Global C-19 Vaccination Strategy – SAGE Extraordinary meeting

June 29, 2021
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World Health Organization
Global C-19 Vaccination Strategy SAGE Extraordinary meeting

Objectives

Critical appraisal from SAGE will be sought for:

• The **Conceptual Goal Framework**, built along health and socio-economic dimensions, and the identification of the **levels of scientific uncertainty** associated with the different steps in the framework.

• The **Goal Synthesis** based on scenario analysis as a means to inform a global strategy.

• The lay out of the **three potential options for a Global Strategy for 2021-2022**.
Global C-19 Vaccination Strategy
SAGE Extraordinary meeting

Agenda

1. Context and proposed goal framework – Kate O’Brien (10’)

2. Health impact and uncertainties – Sarah Pallas (10’)

3. Goal synthesis and feasibility assessment – Tania Cernuschi (10’)

4. Options for an updated global strategy – Kate O’Brien (10’)

June 29, 2021
Over one year since the start of the pandemic, we have a renewed need for collective action

Pandemic status in 2021

- Epidemiology is dynamic and uneven
- Death toll continues to increase
- High transmission is leading to the emergence of new variants of concern
- We now have the tools to end the acute phase of the pandemic, with several vaccines authorized and available in increasing quantities

Rationale for Updated Goals and Strategy

- Ambitious vaccination coverage targets are being set, however the preconditions, benefits, risks, and resources needed are not explicit
- Uncoordinated approach is further exacerbating inequities, and consequent impacts on virus and disease
- Major financial, donor, and political institutions are making investment decisions and require strategic global guidance
- Manufacturers need enhanced clarity on required supply

“We need to work together. (...) To end the pandemic everywhere, we need a global vaccination plan” – UN Secretary General Antonio Guterres

Updating the Global Vaccination Strategy

1. Inform the decisions countries are making regarding their vaccination goals and targets for 2022 and beyond

2. Promote an equitable approach to COVID-19 vaccination globally, as part of the broader pandemic control strategy

3. Update global vaccination goals for 2022, based on specific changes in the global context and in light of key uncertainties

4. Inform global policymaking and access efforts, investment decisions by financial and donor institutions, R&D groups and vaccine manufacturers as well as country planning and programmatic work
Conceptual goal framework: Socio-economic goals and vaccination
2022 goals development

<table>
<thead>
<tr>
<th>2021 Goal</th>
<th>Reduce COVID-19 mortality and protect health workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSM</td>
<td>Stringent PHSM, leading to lockdown</td>
</tr>
<tr>
<td></td>
<td>Less stringent PHSM, some limitations to socio-economic activity and travel</td>
</tr>
<tr>
<td></td>
<td>Test-Trace-Isolate-Quarantine (TTIQ) and travel restrictions only</td>
</tr>
<tr>
<td></td>
<td>TTIQ only, fully resumed economic and social activity</td>
</tr>
</tbody>
</table>

Priority group vaccination targets defined according to SAGE Roadmap

- Low
- Medium
- High
- Very high

Countries are setting health and socio-economic goals of increasing aspiration across a continuum
To reach these goals, and hence sustainably lift PHSM, different levels of vaccination ambition are necessary to avoid death and suffering
For instance, to reduce COVID-19 mortality and protecting health workers, countries need to increase their vaccination targets, if lifting PHSM
As they increase their vaccination targets, countries can follow the SAGE Roadmap to prioritize populations

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1. Indicative framework as other countries have achieved same goals with different combinations (e.g., China); 3. Maps to SPRP 2021 strategic goals of “Protecting the vulnerable” and “Reducing mortality and Morbidity from all causes”
Conceptual goal framework: Health dimension

2022 goals development

1. Indicative framework as other countries have achieved same goals with different combinations (e.g., China);
2. Maps to SPRP 2021 “Suppress transmission” strategic goal;
3. Maps to SPRP 2021 strategic goals of “Protecting the vulnerable” and “Reducing mortality and Morbidity from all causes”

Similarly, for each level of PHSM, countries may also wish to increase their health goal aspiration level, from mortality reduction and health system protection to reducing viral transmission, for instance to reduce emergence and transmission of VoCs.
Conceptual goal framework
2022 goals development

The framework is intended to help countries move away from setting coverage targets as goal in themselves and rather defining explicit health and socio-economic goals and working towards equitable outcomes for all, both within and amongst countries.

The framework is not meant to endorse any specific combination of goals and vaccination targets, but rather lay out all the possible options for individual countries and the international community as a whole.

The framework focuses on vaccination, however must be considered within the broader Strategic Preparedness Response Plan

Goals (global and countries) to be revisited as the pandemic unfolds and new epi data/information becomes available

1. Indicative framework as other countries have achieved same goals with different combinations (e.g., China);
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3. Maps to SPRP 2021 strategic goals of “Protecting the vulnerable” and “Reducing mortality and Morbidity from all causes”
Simplifications adopted for the conceptual framework and analytics

Within their chosen vaccination ambition, countries are encouraged to prioritize priority populations leveraging the SAGE Roadmap.

For simplification, we are considering age-descending prioritization in this work.

Age is most consistent risk factor for severe disease and death across countries and hence chosen as simplifying assumption; age-descending strategy consistent with SAGE Prioritization Roadmap.

