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Vaccinating the World in 2021

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Foreword

We should have recognised the warning signs that humanity's international response to Covid-19 could get bogged down in geopolitical crosscurrents. In early March 2020, a senior Chinese leader proclaimed in a published report that Covid-19 could be turned into an opportunity to increase dependency on China and the Chinese economy. The following month, due in part to the World Health Organisation's refusal to include Taiwan in its decision-making body, the Trump administration suspended funding to the agency. In May 2020, President Trump announced plans to formally withdraw from it. Quite naturally, many public-health experts and policymakers were discouraged by the growing possibility that global politics could overshadow efforts to unite the world in the effort to fight the disease.

However, this report from the Global Health Security Consortium offers hope. It recommends a strategic approach to "vaccine diplomacy" that can help the world bring the pandemic under control. The rapid development of effective vaccines has been a historic accomplishment – a marvel of medicine and a validation of applied private enterprise. This report sets out an approach for policymakers that would be worthy of that achievement.

Vaccinating the World in 2021 suggests we're at a crossroads moment – a moment when real choices are to be made. Through innovative modelling, the report suggests what lies ahead if the current path of vaccine production and distribution continues unmodified. It's a discouraging future – especially in light of the growing number of worrisome variants and the likely need for booster shots later this year. That same modelling, however, suggests what our future *could* look like if the report's "four solutions" are pursued as rapidly as possible. It calls on world leaders to work together to, among other things, "strategically vaccinate key populations" and "coordinate distribution of vaccines to strategic populations."

In short, *Vaccinating the World in 2021* lays out the choices facing public-health experts and political leaders. It shows how we can effectively mobilise to respond to a challenge that has cost more than 3 million lives globally to date and darkened so many others. It states what should not need to be said: that effective production and strategically optimised distribution of vaccines is in our self-interest. And enlightened self-interest can save the world.

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Former Administrator of the US Agency for International Development (USAID)

Executive Summary

The only way to protect the whole world from a mutating virus that is still growing exponentially is to achieve vaccination at scale. Until that point there remains a significant risk of new mutant strains emerging that are more transmissible and potentially resistant to vaccines. Put simply, none of us are safe until all of us are safe.

We propose four solutions to address four interrelated barriers to vaccinating the world as quickly as possible.

1. **Strategically vaccinate key populations to minimise mortality, maintain essential services and minimise viral transmission.** No matter how quickly we manufacture and administer vaccines, we will not vaccinate the entire world this year. Therefore, we need to take a strategic approach to vaccinating key populations that will achieve these three goals. In particular, focusing on densely populated and urban areas, while maintaining a focus on equity across socioeconomic and other demographic factors, can help reduce the likelihood of excess mortality and viral mutation.

2. **Maximise the supply of vaccines available in 2021 and beyond.** Given the global shortfall in vaccines against Covid-19, and the likely need for booster doses, it is important to maximise our total supply. There are different tactics to do so across different time horizons. In the near term, it is important for the US, the UK and other countries with financial means to continue to incentivise production of vaccines, even after the majority of their populations have been vaccinated and they have built strategic stockpiles of vaccines. In the medium term, repurposing of manufacturing plants is needed to increase global manufacturing capacity, but these efforts must not put supply of other essential vaccines and medical products at risk. In the long term, a global and strategic network of manufacturing capacity that can address outbreaks is critical.

3. **Ensure vaccine supply reaches people.** In parallel to increasing global supply of vaccines, it is critical to ensure that these vaccines will actually reach populations that need them. Countries need to increase absorption capacity by implementing a four-part framework covering settings, staff, systematic data capture and strategic communications. In parallel, it is important to reduce vaccine hesitancy and increase vaccine confidence among key populations so there is sufficient demand for vaccines when they are available. Costed distribution plans are needed urgently and require adequate funding alongside the cost of procuring vaccines for the world.

4. **Coordinate distribution of vaccines to strategically identified key populations.** This requires political clout and monitoring capacity on a global scale. It is a function that should be delivered through existing bodies but guided by an advisory group to COVAX, initiated by the World Health Organisation (WHO) with support from the G7 and the G20. It would cover supply from COVAX and any surplus supply or doses generated by repurposed manufacturing, strategically deploying supply to countries with sufficient absorption capacity. It would direct national efforts for future pandemics to ensure supplies go where they are most needed.

Vaccinating the World in 2021: The Plan

There is growing consensus that vaccinating the world should be done as quickly as possible. Indeed, a remote ambition six months ago is now mainstream, and we believe that the world should commit to a goal of global vaccination in 2021. Yet this ambition risks becoming a mere platitude from developed countries if it doesn't have a strategic focus and a plan.

Figure 1

THE 2021 GLOBAL VACCINATION PLAN

Goal	Plan
Vaccinate the world in 2021 to prevent the threat of new Covid-19 strains and minimise illness/mortality	• Vaccinate health-care workers, clinically vulnerable people and dense urban populations to minimise illness and mortality, maintain essential services and reduce viral transmission. This will reduce the target population of adults outside of Russia and China from 4.2 billion to 3.2 billion. **Total to be vaccinated in 2021 using US-, UK- and EU-approved or considered vaccines is 3.2 billion people across the globe.**[1]
Reduce shortfall by boosting vaccine supply	• Ensure pharmaceutical companies continue producing Covid-19 vaccines with existing manufacturing base. • Repurpose non-Covid manufacturing capacity. • Build new long-term capacity that can contribute to the current Covid-19 pandemic and that is flexible enough to be deployed for future global health security.
Ensure vaccine supply reaches people	• Build in-country ability now to administer and document vaccinations that will arrive later in the year. • Work now to increase confidence in vaccines and reduce hesitancy. • Develop comprehensive, costed plans for vaccine distribution and ensure that necessary funding urgently reaches low-income countries.
Coordinate distribution decisions at a global level	• Establish an advisory panel initiated by the WHO with support from the G7 and the G20 that works in collaboration with COVAX to strategically deploy supply to countries. • Build feedback loops on vaccine efficacy and safety and closely coordinate with global genomic sequencing and surveillance efforts to understand how to deploy and modify vaccines in the context of emerging variants.

According to our modelling, if we continue to vaccinate at current rates – our baseline scenario – we will vaccinate the global adult population[2] using the four vaccines that have been approved by the US, the UK and/or the EU by the third quarter of 2023.

However, our modelling also indicates that there are opportunities to get closer to vaccinating the world in 2021.

In Scenario 1, we focus on "strategically vaccinating the world", with a focus on priority populations that will help minimise mortality, maintain essential services and reduce viral transmission. We find that we can vaccinate this priority population by the end of 2022, a nearly six-month improvement over our baseline scenario where we aren't strategic about who we vaccinate.

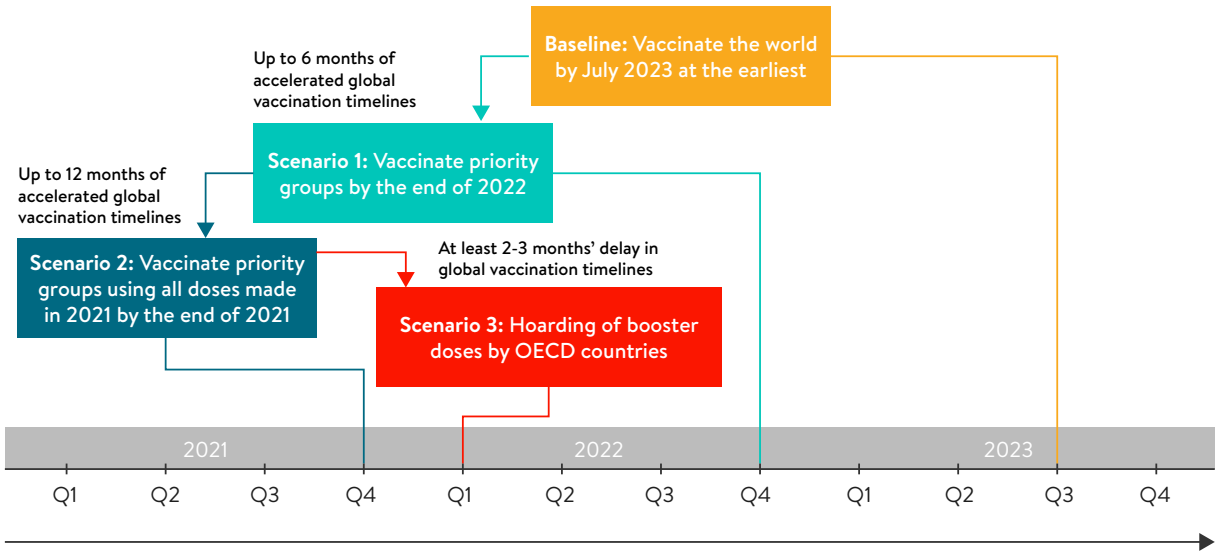
Both those scenarios assume constant rates of vaccine deployment going forwards. However, we have an opportunity to accelerate scale-up of vaccine deployment. Indeed, based on publicly available information, we estimate that there will be enough doses to vaccinate 4.1 billion people by the end of 2021. If we accelerate scale-up of vaccine deployment to use all these doses by the end of the year, we can vaccinate all priority populations by the end of 2021, a full 12-month improvement over Scenario 1 and an 18-month improvement over the baseline scenario.

In other words, by focusing our efforts on whom to prioritise for vaccination and getting available jabs into arms, we can bring our timelines forward for vaccinating the world by nearly a year-and-a-half.

However, this depends on countries that achieve vaccination at scale sharing doses and allocating them to where they are needed, not hoarding them for boosters. We find that if countries hoard vaccine doses for boosters, this will push any vaccination effort – even for a strategic portion of the global population – into 2022.

