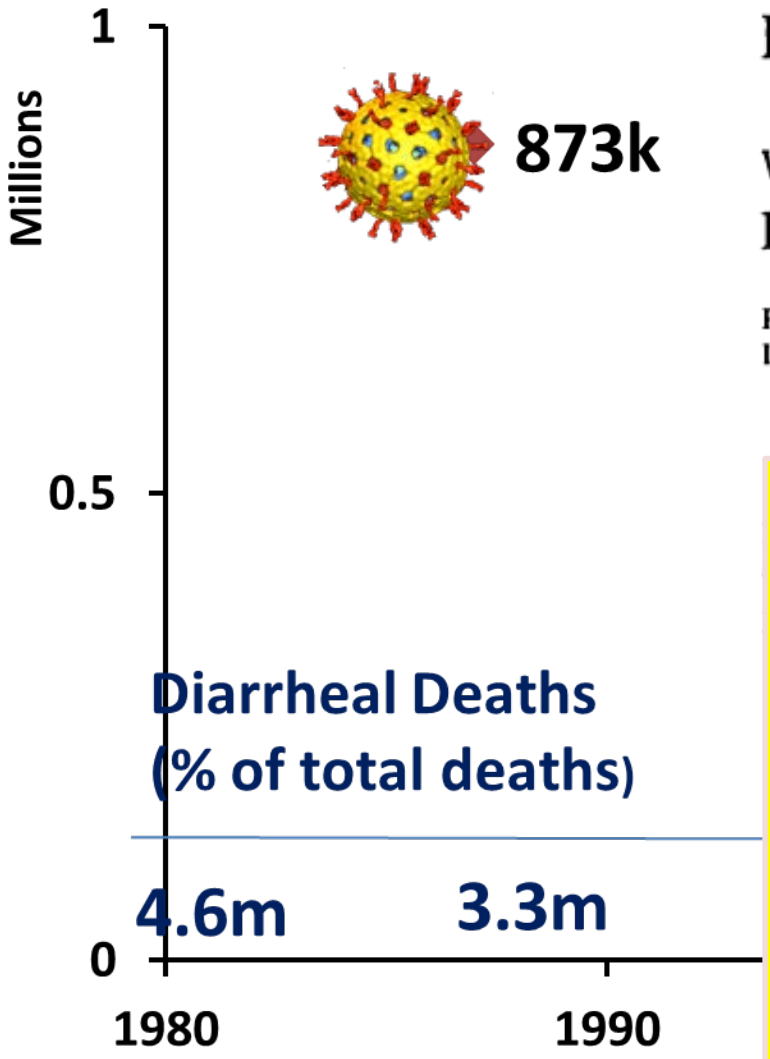
Partnerships and Collaborations to advance the vaccine agenda: Lessons from the Rotavirus Experience

Roger I. Glass, M.D., Ph.D.
Fogarty International Center, NIH
Viral Gastroenteritis Unit, CDC

IOM Estimates of Rotavirus Deaths--1985

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES



New Vaccine Development
Establishing Priorities

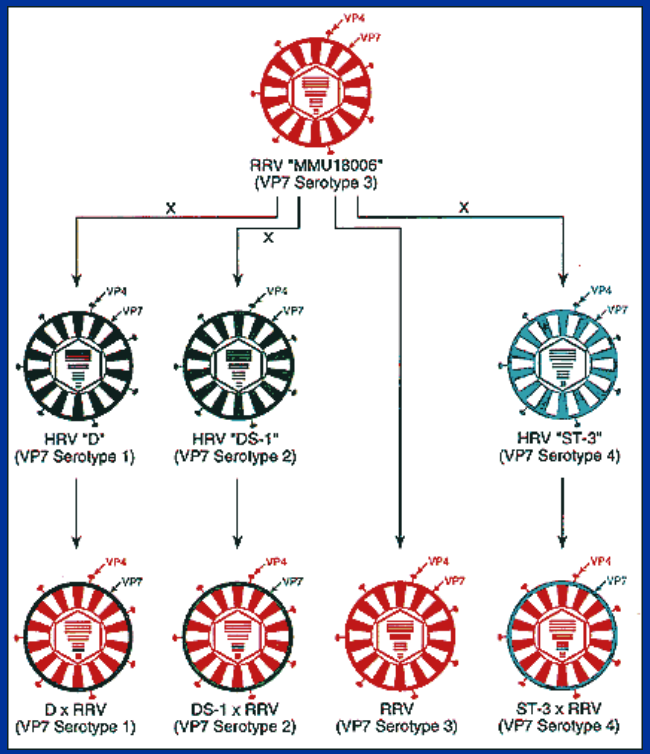
VOLUME II
Diseases of Importance in Developing Countries