Expanding coverage down to children is a necessary implication of reduced transmission goal, or socioeconomic reopening goal.
<table>
<thead>
<tr>
<th>Goal</th>
<th>Vaccination ambition</th>
<th>Age cut-off adapted for analysis</th>
<th>Short answer</th>
</tr>
</thead>
</table>
| Reduce mortality                          | Low=Older adults and high-risk groups | 50+                              | • Substantially **greater mortality risk above 50 years**  
• Lower “older adult” 50+ threshold will (i) capture most adults with comorbidities and (ii) be more appropriate cross-country accounting for IFR variability 65+ (e.g., care homes in HICs) and younger demographic structure in LMICs/LICs |
| Reduce disease burden and limit health system impact | Medium=All adults            | 30+                              | • Hospitalization data from a few HIC settings show **higher risk and number of hospitalizations for those 30+**                               |
| Reduce viral transmission                 | High=Adults + adolescents             | 12+                              | • Direct benefit in reducing symptomatic cases, long COVID, and MIS-C  
• 10-29 years have some of highest pre-pandemic contact rates  
• 12+ cutoff **based on vaccines** with current/anticipated adolescent indications based on clinical trial ages  
• **Separates decision to vaccinate adolescents vs. younger children** |
| Reduce viral transmission while lifting PHSM | Very high=Include children            | 0+                               | • Lifting PHSM increases Rt  
• With higher Rt, it is necessary to vaccinate a larger share of the total population to achieve viral transmission reduction  
• **Implies expansion to children, especially in LMICs/LICs** with younger demographic structures |
Global C-19 Vax Strategy SAGE
Extraordinary meeting

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Incremental benefit of vaccination across the health dimension

Target population vaccinated over 4 months with PHSM in place (Rt=1.2), gradually lifted thereafter (Rt=3.5)
Vaccine efficacy 63% vs infection; 80% vs severe disease; 45% vs transmission

Incremental health benefits with increasing vaccination targets to younger ages (assuming vaccine effective against infection, transmission)

Distribution of incremental benefits reflects demographics (older populations in HICs, younger populations in LICs), contact patterns, and health system strength across countries

Demonstrates efficiency of targeting the oldest age groups in terms of deaths and hospitalisations averted

Even a vaccine with “sub-optimal” efficacy can have substantial public health impact

Source: Imperial College London, MRC Centre for Global Infectious Disease Analysis, Alexandra Hogan, Peter Winskill, Oliver Watson, Azra Ghani
Modelled impact of coverage targets by age: LMIC setting

Vaccinating those <30 years old is an efficient strategy mainly towards the goal of reducing viral transmission.

Vaccinating younger cohorts provides some indirect protection to avert deaths and hospitalisations in older age cohorts, but efficiency depends on vaccine characteristics.

Default scenario shown assumes same infectiousness of <10 years and that health system constraints increase IFR in LMICs/LICs when health system is overwhelmed.

Source: Imperial College London, MRC Centre for Global Infectious Disease Analysis, Alexandra Hogan, Peter Winskill, Oliver Watson, Azra Ghani
Timing of vaccination relative to lifting PHSM: LMIC example

- Coloured bars show the total deaths averted if vaccination begins at that time point.
- Each coloured bar represents an increment of around 2 weeks.
- The black line shows the counterfactual epidemic.
- Only one epidemic wave shown – there would be additional impact on subsequent waves.

Prioritization of vaccination, along with an integrated strategy of PHSM use during vaccine rollout, important to optimize impact across multiple health dimensions.

Rapid vaccination rollout important to minimize economic costs of PHSM.

Vaccination needs to happen well in advance of surges to maximize vaccination impact (limited impact of surge response vaccination due to lag in detection and response times).

Still some longer-term benefit to vaccinating “past the peak” for protection against future waves/waning.

Source: Imperial College London, MRC Centre for Global Infectious Disease Analysis, Alexandra Hogan, Peter Winskill, Oliver Watson, Azra Ghani.
Sensitivity analyses: Strategy implications qualitatively similar (LMIC setting example)

Consider changes in timing of epidemic peaks relative to period over which impacts measured

Source: Imperial College London, MRC Centre for Global Infectious Disease Analysis, Alexandra Hogan, Peter Winskill, Oliver Watson, Azra Ghani
Sensitivity analysis: Potential impacts of VOCs (LMIC setting example)

Default: Vaccine efficacy 63% vs infection; 80% vs severe disease; 45% vs transmission; Rt=3.5
VOC: Vaccine efficacy 40% vs infection; 60% vs severe disease; 33% vs transmission; Rt=4.5

Source: Imperial College London, MRC Centre for Global Infectious Disease Analysis, Alexandra Hogan, Peter Winskill, Oliver Watson, Azra Ghani
1. Indicative framework as other countries have achieved same goals with different combinations (e.g., China);  
2. Maps to SPRP 2021 “Suppress transmission” strategic goal;  
3. Maps to SPRP 2021 strategic goals of “Protecting the vulnerable” and “Reducing mortality and Morbidity from all causes”

Goals (global and countries) to be revisited as the pandemic unfolds and new epi data/information becomes available:

1. Clinical impact of infection and disease (e.g., long COVID)
2. Emergence of VoC
3. Vaccine performance in reducing transmission
4. Safety/efficacy under 12 years
5. Endemic disease circulation
6. Duration of protection (dealt with through the scenarios)
7. % of population to reduce viral transmission
Uncertainty about transmission reduction

- More transmissible VOCs make vaccination-induced “herd immunity threshold” harder to achieve
- “Herd immunity threshold” harder to achieve in younger demographic settings without (i) high proportion of naturally acquired immunity, or (ii) vaccination of younger cohorts
- Uncertainties:
  - Vaccine effectiveness against infection and transmission across VOCs
  - Duration of protection
  - Relevance of theoretical “herd immunity threshold” as policy/programmatic guide

Curves show estimated vaccination coverage required to reach herd immunity threshold for different levels of vaccine effectiveness and naturally-acquired immunity

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Global C-19 Vax Strategy SAGE Extraordinary meeting

June 29, 2021
Goal-synthesis

A. Identify countries’ vaccination ambition relative to the framework and progress to date
B. Identify barriers on the trajectory towards different goals
C. Perform incremental benefit analysis for moving to higher ambition goals
D. Calibrate expectations with respect to global goals
A. Current country targets mapped against the goal framework

Countries have been setting goals beyond 20% total pop: goals are clustered between 50-75% of total population range.

These translate into very different target ages, with LICs and LMICs having high ambition and targeting youth.

Most countries are probably targeting resumed socio-economic activity while reducing disease burden, but possibly with lack of clarity on how to achieve these.

The framework shows how countries’ desire to lift PHSM may be constrained by their vaccination target.

