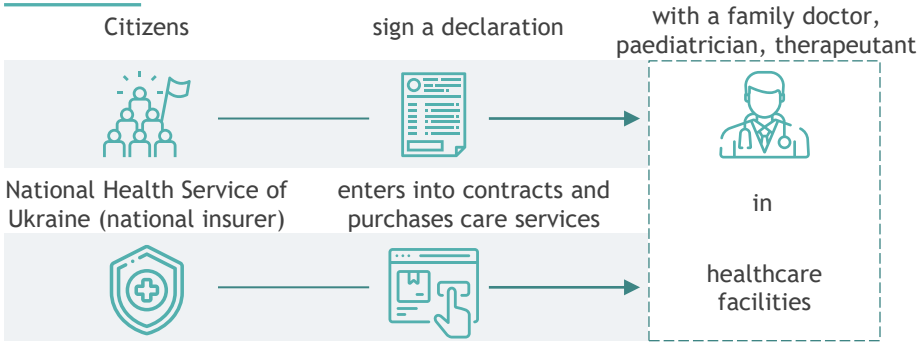
Since 2016, the healthcare system of Ukraine has been undergoing structural changes due to medical reform

Structure of the Ukrainian healthcare system

Cabinet of Ministers of Ukraine
↓
Minister of Healthcare
↓
Ministry of Healthcare → Medical Procurement[2]
↓
National Health Service of Ukraine[1]

How the system works

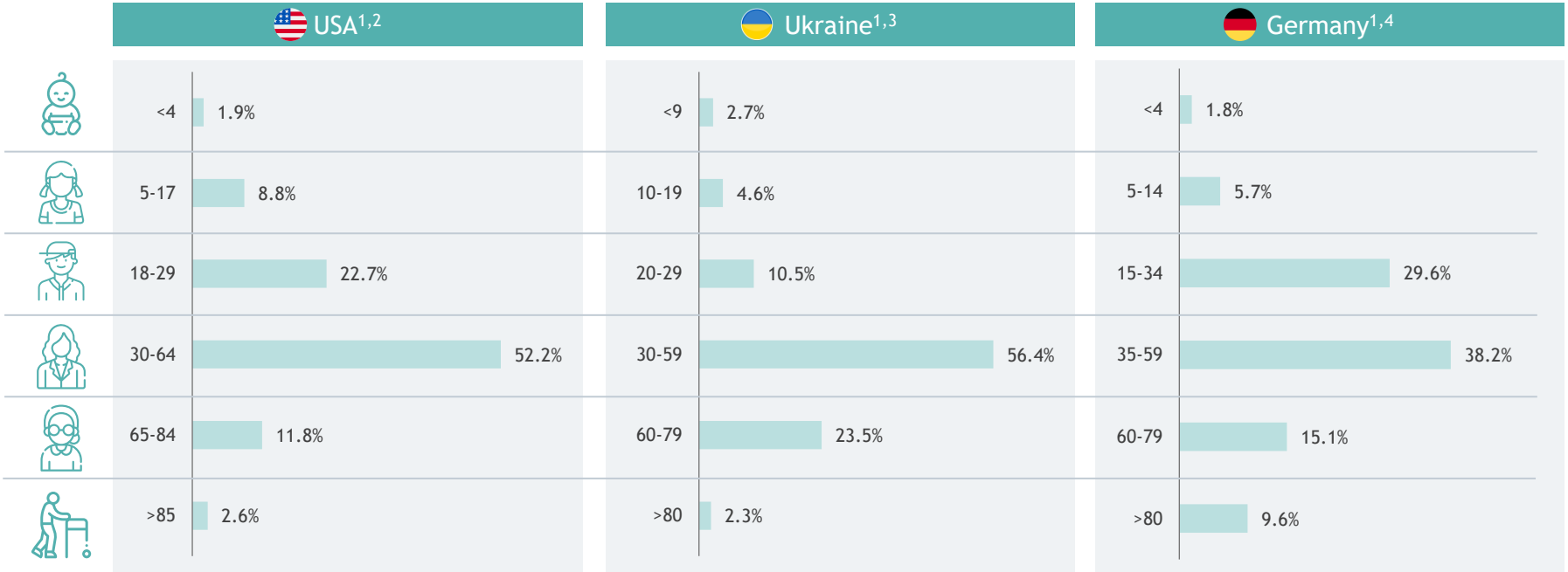


Key data on Ukrainian medical system resources[3]

- 503 hospitals
- 129,7 thousand hospital beds
- 3.011 medical teams
- 4.386 artificial lung ventilation devices
- 66,2 thousand beds allocated for COVID-19 cases
- 55,0 thousand doctors[4]
- 82,3 thousand junior medical staff
- 5.295 anaesthesiologists
- 7.554 infectious disease specialists, therapists, and paediatricians

Source: Ministry of Health of Ukraine website; National Health Service of Ukraine website; Ukrinform website
Notes: (1) Activities of the National Health Service of Ukraine are directed and coordinated by the Cabinet of Ministers of Ukraine through the Minister of Healthcare; (2) State enterprise Medical Procurement was established in 2018 and is responsible for medical procurements. On 13 January 2021, the Cabinet of Ministers of Ukraine appointed Crown Agents Limited as an organisation responsible for purchasing the COVID-19 vaccine for Ukraine; (3) As of 11 January 2021; (4) Total number of doctors, in particular, anaesthesiologists, infectious disease specialists, therapists, and paediatricians

In Ukraine, the population at the age between 30-59 years old comprises around 56% of all infected COVID-19 cases

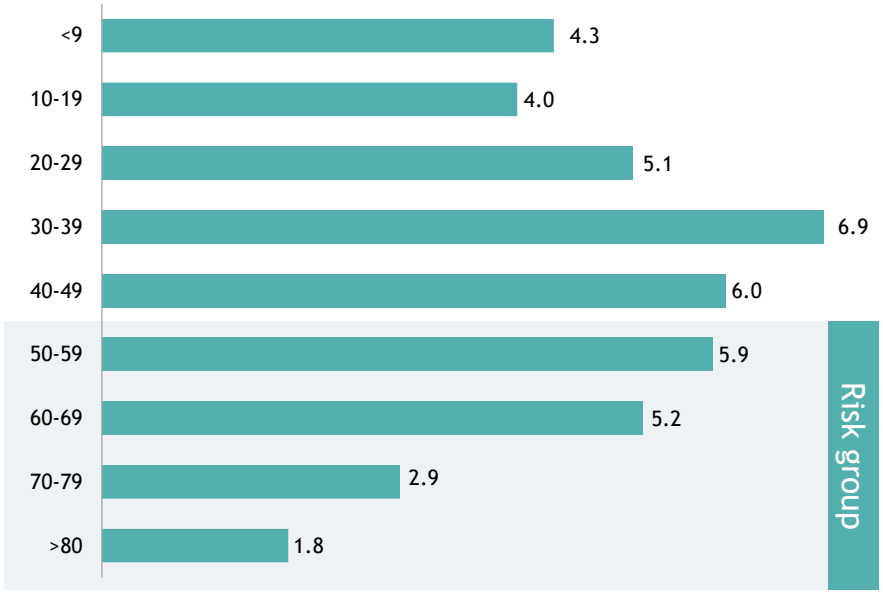


Source: Centers for Disease Control and Prevention website; National Security and Defence Council of Ukraine website; Ministry of Healthcare website; Robert Koch Institut: COVID-19 Dashboard

Notes: (1) Percent of total infected population; (2) As of 10 January 2021; (3) As of 17 October 2020; (4) As of 11 January 2021

Almost 16 million people at the age of 50-80+ years, which is 37% of the Ukrainian population, are in the risk group

Distribution of Ukrainian population by age, millions[1]



~42 million people in Ukraine

72 years average life expectancy[2]

37,4% people are at the age of 50-80+

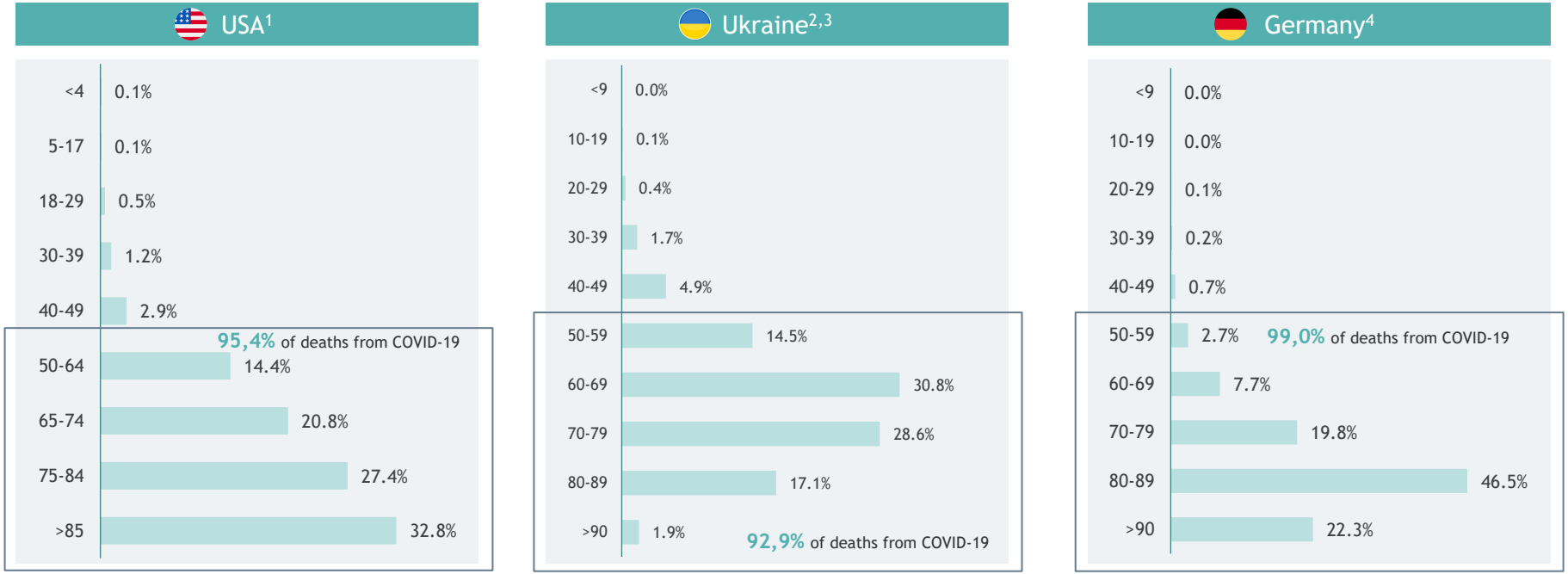
= ~15,7 million people

~2,7% of the population were infected with COVID-19

~0,05% of the population died due to COVID-19

Source: State Statistics Service of Ukraine website; Verkhovna Rada of Ukraine website
Notes: (1) As of January-October 2020; (2) In 2020, according to the United Nations Organisation