Part Two of a Two-Part Study by the Committee on
Issues and Priorities for New Vaccine Development

High priority for Developing Countries…

1998
Rhesus Tetravalent vaccine-Rotashield Licensed

Albert Kapikian,



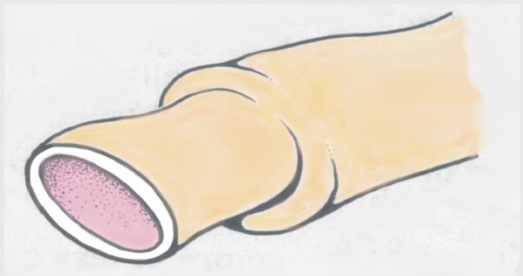
CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

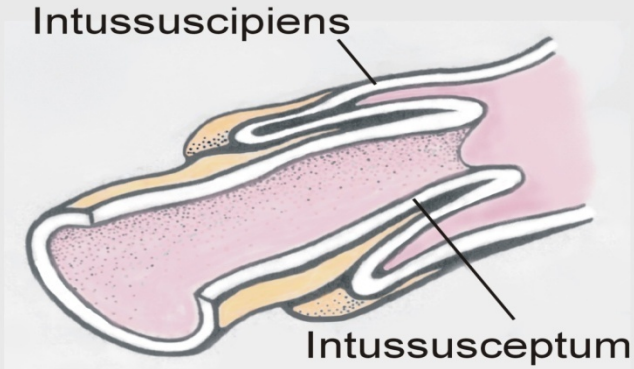
July 16, 1999 / Vol. 48 / No. 27

MMWR™
MORBIDITY AND MORTALITY
WEEKLY REPORT

Intussusception Among Recipients of Rotavirus Vaccine — United States, 1998–1999

On August 31, 1998, a tetravalent rhesus-based rotavirus vaccine (RotaShield®*, Wyeth Laboratories, Inc., Marietta, Pennsylvania) (RRV-TV) was licensed in the United States for vaccination of infants. The Advisory Committee on Immunization Practices





Intussusception

The telescoping of the intestine onto itself usually at the ileal-cecal junction, leading to reversible repair or entrapment with edema, necrosis and perforation

1990s

DEPARTMENT OF MEDICAL RESEARCH

Kyaw Moe
Virology Research Div.

The Journal of Infectious Diseases

SUPPLEMENT ARTICLE

Hospital-Based Surveillance for Rotavirus Diarrhea in Children in Yangon, Myanmar

