THE IMPORTANCE OF INNOVATION IN ADDRESSING GLOBAL HEALTH GAPS IN THE DEVELOPING WORLD

Global Vaccine and Immunization Research Forum

March 6, 2014

DR. TREVOR MUNDEL
PRESIDENT, GLOBAL HEALTH
EVERY PERSON DESERVES A CHANCE TO LIVE A HEALTHY, PRODUCTIVE LIFE
WHAT WE DO
OUR GLOBAL REACH AND PRESENCE
DO WE NEED INNOVATION IN GLOBAL HEALTH

...beyond better delivery of existing simple solutions?
PROGRESS IN REDUCTION
of under-five, infant and neonatal mortality rates

Deaths/1,000 live births

1990

Under-five
90

Infant
63

Neonatal
33

2012

48

2015

35

MDG 4 target: 30

21
MAJOR PREVENTABLE CAUSES of under-five (U5) child deaths from infectious diseases

- **Pneumonia**: ~1.1M (17% of all U5 child deaths)
- **Diarrhea**: ~594,000 (9% of all U5 child deaths)
- **Malaria**: ~627,000 (7% of all U5 child deaths)

2012
TECHNICAL HURDLES TO IMPACT ARE HIGHER IN GLOBAL HEALTH

...due to environmental factors and broken delivery systems.
WHAT IS INNOVATION IN GLOBAL HEALTH?
MANUFACTURERS supplying GAVI-funded vaccines DOUBLED
> TWO THIRDS of children worldwide get vaccines from DCVMs
>50% of GAVI’s vaccine suppliers are DCVMs
ADDITIONAL CHILDREN IMMUNIZED with GAVI support: 370M
36% DROP IN COST to fully immunize a child with pentavalent, pneumococcal, and rotavirus vaccines.
In 2009, rotavirus vaccines were $7.50 per dose.
In 2012, rotavirus vaccines dropped to $2.50 per dose.
In 2015 rotavirus vaccines will drop to $1.00 per dose.
CHALLENGES IN INNOVATION FOR GLOBAL HEALTH
Innovating for the developing world poses a unique set of difficulties, including developing:

- Solutions for weakened immune systems
- Novel ways to boost vaccine responses
- Single-shot vaccines and long-lasting antiretroviral drugs
- Combination vaccines to target multiple diseases
Uses messenger RNA (mRNA) to test novel vaccines or vaccine concepts (e.g. influenza and non-live Rotavirus vaccines)

- Efficient development - a very fast manufacturing process
- Relatively streamlined - one manufacturing process for all product candidates
- High stability
- Self adjuvantation
- Absence of any protein immunogen purification
INFRASTRUCTURE LIMITATIONS

Limited cold chain storage and weak health systems intensify the need for:

- Heat-resistant vaccines
- Innovative packaging/multi-dose vials to reduce volume in cold chain
- Reducing wastage - preservatives for multi-dose vials
- Battery-operated, rapid diagnostic tools
- Tracking mechanisms and efficient supply chains to avoid stock-outs
Results of VillageReach’s work to overcome infrastructure limitations in Mozambique include:

- Reduction in incidence of vaccine stockouts in rural health centers from 80% to 1%
- Increase in the amount of time the cold chain is working from 40% to 96%
- Increase in the percentage of children receiving basic vaccines from 69% to 95%
Sanofi-BMGF price support mechanism will enable US$1/dose pricing for IPV

IPV is necessary to achieve a polio-free world by 2018

UNICEF will procure up to 300 million doses of IPV per year

The GAVI Alliance will make IPV available for inclusion in routine immunization in 73 of the poorest countries
OVERCOMING MARKET FAILURES

We provide financial support to industry through a variety of financial instruments to de-risk investments in global health products, including:

- Advanced Market Commitments
- Volume Guarantees
- Product-Related Investments
- Equity Investments
GLOBAL HEALTH INVESTMENT FUND