Higher income countries are advancing at much faster pace towards goals.
### B. Three scenarios for global dose requirements

<table>
<thead>
<tr>
<th>Dose schedule scenario</th>
<th>Primary series</th>
<th>Booster</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘No booster scenario’</td>
<td>Two-dose course primary vaccination for HICs and UMICs and one-dose course primary vaccination for LMICs/LICs*</td>
<td>No booster</td>
</tr>
<tr>
<td>‘High-risk booster scenario’</td>
<td>Two-dose course primary vaccination for all countries</td>
<td>Annual one-dose booster for those 50+ years only. Booster every two years for other populations</td>
</tr>
<tr>
<td>‘Yearly booster scenario’</td>
<td>Two-dose course primary vaccination for all countries</td>
<td>Annual one-dose booster for all target populations</td>
</tr>
</tbody>
</table>

*WHO currently recommends a two-dose course for all vaccines except for J&J, which requires only one dose. Eventual booster needs have not yet been established*

*Low resource requirement scenario requested by African Union for exploratory purposes.

**Disclaimer:** It is important to specify that scenarios used in the analysis were designed to explore possible trajectories and the resilience of the proposed strategy to different types of uncertainty. They do not constitute forecasts by WHO or any participating partners as to the likely trajectory of the pandemic nor of any anticipated vaccine performance, regulatory or policy decisions. Neither do these scenarios represent any judgement by WHO or participating partners about their relative desirability.
# B. Global programmatic dose requirements per goal and scenario

## Aggregate global dose requirement for 2021 and 2022 (bn doses)

<table>
<thead>
<tr>
<th>Target</th>
<th>Scenario</th>
<th>HICs</th>
<th>UMICs</th>
<th>LICs &amp; LMICs</th>
<th>China</th>
<th>India</th>
<th>Total</th>
<th>Demand considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Older adults and high-risk groups</strong></td>
<td>Yearly booster</td>
<td>1.2</td>
<td>0.9</td>
<td>0.8</td>
<td>1.2</td>
<td>0.7</td>
<td>2.6-4.9bn</td>
<td>There is a large variance in programmatic dose requirement across goals and scenarios.</td>
</tr>
<tr>
<td></td>
<td>No booster</td>
<td>0.8</td>
<td>0.6</td>
<td>0.3</td>
<td>0.8</td>
<td>0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>All adults</strong></td>
<td>Yearly booster</td>
<td>2.0</td>
<td>1.9</td>
<td>2.1</td>
<td>2.3</td>
<td>1.6</td>
<td>5.4-9.8bn</td>
<td>As expected dose requirement is increasing with level of goal ambition and boosters.</td>
</tr>
<tr>
<td></td>
<td>No booster</td>
<td>1.3</td>
<td>1.3</td>
<td>0.7</td>
<td>1.5</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Adults and adolescents</strong></td>
<td>Yearly booster</td>
<td>2.5</td>
<td>2.6</td>
<td>3.3</td>
<td>3.0</td>
<td>2.3</td>
<td>7.8-13.8bn</td>
<td>Considerable drop in dose requirements in year 3 in all scenarios. In no-booster scenario, requirements approach annual birth cohort size with important considerations on likelihood of market investments.</td>
</tr>
<tr>
<td></td>
<td>No booster</td>
<td>1.7</td>
<td>1.9</td>
<td>1.3</td>
<td>2.0</td>
<td>0.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Include children</strong></td>
<td>Yearly booster</td>
<td>2.8</td>
<td>3.1</td>
<td>4.3</td>
<td>3.3</td>
<td>2.7</td>
<td>9.6-16.2bn</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No booster</td>
<td>2.0</td>
<td>2.4</td>
<td>1.8</td>
<td>2.3</td>
<td>1.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Requirements range from 2.8 to 16.2 bn doses

Source: COVAX Global Market Assessment
B. Potential supply - dose requirement for low supply scenario for 2021 and 2022

Incorporating key distribution assumptions based on manufacturing capacity, existing deals, and dose sharing

<table>
<thead>
<tr>
<th>Scenario</th>
<th>HICs</th>
<th>UMICs</th>
<th>LICs/LMICs</th>
<th>China</th>
<th>India</th>
<th>Total</th>
<th>Target</th>
<th>Supply considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearly/high-risk booster – 50+ yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Older adults</td>
<td>Potential production ranges from 6.5 to 9 bn doses in 2021 and 9 to 17 in 2022</td>
</tr>
<tr>
<td>No booster – 50+ yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yearly booster – 30+ yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>All adults</td>
<td>No supply constraints for the ‘older adults + high-risk’ and ‘all adults’ goals</td>
</tr>
<tr>
<td>High-risk booster – 30+ yrs</td>
<td></td>
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<tr>
<td>No booster – 30+ yrs</td>
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<tr>
<td>Yearly booster – 12+ yrs</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Adults &amp; adolescents</td>
<td>For the more ambitious goals of ‘adults and adolescents’ and ‘include children’, all countries except for HICs face supply constraints in at least one scenario.</td>
</tr>
<tr>
<td>High-risk booster – 12+ yrs</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No booster – 12+ yrs</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yearly booster – 0+ yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Include children</td>
<td>There is ~1.5-4.5 bn of currently unreserved manufacturing capacity that could be further secured to address gaps</td>
</tr>
<tr>
<td>High-risk booster – 0+ yrs</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>No booster – 0+ yrs</td>
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</tr>
</tbody>
</table>

Assumes 2 year programmatic dose requirements are needed by end of 2022, likely over-estimating gaps in supply. ‘No booster scenario’ assumes 1 dose for LICs and LMICs.

Source: COVAX Global Market Assessment
B. Indicative cost to reach different vaccination targets in LICs and LMICs over a two-year period

Given the wide range of dose requirement scenarios, there is a similarly wide range of costs up to ~60 USD bn in 2021-22

Primary course and booster scenarios are an important driver of cost difference and have long term implications

Delivery and HW costs will represent ~1/4 of overall cost

These costs are only indicative and are under discussion at COVAX CR&D Task Team

Currently assumes following costs per dose:
- 6.7 USD for procurement
- 0.5 to ~1 USD for delivery costs, decreasing with increasing number of doses, thanks to economies of scale
- ~0.9 to ~1.2 USD for HW surge costs, increasing with the number of doses supplied
B. Important investments have already been made towards ambition vaccination targets

Important investments have already been made to date by COVAX, MDBs, earmarking for bilateral and regional deals, commitments to dose donation.