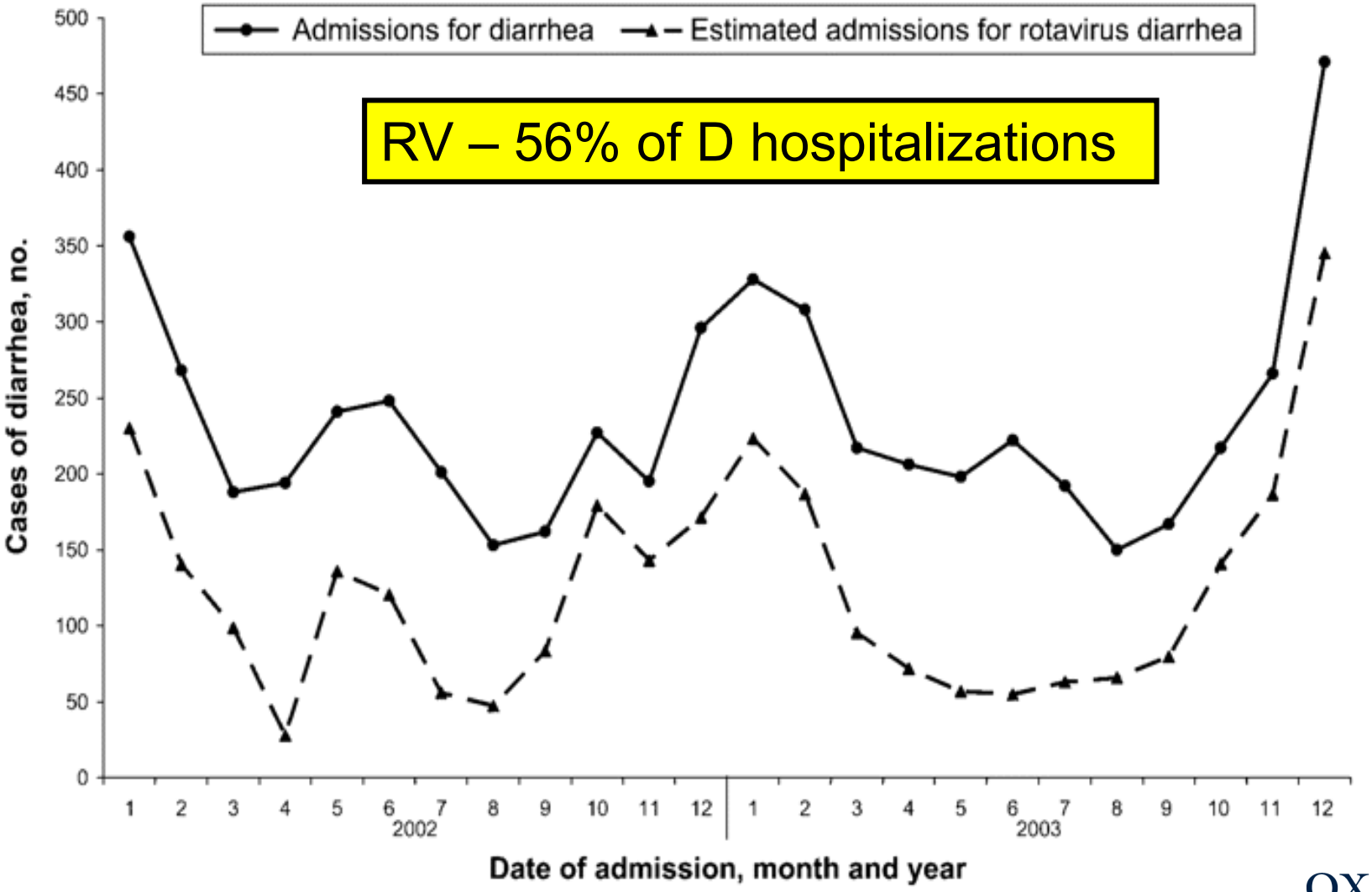
Kyaw Moe,[1] Erik G. Hummelman,[2] Win Mar Oo,[1] Thandar Lwin,[1] and Tin Tin Htwe[1]

[1]Virology Research Division, Department of Medical Research (Lower Myanmar), Yangon, Myanmar; [2]Centers for Disease Control and Prevention, Atlanta, Georgia

The Journal of Infectious Diseases, Volume 192, Issue Supplement_1, September 2005, Pages S111–S113, https://doi.org/10.1086/431509