Figure 2

WE CAN REDUCE THE TIME NEEDED TO VACCINATE THE WORLD BY UP TO 18 MONTHS WITH A STRATEGIC AND ACCELERATED APPROACH



Source: GHSC illustration

Modelling

We have modelled the plans set out in this document. If we optimise existing supply and increase manufacturing capacity, we can vaccinate a strategic portion of the global population by early December 2021. This will reduce deaths, hospitalisations, transmissions and the potential of new variants.

- Our modelling shows that if we don't increase manufacturing capacity and do not optimise our supply, then the global adult population won't be vaccinated until July 2023 at the earliest.

- Even if we don't increase manufacturing capacity but do optimise existing supplies to vaccinate a strategic group, we can still reduce the likelihood of variants, deaths and hospitalisations. This will require 3.2 billion people to be vaccinated. In this scenario, it would take until December 2022.

- Vaccinating children will get us closer to widespread vaccine coverage in OECD countries. Our model shows that if the OECD vaccinates all children aged 5 and older but we retain an optimisation of existing supply, this will only delay us by a week, assuming daily vaccine supply rises to match manufacturers' stated commitments. It would mean enough doses available for our strategic population and all children aged 5 or older by end of December 2021.

This requires coordination, as set out in this paper. It also means preventing bad behaviour and moving away from vaccine nationalism – particularly when it comes to hoarding vaccines. For example, our modelling shows that if countries hoard vaccines to provide boosters for their populations aged 5 and over, it will take *at least* until February 2022 to vaccinate the world's population, even if we optimise supply.

A Note on Our Modelling Approach, Regarding Vaccinating China and Russia With Sinovac, Sinopharm and Sputnik

For the purposes of this paper, we have only considered vaccines either approved by or under consideration by the US, the UK and the EU.[3] For this reason, we have excluded the Sinovac, Sinopharm and Sputnik vaccines. We expect these vaccines will be the primary vaccines used to vaccinate populations in China and Russia, respectively, and therefore have excluded the populations of China and Russia from our model.

We have hope that these vaccines will prove to be affordable and effective options for vaccinations beyond Russia and China, pending their availability. On 7 May, Sinopharm received WHO approval for emergency use,[4] a potential boost to the global vaccination efforts, although estimates of available doses for COVAX and global distribution are not yet available.[5]

Sputnik is not approved by the WHO; however, there is encouraging data on its safety and efficacy in peer-reviewed journals.[6] It is already being used in many countries and by all accounts with significant success in reducing transmission and disease.

The global community should continue to monitor the safety and efficacy of these vaccines and consider them as part of a global vaccination strategy as relevant data continues to emerge.

The Self-Interested Act of Vaccinating the World

Recommendation

Adopt a global mission to vaccinate the world as quickly as possible, recognising and communicating the benefits of this to domestic populations. These benefits include reducing the threat of a new mutant strain of SARS-CoV-2 that could prove resistant to vaccinations and previous immunity.

Vaccinating as many people as quickly as possible is the only way we can completely remove the threat of Covid-19 as the pandemic continues to grow exponentially.[7] Countries that are succeeding in rapidly vaccinating their populations, especially the UK and the US, must now begin to think about how they can do the same for the rest of the world. This is an act of enlightened self-interest, not just humanitarian aid: failure to vaccinate a large swathe of the global population as soon as possible risks undoing all the progress that has been made to date.

WE MUST VACCINATE THE WORLD TO PREVENT NEW VARIANTS

Early in the pandemic, there was little genetic variation in SARS-CoV-2. However, over time, consistent with how RNA viruses typically evolve, we are observing different genetic variants. As of April 2021, the US Centres for Disease Control and Prevention (CDC) had identified five Covid variants of concern (VOC) and another eight variants of interest.[8] Variants now exist in countries all over the world, and we live with the constant possibility that new variants of concern will be identified.

Viruses mutate and strains emerge for several reasons. Viruses undergo general adaptation – such as mutations that increase transmissibility and infectiousness – and the more opportunity a virus has to transmit, the more likely it is that new variants will arise. This makes those populations infected with Covid-19 but without measures to bring the virus under control particularly susceptible to new variants; while these strains may retain the label of their origin country, they do not respect borders.

If vaccines aren't available to these populations and the prevalence of the virus remains high, we face a potential doomsday scenario. Variants can achieve "viral escape", whereby a virus can evade the antibodies and T-cells generated by a vaccine or prior virus exposure. This means new strains of Covid-19 could infect and kill at a global scale, even after we achieve mass vaccination. Modelling suggests that variants are most likely to emerge at "intermediate" levels of vaccination coverage (where approximately 15 per cent to 40 per cent of the population is vaccinated, depending on which groups receive vaccination first).[9]

To date, the existing vaccinations are proving relatively effective against existing variants. Real-world data from the UK Office for National Statistics (ONS) Covid-19 Infection Survey and from Public Health England suggests that the vaccines are still protecting against severe disease and death despite the circulation of new variants.[10,11] However, lab-based work on immunogenicity suggests that the new variants lessen the protective effect of the vaccines, requiring vaccine developers to work on enhancements to the vaccines to offer more protection against new strains.

If we wait too long to vaccinate the global population, we increase the chances of more genomic mutations emerging, making the virus harder to control and potentially rendering the existing vaccines less effective or, in the worst-case scenario, ineffective.

Figure 3

NOTABLE COVID-19 STRAINS SO FAR (A NONEXHAUSTIVE LIST)

Strain name	Common name	Mutations	Increases severity of virus?	Resistant to existing vaccines?
B.1.1.7, 20I/501Y.V1 or VOC 202012/01	Kent/UK strain	**N501Y** (increases transmissibility) P681H 69/70 deletion	No	No
B.1.351 or 20H/501Y.V2	South Africa strain	**N501Y** (increases transmissibility) **E484K** (reduces antibody recognition) **K417N** (reduces antibody recognition)	No	Vaccines proven less effective against mild-moderate infection
P.1 or 20J/501Y.V3	Brazil strain	**N501Y** (increases transmissibility) **E484K** (reduces antibody recognition) **K417T** (unknown)	Not yet clear	Vaccines proven slightly less effective against mild-moderate infection
B.1.427	California strain	**L452R** (more infectious) **D614G** (more infectious)	Not yet clear	Research ongoing; vaccines likely to be slightly less effective against mild-moderate infection
B.1.617	India strain	**E484Q** (greater immune escape potential) **L452R** (more infectious)	Not yet clear	Research ongoing; vaccines likely to be slightly less effective against mild-moderate infection

WE MUST VACCINATE THE WORLD TO RESTORE THE GLOBAL ECONOMY

Non-pharmaceutical interventions (NPIs), including lockdowns and social distancing, have been critical and effective aspects of the pandemic response, but they have had detrimental impacts on the global economy and supply chains. In 2020, there was an estimated 6.6 per cent shortfall in global GDP, which is equivalent to $5.6 trillion. These measures and the damage they create are not sustainable, but simply removing such restrictions when the threat of the virus still looms will not work either. Confidence is as important to recovery as having measures removed, and vaccinations are the only tool that enables reopening while simultaneously restoring people's confidence to participate economically and socially. We will only be able to fully rebuild the economy once people are vaccinated at scale and these NPIs have been safely relaxed.

WE MUST VACCINATE THE WORLD TO REOPEN BORDERS

While it is important for countries to vaccinate their own populations, they will still face an important choice that will impact the global economy and the pandemic if other countries do not achieve vaccination at scale: fully close borders and remove other NPIs domestically, or open borders and maintain other NPIs domestically. In an interconnected, global economy, there is only one feasible, sustainable option: keep borders open.

Widespread global vaccination is the only way to return to some level of normality and for widespread mask-wearing, social distancing and lockdowns to become a thing of the past.

WE MUST VACCINATE THE WORLD BECAUSE IT IS THE RIGHT THING TO DO

In 2015, long before we knew about the Covid-19 pandemic, the world committed to the Sustainable Development Goals (SDGs), which aimed to improve equitable development around the world. This agenda included ensuring healthy lives and promoting wellbeing for all. For as long as the pandemic continues, we cannot achieve this goal or many of the other SDGs that we set for ourselves.

We have a health, economic and moral impetus to vaccinate everywhere. Our ambition should be to do this as rapidly as possible.

Vaccinating the world as quickly as possible is the most self-interested of selfless acts.

