Financing COVID-19 Vaccines in 2021 and Beyond

Presented by Dr. David Bishai
Outline

• Section A: Financing COVID-19 Vaccine Discovery and Production
• Section B: Financing COVID-19 Vaccine Demand
• Section C: Financing COVID-19 Vaccine Delivery
• Section D: How to know what we need to know
Section A
Financing COVID-19 Vaccine Discovery and Production
COVID-19 Vaccines (Oct 2020)

- 149 Candidates in Pre-Clinical
- 38 Candidates in Clinical trials in US, Europe, China

- China and Russia have each approved vaccines that have not completed Phase 3

- US has 4 in Phase 3 Trials
  - Johnson & Johnson JNJ-78436735
  - Moderna/NIAID mRNA 1273
  - University of Oxford/AstraZeneca AZD1222
  - Pfizer and BioNTech BNT162
Public Finance for Discovery

• International Initiatives:
  • ACT and COVAX

• National Initiatives:
  • US
  • China
  • Japan
  • Canada
  • Australia
WHO, EU and France Launched ACT in April 2020

Access to COVID-19 Tools Accelerator

VACCINES

COVAX

DIAGNOSTICS

TREATMENTS
AMC Countries
• 92 LMICs eligible
• GNI< $4000
• Raise $2 billion by end of 2020
  • $1.7 B so far
  • Spend on advance mkt commit
• Raise $5 billion by end of 2021
• No money from self-financing countries!

Self-Financing Countries
Assumes $11 vaccine dose
Committed Purchase
• Pay $1.60 per dose now
• Commit to pay balance later
• Guaranteed enough vaccine to cover up to 20% of population

Optional Purchase
• Pay $3.50 per dose now
• Can opt out later no penalty
• Get vaccine for 20% population
COVAX Facility

92 AMC Countries

~80 Self-Financing Countries
COVAX Financing Vaccine Candidates

- **Pre-Clinical**
  - Institut Pasteur/Merck/Themis, France/United States of America Austria (Preclinical)

- **Phase I**
  - University of Hong Kong, China (Phase I)
  - Clover Biopharmaceuticals, China (Phase I)
  - University of Queensland/CSL, Australia (Phase I)
  - Inovio United States of America (Phase I/II)

- **Phase II**
  - CureVac, Germany (Phase II)

- **Phase III**
  - Moderna, United States of America (Phase III)
  - AstraZeneca/University of Oxford, United Kingdom of Great Britain and Northern Ireland (Phase III)
  - Novavax, United States of America (Phase III)
Economics of Advance Commitments

• Up front money effects
  • Draws firms in to supply the market because
    • Lower risk that they will not have buyers
    • Raise capital to build factories
    • Makes the factories large because commitments are for 100s of millions

• Non-exclusivity
  • More firms means supply stability
  • But, for COVID-19 what if only one or two vaccines work out?
COVAX AMC Governance

**COVAX Shareholders Council**  
For 76 Self-Financing Countries

- Secretariat at GAVI
  - Contracts payment advances with manufacturers
  - Discounts and delivery guarantees
  - Penalties if non-delivery
- AMC Stakeholders Group meets twice year to govern GAVI
  - UNICEF
  - PAHO
  - Donors
  - Development banks
  - Countries

**AMC Engagement Group**  
For 92 COVAX AMC Countries

Aurélia Nguyen  
Managing Director of COVAX Facility since Oct 1, 2020
Who Gets COVAX AMC COVID-19 Vaccine?

- GAVI eligible countries will apply for GAVI-pricing
  - Tiers of co-financing for GAVI transition countries
  - Expect bottom tier not free
- Participating countries in COVAX get allocations proportional to population size.
- No country will receive more than 20% of population size until all countries received enough for 20% of population

IMPLICATION: By end of 2021 best case is 20% of humans covered by COVAX vaccine

Countries that do better will do so with side deals
Individual Countries’ Side Deals

- **US**
  - Operation Warp Speed

- **China**
  - Sinopharm/Beijing Inst of Bio Products approved by China

- **Japan**
  - Contracted with Pfizer/BioNTech for 120M doses

- **Canada**
  - Contracted with Sanofi for 72M

- **Australia**
  - Deal with CSL and Univ Queensland for 51M doses

- **Pay now for**
  - Trials
  - Plant capacity
- **Get guaranteed doses**
- **Guarantee price**
## US Operation Warp Speed Candidates

### Examples

<table>
<thead>
<tr>
<th>Phase</th>
<th>Candidate</th>
<th>Finances</th>
<th>Doses Promised</th>
<th>Tech</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Moderna/NIAID mRNA 1273</td>
<td>$1.5 billion</td>
<td>100 million</td>
<td>mRNA</td>
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<td>Johnson &amp; Johnson JNJ-78436735</td>
<td>$1 billion</td>
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<td>Adenovirus Vector</td>
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<tr>
<td>3</td>
<td>University of Oxford/AstraZeneca AZD1222</td>
<td>$1.2 billion</td>
<td>300 million</td>
<td>Adenovirus Vector</td>
</tr>
<tr>
<td>3</td>
<td>Novavax (protein adjuvant)</td>
<td>$1.6 billion</td>
<td>100 million</td>
<td>Protein adjuvant</td>
</tr>
<tr>
<td>1/2</td>
<td>GlaxoSmithKline and Sanofi</td>
<td>$2 billion</td>
<td>100 million</td>
<td>Protein adjuvant</td>
</tr>
</tbody>
</table>