Ukraine has a relatively lower COVID-19 death rate among elderly people because of lower average life expectancy

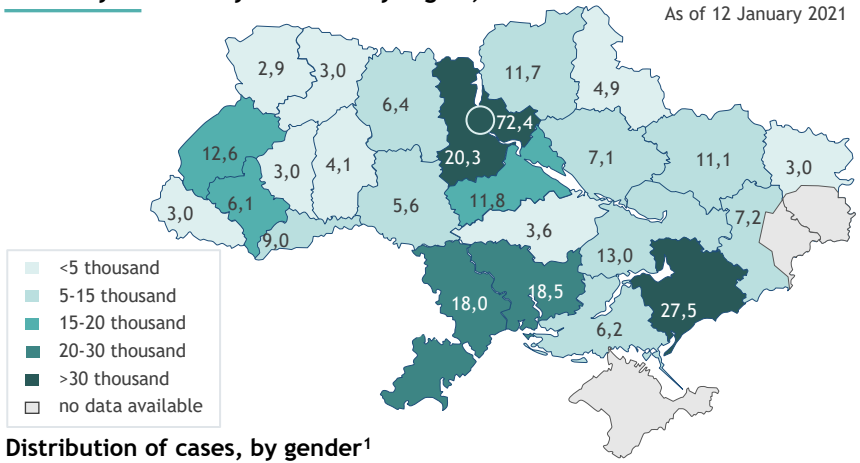


Source: Centers for Disease Control and Prevention website; Ined website — The demography of COVID-19 deaths
Notes: (1) As of 10 January 2021; (2) As of 23 December 2020; (3) For Ukraine, there may be a lack of correct data because elderly people do not often take COVID-19 tests. Besides, as the average life expectancy is 72 years, there is a smaller percentage of the population older than 80 years; (4) As of 5 January 2021

Although the predominant share of women is infected with COVID-19, lethal cases among men constitute 53%

Currently affected by COVID-19 by region, thousands

As of 12 January 2021



Distribution of cases, by gender[1]

As of 12 January 2021

- ~1.124 thousand infected with COVID-19
- ~20 thousand lethal cases
- ~812 thousand recovery cases
- ~292 thousand currently ill
- ~5.733 thousand COVID-19 tests done[2]
- ~131 thousand COVID-19 tests per million people

Source: National Security and Defence Council of Ukraine website; Ministry of Healthcare website; Minfin website; UNICEF — COVID-19: Weekly situation overview — [December 2020]

Notes: (1) Between 9 November and 6 December 2020; (2) As of 12 January 2021, 64,6% of tests were done in state laboratories and 35,4% in private laboratories

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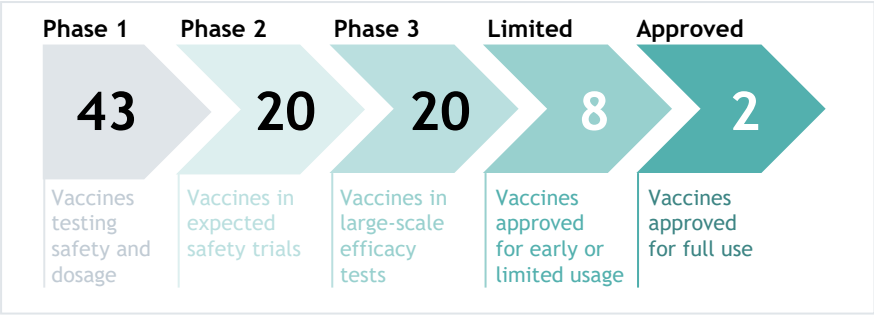
2. COVID-19 vaccines: key facts and options

The rising number of approved vaccines increased the chances to combat the global COVID-19 pandemic faster

COVID-19 vaccine tracker, as of 11 January 2021



Recent updates in COVID-19 vaccine development in the world

- 6/01/2021: The European Union authorises the Moderna vaccine
- 4/01/2021: Israel authorises the Moderna vaccine
- 31/12/2020: The WHO gives emergency validation to Pfizer-BioNTech
- 30/12/2020: The UK authorises the Oxford-AstraZeneca vaccine
- 21/12/2020: The European Union authorises the Pfizer-BioNTech vaccine

29 million
doses of COVID-19 vaccines have been administered in 43 countries around the world[1]

8,1 billion
vaccine doses have been pre-ordered globally as of January 2021

9 doses
of COVID-19 vaccines per person have been pre-ordered by Canada

2023-2024
the indicative period when low-income countries will receive COVID-19 vaccination

1,79 Euro[2]
is the lowest price of the COVID-19 vaccine by British-Swedish AstraZeneca[3]

7,8 billion doses
is a combined predicted manufacturing capacity of COVID-19 vaccines in H1 2021

Source: New York Times — Coronavirus Vaccine Tracker; Bloomberg website; Nature website; UNICEF — COVID-19 Vaccine Market Dashboard
Notes: (1) As of 12 January 2021; (2) Numbers are converted from USD to Euro due to the exchange rate by the ECB as of 28 December 2020; (3) Based on the price for the EU

There are eight vaccines approved for early, limited, or emergency use and two vaccines approved for full use

Vaccine name	Primary developers	Country	Vaccine type	Efficacy	Approval / Limited use
BNT162b2	Pfizer-BioNTech		mRNA-based vaccine	95%	**Approved**: Switzerland, Bahrain, Saudi Arabia **Limited use**[1]: USA, EU, UAE, Canada[2]
mRNA-1273	Moderna-National Institutes of Health		mRNA-based vaccine	94,5%	**Limited use**: Canada, USA, EU, Israel, UK
Sputnik V	Gamaleya Research Institute		Non-replicating viral vector	91,4%	**Limited use**: Russia, Argentina, Belarus, Serbia, Algeria, Bolivia
BBIBP-CorV	Beijing Institute of Biological Products, Sinopharm		Inactivated vaccine	79,3%	**Approved**: China, Bahrain, UAE **Limited use**: Egypt, Jordan, Seychelles
AZD1222	Oxford-AstraZeneca		Non-replicating viral vector	62-90%	**Limited use**: UK, India, Dominican Republic, Morocco, Argentina, Mexico, El Salvador
CoronaVac	Sinovac Biotech		Inactivated vaccine	50,4%[3]	**Limited use**: China, Indonesia
BBIBP-CorV	Wuhan Institute of Biological Products, Sinopharm		Inactivated vaccine	N/A	**Limited use**: China, UAE
Convidecia (Ad5-nCoV)	CanSino Biologics		Non-replicating viral vector	N/A	**Limited use**: China
EpiVacCorona	Vector Institute		Protein	N/A	**Limited use**: Russia
Covaxin	Bharat Biotech		Inactivated vaccine	N/A	**Limited use**: India

Source: New York Times — Coronavirus Vaccine Tracker; Regulatory affairs professionals society website; Bloomberg website
Notes: (1) Early, limited, or emergency use; (2) Also Mexico, Costa Rica, Panama, Chile, Ecuador, Argentina, Singapore, Kuwait; (3) Overall efficacy in the most recent Brazil trial as of 12 January 2021

The growing number of vaccines in development phase 2/3 raises the chances to approve new treatment in early 2021

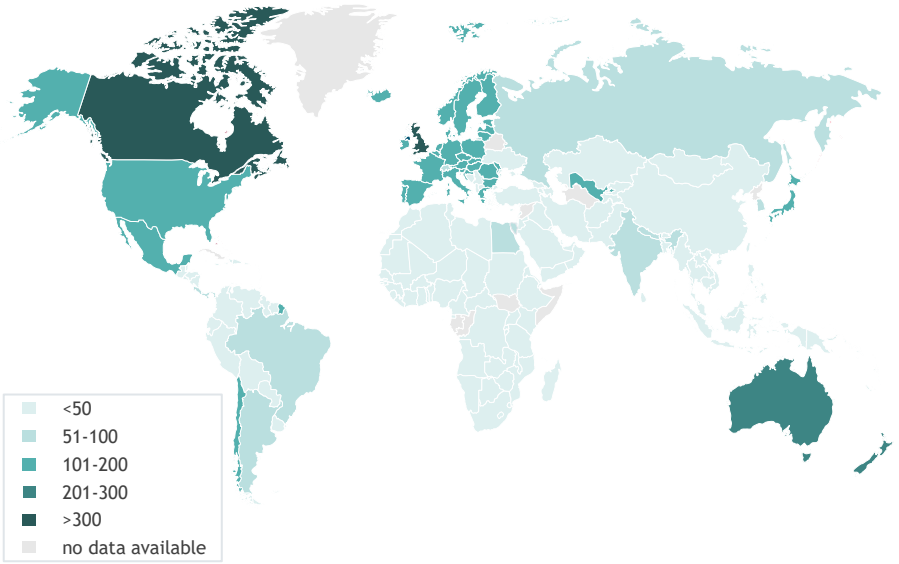
Selected COVID-19 vaccines in development

