Workshop 2: Re-opening safely

World Bank EAP COVID-19 Vaccine Strategy Workshop Series
May 26, 2021
Part 1a: Policymaker's toolkit for re-opening safely

by Dr. Marin Gjaja, Managing Director and Senior Partner, BCG
Context | Policymaker's toolkit contains four elements to re-open safely

**PUBLIC HEALTH MEASURES (PHM)**
- **Degree of domestic opening**
- **Policies on different societal guidelines, e.g.,**
  - School/business closures
  - Social distancing
  - Mask requirements
  - Capacity restrictions
  - Etc.
- **PHMs** are typically measured on "stringency" with a goal of reducing contact rates and thus spread
- **Greater stringency** typically means greater impact on virus but also socioeconomically

**BORDER CONTROL**
- **Degree of international opening**
- **Status of international borders**
- **Policies include**
  - Open/closed
  - Testing
  - Quarantining
  - Vaccine status treatment (e.g., Vaccine Passports)
  - Etc.

**VIRUS MONITORING**
- **An integrated system that typically includes**
  - Testing
  - Tracking
  - Tracing
  - Technology
  - Isolation
  - Quarantine
- **Monitor new risks, i.e., Variants**
- **Seeking to break transmission chains and inform other policy choices**

**VACCINE ROLLOUT**
- **Overall approach to vaccine distribution and uptake**
- **Multiple different strategies can be deployed**
  - Sequence of eligible groups
  - Dose interval
  - Mix of vaccines
- **Considerations include**
  - Available supply
  - Vulnerable populations
  - Presence of variants
  - Current prevalence and trajectory
  - Hotspots

Not covered in depth today
Context | Policymakers need to trade off across the elements to achieve integrated goals across three important dimensions

PUBLIC HEALTH
Minimizing disease risk to flu-like levels to protect population

- 3.3m Global deaths due to COVID-19 vs annual flu-related deaths (300-650k)
- 26 days Duration of hospitalization vs flu level at 17 days

FINANCIAL & ECONOMIC HEALTH
Recovery of lost economic value and building back better

- 131m People pushed to poverty in 2020 globally
- 42% Estimated revenue loss of global tourism industry in 2020 vs 2019

SOCIETAL HEALTH
Reversing negative societal impact to vulnerable in society

- 9mos Math learning lost by elementary students in the US
- 50% Women in Asia Pacific reported drop in working time in formal jobs vs. 35% men

Source: Time, Statista, Nature, Our World in Data, Press search
EAP countries have historically deployed the four elements to varying degrees along the continuum of these three response strategies:

<table>
<thead>
<tr>
<th>Strategy Objective</th>
<th>Crush &amp; Contain</th>
<th>Flatten &amp; Fight</th>
<th>Sustain &amp; Support</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong></td>
<td>Full containment to drive cases to ~zero by one of following:</td>
<td>Lockdown and/or open containment to decrease case count and buy time for system investment: increase healthcare system capacity, testing, contact tracing infrastructure</td>
<td>Short or no lockdown period. Lockdown could result in negative humanitarian outcome and/or is not needed to build infrastructure</td>
</tr>
<tr>
<td><strong>Restart Implications</strong></td>
<td>Open economy by managing disease with strong monitoring: prevent new cases from spreading by conducting widespread testing</td>
<td>Progressive lifting of restrictions and reopening of economy without surpassing healthcare system limits</td>
<td>Prolonged isolation of vulnerable population. Economy resumes activity w/ fewer restraints, but continued health precautions (e.g., PPE)</td>
</tr>
</tbody>
</table>
| **Typical Prerequisites** | • Strict border control  
• High capacity for testing and contract tracing  
• High compliance with stringent measures | • Increase healthcare system capacity  
• Increase virus monitoring  
• Compliance with PHMs during period of gradual reopening | • Ability to isolate, support socio-economic wellness of vulnerable pop.  
• Population with high trust in government actions |
| **Example countries** | • Australia  
• New Zealand  
• Singapore  
• China | • Philippines  
• Malaysia  
• Thailand  
• Cambodia  
*And many more…* | • Sweden  
• Iran |