*Red options also being funded by COVAX*
Operation Warp Speed and the World

- US National Academy Recommends:
  - OWS should allocate 10% of US stock to LMICs
  - OWS should join COVAX to hedge bets
Economic Priorities

• In GAVI-eligible countries
  • Cost-sharing of $1.60-$2.00 per dose ("flexibilities will be required")
    • Waivers up to $85 million for whole planet on a case-by-case basis
    • Some will want to source outside COVAX for vaccine beyond 20%

• In GAVI-transition countries
  • Financial sustainability plan for co-financing inside COVAX
  • Pricing is not public yet guessing $3 to $11 per dose
  • Dosing is not known yet

• Unknown
  • Role of Vaccine Nationalism by sovereign governments where producers are located
  • The costs of making side-deals and negotiations to open supply

All countries will need to finance delivery and demand management
Section B
Financing COVID-19 Vaccine Demand
COVID-19 Vaccine Demand Problems

• Politicization of discovery
  • Political leaders have made it seem that they controlled the safety testing

• Politicization of supply
  • Political leaders have made it seem that they would limit exports if COVID-19 or substrates are produced in their country

• Shortages are expected
  • Demand is heavily affected by politics and stigma
    • “Russian Vaccine” “Chinese Vaccine” “American Vaccine”
  • Demand is permanently affected by feelings of fairness, fear, panic
    • Delays and denial start rumors and conspiracy theories
National COVID-19 Vaccine Demand Tasks

Task 1: Convene conversations about how to fairly allocate vaccine

  Openness and transparency

Stakeholder inclusion

Convener could be MOH, NITAG, EPI, University
Conversations about how to fairly allocate vaccine

• Principles
  • Openness/transparency
  • Stakeholder inclusion
    • Across multiple channels
    • Continuity
    • Listening to voices
  • Start early
  • Trustworthy convener
    • MOH, NITAG, EPI, Academia
    • Apolitical

• Participants
  • Medical community
  • COVID-19 impacted community
  • Minorities
Vaccine Allocation Framework

• Establishes foundational principles to guide vaccine allocation
  • Maximum benefit,
  • Equal concern for all
  • Mitigate inequities
  • Fairness,
  • Transparency
  • Evidence

• State the goal of allocation
  • Morbidity
  • Mortality
  • Social impact

• State criteria
  • Risk of infection, Risk of death, Risk of spreading, Risk of social impact
New Institution Needed

- National COVID-19 Vaccine Program
  - Convene stakeholders about vaccine allocation
  - Oversee national vaccine risk perception, risk communication
  - Use risk communication science

- Set up ways to listen to people’s concerns about vaccines and fairness
  - CHWs
  - Surveys
  - Key informants

- Set up multiple ways to stay engaged with all stakeholders
  - Check concerns
  - Register concerns
  - Communicate
  - Repeat

- Medical community is a key ally also faith community, politicians, commerce, etc.
Financing Vaccine Demand Activities

- Many pieces are part of comprehensive primary health care systems
- State, District, and Village health committees
  - Need invest now to make them functional now
  - Many are practicing with influenza vaccine campaigns
- Community Health Workers
  - Trusted outreach to millions
  - Many CHWs tied to special programs—how to access them?
- COVID-19 Vaccine Demand Program will have ingredients that are reallocated
  - OPPORTUNITY COSTS
Section C
Financialing COVID-19 Vaccine Delivery
COVID 19 Vaccine Delivery Costing

• Governance
  • COVID-19 Vaccine Administration Units in Each of the 168 COVAX countries

• Personnel
  • New immunization staffing
  • Training and reallocating staff to include COVID-19 vaccine duties

• Capital
  • Cold chain
  • Data systems

• Supplies
  • Waste management
  • Syringes
  • Outreach
# Economics of Delivery

<table>
<thead>
<tr>
<th><strong>List of Needs</strong></th>
<th><strong>List of Current Assets</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Managers</td>
<td>EPI program staff</td>
</tr>
<tr>
<td>Financial Managers</td>
<td>Current stocks of supplies</td>
</tr>
<tr>
<td>Vaccinators</td>
<td>Current stocks of</td>
</tr>
<tr>
<td>Supplies</td>
<td>Warehouses</td>
</tr>
<tr>
<td>Cold chain</td>
<td>Transport</td>
</tr>
<tr>
<td></td>
<td>Refrigerators</td>
</tr>
<tr>
<td></td>
<td>Current Information Systems</td>
</tr>
<tr>
<td><em>Infection control specialists</em></td>
<td></td>
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</tbody>
</table>
Costs of Delivery