Vaccine name	Trial phase	Primary developers	Country	Vaccine type
JNJ-78436735 (Ad26.COV2.S)	3	Johnson & Johnson		Non-replicating viral vector
NVX-CoV2373	3	Novavax		Protein
Bacillus Calmette-Guerin (BCG) vaccine	3	University of Melbourne and Murdoch Children's Research Institute, Radboud University Medical Centre, Faustman Lab at Massachusetts General Hospital		Live-attenuated vaccine
CVnCoV	3	CureVac		mRNA-based vaccine
ZF2001 (RBD-Dimer)	3	Anhui Zhifei Longcom and the Chinese Academy of Medical Sciences		Protein
CoVLP	2/3	Medicago and GSK		Plant-derived virus-like particle
AG0302-COVID19	2/3	Japanese biotechnology company AnGes in partnership with Osaka University and Takara Bio		DNA vaccine
INO-4800	2	Centre for Pharmaceutical Research, University of Pennsylvania		DNA vaccine

 Source: New York Times — Coronavirus Vaccine Tracker; Regulatory affairs professionals society website

Countries that are top vaccine recipients have at least six different types of vaccines in their purchasing portfolios

Global map of vaccine contracts, % of population covered[1]

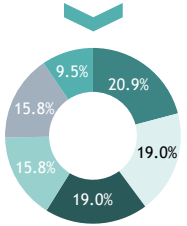


Top-5 countries by number of people covered with vaccine against COVID-19[1]

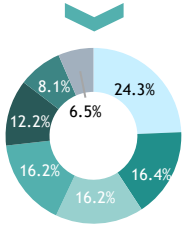
Country	People covered, as % of population
Canada	303,5%
UK	302,2%
New Zealand	246,8%
Australia	229,9%
Germany	183,5%

Top-3 largest vaccines recipient countries (supply agreements)[1,2]

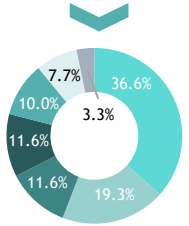
USA
~3,2 billion
vaccine doses pre-ordered



EU
~2,5 billion
vaccine doses pre-ordered



UK
~519 million
vaccine doses pre-ordered



Source: Bloomberg website; UNICEF — COVID-19 Vaccine Market Dashboard
Notes: (1) As of 12 January 2021; (2) COVAX programme is excluded

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More than 1,8 billion doses of Pfizer-BioNTech vaccine are already pre-ordered worldwide with the USA as the leader

Key data about Pfizer-BioNTech vaccine

Vaccine name	BNT162b2
Vaccine type	mRNA-based vaccine
Doses	2
Efficacy	95%
Days before full immunity	28
Storage terms	▪ -70°C1 ▪ Can be kept for 5 days at standard refrigeration
Price[2]	14,0 Euro per dose[3]
Manufacturing capacity, 2020	50 million doses
Manufacturing capacity, 2021	1,3 billion doses

Number of vaccines ordered by selected countries

- Ordered **600 million doses**
- Ordered **600 million doses**
- Ordered **120 million doses**
- Ordered **100 million doses**

- The Pfizer-BioNTech vaccine is recommended for people **aged 16 years and older**
- The most commonly reported **side effects** are pain at the injection site, tiredness, headache, muscle pain, chills, joint pain, and fever
- There were **five reported cases of an allergic reaction** to the vaccine in the UK and the USA, so Pfizer's vaccine may be contraindicated for people with allergies
- In Portugal, a healthcare worker died after 48 hours after getting the Pfizer vaccine jab
- Recent studies showed that the Pfizer-BioNTech vaccine can be effective against key mutation that has emerged in two new variants of coronavirus
- Israel plans **sharing data with Pfizer** in exchange for COVID-19 vaccine doses

Source: Bloomberg website; Statista website; US food & drug administration website; Forbes website; UK Government website; BBC website; UNICEF — COVID-19 Vaccine Market Dashboard; Media overview
Notes: (1) It can be stored for up to 15 days in a thermal shipping box with dry ice; (2) Median price; (3) Numbers are converted from USD to Euro due to the exchange rate by the ECB as of 28 December 2020

Moderna vaccine showed lower efficacy than Pfizer, but its logistics is easier due to higher temperature storage terms

Key data about Moderna-National Institutes of Health vaccine

Vaccine name	mRNA-1273
Vaccine type	mRNA-based vaccine
Doses	2
Efficacy	94,5%
Days before full immunity	28
Storage terms	▪ Between -2°C and -8°C for 30 days ▪ -20°C for up to six months
Price[1]	20,5 Euro per dose[2]
Manufacturing capacity, 2020	20 million doses
Manufacturing capacity, 2021	1,0 billion doses

Number of vaccines ordered by selected countries

- Ordered **500 million doses.** As of 4 January 2021, Moderna has supplied the USA with 18 million doses
- Ordered **160 million doses** that will be delivered between the first and the fourth quarters of 2021
- Ordered **100 million doses**
- Ordered **56 million doses** to vaccinate all willing population by the end of September 2021

- The Moderna vaccine is recommended for the prevention of COVID-19 disease for individuals **18 years of age and older**
- The commonly reported **side effects** are pain at the injection site, tiredness, headache, muscle pain, chills, joint pain, swollen lymph nodes in the same arm as the injection, nausea with vomiting, and fever
- On 2 December 2020, Moderna registered **a trial to test the vaccine on adolescents** between 12-18 years old
- On 24 December 2020, **Canada received the first shipment** of the vaccine
- On 8 January 2021, the Moderna vaccine was **approved in the UK**
- On 11 January 2021, **distribution** of the first doses of the Moderna vaccine **started in the EU** (in the Netherlands, France, and Germany)

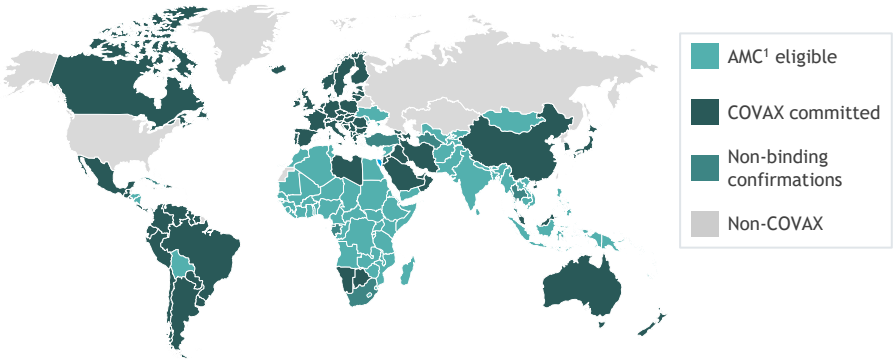
Source: Bloomberg website; Statista website; Centers for Disease Control and Prevention; CTV News website; New York Times — Coronavirus Vaccine Tracker; UNICEF — COVID-19 Vaccine Market Dashboard

Notes: (1) Median price; (2) Numbers are converted from USD to Euro due to the exchange rate by the ECB as of 28 December 2020

3. Vaccine transportation process in Ukraine

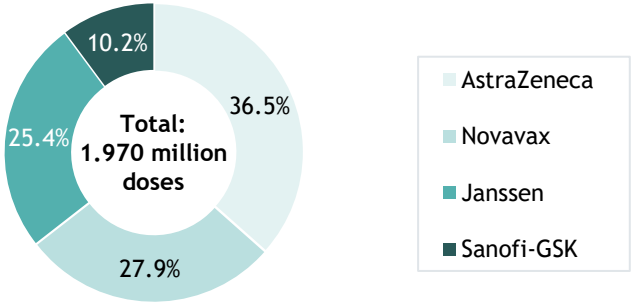
COVAX is a part of the WHO programme developed with the aim to ensure global equitable access to COVID-19 vaccines

COVAX coverage by country as of 11 December 2020



High-income countries have committed funding to COVAX, allowing low- and middle-income countries eligible through the AMC to be covered as funded countries. Non-binding confirmations represent those who have confirmed interest but have not made a binding financial commitment. Some of the countries, including Russia and the USA, have refused to participate in the COVAX initiative or to use the facility to secure their own vaccines.