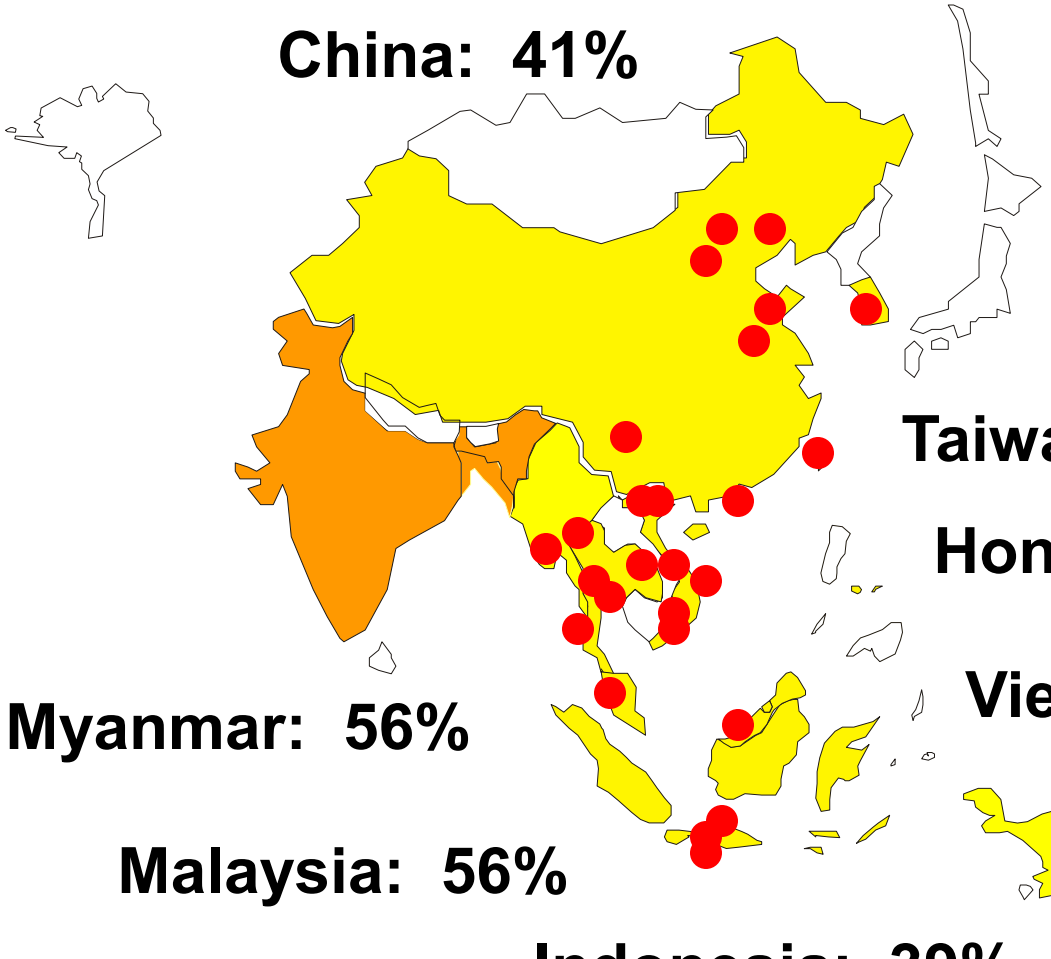
OXFORD UNIVERSITY PRESS

Diarrhea-associated admissions of children <5 years to Yangon Children's Hospital , January 2002 - December 2003.