The commitments already place LICs and LMICs on a good trajectory towards achievement of ambitious targets (12+ and 30+)

Additional funds are available from MDBs and more ODA could be mobilized, as well as return on investments from immunization.
B. Number of countries and population with potential financial & system challenges by scenario

<table>
<thead>
<tr>
<th>Population, Bn</th>
<th>UMIC</th>
<th>LMIC</th>
<th>LIC</th>
<th># countries meeting at least one of three criteria</th>
<th># countries meeting at least one of the HW or DTP3 criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td># countries</td>
<td>13</td>
<td>15</td>
<td>28</td>
<td>41</td>
<td>58</td>
</tr>
</tbody>
</table>

**Indicators used to identify countries**

1) the cost of vaccinating x% of the population is over 1% of 2021-2022 General Government Expenditure* for countries where expected government revenue per person vaccinated is less than the cost per person vaccinated

AND/OR

2) the extra HW for vaccinating the target population is larger than 10% of existing HW in countries where the number of physicians/1000 pop is lower than 0.2.

AND/OR

3) countries are not able to reach DTP3 coverage above 60%**

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*(IMF WEO April 2021 data)  
** (WUENIC estimates extracted from WIISE, June 2021) (assumed applicable to 30yrs and 0yrs goals)
C. Incremental benefits and trade-offs of ambitious vaccination target in LICs and LMICs

National considerations

益处

- **最大增量健康益处**：因人口统计、社交模式和卫生系统限制，改换到较年轻年龄组的增量健康益处
- **增量经济效益**：如果接种疫苗的推进迅速，可以避免GDP损失，并允许更快的经济上性价比更高的解封

风险

- **资源使用效率低下**：对免疫化结果和新疾病投资的可持续性构成风险
- **病例增加和病死率风险**

全球考虑

- 低/缓慢的接种疫苗推广在(LM)ICs可能会导致 VOC 的有限控制，并导致全球的经济损失（由于贸易、财务和消费模式）
- "到2021年底全球接种40%，2021年第一季度接种60%，到2025年带来的收益为9万亿美元，其中超过40%将流向先进经济体"
- "我们的估计表明，即使在各国实现普遍接种的情况下，2021年全球大流行病的经济成本（1.5-9万亿美元）的53%将由先进经济体负担"
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June 29, 2021
D. Countries and public health agencies have been setting immunization targets as share of total population

Priority Group Population by Age Strata, mn

Vaccination target mapped to % of total population with priority group coverage assumption

Vaccination target mapped to % of total population w/ 100% coverage assumption

Within Priority Group Coverage Assumptions

1. HICs; 2. UMICs and L(M)ICs
3. Explicitly calculated and subsequently subtracted from their corresponding age group to avoid double-counting

Source: UN population estimates, https://population.un.org/wpp/
D. Step-wise approach along the trajectory of potential global goals

The path to full global recovery advances through several goals in a step wise approach.

**Goal description**

**Step 1**
Reducing highest risk of mortality and protecting health system limits most severe PHSM needed for crisis response.

**Target pop**
Global %

- **Older adults and high-risk**
  - 20%

- **All adults**
  - 40%

- **Adults and adolescents**
  - 60%

- **Include children 70-80%**

**Step 2**
Minimizing mortality and severe disease puts countries on trajectory toward resuming socio-economic activity.

**Step 3**
Minimizing disease burden, directly and indirectly advances countries towards resuming socio-economic activity.

**Step 4**
Mitigating future health risks (e.g., VoC) for full global recovery.

---

1. The % population targets include coverage assumptions within the prioritized population: HCW and 65yrs+: 85% coverage, 5-65yrs: 70% coverage, 0-4yrs: coverage ranging from 70% to 87%
2. Including all HW
D. Step-wise approach along the trajectory of potential global goals

The path to full global recovery advances through several goals in a step wise approach.

Country specific targets need to account for local circumstances, including demographic and priority populations distribution.

**Goal description**

**Step 1**
Reducing highest risk of mortality and protecting health system limits most severe PHSM needed for crisis response.

**Step 2**
Minimizing mortality and severe disease puts countries on trajectory toward resuming socio-economic activity.

**Step 3**
Minimizing disease burden, directly and indirectly advances countries towards resumption of socio-economic activity.

**Step 4**
Mitigating future health risks (e.g., VoC) for full global recovery.

**Target pop**
Global % (range)

- Older adults and high-risk^3 20% (8%-31%)
- All adults 40% (22%-50%)
- Adults and adolescents 60% (47%-64%)
- Include children 70-80%

1. The % population targets include coverage assumptions within the prioritized population: HCW and 65yrs+: 85% coverage, 5-65yrs: 70% coverage, 0-4yrs: coverage ranging from 70% to 87%
2. Including all HW
D. Step-wise approach along the trajectory of potential global goals

The path to full global recovery advances through several goals in a step wise approach from reducing highest risk of mortality and protecting health systems limiting most sever PHSM needed for crisis response to mitigating future health risks for full global recovery.

Country specific targets need to account for local circumstances, including demographic and priority populations distribution.

Vaccination targets should be driven by considerations on:
- Incremental benefits
- Feasibility
- Future risks

1. The % population targets include coverage assumptions within the prioritized population: HCW and 65yrs+: 85% coverage, 5-65yrs: 70% coverage, 0-4yrs: coverage ranging from 70% to 87%

2. Range refers to the % population in the age strata across HIC, UMIC, LMIC and LIC

3. Including all HW
Options for a Global Strategy for 2021-2022

Global Strategy 3
- Older adults
  - (2022)

Global Strategy 2
- All adults +
  - risk mitigation
  - (2022)

Global Strategy 1
- All
  - (2022)

1. The % population targets include coverage assumptions within the prioritized population: HCW and 65yrs+: 85% coverage, 5-65yrs: 70% coverage, 0-4yrs: coverage ranging from 70% to 87%
2. Range refers to the % population in the age strata across HIC, UMIC, LMIC and LIC
3. Including all HW