COVAX agreements with COVID-19 vaccine developers, million doses[2]



Goals of COVAX

Doses for **at least 20%** of countries' populations

2 billion doses of vaccine delivered by the end of 2021

92 middle- and lower-income countries that cannot fully afford to pay for vaccines get equal access to them

5% of available doses will be kept aside to help with acute outbreaks and support humanitarian organisations

Source: UNICEF website; Gavi, The Vaccine Alliance website; Duke Global Health Innovation Center website
Notes: (1) Advance Market Commitment; (2) The COVAX supply assumes an even split of the 1,1 billion AstraZeneca or Novavax doses (200 million secured and options for up to 900 million more) manufactured by Serum Institute of India for the COVAX facility

COVAX officially approved the free of charge delivery of over 8 million doses of the COVID-19 vaccine for Ukraine

8 million
vaccine doses will be delivered to Ukraine under the COVAX programme[1,2]

86,6 Mn Euro[5]
Is allocated from the state budget to purchase the vaccine from private companies

433,0 Mn Euro[5]
should be allocated from the state budget to purchase the vaccine to cover the full vaccination of the Ukrainian population

This will be enough for
4 million people
as two doses are sufficient for vaccination

In 2021, **a special fund** will be created to accumulate funds for vaccines and surcharges for doctors

According to the WHO, at least
65% of the population
should be vaccinated to develop collective immunity

1,9 million
vaccine doses of CoronaVac (Sinovac Biotech, China) will be delivered to Ukraine[3,4] per price of 14,5 Euro[5] per vaccine dose

The Ministry of Health of Ukraine estimates that approximately
21 million people
need primary vaccination

Ukraine is expected to have wide access to vaccines between
April 2022-December 2023

Source: Kyiv Post website; Ukrainian media overview; Lexim website
Notes: (1) Additional 8 million doses of vaccine might be ordered under the COVAX programme; (2) It is expected to receive the vaccine at the end of the first quarter of 2021, most likely it will be the AstraZeneca vaccine; (3) Delivery of the vaccine is scheduled for April-May 2021; (4) In January 2021, Lekhim signed an agreement to supply 5 million doses of COVID-19 vaccine in H1 2021 with Sinovac Biotech. In 2022, Lekhim plans to start production of the Sinovac Biotech vaccine; (5) Numbers are converted from UAH to Euro due to the exchange rate by the National Bank of Ukraine as of 29 December 2020

The biggest challenge for the new COVID-19 vaccines is the necessity of the cold or a deep freeze delivery chain

Vaccines should be kept **at low-temperature** conditions from the moment they are bottled to the time they are ready to be injected into patients' arms. For example, the **Pfizer** vaccine should be kept at **-70°C** (the ultralow or deep-freeze chain) and **Moderna's** at **-20°C** (frozen chain).

Vaccine delivery process from point A to point B

The vaccine will be distributed from its manufactured centres and will need to be transported **both on land and by air** and possibly be stored in distribution / logistic centres before reaching vaccination centres.

The vaccine can be sent to the destination country in **special dry ice packs** each holding up 5.000 doses or in other cooling equipment.

The destination country can choose to store the vaccine in a **'freezer farm'** for up to 6 months at -70°C (Pfizer vaccine) and -20°C (Moderna vaccine). In unopened dry ice packs, the vaccine **has 10 days to reach the vaccination centre.**

Once delivered, the vaccine **can be stored for up to 5 days** in a fridge between -2°C and -8°C (Moderna vaccine).

 Source: BBC website; New York Times website

Ukrainian government is preparing refrigerating equipment to store the COVID-19 vaccine at ultralow temperatures

Ukraine is getting ready for the distribution of the vaccine in three different ways depending on the temperature requirements.

+2-8°C

Ukraine has enough refrigerating equipment to store almost **12 million doses** of the vaccine at room temperature

-20°C

Ukraine has freezing cameras that could store **340 thousand doses** of the vaccine

-70°C

There is enough equipment to store only **57 thousands doses** of the vaccine

The Ministry of Health of Ukraine announced that the storage, logistics, and distribution of the vaccine will be handled by the **state enterprise 'Ukrvaktsina' together with private companies.**

The National Storage Centre will be set up near Kyiv or the International Airport Boryspil. It will be equipped with refrigerators, each with a capacity to store **250 thousand doses.**

The government is preparing an offer for Pfizer, BioNTech, and AstraZeneca to use **national aircrafts 'Mriya'** to transport vaccines around the world and for this expects to accelerate the receipt of the vaccine.

Source: DW website; BBC news website; Ukrainian media overview

Germany's plan can be taken as an example of coping with logistics and distribution challenges of COVID-19 vaccines

Germany's preparation for COVID-19 vaccine logistics

Germany started building vaccination centres even before there was a vaccine to distribute. For example, the Festhalle centre in Frankfurt can **administer up to 4.000 vaccinations a day**.

Lufthansa Cargo

Lufthansa Cargo invested in its **temperature control facilities**, e.g. Lufthansa Cargo Pharma Hubs in Frankfurt and Munich. Lufthansa Cargo has one of the world's largest airline pharmaceutical networks.

KUEHNE+NAGEL

Once the vaccine dose arrives, Kuehne+Nagel will store batches in **temperature pods** and repackage them into smaller quantities, which will be distributed to 53 vaccinations centres in North Rhine-Westphalia.

va-Q-tec

The Würzburg-based va-Q-tec, a company that specialises in **ultralow freezers**, announced that it will deliver 1.000 of high-performance transport containers to one of the largest pharmaceutical groups.

Frankfurt Airport

Frankfurt is Europe's largest hub for transporting pharmaceutical goods. It has **12.000 m² of temperature-controlled warehouses**, essential for storing medicines, with 2.000 m² of cold storage, ideal for vaccines.

Deutsche Post DHL Group's plan for logistics of COVID-19 vaccines for the German federal state of Lower Saxony

DHL will store and transport around **2,2 million vaccine doses** and about 350 pallets of vaccination equipment.

The vaccine and vaccination equipment will be stored at 2 of its more than **140 certified Life Science Health Care locations**.

From there DHL will transport the **vaccine to vaccination centres** and hospitals across the state.

It is planned to store vaccines in **different temperature ranges**:

- -70°C — Pfizer-BioNTech
- -20°C, -2-8°C — Moderna

- Based on the German federal structure, 16 individual states are responsible for vaccination management
- The State of Lower Saxony is the first German state to partner with a private logistics provider to manage COVID-19 vaccine logistics
- Negotiations with DHL and other states are nearing completion

Source: DW website; Deutsche Post DHL Group website; Lufthansa Cargo website; Kuehne+Nagel website; Media overview

Ukraine also may follow the successful examples of other countries to make the vaccination process more efficient

Factors that have allowed Israel to efficiently vaccinate the population

1 Efficiency of its healthcare system

Every person belongs to one of four health care maintenance organisations (HMOs).

Vaccine supplies are distributed to these HMOs who in turn deploy them to their respective members.

Vaccination is carried out in all hospitals, clinics, and in specially designed mobile centres.

Hospitals are also giving people outside of the priority groups the vaccines at the end of the day in order not to waste supplies.

2 Digitalisation

HMOs keep digital records of all patients, allowing to extract people's medical data since birth.

Everyone receiving the COVID-19 vaccine is registered as having done so by the health ministry.

3 Small population and geography

9,2 million people

Area of 20.770 km^2

4 Special deal with Pfizer which allows Israel to get the needed amount of vaccines in the shortest time possible[1]

Examples of how military forces, national post, and national rail may help

Military forces

Over 5.000 UK Armed Forces personnel are currently deployed to support the response to COVID-19 across the UK, working on **70 different tasks** ranging from school testing to the rollout of vaccines.

National post

Ten European countries are already supplied with batches of the COVID-19 vaccine by the **Express division of Deutsche Post DHL** Group. More than 50 flights carried vaccine shipments to European locations.

National rail

Indian Railways and the Indian government review the possibility of the vaccine transportation through its **special refrigerated vans** that may be set aside for transporting the vaccine, or luggage compartments may be **modified** into **temperature-controlled** units. The vans have the capacity to carry 17 tonnes of cargo.

Source: CNBC website; Politico website; GOV.UK website; Deutsche Post DHL Group website
Notes: (1) Israel will provide details to Pfizer (as well as to the WTO) about the age, gender, and medical history of those receiving the jab as well as its side effects and efficacy

Ukrposhta, Ukrzaliznytsia, and Armed Forces of Ukraine may help Ukraine with COVID-19 vaccine transportation

Ukrposhta — Ukraine's national post

Covers 100% of localities in Ukraine, even places without banks and shops

187,5 million units of correspondence, 24,7 million parcels, 61+ million pensions delivered in 2019

11.000+ branches, 3.500+ cars, 1+ million m^2 of premises

72.000+ employees, most of whom are postmen and branches' operators

Ukrzaliznytsia — Ukrainian Railways

78% share of freight traffic carried out by all modes of transport

83,5 thousand freight cars (working fleet is 57,7 thousand cars)

19.787 km operational length of the main tracks

312,9 million tonnes of cargo were transported in 2019

Armed Forces of Ukraine

246.160 people in active military, 900.000 people in reserve military

Service branches: Ground Forces, Air Force, Navy, Air Assault Forces, Special Operations Forces

5,5 Bn USD (3% of GDP) expenditures on Armed Forces of Ukraine from the budget in 2020

How Ukrposhta may help

- **Transport vaccine in Ukraine** through its more than 11.000 branches that cover most remote locations using temperature-controlled boxes. Currently, Ukrposhta delivers only medicines that do not require a special temperature regime. To transport the vaccine, it should test several refrigerators of different manufacturers and their technical characteristics for further purchase and use
- **Store vaccine** and cooperate with packaging companies or dry ice production companies

How Ukrzaliznytsia may help

- **Transport vaccine in Ukraine** e.g. through Ukrzaliznytsia branches: Refrigerated Wagons Company (maintains the temperature regimes of containerised cargo) and Centre of Transport Service 'Liski' (transports cargo in 20 and 40-foot containers, tanks, and refrigerated containers). However, a fleet of refrigerated wagons should be increased, modernised, and repaired
- **Store vaccine** in temperature-controlled warehouses that may be built near railway stations

How Armed Forces of Ukraine may help

- **Establish vaccination centres** (e.g. organise car parking and traffic flow systems, establish patient recording methods and practices, facilitate vaccine delivery to the sites, prepare storage for medicines and equipment) using their logistical, organisational, and clinical expertise
- **Support the delivery** of the COVID-19 vaccine, especially in remote locations
- **Provide vaccination assistance** in long-term care homes, nursing homes, etc.