The Journal of Infectious Diseases, Volume 192, Issue Supplement_1, September 2005, Pages S111–S113, https://doi.org/10.1086/431509

Rotavirus Hospitalizations in the Asian Rotavirus Surveillance Network



Joe Bresee

Tools for Global Rotavirus Surveillance

World Health Organization

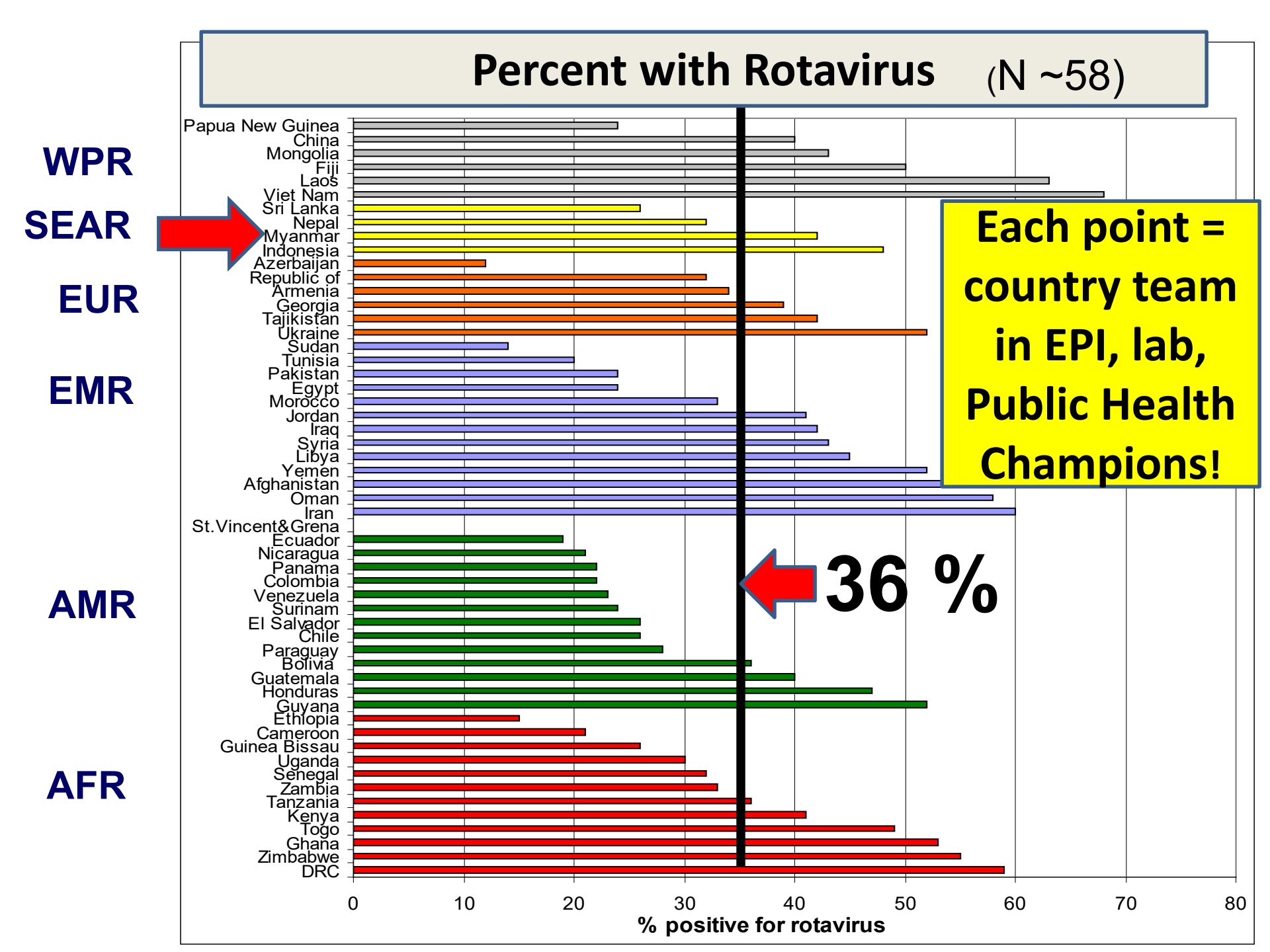
Laboratory Manual

Sentinel Hospital Surveillance

Cost- Effectiveness

Impact Evaluation

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION


Percent with Rotavirus (N ~58)
WPR
SEAR
EUR
EMR
AMR
AFR
Papua New Guinea
China
Mongolia
Fiji
Laos
Viet Nam
Sri Lanka
Nepal
Myanmar
Indonesia
Azerbaijan
Republic of
Armenia
Georgia
Tajikistan
Ukraine
Sudan
Tunisia
Pakistan
Egypt
Morocco
Jordan
Iraq
Syria
Libya
Yemen
Afghanistan
Oman
Iran
St.Vincent&Grena
Ecuador
Nicaragua
Panama
Colombia
Venezuela
Surinam
El Salvador
Chile
Paraguay
Bolivia
Guatemala
Honduras
Guyana
Ethiopia
Cameroon
Guinea Bissau
Uganda
Senegal
Zambia
Tanzania
Kenya
Togo
Ghana
Zimbabwe
DRC
36 %
Each point = country team in EPI, lab, Public Health Champions!
0
10
20
30
40
50
60
70
80
% positive for rotavirus

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Review

Rotavirus epidemiology: The Asian Rotavirus Surveillance Network☆

E.A.S. Nelson[a,*], J.S. Bresee[b], U.D. Parashar[b], M.-A. Widdowson[b], R.I. Glass[c], the members of the Asian Rotavirus Surveillance Network[d]

[a] Department of Paediatrics, The Chinese University of Hong Kong, Hong Kong SAR, China
[b] Centers for Disease Control and Prevention, Atlanta, GA, United States
[c] Fogarty International Center, National Institutes of Health, Bethesda, MD, United States