Vaccinating the World: Progress Report

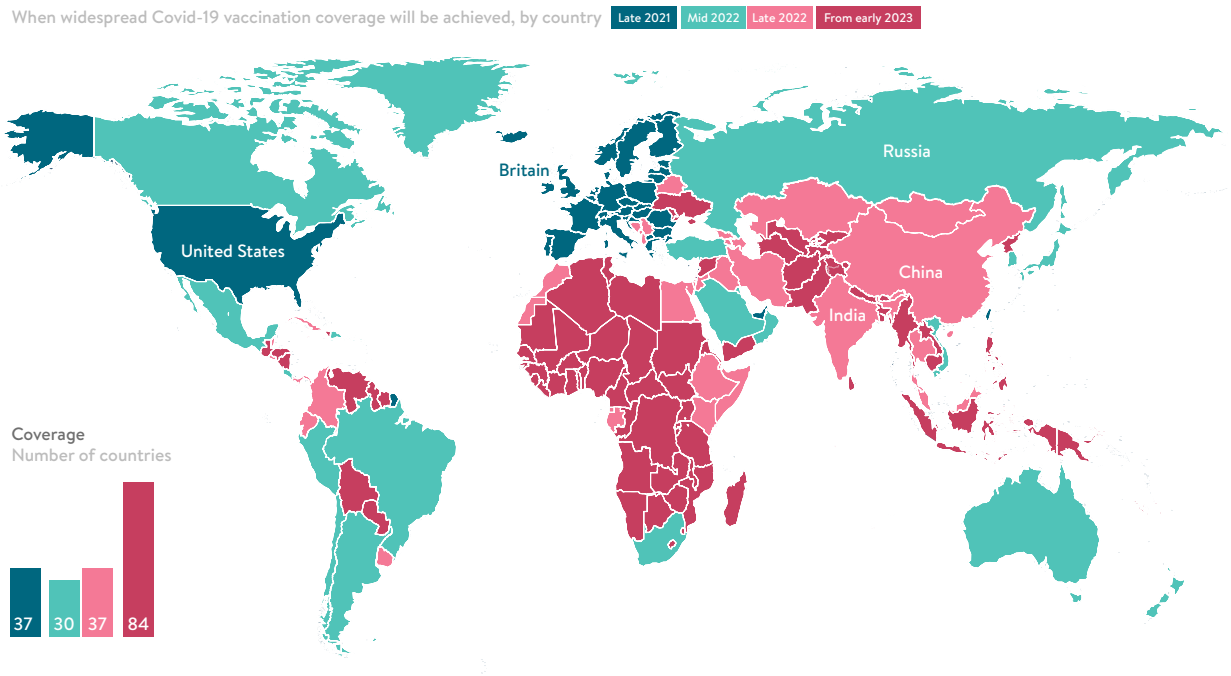
We are set to manufacture enough doses for 80 per cent of the global population—or close to 100 per cent of the adult population—by the end of 2021[12] but this does not translate into vaccination coverage. The difference between manufacturing capacity and the doses available to each country is stark, with most of the global capacity reserved by individual governments and institutions. This is likely to become more pronounced as many wealthier countries build a surplus for potential booster doses.

This has seen individual countries – including Israel, the US and the UK, along with the EU – storm ahead, leaving others with only a relatively small number of vaccines rolled out. If we continue to vaccinate the global population at the same rate as has been achieved to date, we will only vaccinate 36 per cent[13] of the global adult population with vaccines approved by the WHO[14] in 2021. Widespread vaccination with these vaccines will not be achieved until the third quarter of 2023.

Research from *The Economist* projects coverage by early-to-mid 2023 and assumes a small scale-up in vaccine administration.

Figure 4

MAPPING PROJECTED GLOBAL VACCINATION COVERAGE



Source: Economist Intelligence Unit

This piecemeal approach leaves countries exposed and has an impact on the world. As set out earlier, we risk further strains and mutations if we don't vaccinate as many people as quickly as possible. This will require global coordination and a plan that is realistic about supply constraints and OECD countries retaining doses for booster shots in late 2021. This plan must do four things:

1. **Optimise the supply available** by providing strategic focus to who receives vaccines in 2021.

2. **Reduce likely shortfall in manufacturing** by boosting existing capacity, repurposing non-Covid capacity and building new long-term capacity.

3. **Ensure vaccine supply reaches people** by supporting countries now to build absorption capacity and efficiently roll out vaccines, and by continuing to build confidence in the global workhorse vaccines and reduce hesitancy.

4. **Coordinate distribution decisions at a global level** by establishing an advisory group initiated by the WHO with support from the G7 and the G20, and connected to COVAX to strategically deploy supply to countries.

Part 1: Optimise Available Supply in 2021

Recommendation

The world needs to optimise coverage of potential and existing vaccine doses. We can do this by strategically prioritising key populations, with a focus on densely populated and urban areas, while maintaining a focus on equity across socioeconomic and other demographic factors. This will reduce the likelihood of excess mortality and viral mutation.

Total people to be vaccinated in 2021: 3.2 billion

In the context of limited global supply of vaccines, the global community faces a challenge in optimising distribution and the allocation of doses. We see three key objectives as critical for optimising allocation:

1. Reduce deaths and hospitalisations.
2. Maintain essential services and support the reopening of economies.
3. Minimise viral transmission and the likelihood of viral mutation.

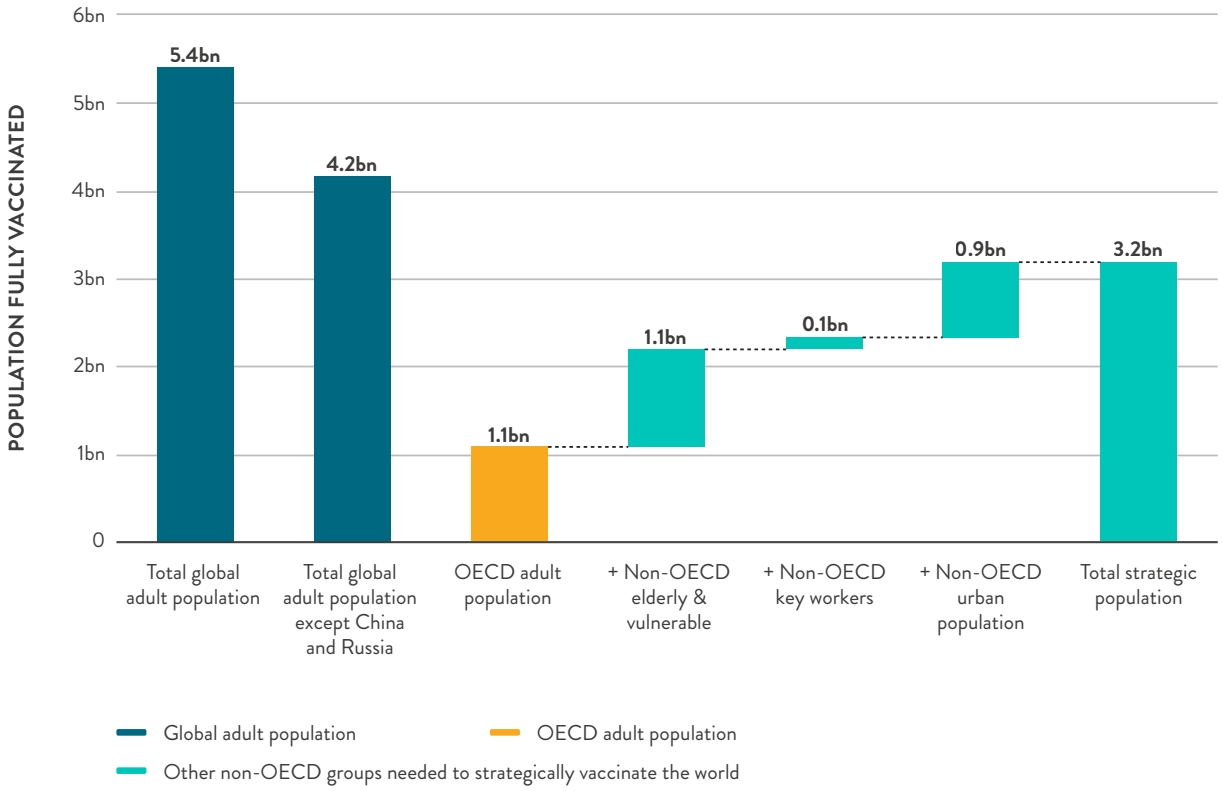
STRATEGICALLY VACCINATING THE WORLD

The three objectives listed above suggest different vaccination strategies and priority groups. Minimising illness and mortality requires vaccinating the elderly and individuals with underlying medical conditions that put them at risk of severe disease. Maintaining essential services and supporting the reopening of economies requires vaccinating health-care workers, police, military, and staff working in energy, food and transportation sectors. Minimising viral transmission requires prioritising densely populated and urban areas.

Given the scarcity of resources and the higher levels of vaccination coverage required to achieve herd immunity in densely populated areas, we advocate an approach that distributes vaccines based on level of risk due to population density. This approach would therefore focus on urban residents across all socioeconomic levels, and we believe it would be the soundest way to achieve protection for the entire global population as quickly as possible. It is also an equity-focused solution because it allocates vaccines proportionally based on level of risk of exposure to the virus as a result of living and working conditions. Finally, emerging modelling indicates that vaccinating individuals who have high levels of contact with each other can help minimise the risk of viral mutations and the levels of illness and mortality in the population overall.[15]

Figure 5

BREAKDOWN OF PRIORITY GROUPS FOR STRATEGIC GLOBAL VACCINATION (OUTSIDE CHINA AND RUSSIA)



Source: GHSC modelling based on data from the United Nations, World Bank and https://www.bmj.com/content/371/bmj.m4704.
Note on our modelling: To estimate population sizes, we use UN 2020 age-stratified population data to calculate adults by country, and then base non-OECD strategic groups on elderly and vulnerable and key worker estimates from a 2020 academic analysis by Yu et. al published in the British Medical Journal. We then apply national urbanisation ratios taken from the World Bank to calculate residual adult urban populations in non-OECD countries.

Achieving each of the objectives alone would require vaccinating up to 3.2 billion individuals.[16,17] As shown in Figure 5, we have included all adults in OECD countries, operating under the assumption that OECD countries will aim to secure enough doses, at minimum, to vaccinate their entire adult populations and not just certain sub-populations.

THE SHORTFALL

Even by prioritising certain populations to strategically vaccinate the world, the pace of global vaccine rollout is insufficient to vaccinate the world in 2021. Assuming we progress at current vaccination rates, we will only vaccinate 62 per cent of these prioritised sub-populations by the end of the year, and we will only vaccinate the entire population by the end of 2022.

However, we have opportunities to accelerate this pace using the projected available supply for 2021, as discussed in the next section.