Target pop
Global %1 (range2)

Older adults
- 40% (22%-50%)

Older adults and high-risk3
- 20% (8%-31%)

Adults and adolescents
- 60% (47%-64%)

Include children 70-80%

Step 1

Step 2

Step 3

Step 4
# Key features of the three potential global strategies

<table>
<thead>
<tr>
<th>Goals</th>
<th>Global Strategy 3: <em>Older adult global vaccination</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce highest risk of mortality and protecting health systems limiting most severe PHSM needed for crisis response</td>
<td>Aim to reduce disease burden and putting countries on trajectory toward resuming socio-economic activity</td>
</tr>
<tr>
<td>Focus only on highest risk groups and older adults where incremental benefits are most certain</td>
<td>Prioritize highest risk groups where incremental benefits are highest, and encourage and support countries to all adult populations</td>
</tr>
<tr>
<td>Reinforce and build on the current unfinished agenda</td>
<td>Leverage clear political will and already ongoing in investments, and could be feasible for majority of countries with external support</td>
</tr>
<tr>
<td>Encourage all countries to await for further evidence on need/desirability of further ambitions</td>
<td>Leverage recent ambitious calls for actions and establish equitable opportunities</td>
</tr>
<tr>
<td>Requirements and resource-handling</td>
<td>May require massive investments, including of external technical support, to support externally drive, campaign-type approach to timely immunization in context of high scientific uncertainty</td>
</tr>
<tr>
<td>Ensure efficient and effective use of scarce resources for more feasible and impactful targets</td>
<td>Propose concomitant investment in other immunization activities and primary care</td>
</tr>
<tr>
<td>Risk leaving us unprepared in potential need for more ambitious vaccination targets as more data and knowledge is collected on scientific uncertainties.</td>
<td>Call for important at-risk investments in vaccine supply and systems to ensure readiness to implement future steps once scientific uncertainty is cleared</td>
</tr>
</tbody>
</table>

---

**Global Strategy 2: All adult global vaccination with risk mitigation**

- Aim to reduce disease burden and putting countries on trajectory toward resuming socio-economic activity
- Prioritize highest risk groups where incremental benefits are highest, and encourage and support countries to all adult populations
- Promote efficient use of resources in face of many scientific uncertainties on feasibility and desirability of adolescent and children vaccination
- Call for important at-risk investments in vaccine supply and systems to ensure readiness to implement future steps once scientific uncertainty is cleared

---

**Global Strategy 1: Universal global vaccination**

- Aim to mitigate future health risks for full global recovery
- Prioritize older adults and highest risk groups, but encourage and support all countries to quickly move to include children vaccination
- Leverage recent ambitious calls for actions and establish equitable opportunities
- Propose concomitant investment in other immunization activities and primary care

---

**Age**

- **Global Strategy 3: Older adult global vaccination**
  - Focus only on highest risk groups and older adults where incremental benefits are most certain
- **Global Strategy 2: All adult global vaccination with risk mitigation**
  - Prioritize highest risk groups where incremental benefits are highest, and encourage and support countries to all adult populations
- **Global Strategy 1: Universal global vaccination**
  - Prioritize older adults and highest risk groups, but encourage and support all countries to quickly move to include children vaccination
Acknowledgements


Contributing panels and working groups (in no specific order): Global COVID-19 Vaccination Ad-hoc Strategy Group, COVAX global market assessment working group, SAGE Working Group on COVID-19 Vaccines, Imperial College London (MRC Centre for Global Infectious Disease Analysis, WHO Collaborating Centre for Infectious Disease Modelling), Harvard School of Public Health (Value of Vaccination Research Network Secretariat), Country Readiness and Delivery Task Team for Global Delivery Costs, COVAX Workstream Convenors and RSSE
Global C-19 Vaccination Strategy SAGE Extraordinary meeting

Objectives

Critical appraisal from SAGE will be sought for:

- The **Conceptual Goal Framework**, built along health and socio-economic dimensions, and the identification of the **levels of scientific uncertainty** associated with the different steps in the framework.

- The **Goal Synthesis** based on scenario analysis as a means to inform a global strategy.

- The lay out of the **three potential options for a Global Strategy for 2021-2022**.
Appendix: Conceptual goal framework
Rationale for age cutoffs for global strategy analyses

Goal framework key assumption: countries’ primary objective is to “return to normal” (move along horizontal axis) while mitigating health losses

No country aims to stay at “stringent PHSM” forever.

Modeling finding: Maintaining NPIs during vaccination rollout minimizes health losses

Implication: Vaccination at each stage of PHSM is preparatory for next stage of lifting PHSM

Increasing $\text{R}_t$ in absence of vaccination

<table>
<thead>
<tr>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stringent PHSM leading to lockdown</td>
<td>Less stringent PHSM, some limitations to socio-economic activity and travel</td>
<td>Test, trace, isolate, quarantine (TTIQ) and travel restrictions only</td>
<td>TTIQ only, fully resumed economic and social activity</td>
</tr>
</tbody>
</table>

Stringent PHSM leading to lockdown
Less stringent PHSM, some limitations to socio-economic activity and travel
Test, trace, isolate, quarantine (TTIQ) and travel restrictions only
TTIQ only, fully resumed economic and social activity
Age groups vary in their population coverage across income groups

Total Pop Proportion (%) accounted for by Health Goal & Country Income Group (low socioeconomic goal/high PHSM example)

<table>
<thead>
<tr>
<th>GOAL</th>
<th>HIC</th>
<th>UMIC</th>
<th>LMIC</th>
<th>LIC</th>
<th>Average across income groups</th>
<th>Global Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older adults and high-risk groups</td>
<td>31%</td>
<td>23%</td>
<td>14%</td>
<td>8%</td>
<td>19%</td>
<td>19%</td>
</tr>
<tr>
<td>All adults</td>
<td>50%</td>
<td>43%</td>
<td>32%</td>
<td>22%</td>
<td>37%</td>
<td>38%</td>
</tr>
<tr>
<td>Adults and adolescents</td>
<td>64%</td>
<td>60%</td>
<td>54%</td>
<td>47%</td>
<td>56%</td>
<td>57%</td>
</tr>
<tr>
<td>Include children</td>
<td>74%</td>
<td>72%</td>
<td>71%</td>
<td>71%</td>
<td>72%</td>
<td>72%</td>
</tr>
</tbody>
</table>

For the first two goals, HICs/UMICs would require higher % total population coverage than LMICs/LICs due to their older demographic structure.

