Africa's 2nd Green Power for Mobile Regional Working Group –
Hosted by Vodacom/Vodafone
7th-8th November 2011 – Cape Town, South Africa

Energize the Chain

Rerouting Power, Reshaping Lives …

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Energize the Chain: Mission

- Over two million vaccine preventable deaths annually
- Vaccine spoilage primarily due to cold chain disruption
- Grid power unreliable in developing countries …
- … but cell tower penetration high and growing fast
- **Key insight:**

  Co-locate refrigeration systems with cell towers to provide safe vaccines to communities

Key highlights of EtC

- Penn based 501c3 founded in Fall 2010
- Founding Board members from Penn and Wharton faculty
- Core team from Wharton and Harvard
- Core team has medical, business and health policy expertise
- Initial support from Wharton Social Impact and Penn
- Announced project at Africa's 1st Green Power for Mobile Regional Working Group in Mombasa, March 2011

The Global Burden of Disease Study

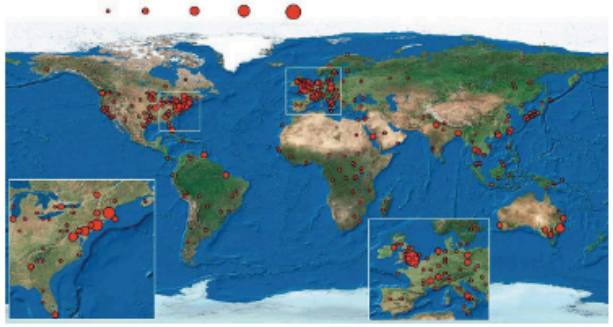
infectious diseases accounts for 22% of all deaths and 27% of disability adjusted life years (DALYs)

disproportionate impact on the developing world where infectious diseases account for 52% of deaths and 50% DALYs in sub-Saharan Africa and only 11% of deaths and 5% of DALYs in established market economies

(Globalization and Infectious Diseases: A review of the linkages. found at http://www.who.int/tdr/cd_publications/pdf/seb_topic3.pdf).

335 new infectious diseases emerged between 1940-2004

Figure 2 Global richness map of the geographic origins of EID events from 1940 to 2004.



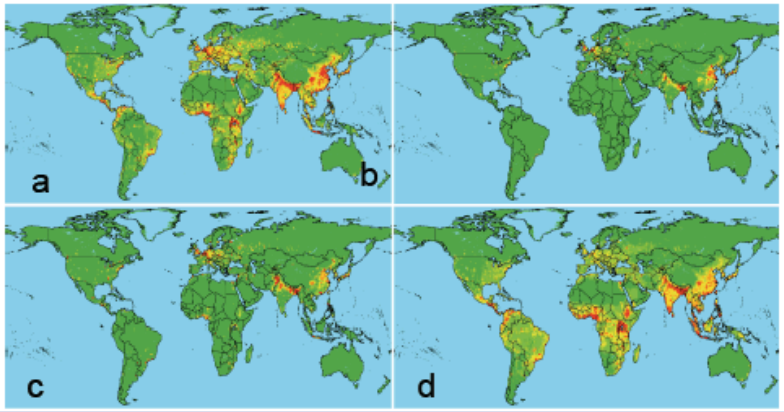


Figure 3 | Global distribution of relative risk of an EID event.
a, zoonotic pathogens from wildlife,
b, zoonotic pathogens from nonwildlife,
c, drug-resistant pathogens
d, vector-borne pathogens.

Global trends in emerging infectious diseases: Jones, Patel, Levy, Storeygard, Balk, Gittleman, & Daszak NATURE Vol 451| 21 February 2008

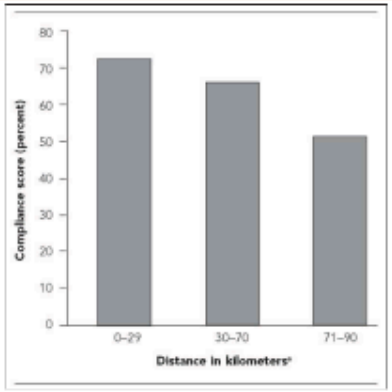
What exactly *is* the problem



Mobile solar vaccination cooler.