Part 2: Reduce Shortfall by Boosting Vaccine Supply

Recommendation

The global community – led by Gavi, CEPI and the WHO and supported by the US, the UK and the G7 – should develop a clear and transparent plan with a three-stage approach for global manufacturing of vaccines, complemented by consideration of how best to handle intellectual property (IP) rights for these vaccines:

1. Ensure pharmaceutical companies are incentivised to utilise their existing manufacturing base for Covid-19 vaccines.
2. Repurpose manufacturing capacity via tech transfers in a coordinated fashion across the world.
3. Increase long-term manufacturing capacity for global health security, with an initial focus on Covid-19 vaccines.

A centralised data "control tower" with organisation and processes to capture and use data to provide enhanced visibility and planning will be critical to enable this process and planning.

Estimates from UNICEF project that the world has the capacity to produce the 11.3 billion doses of Covid-19 vaccines that have already been approved by a regulatory agency. However, as the UNICEF dashboard states, "the capacity information does not account for probability of success and may project a highly optimistic view of the potential supply." [18]

Recent events have demonstrated the reality of this risk, with delays in manufacturing seen among many of the vaccine manufacturers, including AstraZeneca,[19] Johnson & Johnson (with the loss of 15 million doses due to a human error at the Emergent plant in the United States)[20] and Pfizer.[21]

It is important that the global community sense checks even the best projection models against the reality of delivery. So far we have produced and administered enough doses to vaccinate 1.3 billion people – far short of the 3.2 billion vaccines (many of them double doses) required to strategically target the most at-risk and dense populations in the world.

Given the very likely need for booster vaccination doses, possibly as early as the end of this year,[22] the global demand for vaccines is likely to be well above the 11.3 billion doses mentioned earlier; global production, even with no manufacturing issues, is likely to fall short. While we believe a plan to vaccinate strategically provides the best chance to contain the risk posed by mutations and to control the pandemic sooner, we also believe that we need to produce enough vaccines to offset the likely realities of vaccine nationalism, hoarding and manufacturing delays. Therefore, any global vaccination efforts need to consider these longer-term demand issues.

To ensure sufficient global supply, we see a three-stage approach for global manufacturing of vaccines, complemented by consideration of how best to handle IP rights for these vaccines:

1. Ensure pharmaceutical companies are incentivised to utilise their existing manufacturing base for Covid-19 vaccines.

2. Repurpose manufacturing capacity via tech transfers in a coordinated fashion across the world.

3. Increase long-term manufacturing capacity for global health security, with an initial focus on Covid-19 vaccines.

Figure 6

A THREE-STAGE STRATEGY IS NEEDED TO EXPAND GLOBAL VACCINE SUPPLY

Source: GHSC illustration

THE SHORT TERM: CONTINUE MANUFACTURING

Key message: If we can deploy every dose that is projected to be manufactured in 2021, we can vaccinate all 3.2 billion people in the world (outside of Russia and China) who are in OECD countries or who are in vulnerable populations, are essential workers or are living in urban areas in non-OECD countries.

Vaccine supply chains are complex. AstraZeneca, for example, built a global supply network, adhering to GMP (the acronym for "Good Manufacturing Practice") quality and safety standards, with a capacity of billions of doses. They have more than 25 different supply partners in more than 15 countries across the globe, working across 16 distinct regional supply chains to ensure vaccines reach all countries that want it.

Figure 7

GOOGLE MAPS IMAGE OF VACCINE MANUFACTURING PLANTS AROUND THE WORLD

Source: Google Maps

The Figure 7 map draws on openly available public information to show just how many plants are working on producing Covid-19 vaccines at present. In the short term, it is important to "keep the tap running" on existing Covid-19 vaccine supply to produce the globally projected 7.2 billion doses in 2021. There is a significant lead time to bring new capacity online with tech transfer or building GMP-compliant facilities. It seems sensible therefore to maintain existing manufacturing streams and minimise set-up time and cost. Policymakers should use all financial and legal mechanisms available to ensure that existing manufacturing infrastructure continues to produce vaccines for the world and maximises use of all existing capacity. Recent research indicates that as of 7 May, the world still had the following manufacturing capacity in 2021 for doses that were not yet sold:[23]

- AstraZeneca: Approximately 1 billion doses
- Pfizer: Approximately 600 million doses
- Novavax: Approximately 800 million doses
- CureVac: Approximately 20 million doses

These figures are based on announcements of total manufacturing capacity for a given company compared with publicly announced commitments to specific purchasers of vaccines (e.g., countries, COVAX).

It is critical to ensure sufficient incentives exist for doses to be manufactured using this capacity (once vaccines are approved in those countries that have not yet authorised their use).

This approach of countries incentivising continued manufacturing and then redistributing vaccines is not only important but also popular. In a recent poll, 75 per cent of Americans said that they supported donations of vaccines to the rest of the world, but only once everyone in the US had received a dose.[24] Therefore, policymakers must ensure that there is a sufficient supply for their own populations and other parts of the world, especially those with limited manufacturing capacity.

To keep the existing manufacturers of the licensed vaccines incentivised to maintain production, there are a range of financial mechanisms. These include production subsidies, capacity subsidies, concessional loans and volume guarantees/advance market commitments (AMC), including through the COVAX AMC.[25,26] Countries can also use legal mechanisms to compel the production of vaccines for global use. Most notably, the Biden administration has invoked the Defense Production Act (DPA) to encourage continued manufacturing of vaccines in the US.[27]

While it is unlikely that the DPA can be used to manufacture vaccines initially intended for other countries, it likely can be used to build a national stockpile of vaccines (which is in the country's interest), and which could then be partially or fully reallocated to other countries (i.e., through the COVAX mechanism) after the US has vaccinated all eligible people.

As the US, the UK and the EU move to vaccination at scale, it will be important for them to ensure there is stable demand for vaccine doses, both for low- and middle-income countries and for booster shots for their domestic populations. It will be particularly important for the US, the UK and the EU to ensure stable demand for the Oxford University/AstraZeneca vaccine and Johnson & Johnson's Janssen vaccine, even if those vaccines do not make up the backbone of their domestic vaccination programmes, because they will be critical for vaccinating the world.

For example, the EU has recently signalled a clear prioritisation of mRNA (Pfizer and Moderna) vaccines over viral vector (AstraZeneca and Johnson & Johnson vaccines).[28] On the other hand, the US, which has not yet approved the AstraZeneca vaccine, plans to ship 60 million doses of that vaccine abroad, primarily to India, to combat the pandemic there.[29] These two developments demonstrate a fundamental tension with global vaccine demand right now: we need viral vector vaccines to vaccinate the world, but demand from countries with the greatest ability to pay is for mRNA vaccines. This creates a risk that, without deliberate efforts by high-income countries to ensure sufficient global supply by continuing to produce or support the manufacture of viral vector vaccines, low- and middle-income countries will not have enough vaccine for their populations.

Ensuring sufficient near-term capacity also requires adequate supply chain inputs to ensure manufacturing capacity can be fully utilised. Manufacturing processes (upstream, downstream, fill-and-finish) are highly complex and require specialised workforces, equipment, and regulations and quality control. Vaccine manufacturers are increasingly reporting shortages of raw and packaging materials, critical consumables and equipment, especially bioreactor bags, single-use assemblies, cell culture media, filters and vials.[30]

Suppliers of these essential components need visibility of demand forecasts to ensure better supply planning.

Figure 8

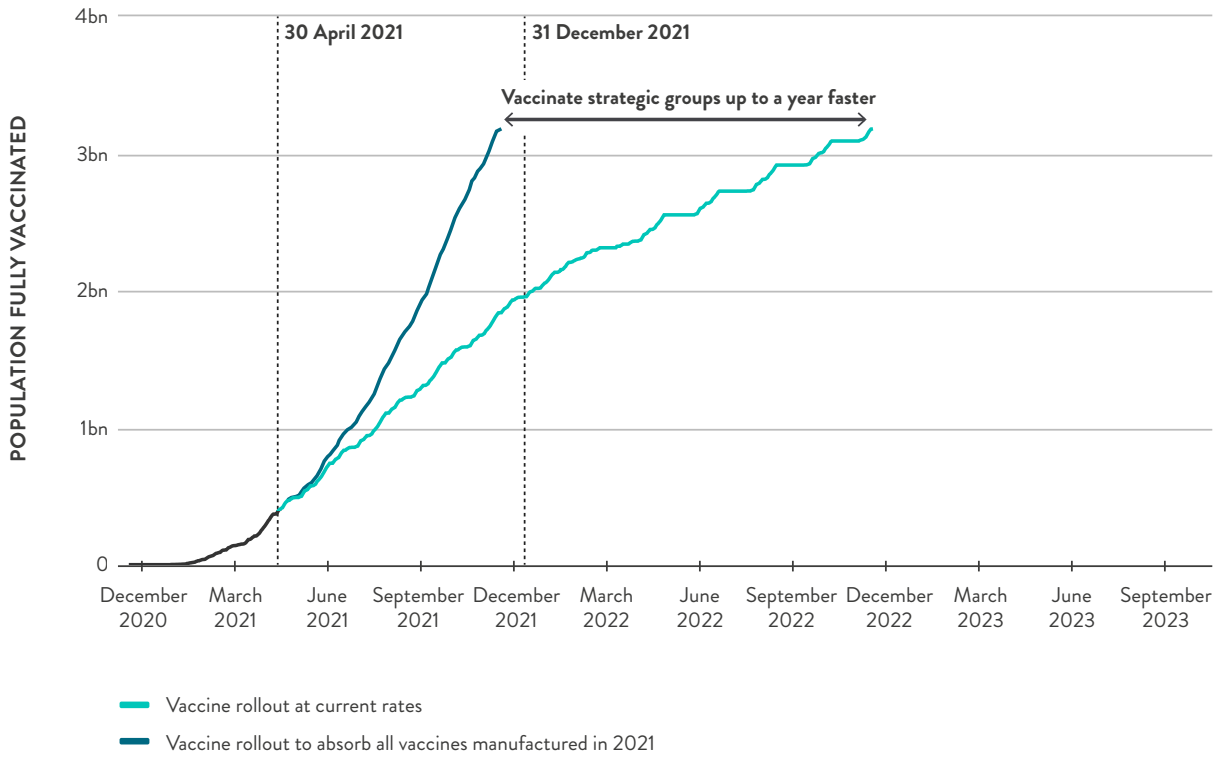
TOTAL PRODUCTION CAPACITY AND COMMITTED DOSES BY MANUFACTURER (HIGHLIGHTING INDICATES THE FOUR VACCINES WITH APPROVAL IN THE US, THE UK AND/OR THE EU)