An innovative approach to funding promising global health technologies

- A $108 million social impact fund composed of individual and institutional investors
- Focused on development of drugs, vaccines, diagnostics, and other interventions for low-income countries
- New technologies will target malaria, TB, HIV/AIDS, and maternal and infant mortality
IMPORTANCE OF DATA ANALYTICS AND MEASUREMENT
Using GIS mapping and GPS tracking of vaccination workers in Northern Nigeria yields data useful in improving microplanning and identifying communities missed during polio campaigns.
Using GIS mapping and GPS tracking of vaccination workers in Northern Nigeria yields data useful in improving microplanning and identifying communities missed during polio campaigns.
GLOBAL BURDEN OF DISEASE

GBD 2010 was the first standardized, comprehensive platform to quantify global health data by geography, age, and sex

- Greater accessibility and improved access to data

We are investing heavily in Global Burden of Disease 2.0

- The goal is to inform decision-making and maximize health system impact

- However, we still have a fundamental issue with primary data quality
COMMUNICABLE, MATERNAL, NEONATAL AND NUTRITIONAL DISORDERS

Latin America and Caribbean, DALYs - both sexes, all ages

Sub-Saharan Africa, DALYs - both sexes, all ages
GUIDING OUR INVESTMENTS IN GLOBAL HEALTH

<table>
<thead>
<tr>
<th>Probability of Technical and Regulatory Success (PTRS) %</th>
<th>Probability of Technical and Regulatory Success (PTRS) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bubble size is equivalent to the amount of DALYs averted</td>
<td>Bubble size is equivalent to the amount of DALYs averted</td>
</tr>
<tr>
<td>10M DALYs Averted</td>
<td>100M DALYs Averted</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disease</th>
<th>Benchmark</th>
<th>Bed Nets</th>
<th>Passive Immunizations</th>
<th>TMC278LA</th>
<th>Pox Protein</th>
<th>Dapivirine Ring</th>
<th>NITD 609</th>
<th>Tafenoquine</th>
<th>GNF 156</th>
<th>RTS,s 2nd Gen</th>
<th>RTS,s 1st Gen</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV/AIDS</td>
<td>$100K</td>
<td>$1M</td>
<td>$100K</td>
<td>$10K</td>
<td>$10K</td>
<td>$100K</td>
<td>$100K</td>
<td>$100K</td>
<td>$100K</td>
<td>$100K</td>
<td>$100K</td>
</tr>
<tr>
<td>Malaria</td>
<td>$10K</td>
<td>$10K</td>
<td>$10K</td>
<td>$10K</td>
<td>$10K</td>
<td>$100K</td>
<td>$100K</td>
<td>$100K</td>
<td>$100K</td>
<td>$100K</td>
<td>$100K</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
</tr>
<tr>
<td>EDD</td>
<td>$100K</td>
<td>$1M</td>
<td>$100K</td>
<td>$100K</td>
<td>$100K</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
</tr>
<tr>
<td>TB</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
</tr>
<tr>
<td>NID</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
<td>$1M</td>
</tr>
</tbody>
</table>

© Bill & Melinda Gates Foundation
GUIDING OUR INVESTMENTS IN GLOBAL HEALTH

Passive Immunizations
TMC278LA
RTS,s 2nd Gen
NRRV
Pox Protein
M72
Aeras402
Aeras485
Novel-2
Leish F3
Anti-Secretory
Shigella CP
Tafenoquine
NITD 609
Dapivirine
Ring
HPV Vx
M72
OZ 439
PCV (SII)
RTS,s
116E Liquid
PaMZ MDR
PaMZ DS
REMox
LIQ
WC
CP

$1
$10
$100
$1K
$10K
$100K
$1M

HIV/AIDS
Pneumonia
Malaria
EDD
TB
NID

Bubble size is equivalent to the amount of DALYs averted

100M DALYs Averted

Surgical Male Circumcision
Benchmark
Bed Nets

Dollars per Disability Adjusted Life Year (DALY) Averted

Probability of Technical and Regulatory Success (PTRS) %

© Bill & Melinda Gates Foundation | 33
IMPORTANCE OF PARTNERSHIPS
SOME OF OUR PARTNERS
EVERY PERSON DESERVES THE CHANCE TO LIVE A HEALTHY, PRODUCTIVE LIFE