Cold Chain

Cold Chain Compliance Drop-Off



Study of Cold-Chain in Rural India:

For every 1 kilometer increase in distance between primary health center and sub-health centers, cold chain compliance decreases by 0.16 units

Evaluation of the Cold-Chain for Oral Polio Vaccine in a Rural District of India. Yogindra Samant, Hemant Lanjewar, David Parker, Lester Block, Gajendra S. Tomar, Ben Stein. Public Health Reports / January–February 2007 / Volume 122, 112-121

Only 50% of sub-centers 71-90 km away from primary health centers were compliant

90% of local health centers suffered frequent power failures

Only 45% of local health centers had back-up generators

4. Temperature management

This section considers how the final RTS,S thermostability profile will be likely to affect programme management.

4.1 Thermostability of existing vaccines

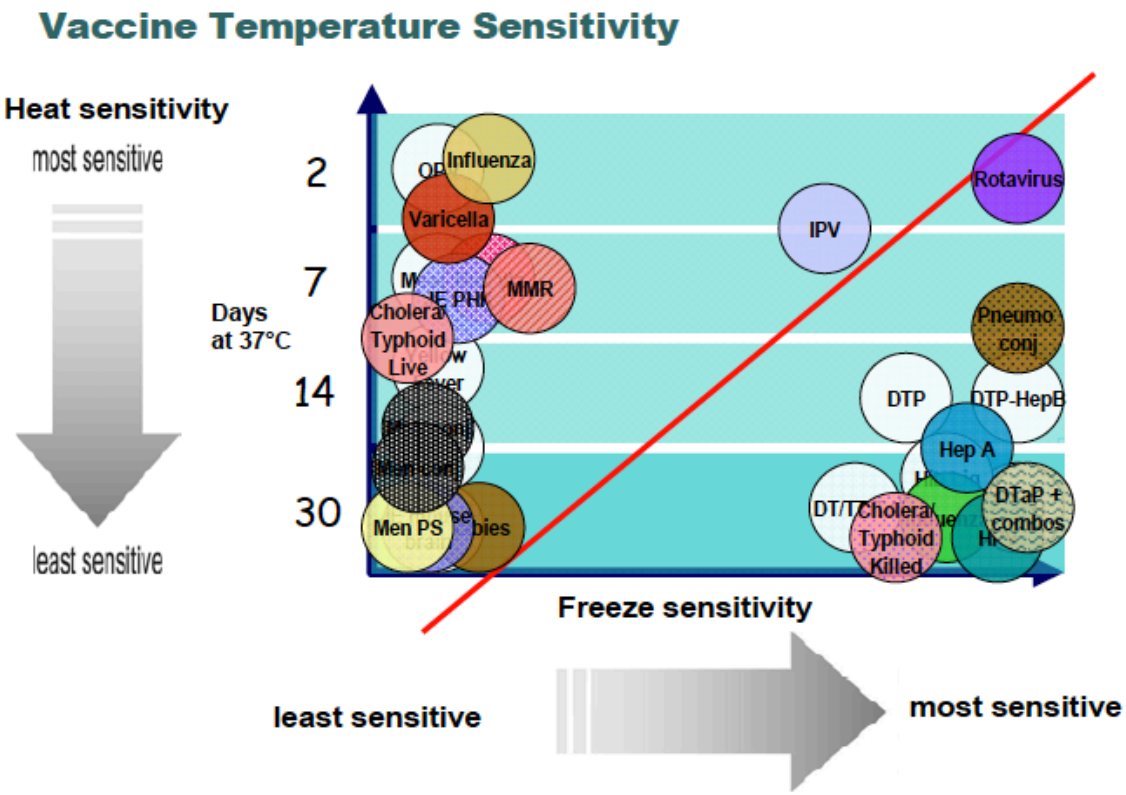
Figure 4.1 shows current WHO recommendations on the storage of vaccines at all levels in the cold chain.