Manufacturer		Total manufacturing capacity by end of 2021
AstraZeneca		3 billion doses[31]
Pfizer		2.5 billion doses[32]
Moderna		700 million doses[33]
Johnson & Johnson		1 billion doses[34]
Novavax		1.2 billion doses[35]
Valneva		250 million doses[36]
Sanofi/GSK		Not publicly reported
CureVac		300 million doses[37]
Total for ALL vaccines		7.9 billion doses
Total for four vaccines with approval in US, UK and/or EU	**=**	**Sufficient doses to vaccinate 4.1 billion people**

As can be seen in Figure 9, deploying all doses projected to be manufactured this year allows us to strategically vaccinate the world in 2021.

Figure 9

VACCINE ROLLOUT AT CURRENT RATES VERSUS ROLLOUT TO ABSORB ALL VACCINES MANUFACTURED IN 2021



Source: GHSC modelling based on data from Our World in Data, United Nations, World Bank, UNICEF and https://www.bmj.com/content/371/bmj.m4704.

Note on our modelling: To estimate vaccination timelines, we use the strategic group population totals described in the Figure 5 notes and apply estimates for global daily vaccine absorption. Historical estimates until 30 April 2021 are taken from Our World in Data: we assume all vaccines except those delivered in China and Russia are one of Pfizer, Moderna, AstraZeneca or Johnson & Johnson, and differentiate between the one-dose-only Johnson & Johnson vaccine and the others based on US Johnson & Johnson vaccine absorption statistics.

For the baseline forecast, we project forward based on the seven-day global vaccine daily absorption rate in Our World in Data from 24 April to 30 April 2021. For the accelerated delivery scenarios, we apply linear scaling to raise global two-dose and one-dose vaccine daily absorption rates such that cumulative global vaccines delivered by the end of 2021 and 2022 match manufacturer's stated commitments, as reported by UNICEF. Second doses are delivered 28 days after the first dose for all vaccines except for Johnson & Johnson. We assume that one booster dose is delivered to all population groups ten months after second doses, except in the OECD stockpiling scenario where we also assume that the OECD hoards two booster doses for adults and children before releasing supplies to the rest of the world.

MEDIUM- AND LONG-TERM MANUFACTURING

Summary: Beyond the first round of vaccines needed, there will likely be a need for boosters and strategic stockpiles of vaccines. Assuming the need for a booster dose and an additional dose in a strategic stockpile dose for every adult in the world, we could require an additional 11.4 billion doses in 2022. Public reports indicate potential global capacity for 16.3 billion doses of the four approved vaccines in 2022, but getting there will require increasing manufacturing capacity and ensuring sufficient redundancy in the system to account for technical failures.

Long term, we will need a global manufacturing footprint that can be ready for future outbreaks and other global health security risks.

Achieving sufficient capacity in the medium and long term requires a well-coordinated global plan.

Taking into account the track record to date of manufacturing vaccines, the shortfalls of global supply in 2021, the high likelihood of boosters being needed and the likely long duration of the pandemic,[38] we need to increase the medium- to long-term capacity and supply of vaccines. The timeframes of this endeavour mean that the extra capacity is unlikely to help the mission in 2021 however it is still worth considering how a coordinating repurposing effort may support the goal of vaccinating the world as fast as possible. Indeed, it may be that a future pandemic requires different technology, something the world learned the hard way when a plan was put in place for global manufacturing of flu vaccines[39] only for the world to later face a pandemic for a different virus.

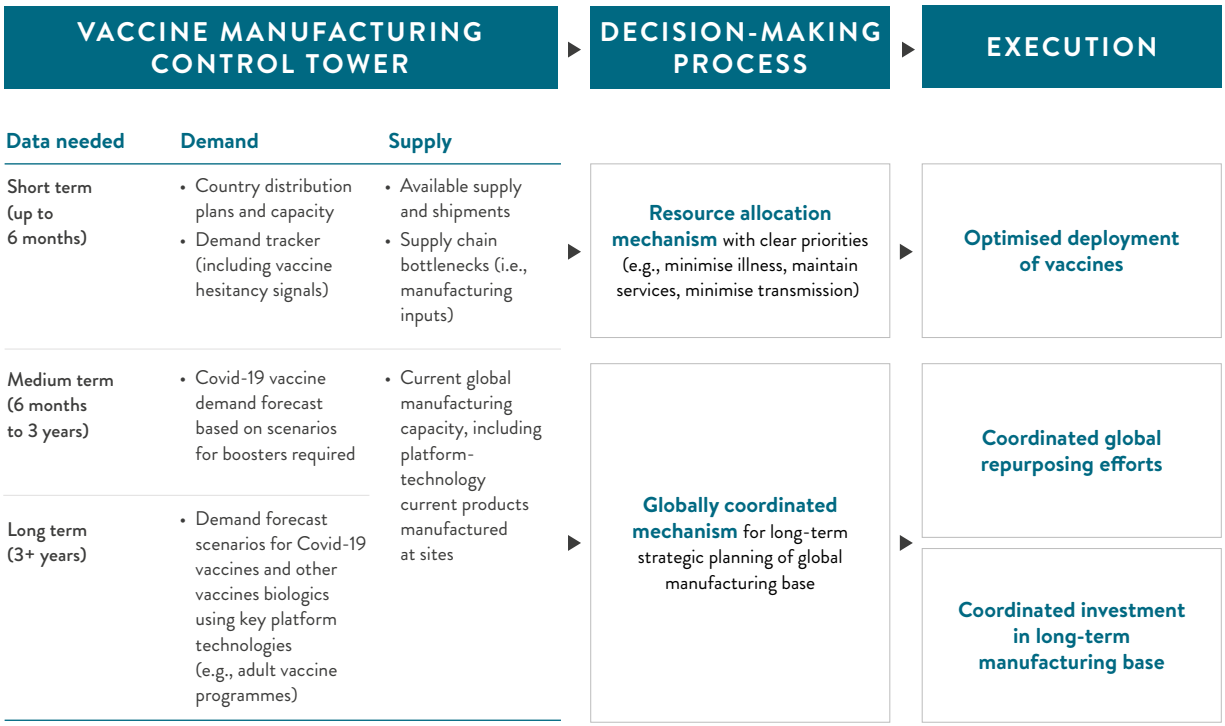
This is why we require a globally coordinated plan for repurposing that can balance out the demand and supply and probability of equitable distribution, minimising disruption to the manufacture and supply of other critical medicines. For this to work, it will have to be owned by the global community – led by Gavi, CEPI and the WHO, with clear support and engagement from the US, the UK and the G7.

The first step in conducting this strategic planning is establishing a global vaccine manufacturing control tower – a central hub with the organisation and processes to capture and use data to provide enhanced visibility – to facilitate coordinated planning. This control tower could also include data on demand and supply for short-term resource allocation for optimised deployment of vaccines and supply chains.

See Figure 10 for an overview of how this control tower would feed into a globally coordinated effort to strategically improve global manufacturing capacity, and further details on medium- and long-term planning in the sections that follow.

Figure 10

A CENTRAL CONTROL TOWER IS NEEDED TO STRATEGICALLY PLAN GLOBAL MANUFACTURING CAPACITY



Source: GHSC illustration

The figures that follow give a starting indication of data that could be used in a global data control tower for medium- and long-term planning.