Source: Ukrposhta website; Ukrzaliznytsia website; Ministry of Infrastructure of Ukraine website; Ukrainian Military Pages website

Refrigerated warehouses of private logistics companies are an attractive option for cooperation to store vaccines

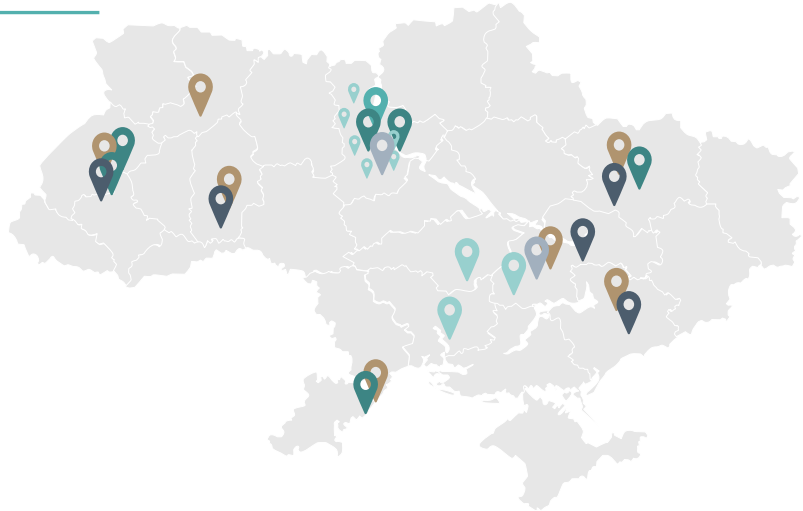
Key groups of refrigerating and freezing warehouses in Ukraine

	Overview	Examples	Potential vaccine storage
1 **Refrigeration plants**	There are a few refrigerating plants in Ukraine, which were built in Soviet era times and use ammonia refrigerating technologies.	Lviv Refrigerator Plant Kyiv Refrigerator Plant #2	More than **50%** of refrigerators do not meet modern requirements of sanitary norms and **need modernisation** and additional investments.
2 **Refrigerated warehouses of logistics providers**	Refrigerated warehouses of logistics companies comply with modern requirements and allow for high-quality storage of frozen products.	DSV, Raben, Термос, GTA Logistic, Business Group Logistics, SKLAD, FOZZY GROUP	Refrigerated warehouses of **private logistics providers** may be **the best choice to cooperate** for vaccine transportation and storage due to available capacity.
3 **Refrigerated warehouses of large companies engaged in production or import**	Large volumes of production, which requires maintenance of certain temperature, demands from manufacturers and importers to build low-temperature warehouses for their own needs.	DANONE, biopharma, Фармак, ВАТФАРМ, Оптима Фарм, Агрофарс, DARNITSA, Яготинське, KUEHNE+NAGEL	The mix of vaccines with food products is **not recommended**. Only refrigerated warehouses of pharmaceutical companies can be considered for vaccine storage.

 Source: Media overview

Logistic companies offer warehouse capacity for fresh and frozen storage with a mode of up to -22°C

The biggest fresh and frozen logistics providers in Ukraine, locations of warehouses



Capacity of the biggest fresh and frozen logistics providers in Ukraine

Raben	24 locations in Ukraine 70.000 m² total warehouse capacity 1.050 vehicles Types of logistics and storage offered: **fresh (from 0°C to +6°C)**
DSV	20 locations in Ukraine Types of logistics and storage offered: **frozen (from -1,5°C to 0°C); fresh (from 0°C to +14°C)**
Logistics	6 locations in Ukraine 50.000 m² total warehouse capacity Types of logistics and storage offered: **frozen (from -18°C to -16°C); fresh (from 0°C to +6°C)**
GIZA	350 employees 2 warehouses in Ukraine The warehouse in Dnipro has 4 chambers for storing products: 2 low-temperature cameras with a mode **of -20°C (600 m² and 400 m²)** 2 cameras with a mode from **0°C to +6°C (400 m² and 150 m²)**
ТЕРМОС	5 warehouses in Ukraine 31.500 m² total warehouse capacity Types of storage offered: **frozen (from -22°C to -18°C); fresh (from 0°C to +5°C)**

Warehouses of top logistics providers are concentrated in Kyiv, Lviv, Kharkiv, and Dnipro regions, which can be a challenge to distribute vaccines in other Ukrainian regions. However, there is a number of privately owned small warehouses for frozen and fresh storage that should be considered.

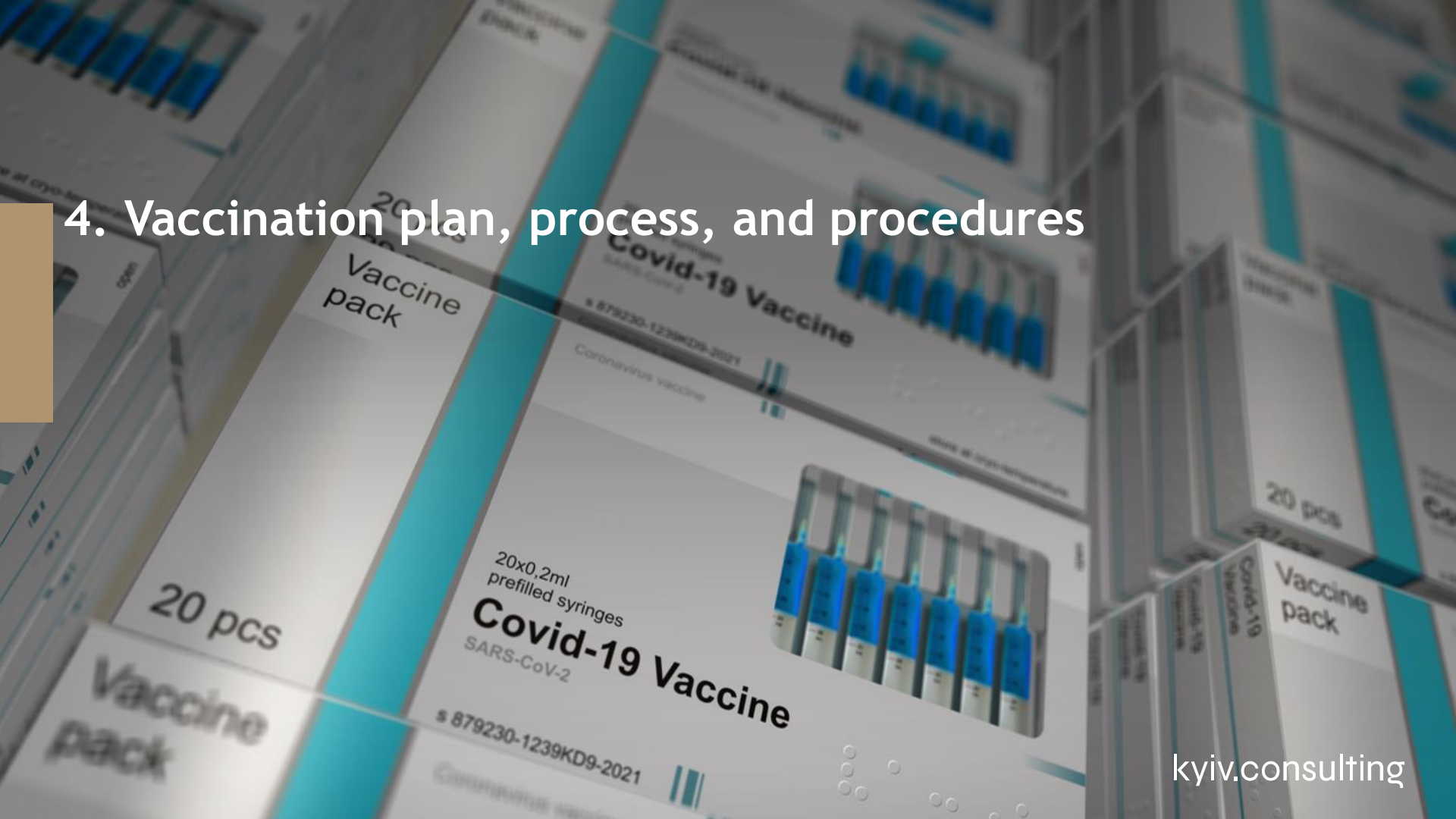
 Source: Companies' websites

Ukraine should develop a clear strategy in terms of logistics and distribution challenges of COVID-19 vaccine

Risk	Possible action
Monitoring of cold temperature supply chain is not complete / unavailable	**GPS tracking** on all packages or boxes with the vaccines to measure temperature
Risk for a truck to get into a car accident while delivering the vaccines	**Emergency button in all trucks** to call for help to either replace the damaged truck or repair it in the shortest time possible
Large distances between Kyiv and rayon / hromadas and unsatisfactory quality of roads increase time to deliver by 2-4 times	**Cooperation with Ukrposhta** (covers 100% of the localities in Ukraine) and **Ukrzaliznytsia** (possesses a track length of 19.787 km)
Lack of vaccination centre capacity and short expiration date of vaccines	Enforcing **a product control system** for tracking boxes of vaccines per destination and expiration date and use FEFO[1] for shipments
Lack of medical staff to vaccinate the population	Involving **additional human resources,** it may also be required to involve parts of military forces and volunteers
Technical aspects of tracking people who got vaccinated, which vaccine they got, and when people are due for a second dose	**Mobile application to create digital databases** that manage patient data and increase collaboration between local and national authorities