1. Disease Tolerance Ratio calculated as daily cases per 1M divided by stringency. Oxford’s COVID-19 Government Response Tracker creates an additive, composite score countries’ COVID-19 policies across nine indicators (school, workplace, and public transit closings, public event cancelations and info campaigns, stay at home requirements, restrictions on internal and international travel. Source: World Bank, Passport, Oxford University COVID-19 Government Response Tracker, Worldometer, BCG Analysis
Example | In Flatten & Fight countries, focus has shifted across different elements over time and will continue to shift with further re-opening

Approach to maintaining \(R_t < 1\)

**Flatten:** PHMs drive down prevalence
- Maintain **strict PHMs** to drive down prevalence
- Ramp up Virus Monitoring
- Strict border controls

**Fight:** PHMs relax, virus monitoring contains, vaccines ramp
- Contain the virus with **full-scale Virus Monitoring** as vaccine roll-out accelerates with supply
- Relax PHMs with caution; preserve healthcare system capacity

**Re-open:** Vaccines reduce risk; apply ongoing pressure
- Focus on **vaccinating the remaining eligible population** to achieve disease risk minimization
- Continue to relax PHMs to get closer to "normal"
- Consider scaling down virus monitoring as immunity increases
Public health measures need to be customized, guided by key indicators while balancing "epinomic" trade-offs

**Key learnings:**

- Plans to lift PHMs need to be tied to key indicators (i.e., virus threat) and context (i.e., testing & tracing capacity and vaccination rate)

- PHM release aligned to tiered approach have acceptable outcomes; "rushed" release can lead to challenges
Domestic reopening: PHM easing tied to vaccination rollout and reduced disease burden, starting with schools and crowd-restricted outdoor gatherings

When?

Key indicators used

How?

Phasing of PHM relaxation

What?

PHM levers activated

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1. Retail & recreational, vs. baseline of median value from 5-week period Jan 3 – Feb 6, 2020; Source: Our World in Data, Google Community Mobility Report; Oxford Stringency; UK COVID-19 Response doc; Press search
**Domestic reopening:** Phases of PHM easing tied to sustained reduction in disease burden prior in 2020, PHM expected to be maintained until broader vaccine coverage.

1. Retail & recreational, vs. baseline of median value from 5-week period Jan 3 – Feb 6, 2020;

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**When?**

- **Key indicators used**
- **Population protection**

**How?**

- **Phasing of PHM relaxation**

**What?**

- **PHM levers activated**

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**Fight phase**

- **Surge in hospitalization**

**'Phase 1' lifting**

- **Sustained low disease burden**

**'Phase 2' lifting**

- **Vaccine coverage picking up**

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**Activity**

- **Household visitors allowed up to 5**
- **Larger crowd sizes allowed**

**Crowd size**

- **Allowing larger crowd sizes**

**Safer interactions**

- **Masks, social distancing enforced**

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**Compliance Indicator**

- **Mobility**
- **PHM Stringency Index**

**Disease burden**

- **% people vaccinated**
- **ICU patients per million**

**Mobility Index**

- **Ratio**

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**Apr** | **May** | **Jun** | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** | **Dec**
---|---|---|---|---|---|---|---|---
**Allowed**
- **Essential retail, home-based school**
- **Schools, non-essential businesses, leisure places such as cinemas and museums allowed in Phase 2**
- **Social, cultural, religious and business gatherings are resumed**
- **Household visitors allowed up to 5**
- **Larger crowd sizes allowed**
- **Masks, social distancing enforced**
Four main border measures employed by countries to manage disease import risk while re-opening internationally

- **Temporary border closures**: Limiting import risk by closing borders:
  - Extend beyond origin countries for variant risk
  - Categorize risk by country – e.g., traffic light system in UK

- **Quarantine tracking and enforcement**: Tracking and enforcement mechanisms of quarantine compliance (e.g., dedicated quarantine hotels, random house checks, location tracking, etc.)