Figure 11

TOTAL ANNOUNCED GLOBAL MANUFACTURING CAPACITY FOR COVID-19 VACCINES IN 2022

Vaccine	Number of doses available in 2022
Johnson & Johnson	3 billion[40]
Moderna	3 billion[41]
Pfizer	3 billion[42]
AstraZeneca	Not available
Novavax (Not yet approved)	2 billion[43]
CureVac (Not yet approved)	800 million[44]

Figure 12

FACILITIES AND CAPACITY BY SCALE RANGE AT WORLDWIDE AND CONTRACT MANUFACTURING ORGANISATIONS (CMOS)

Scale range	Total facilities	CMO facilities	Capacity (L) at worldwide facilities	Capacity (L) at worldwide CMOs
0-99 L	371	93	5,321 L	2,536 L
100-499 L	380	106	86,158 L	33,360 L
500-999 L	231	72	132,311 L	45,036 L
1,000-1,999 L	171	56	210,695 L	71,065 L
2,000-4,999 L	248	71	677,750 L	194,770 L
5,000-9,999 L	120	41	775,350 L	261,300 L
>10,000 L	292	58	14,886,975 L	2,848,850 L
Total	1,813	497 (27%)	16,772,910 L	3,455,267 L (21%)

Source: BioPlan internal data and www.top1000bio.com resources

Figure 13

CAPACITY AT CONTRACT MANUFACTURING ORGANISATIONS (CMOS) BY REGION

Region	Capacity (L) at all facilities	Facilities (All)	Average capacity (L) at all facilities	Capacity (L) at CMOs	Facilities (CMOs)	Average capacity (L) at CMOs
US/North America	6,459,913 L	685	9,430 L	1,149,717 L	218	5,250 L
Europe	5,936,881 L	470	12,632 L	1,225,804 L	197	6,555 L
Asia/Rest of World	4,254,646 L	540	7,879 L	1,072,936 L	127	8,448 L
Global Total	~16,600,000 L	1,695	~9,700 L	~3,278,000 L	~500	>6,000 L

Source: BioPlan internal data and www.top1000bio.com resources

The Medium Term: Repurpose Capacity

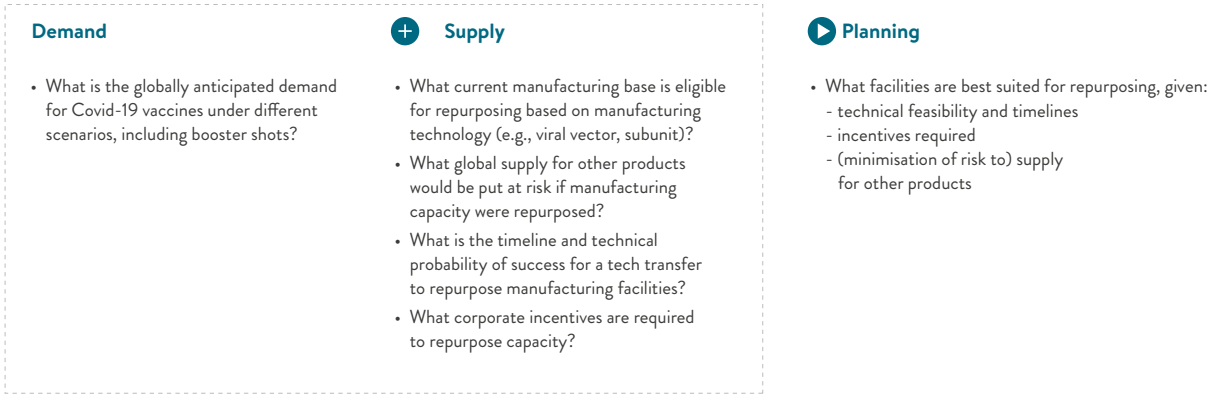
In the medium term, governments should strongly encourage and facilitate tech transfers to repurpose existing manufacturing capacity in line with the coordinated repurposing plan. By jointly selecting international sites to boost production of vaccines now, we could meaningfully add to the global supply of vaccines this year and next.

Tech transfers are the process by which pharmaceutical developers transfer the process and know-how for manufacturing the product to a manufacturer. Typically, tech transfers take at least 18 months, and in some cases longer than 30 months, before products are ready to ship. That being said, there are a range of management and technical approaches that could help fast-track this process.[45] The most widely cited example of a tech transfer between companies to repurpose existing manufacturing capacity of vaccines is the deal brokered by the White House between Johnson & Johnson and Merck; through this deal, Merck agreed to produce Johnson & Johnson's vaccine and to supply doses for the second half of 2021 (potentially less than three months after agreement was announced).[46]

In the medium term, tech transfers for viral vector vaccines (e.g., Johnson & Johnson and AstraZeneca) are more likely than they are for mRNA vaccines because the viral vector platform manufacturing technology is already widely used for a number of other vaccines and medical products.[47] For example, political leaders in Ireland have floated the idea of using Pfizer or Merck manufacturing in the country to expand production capacity, but these proposals have not yet amounted to any concrete agreements.[48] Based on publicly available data assembled by CEPI, there are vaccine manufacturers with the technical capability to make drug substance and drug product for viral vector vaccines.[49] However, it will be important to ensure that the global community manages trade-offs from disrupting production of other vaccines and medical products; global visibility into capacity via a data control tower or capacity map will be critical.

Figure 14

CONSIDERATIONS FOR A GLOBALLY COORDINATED MEDIUM-TERM REPURPOSING PLAN



Source: GHSC illustration

The Long Term: Build Capacity for Vaccines That Can Support Global Health Security Efforts

In the long term, it will be important to build additional manufacturing capacity for vaccines to support global health security efforts, including combatting future pandemics. If we start building new and flexible capabilities now, they could help us reach the end of this pandemic, put in place capacity for boosters as the repurposed facilities return to business as usual, and take on new vaccines for new markets.

The fundamental challenge with expanding the global footprint for manufacturing vaccines (and other medical products) that can be used for outbreaks, epidemics and pandemics is ensuring sufficient surge capacity without having unnecessary surplus that will incur excess investment costs. Given the unpredictable nature of outbreaks, it is impossible to forecast the demand for vaccines that would be needed.

Nevertheless, there are strategies we can adopt to invest in the right kind of manufacturing capacity to manage the trade-offs between supply and surplus. For instance, the global community could try to increase the predictability of demand for vaccines. The Expanded Programme on Immunization (EPI) and Gavi significantly increased demand for child vaccines by scaling up immunisation programmes throughout the world and serving as a basis for all the nations worldwide to initiate their immunisation programmes, rather than a pre-EPI ad-hoc approach.[50] This could be mirrored in an effort to expand adult or other routine vaccines – such as influenza – globally to generate an increase in demand for global vaccine manufacturing capacity.[51]

One study estimated that the public market for vaccines in Africa could increase by 7 per cent to 14 per cent in the next ten years, with demand for an additional 1.5 billion doses. Unfortunately, not all existing (adult) vaccines do use the same manufacturing technologies as the main Covid-19 vaccines. However, there is a wide programme of research on several diseases – including influenza,[52] rabies,[53,54] Zika,[55,56] various allergy shots,[57] HIV,[58,59] various types of cancer,[60,61,62] HPV,[63] respiratory syncytial virus,[64] Cytomegalovirus[65,66] and Nipah virus[67] – that could use some of the same RNA or adenovirus platforms and manufacturing plants as the current Covid-19 vaccines.

That is why it is particularly important to invest in research for platform technologies that are flexible and can accommodate the widest array of vaccines and biological therapies to make manufacturing capacity more versatile. It decreases the risk that the investment will be wasted, because there is a higher likelihood that the technology can be used for different types of diseases. For example, there is currently a lot of excitement about the potential for RNA technologies; even before the Covid-19 pandemic, the Johns Hopkins Center for Health Security identified mRNA vaccine technology as a particularly promising platform because of its ease of manufacture and its adaptability to a wide range of targets, among other reasons.[68]

Beyond these strategies to offset challenges with demand, there are other considerations for how to set up long-term manufacturing capacity. We must be better prepared for the future pandemic, and this requires a longer-term comprehensive strategy that takes into account the lessons of today and builds on the technological possibilities that were previously not available to us. A pandemic-preparedness strategy will need some serious thought beyond the scope of this paper but should include the following elements:

- **Demand forecasts/scenarios** and investments in **vaccine platform technologies,** as described above.
- **A network of manufacturing facilities either on non-sovereign land, or in a network of small countries around the world that circumvent the challenges of vaccine nationalism.**
- **Public financing for this global good, with a public-private partnership (PPP) model that draws on the private sector to design, build, operate and maintain the facility.**
- **Clear governance, legal arrangements and walk-in rights for governments that have part-funded the facility** to utilise this capacity when needed to address outbreaks without putting global supply of other products at risk.
- **A sufficiently trained workforce and adequate processes** to operate these facilities, ensure quality and so on.
- **Coordinated global regulatory processes** that allow for rapid deployment of manufacturing capabilities as needed.
- **Continuous innovation** in manufacturing technologies to improve efficiency of production, delivery of vaccines (especially in low-resource settings) and so on.

This is not a small undertaking. A future strategy must be bold, radical and intelligent. It will require careful creation and oversight from leading global health organisations such as CEPI and the WHO and input from the major industrial players. This should be addressed quickly before the world's focus shifts away from the pandemic and while the lessons of today are fresh in our minds. We urge the G7 and others to come together to consider what we have set out and to develop a clear vision and detailed plans.

A Note on Intellectual Property

In addition to this three-stage strategy for expanding manufacturing capacity for vaccines, governments must also consider the policy options at their disposal to address intellectual property barriers to vaccinating the world. The US has come out in favour of waiving intellectual property rights for Covid-19 vaccines, either through compulsory or voluntary licensing, that would allow the vaccines to be produced by a wider range of manufacturing plants.[69] This is not a silver-bullet solution and does not address the *how* of manufacturing – a critical element in producing safe, effective and high yields of vaccines. And as with the repurposing of manufacturing plants, the benefits of waiving IP rights for vaccines have a significant lead-in time. Furthermore, strict quality controls are needed by state sponsors to ensure that counterfeit vaccines do not start to flood the market.

We believe that there is not a one-size-fits-all approach to the issue of IP specifically for Covid-19 vaccines. We would encourage governments and the private sector to come to the negotiating table in good faith to figure out the appropriate way to address the IP challenge, and to ensure that any efforts to expand access via changes to IP rights are complemented by a commensurate increase in manufacturing capacity and quality control and involve an exchange of manufacturing know-how.

There are positive lessons to be drawn from the existing collaborations. For example, AstraZeneca sublicensed its vaccine to established vaccine organisations – like the Serum Institute of India (SII), R-Pharm in Russia, Fiocruz in Brazil and Shenzhen Kangtai Biological Products in China – in countries with significant manufacturing capacity to supply international markets. This network was designed to balance speed of supply with affordable costs to enable not-for-profit pricing and substantial contributions to COVAX.