<table>
<tr><th rowspan="2">Vaccine</th><th rowspan="2">Primary</th><th colspan="2">Intermediate</th><th rowspan="2">Health Centre</th><th rowspan="2">Health Post</th></tr>
<tr><th>Region</th><th>District</th></tr>
<tr><td></td><td>6 months[a]</td><td>3 months</td><td>1 month</td><td>1 month</td><td>Daily use</td></tr>
<tr><td>OPV</td><td colspan="2">-15°C to -25°C</td><td colspan="3" rowspan="11">+2°C to +8°C</td></tr>
<tr><td>BCG</td><td colspan="2" rowspan="5">WHO no longer recommends that freeze-dried vaccines be stored at –20°C. Storing them at –20°C is not harmful but it is unnecessary. Instead, these vaccines should be kept in refrigeration and transported at +2° to +8°C.</td></tr>
<tr><td>Measles</td></tr>
<tr><td>MMR</td></tr>
<tr><td>MR</td></tr>
<tr><td>Yellow Fever</td></tr>
<tr><td>Hib freeze-dried</td></tr>
<tr><td>HepB</td></tr>
<tr><td>DTP-HepB</td></tr>
<tr><td>Hib liquid</td></tr>
<tr><td>DTP</td></tr>
<tr><td>DT</td></tr>
<tr><td>TT</td></tr>
<tr><td>Td</td></tr>
<tr><td colspan="6">Diluent vials must NEVER be frozen. When the manufacturer supplies a freeze-dried vaccine packed together with its diluent, ALWAYS store the product at between +2°C and +8°C. Where space permits, diluents supplied separately from the vaccine may safely be stored in the cold chain at between +2°C to +8°C
Note a. 6 months is the maximum recommended storage time at primary level. This includes the period required to obtain clearance from the National Regulatory Authority.</td></tr>
</table>

Source: WHO

Figure 4.1. WHO vaccine storage recommendations.

Figure 4.2 shows the relative thermostability of the current EPI vaccines, and Figure 4.3 shows the thermostability of some newer vaccines.

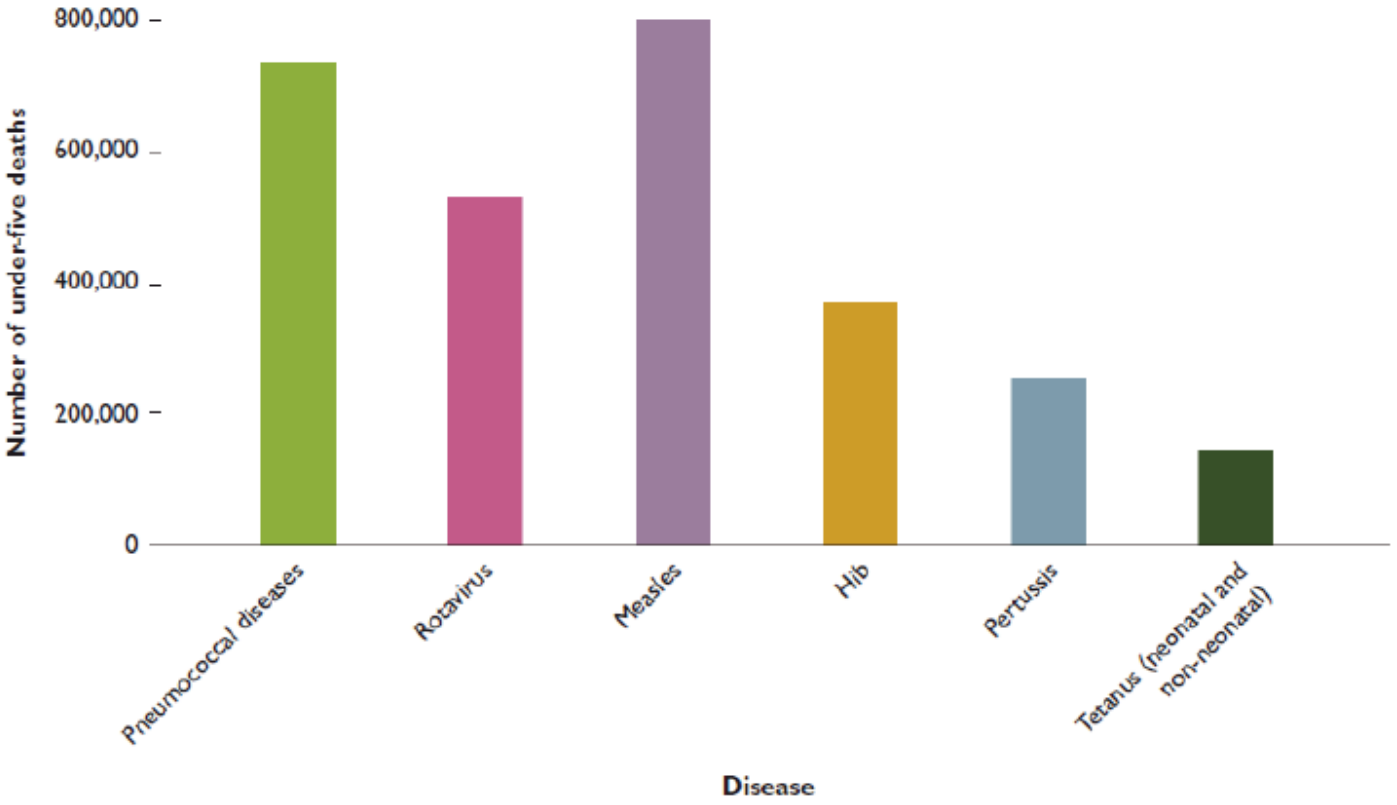


Source: Milstein J. TechNet21 consultation, October 26-27, 2006; Mexico City, Mexico

Figure 4.2. Thermostability of current Expanded Programme on Immunization (EPI) vaccines.

