

Financing COVID-19 Vaccines in 2021 and Beyond

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TVEE
TEACHING VACCINE
ECONOMICS EVERYWHERE

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**

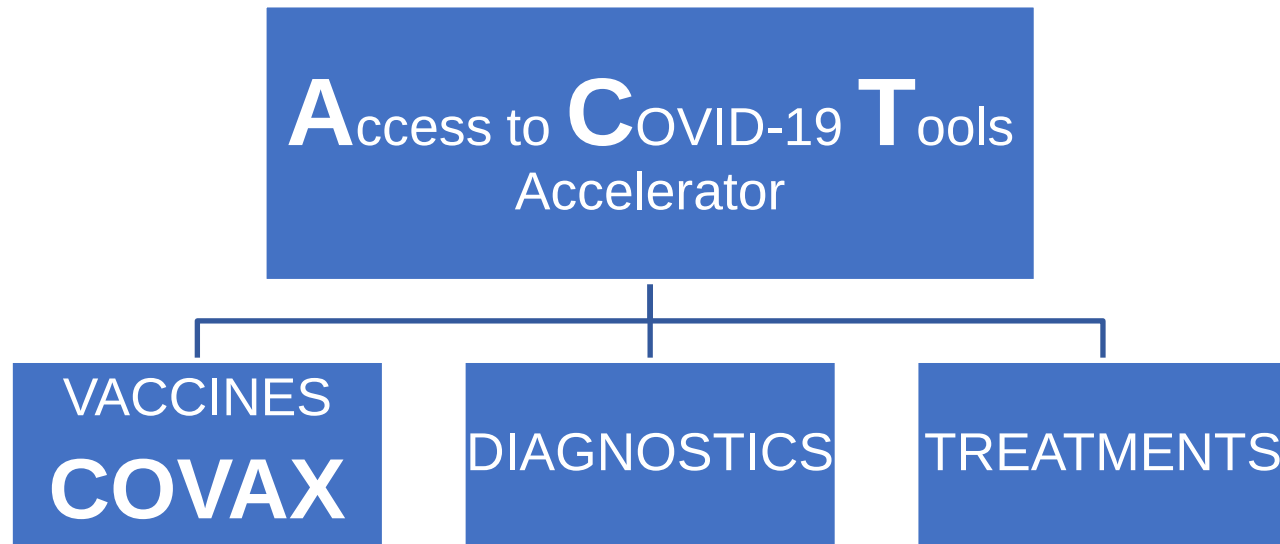
COVID-19 Vaccines (Oct 2020)

- 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



COVAX

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

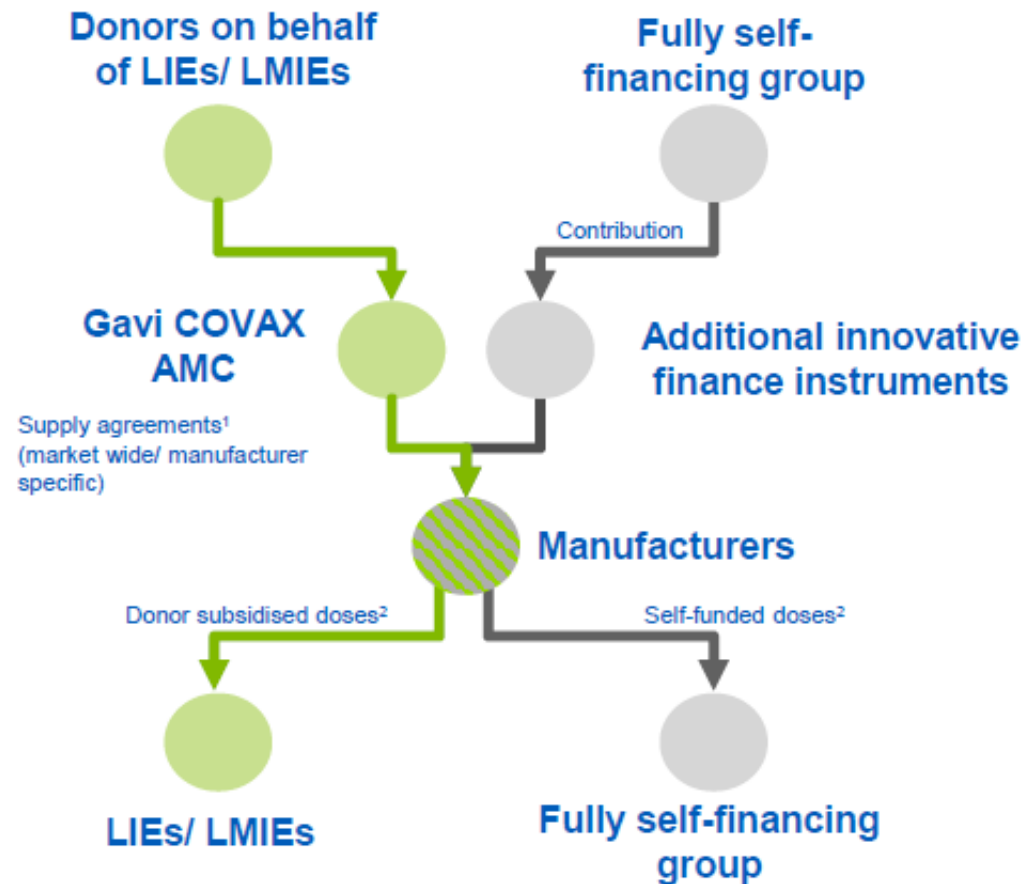
Optional Purchase

- 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

AMC Engagement Group

For 92 COVAX AMC 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



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

Phase	Candidate	Finances	Doses Promised	Tech
3	Moderna/NIAID mRNA 1273	\$1.5 billion	100 million	mRNA
3	Pfizer and BioNTech BNT162	\$1.95 billion	100 million	mRNA
3	Johnson & Johnson JNJ-78436735	\$1 billion	100 million	Adenovirus Vector
3	University of Oxford/AstraZeneca AZD1222	\$1.2 billion	300 million	Adenovirus Vector
3	Novavax (protein adjuvant)	\$1.6 billion	100 million	Protein adjuvant
1/2	GlaxoSmithKline and Sanofi	\$2 billion	100 million	Protein adjuvant

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

**Financing 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

List of Needs

Program Managers
Financial Managers
Vaccinators
Supplies
Cold chain
 Warehouses
 Transport
 Refrigerators
Information Systems
Infection control specialists

List of Current Assets

EPI program staff

Current stocks of supplies
Current stocks of
 Warehouses
 Transport
 Refrigerators
Current Information Systems

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

	Easy to Reach	Hard to Reach
Front Line Health Worker	Urban Hospitals	Slums and Smaller Cities
High spreaders	Dormitory students	Homeless people
High medical risks	Cancer patients	Untreated HIV patients

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

Section D

Knowledge for Vaccine Finance

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