Add coverage assumptions we have used that get us to this shares.
Appendix: Health impact modelling
Timeline to complete Global vaccination work – including consultations

June 10
Member State briefing

June 17
SAGE COVID-19 WG meeting

June 18
Ad-hoc Strategy Group meeting

June 29
SAGE review of initial draft

Beginning of July
Draft available for public consultation

June 29
SAGE review of initial draft

Early-mid July
Member State consultation

End July
Final document

Consultation period

June 25
SAGE COVID-19 WG meeting

June 29
SAGE review of initial draft

June 29
SAGE review of initial draft

End July
Final document

Consultation period
Modelled impact of coverage targets by age, across income settings (incl. 20+)

Trajectories with and without vaccine

Deaths averted per population

Deaths averted per 100 FVP

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Notes

- There is always additional health benefit in vaccinating additional age groups.

- Incremental benefit of vaccinating 0+ group highest in lower-income settings due to demography and contact patterns.

- Health system constraints are assumed to the present, which is reflected in the impact in LMIC and LIC settings.

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Events averted per 100 FVP

**Notes**

- Demonstrates efficiency in terms of deaths and hospitalisations averted of targeting the oldest age groups.
- Benefit of averting infections shown in vaccinating youngest age groups – particularly in LMIC and UMIC settings.

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Interpreting drivers of impact across income settings: deaths with and without vaccine, by age group

Health System Constraints Absent

Pale blue bars: deaths without vaccine

Health System Constraints Present (default)

Notes
- Time period selected such that each bar represents one epidemic wave for comparability
- Top row shows health constraints absent: deaths in younger ages in LMICs and LICs are being driven by assumption about health system constraints

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Interpreting drivers of impact across income settings: infections with and without vaccine, by age group

Notes
• Time period selected such that each bar represents one epidemic wave for comparability

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
“Matrix” of VOC impact – conceptualised as impact on transmission and impact on vaccine efficacy
LMIC setting shown

- Important to consider timing of epidemic peaks and window over which impact is measure (makes it hard to compare)

**Default:** Vaccine efficacy 63% vs infection; 90% vs severe disease; 45% vs transmission; Rt=3.5

**VOC:** Vaccine efficacy 40% vs infection; 90% vs severe disease; 33% vs transmission; Rt=4.5

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
“Matrix” of VOC impact – conceptualised as impact on transmission and impact on vaccine efficacy

- Important to consider timing of epidemic peaks and window over which impact is measure (makes it hard to compare)

**Default: **Vaccine efficacy 63% vs infection; 90% vs severe disease; 45% vs transmission; Rt=3.5
**VOC: **Vaccine efficacy 40% vs infection; 90% vs severe disease; 33% vs transmission; Rt=4.5

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Sensitivity analyses (shown for LMIC setting with 20+): Deaths averted per million population

- Timing of epidemic peaks shifts with different assumptions
- Vaccine that is disease-blocking only (with some reduction in infectiousness for breakthrough infections): few lives saved vaccinating individuals <30 years; slightly higher deaths averted 50+ which is artefact of earlier epidemic and waning immunity
- If no constraints on health system, then fewer deaths to avert but similar pattern of incremental gains
- If <10 years less infectious, smaller overall incremental impact of vaccinating <10 years.

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Sensitivity analyses (shown for LMIC setting with 20+): Deaths averted per 100 FVP

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Sensitivity to assumptions about take-up within age groups: **deaths averted**

<table>
<thead>
<tr>
<th>Scenario: Default</th>
<th>Optimistic elderly</th>
<th>Optimistic elderly + pessimistic young</th>
<th>Pessimistic elderly + younger</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UMIC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LMIC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes**
- Demonstrates importance of maintaining high take-up in the most at-risk populations

**Within priority group coverage scenario**

<table>
<thead>
<tr>
<th></th>
<th>65+ years</th>
<th>&lt;65 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>85%</td>
<td>70%</td>
</tr>
<tr>
<td>Optimistic elderly</td>
<td>95%</td>
<td>70%</td>
</tr>
<tr>
<td>Optimistic elderly + pessimistic younger</td>
<td>95%</td>
<td>50%</td>
</tr>
<tr>
<td>Pessimistic elderly + pessimistic younger</td>
<td>70%</td>
<td>50%</td>
</tr>
</tbody>
</table>

**Source:** Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Sensitivity to assumptions about take-up within age groups: hospitalisations averted

<table>
<thead>
<tr>
<th>Within priority group coverage scenario</th>
<th>65+ years</th>
<th>&lt;65 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>85%</td>
<td>70%</td>
</tr>
<tr>
<td>Optimistic elderly</td>
<td>95%</td>
<td>70%</td>
</tr>
<tr>
<td>Optimistic elderly + pessimistic younger</td>
<td>95%</td>
<td>50%</td>
</tr>
<tr>
<td>Pessimistic elderly + pessimistic younger</td>
<td>70%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Sensitivity to assumptions about take-up within age groups: infections averted

Within priority group coverage scenario | 65+ years | <65 years
---|---|---
Default | 85% | 70%
Optimistic elderly | 95% | 70%
Optimistic elderly + pessimistic younger | 95% | 50%
Pessimistic elderly + pessimistic younger | 70% | 50%

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Timing of window of vaccination relative to epidemic peak

Waning immunity following infection (default)  Lifelong immunity following infection

Yellow = vaccinated later  
Blue/Purple = vaccinated earlier

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
“Matrix” of VOC impact – conceptualised as impact on transmission and impact on vaccine efficacy

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
“Matrix” of VOC impact – conceptualised as impact on transmission and impact on vaccine efficacy

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Age groups in which hospitalisations averted for each age coverage targeting strategy

Notes
Deaths and hospitalisations primarily averted in oldest age groups (where largest severe disease and mortality observed)