**New resources**
- New cold chain space
- New infection control supplies, PPE, barriers
- New personnel
- New communications

→ Financial costs

**Reallocation of resources**
- Reassigning staff and supplies

→ Opportunity costs
Cost Data for Resource Mobilization

• Central government budget requires cost estimates
  • Oversight of funding
  • Sector Wide Planning of COVID-19 Vaccination

• Donor community requires cost estimates
  • GAVI releasing $150 million for delivery/distribution of COVID19
  • Bilateral donors bypassing COVID-AMC

• Outside resources to mobilize
  • Schools
  • Faith-based groups
  • Media outlets
  • Private sector health care
  • Private corporations
Allocating a Vaccine for 20% of People

Herd Immunity cannot be the immediate goals
Other goals may or may not line up

• Minimize cost per case
  • Target those with high exposures (health care front line workers)
  • Target those who spread a lot (school children, taxi drivers)

• Minimize cost per death
  • Target those with high co-morbidities

• Minimize net social costs
  • Include social impacts in terms of job-loss, essential services lost
  • Target essential service workers (police, firefighters, food service)
Priorities informed by Cost to Vaccinate

- Not everybody in a target costs the same to vaccinate

<table>
<thead>
<tr>
<th>Easy to Reach</th>
<th>Hard to Reach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front Line Health Worker</td>
<td>Urban Hospitals</td>
</tr>
<tr>
<td>High spreaders</td>
<td>Dormitory students</td>
</tr>
<tr>
<td>High medical risks</td>
<td>Cancer patients</td>
</tr>
</tbody>
</table>

What is fairness?
- V1: Spend whatever it takes to vaccinate everyone in a risk group
- V2: Maximize coverage in a group by minimizing the cost/dose
Cost Effectiveness Knowledge Priorities

How many people are in each target group?
What is their likelihood of saying yes to a free, safe, effective vaccine?
What is the cost/dose in each group?
What is the benefit/dose in each group in terms of …
  COVID-19 Cases prevented
  Medical spending prevented
  Deaths Prevented
  Impact on families
  Impact on the economy
  Impact on justice and fairness
Urgent Economic Choices

- Requirements to Set Up National COVID-19 Vaccine Units
  - Cross-cutting integration with
    - Expanded Program on Immunizations
    - National COVID-19 Task Force
    - Primary health care workforce
    - National State and Local Public Health Leaders
    - Pharmaceutical regulatory authority
    - Citizen representatives
  - Financing for its internal administration
  - Financing for COVID-19 Vaccination
    - Mobilizing Co-financing to buy COVID-19 Vaccine Doses ($1.60+ per dose)
    - New Cold Chain Requirements
    - New supplies, waste management
    - New communication strategies
    - New infection control measures in vaccine venues
Models of Vaccine Allocation

• Economists need to participate in national conversations
  • Who to vaccinate
  • How to vaccinate
  • Tradeoffs
• Minimizing cost/dose is not the most important question
• Not the least important

• The bottleneck is not money
• The bottleneck is the number of vaccine doses and talented people
• Make every dose count for progress to a set of shared goals
Data Sources

- Data on Target Group Sizes
  - Health Workers → Global Health Observatory
  - High Risk Groups→ Global Burden of Disease 2017
- Data on Unit Costs of Vaccine Delivery→ Immunization Economics.org
- Benefits per Dose → Models needed
Models of Vaccine Hesitancy

- The choice to accept/not accept vaccine is partly rational
- Personal costs of being vaccinated matter
- Economists can measure time and travel costs for patients
- Economists can deploy surveys to measure vaccine hesitancy
  - Social factors
  - Demographic factors
  - Information flows
- Models of costs of overcoming vaccine hesitancy
Vaccine Communication Costs

- Set up two way channels
- Collect quantitative and qualitative perceptions of COVID19 Vaccine
  - Acknowledge concerns
  - Use data to address concerns
- Craft outreach messaging customized to stakeholders
- Deliver messages many ways
  - In person
  - In radio, print, internet, WhatsApp, TikTok...
  - Multiple languages

Costs of enterprise can be shared with community groups
Costing Models

- Ingredients: To Start up and To Maintain
  - People
  - Capital
  - Supplies
- Unit Costs per Ingredient
Analysis

- How to minimize costs while maintaining benefits
- How to maximize benefits per cost
  - What are the choices?
  - Who can decide?
  - What do they need to know?
Summary

• Global financing in 2020 and focused on discovery and production
  • $10 to $20 billion being invested
  • High income countries bearing larger share and expecting larger share of doses
  • COVAX AMC raising $2 billion to assure 20% coverage for all LMICs in 2021
• Shortages are certain
• Expected cost per dose $1.60 to $11
  • Might be 2 doses
  • Cold chain might require new -80°C storage
  • Vaccine nationalism expected
• National financing in 2021 needs to focus on demand and delivery
  • Each country must stand up a COVID-19 Vaccine Unit
  • Each country must estimate demand and delivery costs
  • Must mobilize finances now
  • Must start national conversations on allocation now