- **Testing regimen throughout travel**: Testing throughout:
  - Pre-departure
  - On-arrival
  - Post-arrival/in-quarantine

- **Vaccine / immunity certification**: Accreditation of individuals with low transmission and infection risk (e.g., vaccinated or recently recovered)
Border measures employed to varying degrees of stringency and with different combinations based on government capabilities

**Travel bubbles and strict quarantine**
- Travel corridor created with low-risk countries (e.g., Brunei, China), entry for essential workers allowed
- Negative PCR test <72 hrs before departure, on-arrival testing and 21-day testing in place
- Strict 21-day quarantine in dedicated facilities for foreign travelers

**Closed borders**
(Strict border restrictions)
- Australia
- Singapore

**Tight border with limited bubble**
- Borders closed to all travellers unless part of AUS/NZ bubble (Trans-Tasman bubble) or granted exemption
- Selective domestic travel restrictions as needed (i.e., rise in active cases)
- Upon arrival, non-NZ must quarantine for 14 days in dedicated facility

**Open borders**
(Minimal/flexible border restrictions)
- EU
- USA
- Philippines

**Eased with proof of vaccine**
- Borders closed to high-risk countries (e.g., China, UK, Brazil, SA, India, EU)
- PCR test <72 hrs pre-arrival, optional 3-5 days after arrival
- Not fully vaccinated but tested – isolate 7 days; those not tested isolate for 10 days
- Fully vaccinated travellers must still get tested pre-arrival, but no quarantine

**Considering easing with proof of vaccine**
- Proposed to increase threshold # new cases to be deemed epidemiologically safe
- PCR or rapid test <48-72 hours pre-departure
- 10-14-day quarantine; in some countries can end after 5 with negative test
- EU COVID-19 Travel Certificate to resume travel

**Select restrictions**
- Borders closed for travelers arriving from 7 countries, otherwise visa-holding travelers allowed to enter
- Testing on day 7 of arrival
- 10-day quarantine in pre-booked hotel/ facility, 14 days total

Source: Government websites, Thomson Reuters, Press search
Australia

Closed borders to end first wave, quarantine breaches caused second wave

Early border closures & quarantine effective, but only if well enforced; reopen to similarly safe countries

Note: No public data available for day-by-day infection source after April 14, 2020
1. Where second wave was contained in Australia
Source: Australian Department of Health, Early Analysis of the Australian COVID-19 Epidemic, Our World in Data, National Review of Hotel Quarantine
Singapore

Quarantine and testing measures highly effective in shielding local population from out-breaks

Travel allowed but risk minimized via robust testing and de-averaged quarantine process; flexible corridor creation & suspension

Borders closed against all countries
Travel corridor scheme started with NZ, Brunei
Added corridors for Australia, Vietnam, etc.
Start of corridor suspensions due to variants
Extended quarantine period to 21 days for incoming travellers

Source: Data World, Singapore Ministry of Health, Government websites, Immigration & Checkpoints Authority
Thailand

Quarantine and testing measures effective during 2020 as borders opened; recent lax quarantine may prove costly.

Tourism industry necessitated further border opening; recent surges potentially driven by shorter quarantine periods impacting local population already lax with PHMs.

Source: Our World in Data, Government website, Press search.
**Test, trace & isolate:** Robust systems, built early by EAP countries, have enabled full containment of the virus

4TIQs work in synchrony to quickly identify and isolate positive cases and suspected contacts

- Prioritize high-quality testing of key individuals
  - Sustained leads in tests per case containment, now at 3500+ tests per case vs WHO benchmark of ~20

- Understanding local epidemiological conditions (e.g. true infection rate), location and patterns of hotspots
  - Integration of tracing app data and tracking sources such as CCTV cameras with MoH data

- At the individual level: Trace and quarantine contacts of infected individuals to prevent spread
  - Digital/app-based solutions deployed to enable continuous and comprehensive contact tracing

**Key learning:**

- Robust monitoring systems have been central to crush & contain strategies
- But will not be sufficient as variants continue to pose challenges

**Selective Quarantine and Isolation of infected individuals and their contacts**

- Localized quarantine measures made based on app & MoH data; very strict monitoring and isolation measures for infected people and suspected contacts

Source: BCG analysis, Press search
Genomic surveillance: What are the priorities of genomic surveillance?