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Sensitivity analyses (shown for HIC setting): Disease blocking vaccine only

Deaths averted per million population

Hospitalisations averted per million population

Infections averted per million population

Note some impact on infections due to assumption that vaccinated infections are less infectious

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Sensitivity analyses (shown for **UMIC** setting): Disease blocking vaccine only

- **Deaths averted per million population**
- **Hospitalisations averted per million population**
- **Infections averted per million population**

Note some impact on infections due to assumption that vaccinated infections are less infectious

*Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London*
Sensitivity analyses (shown for LMIC setting): Disease blocking vaccine only

Scenario: Default  Scenario: Disease-blocking vaccine only

Deaths averted per million population

Hospitalisations averted per million population

Infections averted per million population

Note some impact on infections due to assumption that vaccinated infections are less infectious

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Sensitivity analyses (shown for LIC setting): Disease blocking vaccine only

Deaths averted per million population

Hospitalisations averted per million population

Infections averted per million population

Note some impact on infections due to assumption that vaccinated infections are less infectious

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Sensitivity analyses (shown for LMIC setting): Health Systems Unconstrained

Deaths averted per million population

Hospitalisations averted per million population

Infections averted per million population

Note: impact on infections does not change, but greater impact in hospitalisations, therefore fewer deaths to avert

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Sensitivity analyses (shown for LIC setting): Health Systems Unconstrained

Deaths averted per million population

Hospitalisations averted per million population

Infections averted per million population

Note: impact on infections does not change, but greater impact in hospitalisations, therefore fewer deaths to avert

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Sensitivity analyses (shown for HIC setting): Reduced infectiousness in <10 years

Deaths averted per million population

Hospitalisations averted per million population

Infections averted per million population

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Sensitivity analyses (shown for **UMIC** setting): Reduced infectiousness in <10 years

**Scenario: Default**

**Scenario: Reduced infectiousness <10 years**

**Deaths averted per million population**

**Hospitalisations averted per million population**

**Infections averted per million population**

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Sensitivity analyses (shown for LMIC setting): Reduced infectiousness in <10 years

Deaths averted per million population

Hospitalisations averted per million population

Infections averted per million population

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Sensitivity analyses (shown for LIC setting): Reduced infectiousness in <10 years

Deaths averted per million population

Hospitalisations averted per million population

Infections averted per million population

Source: Hogan, Winskill, Watson, Ghani, 2021, Imperial College London
Coverage and efficacy tradeoffs in context of variants

Increase $R$: More transmissible variant and/or lifting PHSM

Reduce efficacy: Immune escape variant

Appendix: Dose requirements
Dose requirement is calculated as a function of the vaccination target and is subject to epidemiological scenarios

Methodology

Target population (TP):
- Older adults and high-risk groups: 50yrs old+
- All adults: 30yrs old+
- Adults and adolescents: 12yrs old+
- Include children: 0yrs old+

Descending age order is applied within each goal. 2021-2022 birth cohort used

Coverage: age dependent (85% 65yrs+; 70% 5-65yrs; 70% - 87% 0-5yrs based on historical performance)

Uptake: time to reach assumed coverage: based on country groupings*

Three scenarios:
- ‘No booster’: Two-dose course primary vaccination for HICs and UMICS and one-dose course primary vaccination for LMICs/LICs
- ‘High-risk booster’: Two-dose course primary vaccination for all countries. Annual boosters for high-risk groups*, every 2 years for general population
- ‘Yearly booster’: Two-dose course primary vaccination for all countries. Annual booster for all

Assumptions & sources

Vx dose demand for Year 1 and 2
Baseline: no vaccination

1. Vaccination target
2. Dosing requirements
3. Wastage

Target population

% Coverage

Uptake

Number of doses that are purchased but not used
Based on predominant 10-dose vial size and delivery mechanism (campaigns): 10%

* Uptake country groupings take into account cold chain capacity, health system strength, campaign experience, country readiness, healthcare workforce, health expenditure, financing constraints, and population size. Expressed as max % share of pop reachable per month
** High risk groups assumed at 20% of total population in any given country

May 25, 2021
B. Dose requirement per scenario per year

The average annual dose requirement per scenario over a 5-year period ranges from 0.6 billion doses to 7.2 billion doses.

- **0+ years** - annual booster
- **12+ years** - annual booster
- **30+ years** - annual booster
- **50+ years** - annual booster

The 0+ yrs and 12+ yrs annual booster scenarios have the highest annual dose requirement.

The high-risk booster scenarios have the most volatility from year to year.

In the no-booster scenarios, dose requirement approach 0 in Year 3.

Source: Global production model and demand forecast, COVID-19 market assessment working group (WHO, CEPI, Gavi, UNICEF, BMGF)
Appendix: Supply
B. Three supply scenarios

Production estimates in billion doses of Covid-19 vaccines per annum

Global vaccine supply forecasts depend on a set of parameters that are hard to accurately predict; three supply forecast scenarios (low, base, high) must be taken with great caution.

Multiple different technology platforms:

- **2021**: production divided between mRNA, Non-Replicating Viral Vector, and Inactivated Vaccines with about a 1/3, 1/3, 1/4 split in the base scenario.
- **2022**: potential entry of Protein Subunit Vaccines with about a 1/3 from mRNA and 1/5 to Viral Vector, Inactivated and Protein Subunit split in the base scenario.

Key factors with largest variance across the three scenarios:

- The probability of technical and regulatory success
- The manufacturing risk, technology transfer experience, and scale-up curve
- The availability of raw materials and manufacturing inputs
- The timing of regulatory approval and actual production ramp-up

Throughout the 2021-2022 period, countries’ ability to secure the supply they need for their vaccine programs is linked not only to supply availability, but also factors that drive distribution.