[d] Asian Rotavirus Surveillance Network Members–China: Zhao-Yin Fang, Bei Wang, Li-Jie Zhang, Li-Wei Sun, Zeng-Qing Du, Jing-Yu Tang, A... Yi Wang, Zhi-Yi Xu, Ying-Lin Zhang, Shou-Jun Zhao, Zhi-Yong Hao, Zhan-Chun Xing, Chang-Quan Han, Jing-Chen Ma, Ji-Chao Chen; Hong K... e Yu, Ying-Chu Ng, Kin-Hung Poon, Chi-Hang Ng, Kin-Sing Ip, Tai-Fai Fok; India: Rajiv Bahl, Pratima Ray, Swati Subodh, Prashant Shambh... p Kang, Shobhana D. Kelkar, Shoba D. Chitambar, Pratima Ray, Trailokyanath Naik. Indonesia: Yati Soenarto, Siswanto Agus Wilopo, Abu... a, Nenny Sri Mulyani; Japan: Toyoko Nakagomi, Osamu Nakagomi, Yoshihiro Takahashi, Masamichi Enoki,Takashi Suzuki; Korea: Jung S. ... g, Sae A. Min, Tae H. Park, Dae S. Jo, Paul E. Kilgore, Batmunkh Nyambat, Zhi Y. Xu, Lorenz von Seidlein, Oak Pil Han, John Clemens; Malaysi... g, Lailanor H. J. Ibrahim, Ahmad Faudzi H. J. Yusoff, Lee Gaik Chan; Mynamar: Kyaw Moe, Win Mar Oo, Thandar Lwin, Tin Tin Htwe; Tai... n Tang, Yung-Feng Huang, Ping-Ing Lee, Jyh-Yuan Yang, Hour-Young Chen; Thailand: Chuleeporn Jiraphongsa, Yaowapa Pongsuwanna, P... te Arporntip, Manas Kanoksil, Nakorn Premsri, Utcharee Intusoma; Vietnam: Nguyen Van Man, Le Thi Luan, Dang Duc Trach, Nguyen Thi H... g, Dang Duc Anh; United States: Erik Hummelman, Jon R. Gentsch, Thea K. Fischer, Vincent P. Hsu, Ashley R. Laird, Brittany Bielfelt, Dixie ... n, Baoming Jiang, Laura Jean Podewils, Lynn Antil, Richard Rheingans, T. Christopher Mast; World Health Organization and collaborating ... e, Carl D. Kirkwood, Krisztiaĭn Baĭ nyai, Nigel A. Cunliffe