Part 3: Ensure Vaccine Supply Reaches People

International efforts should also be directed at helping countries around the world build their vaccination distribution and absorption capacity as well as ensuring demand and uptake for vaccines. Doing so in a sustainable manner will not only accelerate the end of this pandemic but will also leave the global population safer in the face of future outbreaks.

IMPROVING ABSORPTION CAPACITY: A BLUEPRINT

Recommendation

Led by countries with successful vaccine rollouts, an international effort should take place now to prepare countries to absorb vaccine doses. This should follow a four-part framework, preparing:

1. **Settings**
2. **Staffing**
3. **Systemisation and data**
4. **Strategic communications**

The objective is to increase global absorption capacity from 19 million per day to up to 35.5 million per day to strategically vaccinate the global population in 2021.

According to Our World in Data figures, 9.8 million vaccine doses have been administered in Africa out of a total of more than 33 million doses received. While this is in part due to lack of periodic reporting of vaccination status, low capacity to administer vaccines as well as vaccine hesitancy could also be playing a significant part.[70] In South Sudan, 132,000 vaccines were received via COVAX in late March and 60,000 from the African Union (AU), but the AU doses expired before use because they could not be administered in time and only 947 vaccines total have been reported administered to date.[71,72]

The work to increase capacity and demand must start now, following this four-part blueprint:

1. **Settings:** Using the largest number of venues in the right areas to reach as many people as possible.

2. **Staffing:** Recruiting and training the largest number of people possible to safely administer vaccines.

3. **Systemisation and data:** Ensuring data-capture and data-sharing systems allow for tracking of vaccine distribution, safety and side effects.

4. **Strategic communications and community engagement:** Underpinning the rollout with clear and consistent public messaging and community engagement around the vaccination process, tailored to the local context and underpinned by easily accessible data on safety.

Plans and costings for vaccinating the world need to go beyond the costs of procuring vaccines and include all components of this blueprint.

The success of vaccination campaigns will be strongly influenced by the extent to which people trust the effectiveness and safety of the vaccines, the competence and reliability of the system that delivers them, and the principles that guide the underlying government decisions and actions.[73]

Recent reports from Africa indicate that in Malawi, for instance, 16,000 vials of out-of-date AstraZeneca vaccine were destroyed; they had not been taken up due to vaccine hesitancy. Five days into the launch of the Covid-19 vaccination in Zambia, only about 2,000 people were vaccinated out of the 114,000 targeted for the first batch. Local media reports claim that the targets are not being met due to reluctance in the communities to take the vaccine.[74]

1. Settings

- **Vaccination Sites:** The most effective way to administer jabs is to use the largest number of venues possible, set up in areas that will reach as many people as possible. In addition to traditional health-system infrastructure (clinics, hospital hubs, pharmacies), additional settings such as pop-ups at markets (both big and small) should be brought online, to the extent possible given cold-chain requirements. For those who fall outside urban areas or where the geographic distribution of vaccine sites is not possible, mobile units should serve those harder-to-reach communities and individuals. Selection of vaccination sites also needs to account for the requirements of cold chains for distribution, and vaccination strategies can evolve as cold-chain requirements for vaccines change over time.

- **Existing Health-System Infrastructure:** Hospitals, clinics, and community health centres and posts provide an ideal setting for administering jabs. Depending on the national context, pharmacies can also serve as a powerful source for both outreach and administration of vaccines.

  Especially in areas where physical infrastructure is lacking, linking community health workers to mobile vaccination sites may prove most efficient for vaccinating hard-to-reach populations. For example, 16 per cent of adults aged 60 years and older across sub-Saharan Africa have an estimated travel time of two hours or longer.[75] Governments should support innovations like self-administration of vaccines delivered by postal services, which could dramatically simplify the infrastructure challenges for some parts of the world.

- **Mass-Vaccination Centres**: Mass-vaccination sites offer a solution to many of the bottlenecks experienced in vaccine rollout and will serve as an addition to existing vaccination and health infrastructure in countries. For example, with higher levels of foot traffic, mass-vaccination centres are less likely to produce vaccine waste and the large locations eliminate the concern of smaller health centres that do not have the physical space to carry out the 15-minute post-injection observation periods.

2. Staffing

A rollout programme cannot work without the people to oversee, administer and run the vaccination campaign, including allied health professionals and community health workers to engage communities and share information.

In order to administer injections at a pace to match supply, governments should also draw on the following multidisciplinary categories of people to join the rollout programme:

- Retired medical professionals
- Health-care professionals (including all possible pharmacy staff)
- Medical students
- Qualified first aiders
- Community health workers
- Administrators and data managers
- Military, where appropriate, to support logistics for mass-vaccination and/or mobile-vaccination sites

The target for any trained vaccinator should be to administer three injections per hour. We've estimated that each additional trained vaccinator would boost capacity by approximately 21 vaccines per day[76] – meaning an additional 30,000 recruits with sufficient space would allow for 630,000 additional vaccines per day – or 3.15 million per week.[77]

3. Systemisation and Data

Data collection will be essential to call and recall patients for their vaccines, keep track of who is being vaccinated with which vaccine and potentially collate this information for some form of a health pass.

- **Data Capture:** When people are vaccinated, this data must be captured in full and in detail. This data can shed light on questions such as the effect on virus transmission, how often we need boosters, if the Covid-19 vaccine can be co-administered with the yearly flu vaccine, and the effects of vaccines on immunocompromised patients and those suffering from Long Covid.

- **Data Storage:** All vaccination information must be stored on a central system. This system should inform government decisions on resources, prioritisation and better understanding the virus.

- **Data-Sharing:** This data must then be shared across the health-care system. Where appropriate, for instance, in terms of trends with the virus, this information should then be made public. Most critical of all, an individual's Covid-19 information must be made available to them, which is particularly important for the creation of a Covid Pass.

- **Data Privacy:** The success and legitimacy of health passes rests on several contingencies, many to do with the privacy and the security of data. It's not only a question of keeping an accurate record of which individuals have had which vaccine. In the absence of sufficient vaccine supplies, people could be exposed to fake vaccines, with disastrous consequences.

4. Strategic Communications and Community Engagement

Numerous countries have found that securing enough vaccine supply and having the right infrastructure in place is not enough. People need to have confidence in the vaccine to receive it. Therefore, strategic communications and community engagement will be paramount to successful vaccine rollout and require:

- A centrally directed and coordinated national communications campaign.
- Clearly explained and publicly accessible data on safety.
- Consistent messaging on the need to vaccinate to avoid future waves of the virus and safely re-engage in economic activity.
- Targeted community-engagement strategies, utilising channels and media that are tailored to the specific communities' cultural contexts.

REDUCING VACCINE HESITANCY

Recommendation

Coordinate global data-sharing on the impact that vaccinations are having on reducing cases, hospitalisations and deaths to reduce vaccine hesitancy, support better decision-making and provide a bigger sample base for drawing insight.

Data, and the way we present it, is the most important tool we have to combat vaccine hesitancy. Without publishing understandable, contextualised data that clearly sets out the benefits of vaccination, especially when compared to the risks of contracting Covid-19, we are creating vacuums where misinformation, fear and confusion thrive.

Vaccine hesitancy is not confined within borders. The decisions made by a government in one country can impact vaccine take-up elsewhere. Take, for example, the suspension of the AstraZeneca vaccine in March across several EU countries. This decision led to increased hesitancy not only in the EU but other countries too. While most countries eventually resumed their rollout of the AstraZeneca vaccine, lasting damage had been done.

This reputational damage is especially apparent across Africa. Kenya received almost 1 million doses of COVAX-supplied AstraZeneca vaccine in March in the hopes of vaccinating 400,000 of its frontline health-care workers. As of 25 April, however, they have only been able to vaccinate 152,700 due to low vaccine take-up by this group. The Ivory Coast is another example of where this hesitancy is having notable effect. As of 21 April, they had 540,000 doses on hand from COVAX, but only managed to vaccinate 105,100 people between 1 March and 21 April.[78]

Because of the infectious nature of vaccine hesitancy, especially after regulatory action against a specific vaccine, there needs to be global coordination of data-sharing that facilitates regular publishing of data that can be easily understood by the public. This initiative should extend to inform the decisions of regulators, avoiding often confusing and conflicting messages on who can and can't have certain vaccines.

FINANCING VACCINE ROLLOUT

Recommendation

Develop comprehensive, costed plans for vaccine distribution and ensure necessary funding urgently reaches low-income countries to enable effective vaccination campaigns this year. Funding should include direct bilateral assistance, in addition to meeting the needs of the WHO's Access to COVID-19 Tools Accelerator (ACT-A).

Vaccine distribution will go nowhere without sufficient funding. Currently, there is a critical gap in global conversations and guidance regarding vaccine costs and the genuine price of vaccine rollouts. Implementing the above blueprint to improve absorption capacity and efforts to reduce vaccine hesitancy requires significant funding, far and above the cost to procure vaccines. Although COVAX exists to secure vaccines for countries, the responsibility for the distribution of those vaccines to individuals rests with the member states.

CARE estimates that for every $1 a country or donor government invests in vaccine doses, a $5 investment is needed to support the delivery of the vaccine.[79,80] Based on these figures from CARE's latest report, Booz Allen Hamilton estimated that $190 billion is needed to vaccinate a substantial percentage of the population.[81] Current funding efforts for supporting vaccine distribution in developing countries are falling far short of their goals.

The WHO ACT-A estimated that it needs $33.2 billion to accelerate the development and equitable allocation of 2 billion doses of vaccines (to 20 per cent of the population of 190 countries), 900 million tests, 165 million treatments and support improvements to the health systems of 114 countries by the end of 2021. As of 22 April, ACT-A had a funding gap of $19 billion.[82] Filling the ACT-A funding gap is a first step, but still far from the end goal of ensuring vaccines reach the global population.