Example: The Distribution of Vaccines

Figure 3: Leading causes of vaccine-preventable deaths in children under five years old



Source: GAVI (2011)

Recent example:

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

First Results of Phase 3 Trial of RTS,S/AS01 Malaria Vaccine in African Children

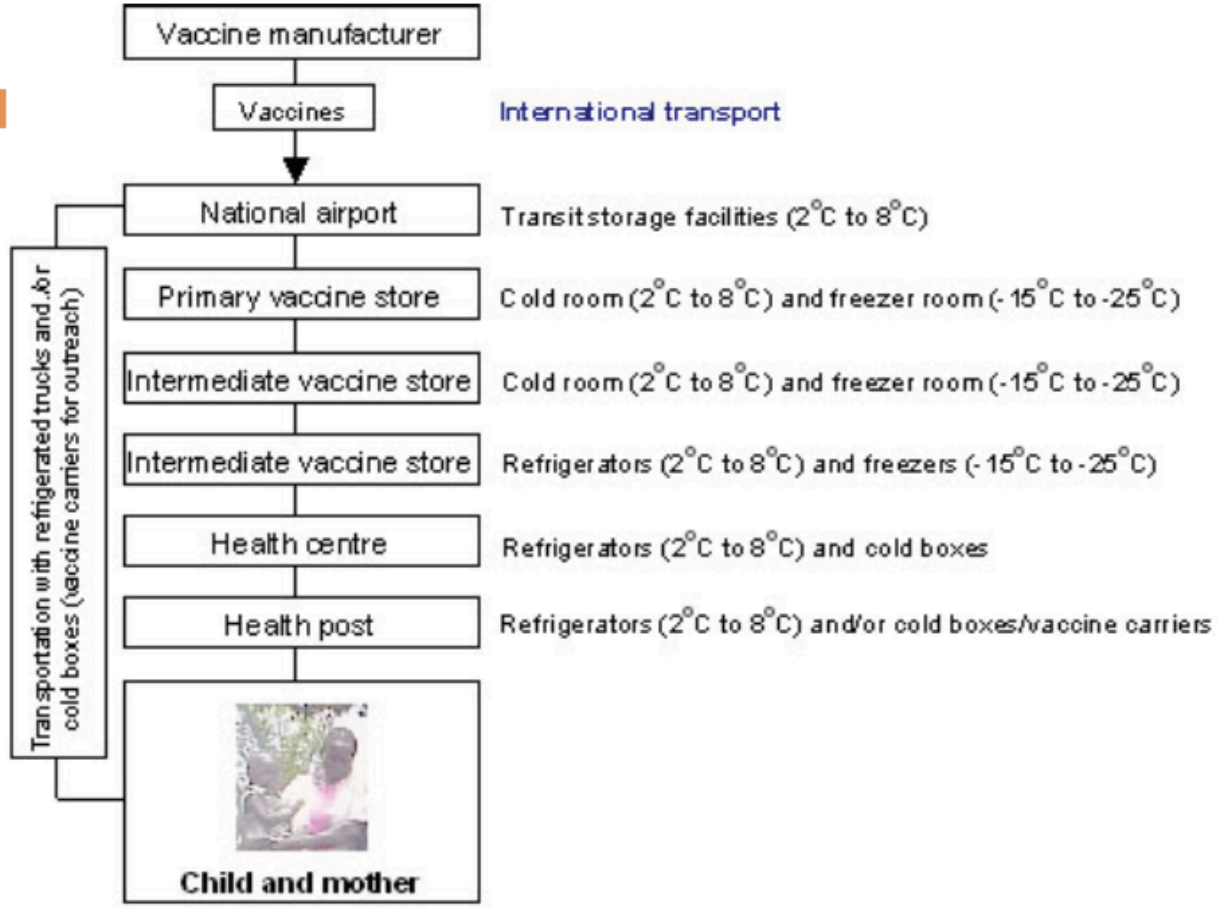
The RTS,S Clinical Trials Partnership*

"At another center, study vaccines were exposed to temperatures outside the recommended storage range, leading to the exclusion of 870 children from the per-protocol analysis." page 6

This article (10.1056/NEJMoa1102287) was published on October 18, 2011, at NEJM .org.