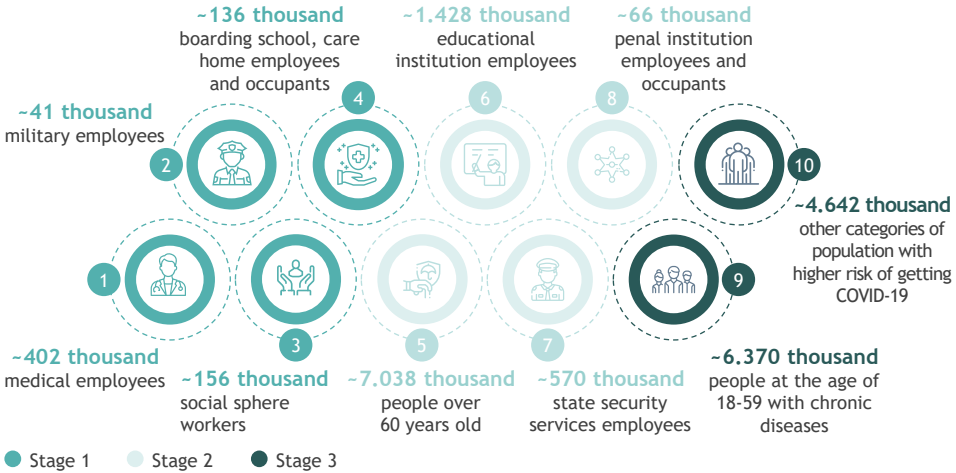
Source: Media overview; Ukrposhta website; Ukrzaliznytsia webiste
Notes: (1) First expiry, first out

4. Vaccination plan, process, and procedures



Ten priority categories of people were identified for vaccination against COVID-19 by the Ukrainian government

Priority groups determined by the Ukrainian government



Mild symptoms such as fever and / or cough are not necessarily a contraindication for vaccination, however, it is important to remain isolated when the COVID-test is positive.

The highest share of infection cases (73,3%) reveals the group of people **at the age of 30-69** (23,9 million people). Within this group, people **at the age of 60-69** should be at the highest priority while vaccinating (30,8% of the total number of people died).

Consequently, there should be developed a **plan regarding the voluntary sponsorship** of the group of people at the age of 60-69 during the large-scale vaccination process

1. Narrow the target audience to the most indigent and socially vulnerable group of people
2. Encourage large-size business to finance vaccine purchases and to provide vaccines for their employees
3. Raise promotions with an emphasis on supporting the target group in the process of receiving the vaccination

Source: United Nations Children's Fund website; Public Health Centre website; Ukrainian media overview; BDO Institute analysis

Voluntary vaccination against COVID-19 is planned to be carried out in four stages for all population groups at risk

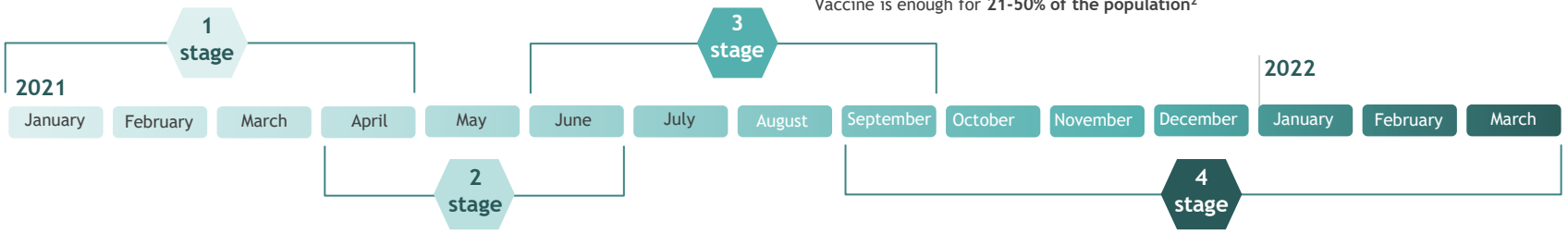
The Ukrainian Ministry of Health **approved an immunisation plan**[1] for the population against COVID-19. The **goal** of this plan is to **cover at least 50%** of the Ukrainian population (**~21 million** people) with vaccination against COVID-19 **in 2021-2022**. Ukraine will be able to provide **free vaccination for people at risk**. If people from the higher priority group refuse to be vaccinated, then the vaccine will be offered to the lower priority groups. The vaccine will appear in Ukrainian pharmacies **no earlier than in autumn 2021**.

1 People at **critical risk of infection** and COVID-19 progression and those **performing critical functions** in response to the COVID-19 pandemic

Vaccine is enough for **1-10% of the population**

3 People at **high risk of infection** and COVID-19 progression and those who perform functions regarding **support of the security** and **vital activity** of the country

Vaccine is enough for **21-50% of the population**[2]



Vaccine is enough for **11-20% of the population**

2 People at **extremely high risk of infection** and COVID-19 progression and those who provide **medical services**

4 People at **increased risk of infection** and COVID-19 progression and those who perform functions regarding **support of the security** and **vital activity** of the country

Source: Public Health Centre website; Ukrainian media overview; DW website
Notes: (1) Possible plan; (2) Related to both Stage 3 and Stage 4

Ukrainians will be vaccinated based on available centres, by mobile teams, and in temporary vaccination points

Places where Ukrainians can get vaccinated against COVID-19

11.346 vaccination centres in Ukraine as of December 2020

Approximately **400 mobile immunisation teams** will be set up

Family doctors will take part in vaccination **(23.795 family doctors in Ukraine)**

Temporary vaccination centres will be established in rural areas

Estimated capacity: 2 million vaccinations per week if all vaccination centres, mobile vaccination teams, mobile vaccination centres, and family doctors are involved. The government of Ukraine plans to allocate funds for the deployment of mobile vaccination centres.

Actions to ensure the effective vaccination process in Ukraine

Involving **additional human resources** and conducting special trainings for medical staff

Developing a transportation and logistics plan to deliver vaccines to **local storages in rayon / hromadas**

Appointing **an individual responsible for vaccination against COVID-19** at the government or Ministry of Health level, as well as **responsible persons for each region**

The Ministry of Health should coordinate the work of every region regarding:

- Vaccination centres, their hours of operation (e.g. from 8 am to 8 pm without weekends), and vaccination places in each district of the region
- The organisation of additional mobile teams and the allocation of additional funds for their maintenance

Case examples in other countries

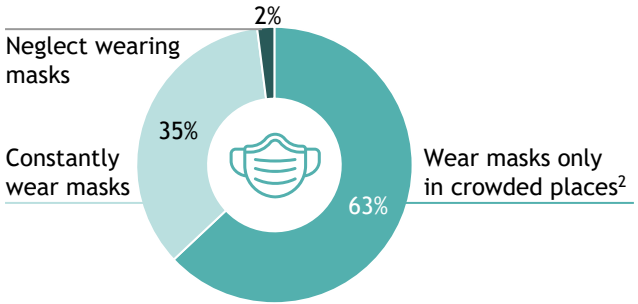
12 European countries are planning to conduct **training for additional staff**, including the involvement of non-medical support staff and retired health workers

The UK appointed **a special minister of vaccination**

Source: Ukrainian media overview; Recommendations for the National vaccinations plan for COVID-19 — [December 2020]

Ukrainians believe that the threat of COVID-19 is real, yet they are more afraid of its economic consequences

How do Ukrainians wear masks?[1]

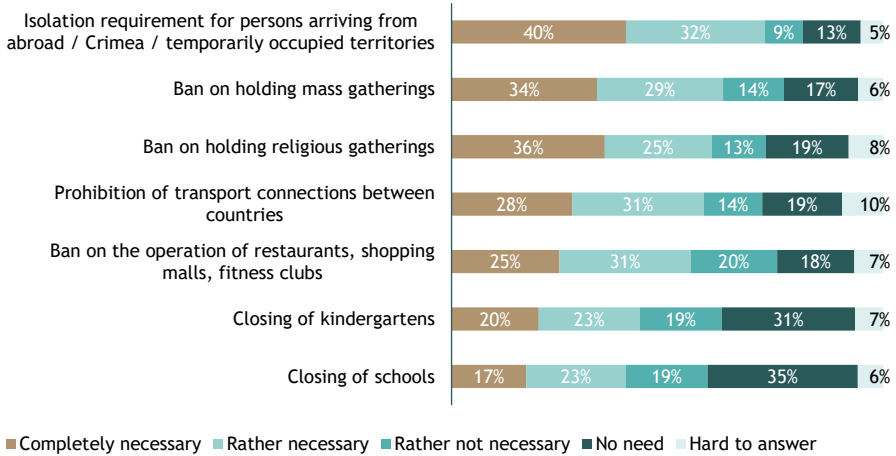


70% of respondents believe the threat of coronavirus is real for themselves and their families[1]

50% of respondents are more afraid of its economic consequences while assessing the COVID-19 crisis[1]

34% of respondents are afraid of the COVID-19 disease itself rather than the financial difficulties it causes[1]

Attitude of Ukrainians towards quarantine restrictions[3]



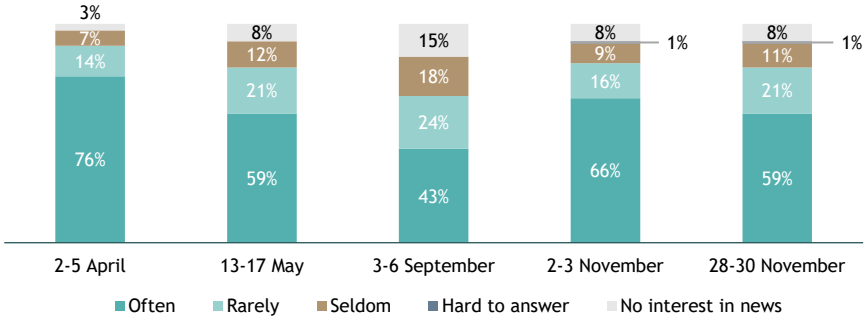
6,0-8,9 USD
fines for not wearing masks in public places[4]