In October 2020 the World Bank Group approved $12 billion in funding for developing countries to finance the purchase and distribution of Covid-19 vaccines, tests and treatments. As of April, $2 billion has been made available to an initial 17 countries.[83]

One of the challenges for financing the efforts is a lack of concise planning. Initial findings from research aimed at assessing the readiness of over 128 developing countries to deploy vaccines, conducted by the World Bank, UNICEF, the Global Fund, Gavi and other partners, has found that while 85 per cent of countries have developed national vaccination plans, only 30 per cent have plans to train the number of vaccinators needed and 27 per cent have put public-engagement strategies in place to combat vaccine hesitancy.[84]

If we are to meet the requirements of a global vaccination campaign, a comprehensive analysis and consensus around the scale of funding required is necessary.

Part 4: Coordinate Distribution of Global Vaccine Supply

Recommendation

Establish an advisory group that connects existing bodies, including COVAX, and coordinates distribution of surplus doses. The group would have capacity to monitor and strategically deploy global vaccine supply to countries with sufficient absorption capacity. It would direct national efforts for future pandemics to ensure supplies go where they are most needed. Serious consideration should be given to setting up a Global Health Threats Council, as recommended by the Independent Panel for Pandemic Preparedness and Response.

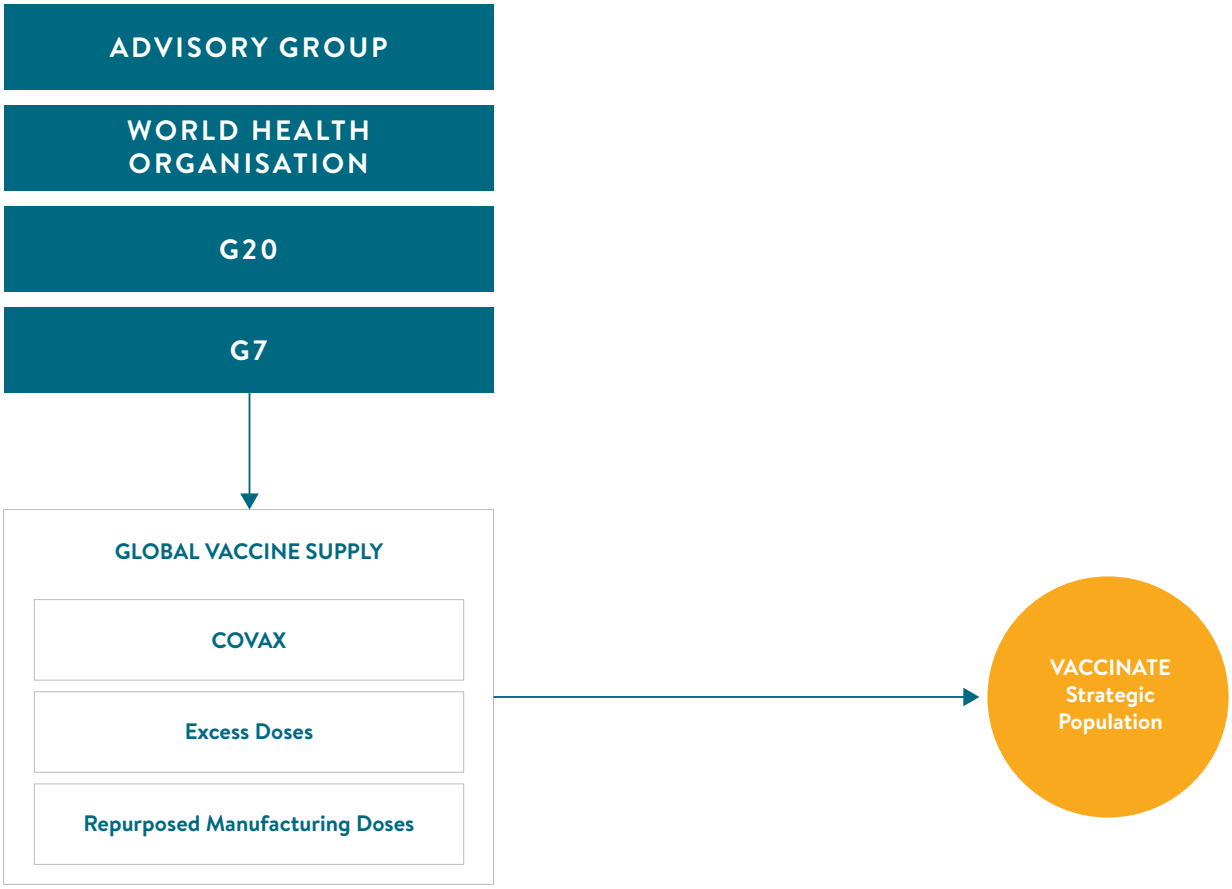
To optimise vaccine supply, reduce the risk of new variants and ensure doses are strategically distributed to reduce transmission, hospitalisation and deaths, a global coordination mechanism is needed. It will require international clout and political power, and be able to receive surplus doses from countries and any generated by excess manufacturing capacity before directing them to countries with sufficient absorption capacity.

Existing efforts are focused on COVAX, which is led by an international coalition including the WHO, Gavi and CEPI. COVAX aims to secure access to 2 billion doses of safe, effective and approved vaccines by the end of 2021 and has already shipped 50 million doses. It is an organisation that should be celebrated, and it should continue to focus on using economies of scale to procure doses, while contributing to this new recommended advisory group to make decisions about priority for distribution.

The advisory body would be accountable to the WHO, with power to direct priority vaccination supply. It would be given political authority from the G7 and the G20 to ensure all possible additional supply is brought under this umbrella.

Figure 15

PROPOSED COORDINATION BETWEEN INTERNATIONAL BODIES ON VACCINATION OF STRATEGIC GLOBAL POPULATIONS



Source: GHSC illustration

The group would monitor global absorption capacity, efforts by countries to tackle vaccine hesitancy and keep track of global vaccine supply. Based on this body of information, the advisory body would make strategic recommendations to prioritise which countries without supply should receive the vaccine sooner, ensuring they have the absorption capacity to utilise it.

It would enable COVAX to focus on meeting demand without having the political burden of prioritisation or absorption considerations. The role of the group would be to add this strategic capability, with the backing and clout of the WHO. Only by adding this missing link to the architecture of the global response to Covid-19 can the optimisation piece of vaccinating the world be realised, and such a mechanism would be a critical resource in tackling future pandemics.

Global coordination is also needed to develop a feedback loop that will assess vaccine safety and efficacy in the context of emerging SARS-CoV-2 variants, which can have different levels of infectiousness, clinical severity and responsiveness to vaccines (and therapeutics and diagnostics). As the virus continues to mutate, it will be critical to assess whether our design and deployment of vaccines needs to change if certain vaccines become less efficacious against certain variants. These feedback loops monitoring safety and efficacy of the vaccines will also have to incorporate genomic sequencing and surveillance data to understand how viral mutations are driving changes in vaccine efficacy. A global coordinating body or advisory group would be well-positioned to incentivise the collection of this data, monitor incoming data, and provide technical guidance for R&D and public-health interventions.

Global monitoring of vaccine efficacy and viral variants will also have implications for vaccine-passport policy. Nations will be well-served to consider vaccination status in the context of vaccine efficacy against dominant and circulating strains, as this could have implications for viral spread and illness as international travel continues to increase, especially if variants that can escape vaccine protection emerge.

A report from the Independent Panel for Pandemic Preparedness and Response, *Covid-19: Make It the Last Pandemic*, drew similar conclusions, and diagnosed an absence of global political leadership throughout the pandemic. Its recommendation to establish a Global Health Threats Council[85] should be given serious consideration as a potential global advisory group.

Conclusion

The world is at a critical moment. A small number of countries are racing ahead on vaccination rollout, with the UK and the US among them, but with many parts of the world lagging far behind. This situation, in the end, benefits no one. Until the whole world is safe, no single country is safe.

As long as some countries, and even regions, remain largely unvaccinated, we live with the very real danger of new strains of the Covid-19 virus emerging that are more resistant to vaccination and more easily transmissible. In a worst-case scenario, with an extremely severe strain, the world could be back to square one with its response to the pandemic.

Those countries racing ahead in their vaccine rollout therefore face the self-interested need to act selflessly and help ensure the whole world is vaccinated as soon as possible.

This is a significant mission in general, but in this paper we have set an even higher bar. Time is not on our side. We need to vaccinate the world urgently. For this reason, we need to strategically vaccinate as many people as possible in 2021.

We cannot afford to wait.

Endnotes

1 Note that this figure excluded populations in China and Russia. The analysis in this report assesses what it would take to vaccinate the world using vaccines that are currently approved by the US, UK and/or EU, or are under consideration for use by the EU. Because China and Russia are using other vaccines to vaccinate their populations, we have excluded them from this analysis.

2 Excluding China and Russia, which are using different vaccines.

3 https://ec.europa.eu/info/live-work-travel-eu/coronavirus-response/safe-covid-19-vaccines-europeans_en

4 https://www.who.int/news/item/07-05-2021-who-lists-additional-covid-19-vaccine-for-emergency-use-and-issues-interim-policy-recommendations

5 https://www.reuters.com/world/middle-east/who-gives-emergency-approval-sinopharm-first-chinese-covid-19-vaccine-2021-05-07/

6 https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)00191-4/fulltext

7 https://www.theguardian.com/world/2021/apr/12/covid-pandemic-still-growing-exponentially-who-says

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