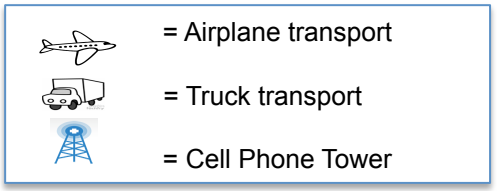
The current formulation of RTS,S vaccine consists of a lyophilized pellet that is reconstituted with diluent/adjuvant. Both substances must be transported and stored at +2ºC to +8ºC in the cold chain, and must be kept together in order to avoid inadvertently reconstituting with the wrong diluent.

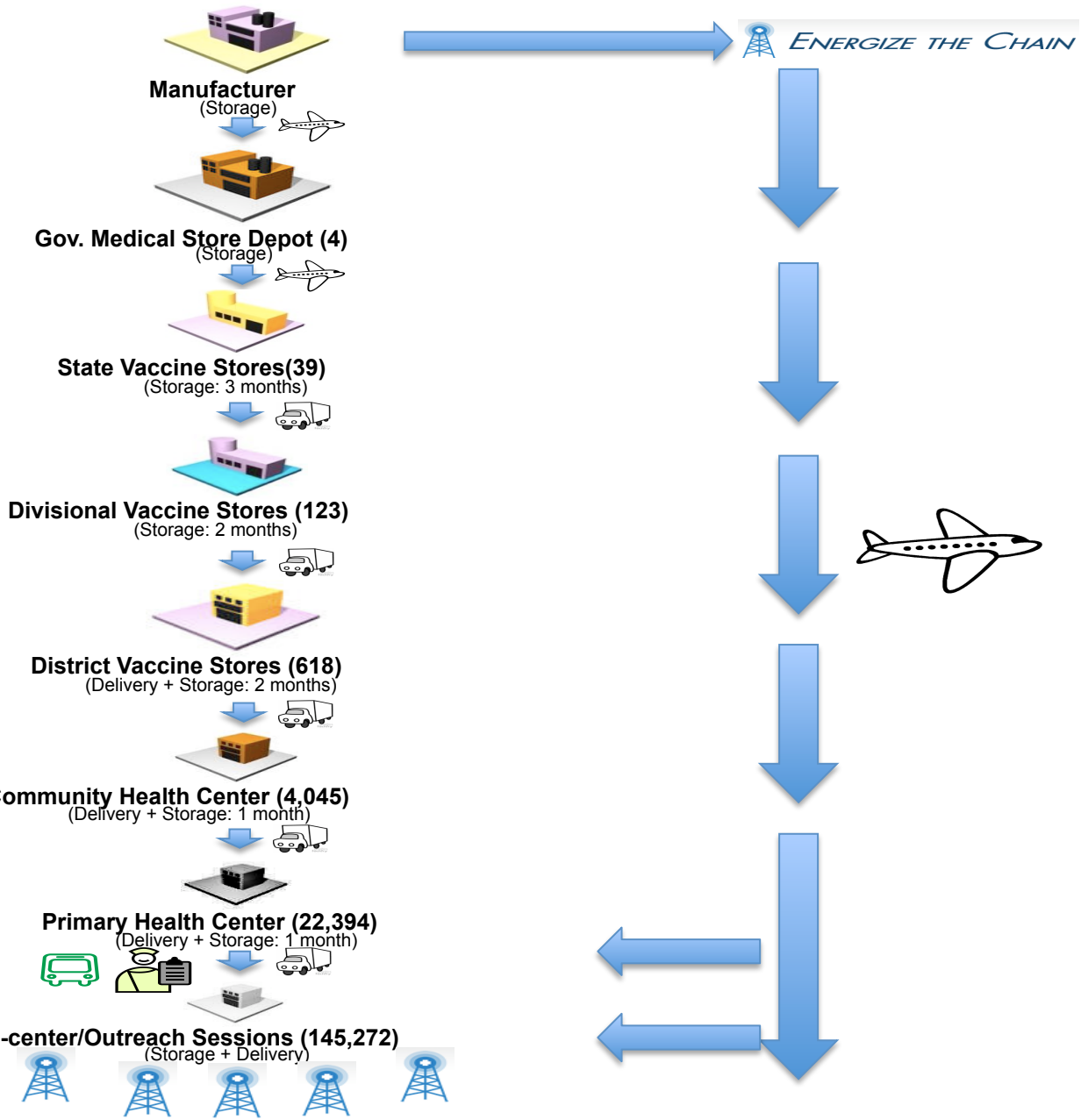
Disease in Developing Countries: Cold Chain



"The Cold Chain." *WHO.INT*. World Health Organization, 26 Nov. 2002. Web. <https://apps.who.int/vaccines-access/vacman/coldchain/the_cold_chain_.htm>.