Source: Global Market Assessment (CEPI, GAVI, PAHO RF, UNICEF, WHO)
Appendix: Incremental benefit analysis and funding
C. Incremental benefit analysis for moving to higher ambition goals

Example LIC scenario of deaths vs. GDP losses under different vaccination and PHSM strategy combinations implemented over 2021-2022

<table>
<thead>
<tr>
<th>Vaccination strategy</th>
<th>Vaccination target achieved by end-2021</th>
<th>Vaccination target achieved by end-2022</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Deaths (over 1000 days)</td>
<td>GDP loss (over 1000 days)</td>
</tr>
<tr>
<td>No vaccination, no PHSM</td>
<td>73,102</td>
<td>$12M</td>
</tr>
<tr>
<td>50+</td>
<td>42,524</td>
<td>$65M</td>
</tr>
<tr>
<td>30+</td>
<td>31,640</td>
<td>$152M</td>
</tr>
<tr>
<td>12+</td>
<td>588</td>
<td>$299M</td>
</tr>
<tr>
<td>0+</td>
<td>22</td>
<td>$462M</td>
</tr>
<tr>
<td>Alternative counterfactual: No vaccination, PHSM in place throughout*</td>
<td>29,105</td>
<td>$2,385M</td>
</tr>
</tbody>
</table>

- **Vaccination strategy**: age descending, vaccination rollout is at a constant rate required to achieve the target coverage. Vaccine product assumed to be 70% effective at reducing the risk of infection.
- **PHSM are lifted at the completion of vaccination of each age group. Simulation run over 1000 days, assuming Rt=1.2 at beginning of vaccination campaign with PHSM in place until the vaccination target is reached, with social contact patterns then increased to approximate level of Rt=1.8 when PHSM are lifted**
- **Gross Domestic Product (GDP) loss over 1000 days in US dollars calculated compared to a no-pandemic counterfactual GDP scenario.**

A strategy relying only on PHSM to control COVID-19 much more costly than a carefully constructed strategy that involves both vaccination and PHSM

Both health and economic benefit from faster vaccination

Only short-term economic impacts from supply side shock captured; **conservative estimates of the economic benefits** of vaccination over the short-term because they do not capture demand shocks, changes in government revenue, international trade losses, and long-term GDP impacts

Source: Harvard School of Public Health
C. Incremental benefits and trade-offs – LICs and LMICs

High, very high vaccination ambition

✅ Benefit

*National* - Biggest incremental benefit of moving to younger age strata as a result of demographics, mixing patterns and health system constraints

*National* – Incremental economic benefits in the from of GDP loss aversion provided timely vaccination

*International* - $9 trillion benefits by 2025, with over 40% of this gain going to advanced economies (IMF, ICC)

⚠ Risk

*National* - Sustainability of immunization outcomes across many other diseases of considerable burden

*National* - Risk to other health-related investments

Low, mid vaccination ambition

✅ Benefit

*National* - Most efficient vaccination strategy

*National* - Focus limited health system resources on achievable target with largest incremental benefit

⚠ Risk

*National* - Negative health outcomes if increase in cases and IFR

*National* - Negative economic impact due to consumption, trade, capital flows consequences

*International* - Negative impact on control of VoC, economic recovery

---

1. LMIC example; Ferranna, Cadarette, Bloom (2021) Harvard School of Public Health
C. Mapping of key funding sources

In low-cost scenarios, ODA and dose sharing could possibly be main sources of funding for **lower income settings**; for higher cost scenarios, MDBs and, ultimately, countries’ budget would be an important contributor.

<table>
<thead>
<tr>
<th>Funding source</th>
<th>Considerations</th>
<th>Supporting evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDB</td>
<td>Repayment needs, constraints and uncertainty on demand and supply, sanctions and process delays</td>
<td>So far $~8bn committed in MDB lending for vaccine procurement and delivery against $~24bn announced envelope</td>
</tr>
<tr>
<td>ODA</td>
<td>Considerable funding already raised, but need represents an important share of current ODA</td>
<td>So far, ~$9bn committed to COVAX for 2021</td>
</tr>
<tr>
<td>HICs budgets</td>
<td>Potential source of funding since <strong>economic returns of vaccination accrue to</strong> all countries</td>
<td>Reduced mortality and morbidity from SARS-CoV2 + economic <strong>return of $9 trillion across all countries</strong> and of ~$1tn for HICs¹ (<em>IMF report</em>)</td>
</tr>
<tr>
<td>Dose donation</td>
<td>Important source that could be unlocked if countries decided to share their excess supply</td>
<td>Corresponds to &gt;1bn doses</td>
</tr>
</tbody>
</table>

Appendix: Country goals
A. Mongolia, Bhutan and Morocco are the only LMIC/LIC that have achieved theoretical coverage of >20%\(^1\)

DATA AS OF 24 JUNE 10:00 AM CET

Cumulative COVID-19 doses administered per 100 population

<table>
<thead>
<tr>
<th>Income group</th>
<th>HIC</th>
<th>UMIC</th>
<th>LMIC</th>
<th>LIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population, millions</td>
<td>1,206</td>
<td>2,945</td>
<td>2,954</td>
<td>686</td>
</tr>
<tr>
<td>Population in economies above 40 d/100, millions and %</td>
<td>981</td>
<td>1,580</td>
<td>41</td>
<td>0</td>
</tr>
<tr>
<td>Economies above 40 d/100, # and % of total</td>
<td>65</td>
<td>10</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

1. As defined by 40 doses administered per 100 population (at least 20% theoretical coverage, assuming most vaccine types require two doses)
Appendix: Key actions
What are key enablers to reach global goals? Key areas for action

1. Anticipate excess vaccine supplies, particularly in the coming months and redistribution of surplus doses from higher to lower income settings as soon as possible, while urgently evaluate dose stretching and dose optimization strategies to expand effective supply.

2. Take steps to enable countries to reach desired targets by supporting free cross-border flows of raw materials and finished vaccines, while ensuring full and global recognition of WHO EUL’d products.

3. Send early, strong and clear signals about demand to secure manufacturing capacity scale up.

4. Governments and vaccine manufacturers to invest in diversifying vaccine productions and prioritize the scale up of vaccine production in the long term, providing increased access for developing countries.

5. Greater transparency on vaccine contracts, options and agreements as well as doses delivered and needed: in these challenging circumstances, information means access.

Source: Call to Action on COVID Vaccine Access for Developing Countries by Heads of World Bank Group and International Monetary Fund