120,8-181,2 USD
fines for admission to public buildings or transport of persons without masks[5]

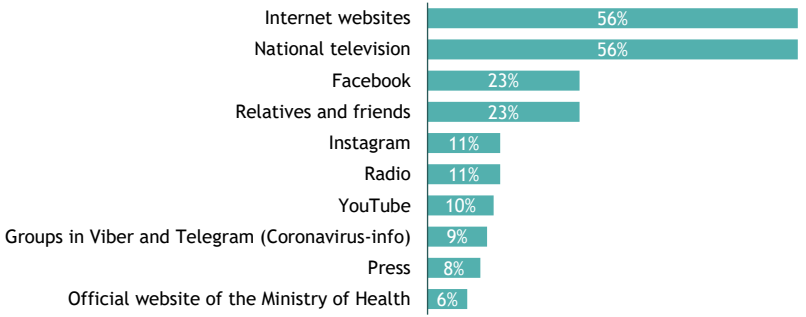
Source: Sociological Group 'Rating' — Assessment of healthcare — [December 2020]; BBC News Ukraine; Ilko Kucheriv Democratic Initiatives Foundation website
Notes: (1) Based on the personal formalised interview conducted among 1.200 respondents — residents of Ukraine aged 18 and older during 27 November-1 December 2020; (2) Transport, shops, and markets; (3) Based on the survey conducted among 2.001 respondents during 12-16 September 2020; (4) Since 21 November 2020; (5) Approved on 17 December 2020, applicable during the quarantine period

Almost 60% of Ukrainians often read news about COVID-19, and internet websites are the main source of information

How often did Ukrainians read news related to COVID-19 in 2020?[1]



Main sources of information about COVID-19[2]



Who reads news related to COVID-19 the most often?[1]

80% of respondents were older than 60 years old

64% of respondents were females

61% of respondents were from central regions of Ukraine

Misinformation related to COVID-19 in Ukrainian media[3]

81% of Ukrainians have faced misinformation about COVID-19

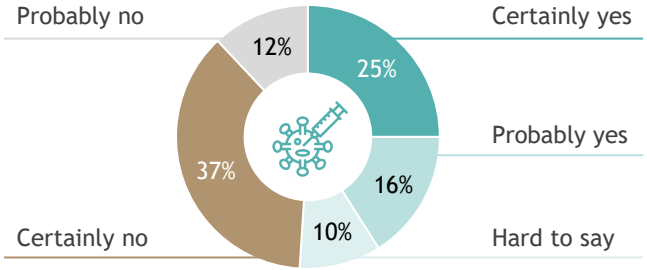
46% of respondents shared information that COVID-19 has no difference from the flue

22% of respondents believed that COVID-19 occurs due to the introduction of 5G technologies

Source: Sociological Group 'Rating' — Monitoring of public sentiment — [December 2020]; Sociological Group 'Rating' — Assessment of healthcare — [December 2020]; USAID-Internews — Attitude of the population to the media and consumption of different types of media — [October 2020]
Notes: (1) Based on the telephone interviewing conducted among 2.500 respondents — residents of Ukraine aged 18 and older during 28-30 November 2020; (2) Based on the personal formalised interview conducted among 1.200 respondents — residents of Ukraine aged 18 and older during 27 November-1 December 2020; (3) Based on the survey of 1.630 respondents — residents of Ukraine aged 18-65 conducted in July-August 2020

It is crucial to raise awareness on the vaccination process as now almost 50% of Ukrainians are not prepared for it

Are Ukrainians ready to get vaccinated against COVID-19?[1]



If the vaccine is free[2]

40%

of Ukrainians say they are not ready to get vaccinated

If the vaccination is on a paid basis[2]

57%

of Ukrainians say they are not ready to get vaccinated

Key steps to raise awareness about the importance of vaccination against COVID-19 in Ukraine

Launch a national campaign to raise awareness about the importance of getting COVID-19 vaccination by launching a multi-media campaign and developing an official mobile application.

Initiate the COVID-19 vaccination multi-media campaign:

- Engage national experts and leading public health organisations to reach populations most at risk of delaying vaccinations or experiencing complications from the coronavirus
- Provide information about the effectiveness of the vaccine that Ukraine is going to use and about the operational capacity to distribute the vaccine across Ukraine

Develop an official mobile application that can be downloaded to smartphones for an easy and free consultation as part of the public campaign. In addition, the mobile app can be used to choose time slots and place for vaccination.

Source: Ukrainian media overview; UNIAN information agency
Notes: (1) According to a survey conducted by Research & Branding Group in November 2020; (2) According to a survey conducted by the Rating Sociological Group in December 2020

Development of mobile and web applications based on blockchain will help track COVID-19 vaccine recipients

Mobile and web applications can be designed to:

- Track COVID-19 vaccine recipients, who have already been vaccinated
- Provide real-time warnings of side effects from the first Ukrainians vaccinated against COVID-19
- Send notifications about the date, time, and vaccination centre
- Provide an online application form to inform about all risks and the preparation process for vaccination

Blockchain will help:

- Maintain vaccine quality throughout the supply chain
- Ensure vaccine availability at service delivery points
- Reduce the risk of information falsification
- Provide real-time tracking and information

Risks:

93% Ukrainians have access to the Internet
The remaining 7% may be more difficult to track

29% of Ukrainians do not have a smartphone
They might be less informed about the vaccination process

Database security threats
Data on tracking COVID-19 vaccine recipients might be lost

Lack of budget for technology development
The programme may not receive adequate funding

Possible solutions:

Social workers or municipal communities need to be involved to track the other 7% of Ukrainians.

Web applications need to be developed for those who cannot use and download the mobile application.

Blockchain security risks must be recognised and mitigated.

Private investors should be encouraged to attract additional financial resources to develop the mobile application and Blockchain.

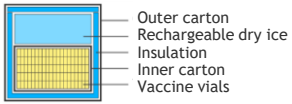
 Source: We Are Social, Hootsuite — Digital 2019 Ukraine — [January 2019]; Media overview

In the UK about 25 million people fall into nine priority categories that are expected to be vaccinated first

The UK pre-ordered 40 million doses of the Pfizer-BioNTech vaccine and took delivery of 800.000 so far — enough for 400.000 people

Pfizer site in Puurs, Belgium, makes vaccine doses destined for the UK

Up to 1.000 doses at a time are placed into special freezer boxes



Boxes keep the vaccine at -70˚C for 10 days

Boxes are flown or ferried to the UK, then sent to hubs and vaccination centres

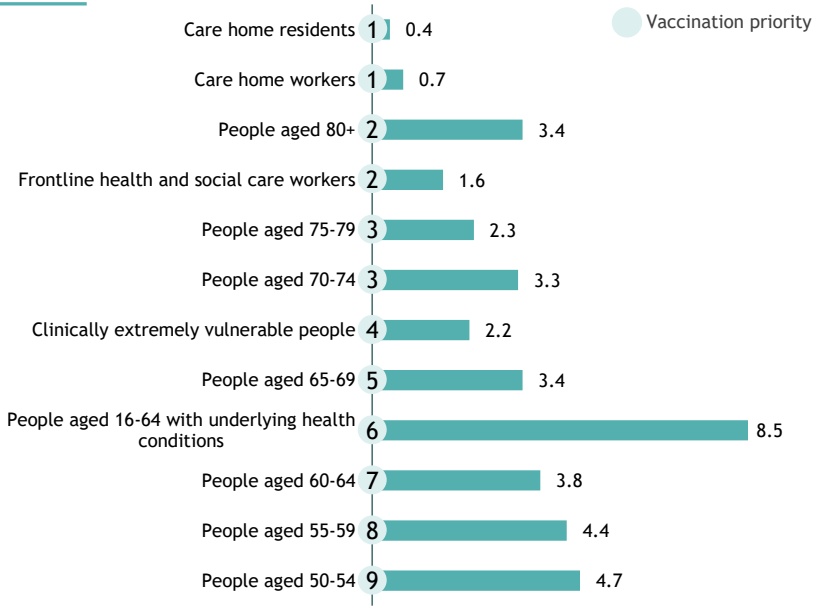
Patients receive two doses of the vaccine, 21 days apart

Vials go to 8 mass vaccination sites, 50 hospitals, and more than 1.500 GP[1] immunisation centres in England alone

Delivered vaccines can be stored in medical fridges for up to five days at 2-8˚C

Thermo-sensors and GPS trackers monitor temperature and location data. At any point, boxes can be recharged with dry ice

Estimated number of people in each of the vaccine priority groups, millions[2]



Source: BBC website; The Guardian website
Notes: (1) General Practitioner; (2) Some people fall into more than one category

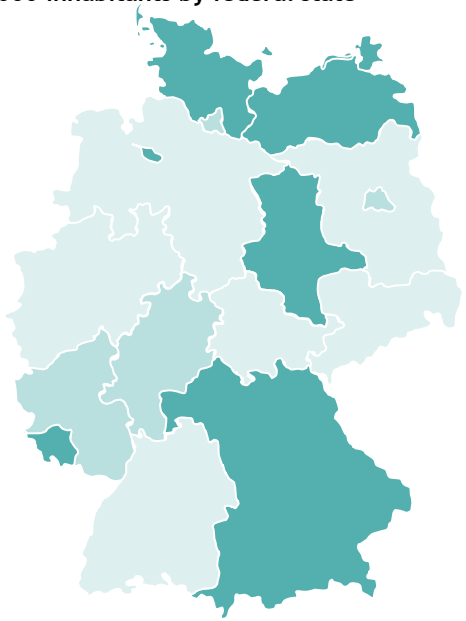
Germany plans to immunise the first group until March, still, it may take a year for all Germans to be vaccinated