Four main use cases under consideration when setting priorities for genomic surveillance activities

<table>
<thead>
<tr>
<th>USE CASES</th>
<th>TESTING TECHNOLOGY</th>
<th>SAMPLING METHOD</th>
<th>VALUE FOR COUNTRIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor in-country prevalence of existing variant</td>
<td>Cheaper point mutation assays</td>
<td>Random &amp; representative sample</td>
<td>• Enable clinical &amp; public health response if variant affects severity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Assess therapeutics, testing, vaccine performance</td>
</tr>
<tr>
<td>Assess how variants impact disease severity &amp; transmissibility</td>
<td>Both PCR &amp; NGS can yield useful results</td>
<td></td>
<td>• Enable clinical &amp; public health response</td>
</tr>
<tr>
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</tr>
<tr>
<td>Detect &amp; control outbreak of new variants</td>
<td>Whole-genome sequencing technology</td>
<td>Identify hotspots &amp; transmission routes</td>
<td>• Anticipate spreading of potentially dangerous variants</td>
</tr>
<tr>
<td>Characterize variants response to Vx, Dx and Tx</td>
<td></td>
<td>Random &amp; representative sample</td>
<td>• Enable clinical &amp; public health response</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Enable critical research on vaccine, testing, therapeutics development</td>
</tr>
</tbody>
</table>

Key learnings:

Building tailored approaches

There are no universal targets for genomic data collection, and genomic surveillance strategies will adapt to local contexts.

Note: NGS = Next Gen Sequencing
Source: Expert consultation
Genomic surveillance: Where do we start setting up sequencing capacity?

Country archetypes defined based on needs and sequencing capacity gaps...

Mapping of current capacity across EAP

... along with corresponding interventions tailored to country context

<table>
<thead>
<tr>
<th>Archetype</th>
<th>Interventions</th>
</tr>
</thead>
</table>
| **Strengthen** | • Increase sequencing capacity for scale-up  
| | • Link genomic data with epidemiology to inform public health response |
| **Leverage** | • Leverage/repurpose existing sequencing capacity  
| | • Link sequencing capacity with existing molecular testing networks |
| **Connect** | • Set up sample referral networks  
| | • Build and link sequencing capacity with existing molecular testing networks |
| **Test** | • Increase diagnostic/molecular testing capacity |

Source: WHO, Our World In Data, GiSAID

Key learnings:

Mapping country needs

Mapping existing capacity is the first step to guide interventions addressing disparities in global coverage of genomic data
### Archetypes (% of global pop’n)

<table>
<thead>
<tr>
<th>Archetype</th>
<th>Supply</th>
<th>Demand</th>
<th>Throughput</th>
<th>Urgency</th>
<th>Broader coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roll-out leaders (6)</td>
<td>Sufficient purchase and prioritized delivery</td>
<td>Possible risk of vaccine hesitancy</td>
<td>Accelerated due to robust healthcare infrastructure</td>
<td>Decreased urgency as cases decline</td>
<td>Q2 ‘21</td>
</tr>
<tr>
<td>High income laggards (6)</td>
<td>Sufficient purchase but lower delivery priority vs roll-out leaders</td>
<td>Possible risk of vaccine hesitancy</td>
<td>Potential delays from regulatory and bureaucratic issues</td>
<td>Sustained urgency as COVID-19 still wide-spread</td>
<td>Q3 ‘21</td>
</tr>
<tr>
<td>Crush &amp; contain countries (21)</td>
<td>Sufficient purchase with deliveries ramping up</td>
<td>High expected uptake</td>
<td>Large opportunity to accelerate with robust HC infra</td>
<td>Lowest urgency as disease burden minimized</td>
<td>Q3–Q4 ‘21</td>
</tr>
<tr>
<td>Leading LMICs (32)</td>
<td>Supply covered by own capacity and/or purchases</td>
<td>Mix of low and extreme vaccine hesitancy</td>
<td>Current HC infra will pose challenges</td>
<td>Mixed urgency; some countries with high spread</td>
<td>Q3 ‘21–Q2 ‘22</td>
</tr>
<tr>
<td>COVAX dependents (35)</td>
<td>Supply contracts yet to be completed; to depend on int’l support</td>
<td>Potential uptake unknown</td>
<td>Lack of HC infra may prolong distribution</td>
<td>Mixed urgency</td>
<td>Q4 ‘21 – 2022+</td>
</tr>
</tbody>
</table>