The Journal of Infectious Diseases, Volume 192, Issue Supplement_1, September 2005, Pages S111–S113, https://doi.org/10.1086/431509

Surveillance of rotavirus gastroenteritis (2015-2017); vital information for pre-and post-rotavirus vaccination in Myanmar

[1]Theingi Win Myat, [1]Hlaing Myat Thu, [2]Ye Myint Kyaw, [1]Nang Sarm Hom, [1]Myat Mo Zar Kham, [1]Win Mar, [1]Khin Sandar Aye, [1]Hla Myo Thu and [1]Kyaw Zin Thant

[1]Department of Medical Research

[2]Yangon Children Hospital

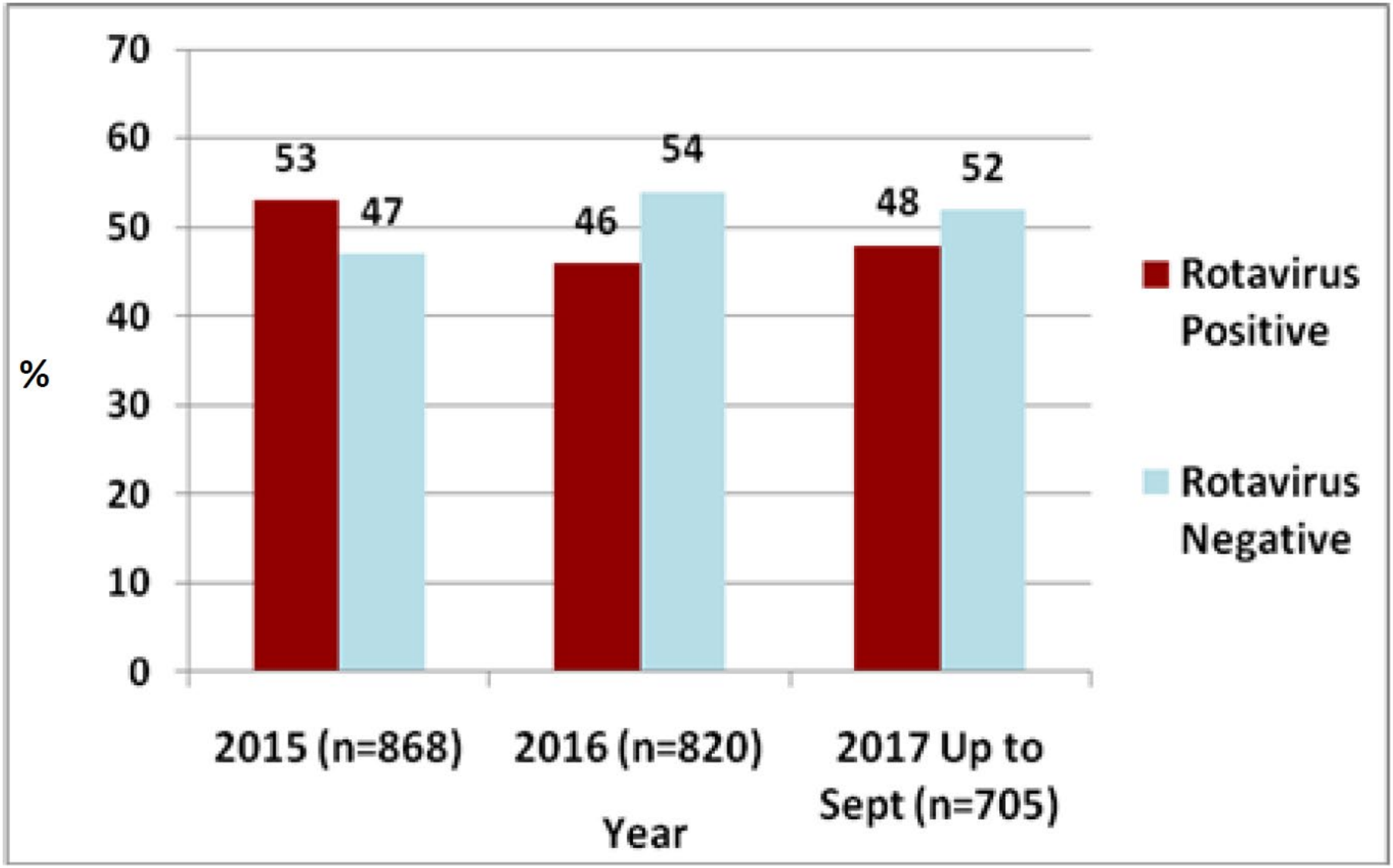


Fig (1) Proportion of Rotavirus positive cases tested by ELISA

6. Genotype distribution

Seasonal Year	Most Prevalent Genotype	N (%)	Total genotyped
2008-2009	G1P[8]	15 (35%)	43
2009-2010	G12P[8]	50 (61.7%)	81
2010-2011	G12P[8]	103(75.2%)	137
2011-2012	G12P[8]	45 (26%)	173
2012-2013	G2P[4]	22 (73.3%)	30
2013-2014	G1P[8]	31 (41.9%)	74
2014-2015	G9P[8]	72 (53.3%)	135
2015-2016	G9P[8]	25 (30.9%)	81
2016-2017	G3P[8]	32 (58.2%)	55

www.fic.nih.gov

GLOBAL HEALTH MATTERS

FOGARTY

MAY/JUNE 2012

Inside this issue

FOGARTY INTERNATIONAL CENTER • NATIONAL INSTITUTES OF HEALTH • DEPARTMENT OF HEALTH AND HUMAN SERVICES

Fogarty director joins US health delegation to Burma

As part of the warming of relations between the U.S. and Burma, Fogarty Director Dr. Roger I. Glass recently traveled to Rangoon to represent the U.S. at an international science meeting and to discuss possible research collaborations with the country's health minister.

"The Burmese are very enthusiastic about engaging with the U.S. scientific community to advance their research efforts in HIV/AIDS, malaria, dengue, and maternal and child health in particular," observed Glass. "I was very impressed with the caliber of scientists I met and look forward to establishing research and training collaborations with them."