Vaccinations per 1.000 inhabitants by federal state[1]

688.782
vaccine doses were administered in total[1]

60.858
vaccinations per day[1]

Two-thirds of Germans
have shown a willingness to be vaccinated[2]



Group 1 — highest priority:
- Those over 80 years old
- Care workers who work in elderly people's homes or regularly look after the elderly or the mentally ill
- Health care workers with a high risk of exposure to COVID-19
- Health care workers who primarily treat patients with a higher risk of dying from COVID-19

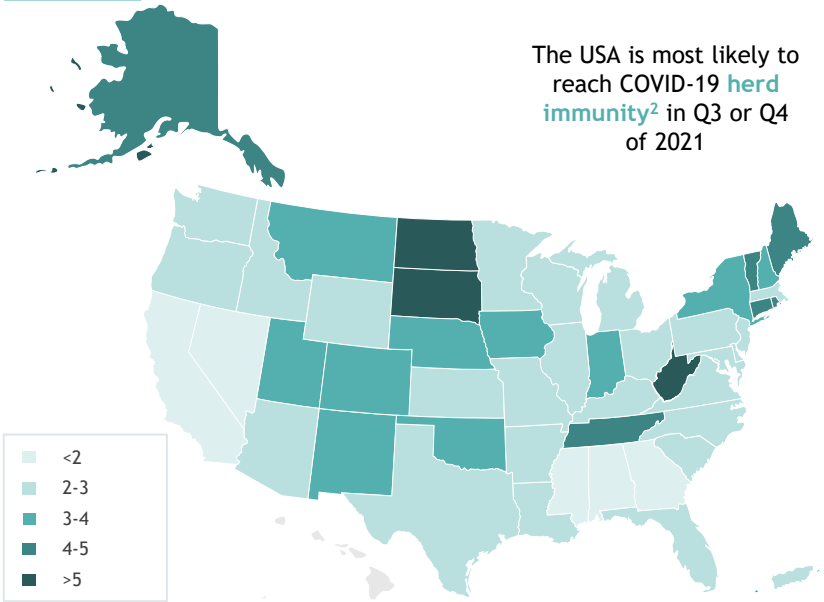
Group 2 — higher priority:
- Those over 70 years old
- People with underlying health conditions with the risk of dying from COVID-19
- Those who live or work in close contact with people in care or pregnant women
- Doctors and other health care workers who have a higher risk of exposure to COVID-19
- Essential workers who maintain public hospital infrastructure

Group 3 — high priority:
- Those over 60 years old
- People with underlying health conditions
- Health care workers not already included in the first two groups
- Those vital to maintaining the state apparatus
- Other critical infrastructure workers
- Teachers and daycare workers
- Those in precarious part-time jobs
- Retail workers

Source: DW website; Robert Koch-Institut website
Notes: (1) As of 12 January 2021; (2) According to a YouGov survey commissioned by the news agency DPA conducted on 21-23 December with 2.035 respondents

In the USA, more than 9,3 doses have been administered starting from the beginning of vaccination on 14 December

Vaccine across the USA, doses administered per 100 people[1]



Phase 1a categories vaccinated:

- Health-care workers who are most at risk of exposure to COVID-19 and residents at long-term-care facilities
- Workers in essential and critical industries, people at high risk for severe COVID-19 illness due to underlying medical conditions, people over the age of 65
- People aged 75 years and older who are residents of long-term care facilities
- People aged 65-74 years who are residents of long-term care facilities

Phase 1b categories vaccinated:

- Frontline essential workers and those who work in the educational sector
- People aged 75 years and older because they are at high risk of hospitalisation, illness, and death from COVID-19

Phase 1c categories vaccinated:

- People aged 65-74 years
- People aged 16-64 years with underlying medical conditions
- Other essential workers like people who work in transportation and logistics, food service, housing construction and finance, information technology, communications, energy, law, media, public safety, and public health

Source: Bloomberg website; Centers for Disease Control and Prevention website
Notes: (1) As of 12 January 2021; (2) Herd immunity is a concept used for vaccination, in which a population can be protected from a certain virus if a threshold of vaccination is reached

US companies are developing valuable technological innovations in order to improve the COVID-19 vaccination process

mazikglobal

- Mazik Global[1] has developed an app called **MazikCare Vaccine Flow**, the aim of which is to **accelerate mass COVID-19 vaccination**
- Vaccine Flow simplifies the **connection between patients and distributors**
- The **services portfolio** includes EMR[2] integration, provider enrolment, self-service patient, vaccine inventory management, and public health society dashboards

FedEx

- FedEx[3] exploits a new **controlling program** in cooperation with Microsoft, it is called **Surround**
- The program focuses on historical information around FedEx's distribution itineraries, weather, maps, and analytics to **accelerate delivery**
- The program is able to **trigger an alert** to customer service agents in case there is a delay of the vaccine because of the weather

IBM

- IBM has been developing the structure called **IBM Health Pass**, which functions on the basis of **blockchain technology** to confirm a person's COVID-19 status
- Blockchain could also be applied to bring together data about immunisation for the patient, especially making sure that the **individual receives the appropriate vaccine** in a set of two

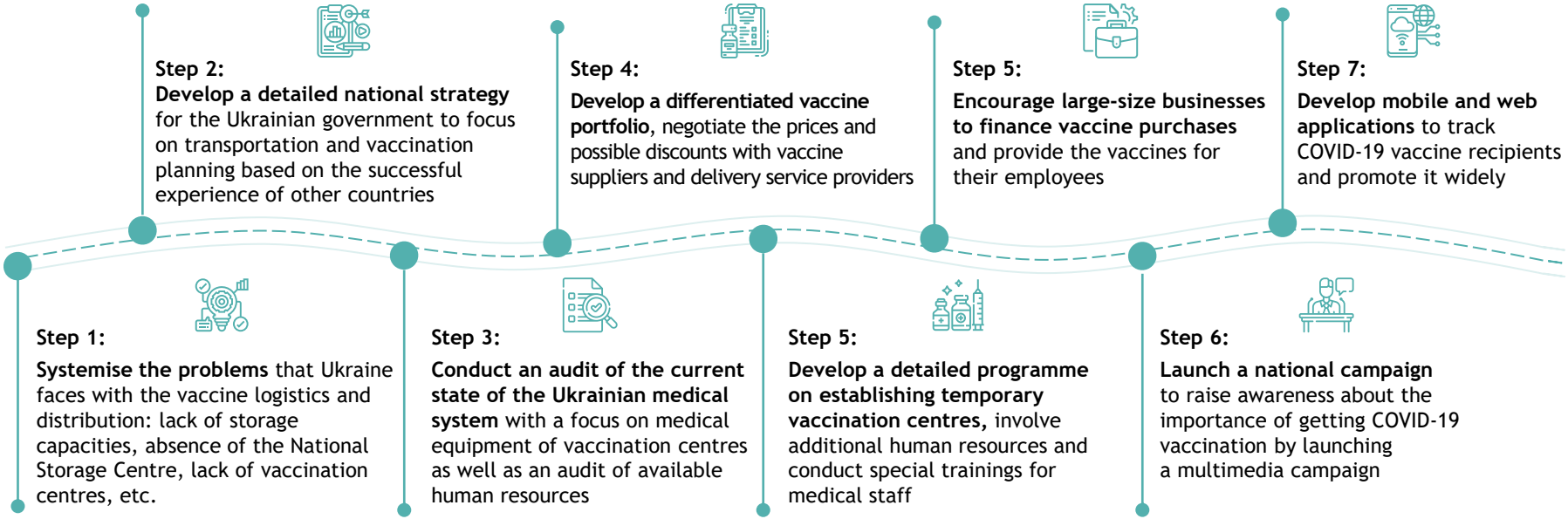
roambee

- The Roambee[4] controlling system allows **real-time evaluation**, applying **Cloud-analytics and Machine Learning**
- The program makes suggestions to **optimise the procedure of vaccine distribution**, particularly when there is restricted time to arrange logistics and distribution from door to door
- The program also provides **reports per-batch** about temperature during transportation

Source: Media overview
Notes: (1) An IT solution development and implementation company and Microsoft Gold Partner; (2) An electronic medical record includes information about a patient's health history; (3) An American multinational delivery services company; (4) A software company headquartered In the Silicon Valley, the USA

The Ukrainian government should develop a strategy on COVID-19 vaccine logistics as well as vaccination planning

Roadmap on conducting a successful vaccination campaign in Ukraine



Step 1:
Systemise the problems that Ukraine faces with the vaccine logistics and distribution: lack of storage capacities, absence of the National Storage Centre, lack of vaccination centres, etc.

Step 2:
Develop a detailed national strategy for the Ukrainian government to focus on transportation and vaccination planning based on the successful experience of other countries

Step 3:
Conduct an audit of the current state of the Ukrainian medical system with a focus on medical equipment of vaccination centres as well as an audit of available human resources

Step 4:
Develop a differentiated vaccine portfolio, negotiate the prices and possible discounts with vaccine suppliers and delivery service providers

Step 5:
Develop a detailed programme on establishing temporary vaccination centres, involve additional human resources and conduct special trainings for medical staff

Step 5:
Encourage large-size businesses to finance vaccine purchases and provide the vaccines for their employees

Step 6:
Launch a national campaign to raise awareness about the importance of getting COVID-19 vaccination by launching a multimedia campaign

Step 7:
Develop mobile and web applications to track COVID-19 vaccine recipients and promote it widely

 Source: BDO Institute analysis

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