### Key learnings:

- Vaccines are excellent at preventing severe disease and death in vulnerable populations.
- High levels of coverage are needed before vaccination has an impact on transmission.

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1. Based on country reported plans, earlier timelines likely do not include children.
2. Includes Bulgaria, a Middle-Income EU member.

Note: Example countries are not exhaustive. Archetypes exclude 16.7M population across Belarus, Turkmenistan and smaller island nations.

Vaccination rollout critical to reduce disease burden

Accelerated elder vaccination in the US helped mitigate hospital rates in recent surge

Hospitalization vs. Index [1= new admissions in week of 11/14/2020, peak of fall surge]

VACCINATION ELIGIBILITY

- LTC and healthcare workers
- Frontline essential workers and age 65 and up
- High-risk conditions or disabilities, age 16 and up
- Age 16 and up

50% 1st dose for 60+
50% 1st dose for 50-59
50% 1st dose for 40-49
Summary | Country context will determine balance of elements required to reach national objectives

Sample country contexts and objectives...

**Flatten & Fight: Tourism-dependent with vaccine delays**
- Enforce strict PHMs especially on indoor activities
- Ramp up virus monitoring
- Open borders while ensuring strict border measures in place

**Flatten & Fight: Low middle-income with vaccine supply gaps**
- Enact highly targeted PHMs considering economic prioritization
- Concentrate available vaccine supply on vulnerable
- Ensure sufficient balance of monitoring and border control

**Crush & Contain: Trade-dependent with early vaccine supply**
- Continue to ramp up vaccinations, focusing on increasing population's immunity as a whole
- Relax more public health measures as vaccine coverage widens

... and resulting balance of tool-kit required

"Natural" Rt | PHM | Border Control | Virus Monitoring | Vaccines & Natural Immunity | "Effective" Rt
---|---|---|---|---|---
| | | | | | ~1

Illustrative
EU Digital COVID Certificate
Overview of the key aspects, technical architecture and timeline

Konstantin Hyppönen, Policy Officer, European Reference Networks and Digital Health, DG SANTE
Status quo

- Many different free movement restrictions in place across the EU
- MS require **various types of documents** (medical certificates, tests results etc.)
- Several MS already exempt vaccinated/recovered persons from restrictions (or plan to do so)
- Absence of standardised and secured formats cause **problems for acceptance and fraud**
Examples of the current fragmented approach – vaccines certificates

- 27 Member States, 27 types of certificates, with different data fields, verification and authentication mechanisms
- EU citizens should not suffer from the adverse effects of fragmentation and divergent approaches which are not interoperable
• **Legal basis**: Art 21(2) TFEU – free movement of EU citizens within the EU
  
  + a “twin regulation” to cover third country nationals legally residing in the EU

• **Objective**: to facilitate safe free movement during the pandemic by establishing a common framework – the EU Digital COVID Certificate – for the **issuance, verification** and **acceptance** of **interoperable**:
  
  • vaccination certificates
  • test certificates
  • certificates of recovery

• **Not covered**: Other uses – would have to be based on national law
The vaccination journey – an example

Identification
The citizen is identified by the vaccine provider

Vaccination
The citizen is vaccinated

Data registration
The vaccine provider registers information about the event in a national (or regional/local) database

Storage
The citizen stores the certificate

Issuance
The certificate issuer issues a vaccination certificate (digital/paper)

Certificate request
The citizen requests a certificate from a certificate issuer. Certificates can also be issued automatically.