Vaccine Supply Chain: India





Coverage and Frequency

Vaccine	Diseases	Age
BCG	tuberculosis	At birth
DPT3	diphtheria, pertussis, tetanus	6, 10, 14 weeks
OPV	polio	At birth, 6, 10, 14 weeks
Measles	measles	9 months

Source: Gavi (2011)

Cold Box Volume and Improper Use



Source: medicalcares.com

No power?---WRONG!



Green Power for Mobile

Supported by IFC International Finance Corporation

Bi-annual Report July 2011

In partnership with the Gates Foundation: A Feasibility Study in Kenya



Report on the Feasibility of using excess energy from communication masts in Kenya for cold chain and other EPI activities

by
Anthony Battersby
FBA Health Systems Analysts

8 August – 20 September 2011

Partners so far

Include:

- UNICEF
- Gates Foundation
- WHO
- GSMA

- Bharti Airtel
- Econet Wireless
- Karuna Trust, India
- Sanjoy Hazarika, Centre for North East Studies and Policy Research, India

karuna trust
(Affiliated to Vivekananda Girijana Kalyana Kendra)
Bangalore Branch : # 686, 16th Main, 39th Cross, 4th 'T' Block, Jayanagar, Bangalore-560 041
Phone / Fax : 080 - 22447612 e-mail : karuna.trust@vsnl.net www.karunatrust.com

Dear Dr Rubin,

Date: 10-08-2011

It gives me great pleasure to express Karuna Trust's support for the Energize the Chain project. Maintaining Cold Chain integrity to ensure vaccine quality is a revolutionary idea that has immense potential for improving health care delivery and infant survival across India.

At Karuna Trust, we have a deep involvement with primary health care provision in rural and inaccessible areas of the country. At present, we manage fifty five Primary Health Centres in a Public-Private Partnership model across 6 states in India. Karuna Trust is responsible for promotive, preventive, curative and rehabilitative services across all fifty five centres, including immunization for children and pregnant mothers. Some of these centres are remote and inaccessible with suboptimal cold chain facilities. The Energize the Chain initiative has immense potential to positively impact routine vaccination services in these areas.

I would like to formally express my support for this initiative and for the pilot project to be implemented in India. As part of an initial agreement between Karuna Trust and Energize the Chain, I would like to extend the following:

- Logistical support and partnership for initial background research study at the proposed pilot sites.
- Partnership with Karuna Trust Primary Health Centres to operationalize the pilot project.
- Support in negotiation and advocacy with key members of concerned government departments and fostering of appropriate partnerships therein.

I look forward to this partnership eagerly and am sure that it has the potential for positive impact in healthcare service delivery.

Warm Regards,

Dr Ramnath Ballala
Joint Director -PPP
Karuna Trust

Future Work

Participate in the 3rd Cold Chain Logistics Taskforce Workshop
UNICEF, New York City, November 29 to December 2, 2011
"Effective Vaccine Management Review and Cold Chain and Logistics Guidance Workshop"

Carry out feasibility studies in India

Scale up in selected other countries
Towards a Safer World
Rome September 16, 2011
The Challenge: increasing societal resilience while maximizing resources

Design and conduct health, economic, social impact studies

Engage additional cell tower operators and suppliers as partners
—let's discuss the details here in Capetown

Thanks...(alphabetically)

- Anthony Battersby—Gates
- Alice Conant—Penn
- Bernard Fernandes—Econet
- Tommy Fu—Penn
- Areef Kassam—GSMA
- Steve Landry—Gates
- Judah Levine—HIP/EtC
- Brittany Lin—Penn
- Aravind Menon—Penn
- Chandan Mishra—Penn
- David Morse—Actor
- Dragoslav Popovic—UNICEF
- Anand Raghavan—Penn
- Katherine Sanken—Penn
- Kent Smetters—Penn
- Tracey Strange—OECD
- David Taverner—GSMA
- Charlotte Ward—GSMA