Verification request
The verifier asks the citizen for the vaccination certificate

Presentation
The citizen presents the vaccination certificate to the verifier

Verification
The verifier checks the authenticity, integrity and validity of the certificate
What is the EU Digital COVID Certificate?

**Digital proof that a person has either**
- been vaccinated against COVID-19
- received a negative test result
- recovered from COVID-19

**Barcode technicalities**
- Specified by European expert group
- Technically robust, easy to read
  (Paper print out & phone screen support)
- Bound to an EU citizen: 1 certificate, 1 holder
- Europe-wide validity
- Data is encoded, compressed and digitally signed in barcode
- Signature validation key exchange is done via an EU Gateway
Outline technological architecture

Country A (issuer)

Country B (verifier)

private key

public key

EU Digital COVID Certificate

Signing

verifier app

External (such as WHO)

EUDCC Gateway

Verifying

European Commission
Guidelines and technical specifications

- Technical specifications were adopted on 21 April 2021 and are available at https://ec.europa.eu/health/ehealth/covid-19_en
  - Value sets
  - JSON Schema for EU Digital COVID Certificates
  - Volume 1: formats and trust management
  - Volume 2: EU Digital COVID Certificate Gateway
  - Volume 3: 2D Barcode Specifications
  - Volume 4: EU Digital COVID Certificate Applications
  - Volume 5: Public Key Certificate Governance

- Already in January-March, the eHealth Network adopted the following earlier guidelines to support the interoperability of EU Digital COVID Certificates:
  - Interoperability of health certificates - Trust framework (outline)
  - Verifiable vaccination certificates - basic interoperability elements
  - COVID-19 citizen recovery interoperable certificates - minimum dataset

- In addition, the Health Security Committee has adopted guidelines for test certificates:
  - A common list of COVID-19 rapid antigen tests, and a common standardised set of data to be included in COVID-19 test result certificates
Deployment roadmap

Work on technical specifications
March-April, eHealth Network supported by COM (including contractor)

Technical specifications
Published 22 April

Development and first tests of the EUDCC Gateway
Beginning of May

Mid-May

Wallet app
The citizen stores the certificate

Verification app
Reference app for Member States to verify EU Digital COVID Certificates

Certificate issuance app
Template software for Member States to issue EU Digital COVID Certificates

On-boarding
Technical support to Member States to connect and on-board EU Gateway

Financial support
Financial support to Member States (€ 1M per Member State)

EU Gateway
Hosted by Commission – 1st week of June
Transparency and data protection

• **EU General Data Protection Regulation applies**, including data minimisation (only necessary data on cert.)

• Privacy and security by design

• Software is developed by the Commission in Open Source and made publicly available to the community for scrutiny

• The EU Gateway stores only Public Keys and other basic data necessary for the functioning of the system – no personal data

• Verifier app does not store personal data

• Both paper and digital versions are supported
Collaboration with international organisations

• The eHealth Network, the Commission, and individual European experts have actively participated to the work of the WHO expert group on Smart Vaccination Certificates.

• The Commission and eHN experts have also exchanged views with and provided input to the work of the International Civil Aviation Organisation (ICAO) and other relevant international organisations.

• In addition, the Commission is exchanging information about the EU DCC and similar systems used by non-EU countries.
International travel

• An EU Digital COVID Certificate is not a travel document

• Acceptance of certificates from third countries to be governed by Regulation
  • Adequacy decisions
  • Adopted through secondary legislation

• Process not yet formalised
  • However, if a system used by a third country is based on the same specifications, preparing an adequacy decision is likely to be easier.
Thank you