In his role as lead U.S. health representative, Glass participated in the meeting of ASEAN's Committee on Science and Technology. He proposed that Fogarty and its federal partners host an influenza workshop in the region later this year, which was met with enthusiasm.

Courtesy of U.S. State Department

Fogarty Director Dr. Roger I. Glass visited Burma recently to discuss possible research collaborations with the country's health minister, Dr. Pe Thet Khin.

HEARTBEAT OF THE NATION
MYANMAR TIMES
5 June, 2015

Government set to introduce vaccine for rotavirus

MYINT KAY THI | 05 JUN 2015

The Ministry of Health plans to launch an immunisation drive against the deadly rotavirus in 2017-18, an official said last week.

https://www.mmtimes.com/national-news/14874-government-set-to-introduce-vaccine-for-rotavirus.html

HEARTBEAT OF THE NATION
MYANMAR TIMES

Vaccine alliance gives $60 million for immunisation programme

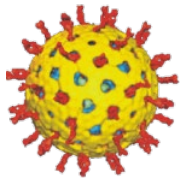
Mar 6, 2018

MYINT KAY THI | 06 MAR 2018

Geneva-based **Gavi, The Vaccine Alliance, will provide US$60 million** over the next two years to implement an immunisation programme in the country, largely focusing on cold chain facilities, according to the Ministry of Health and Sports.

https://www.mmtimes.com/news/vaccine-alliance-gives-60-million-immunisation-programme.html

National RV introductions by region: 92 countries*

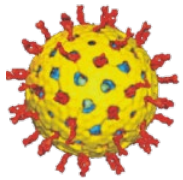


What's funny with this picture ?

*As of January 1, 2018
RV = rotavirus vaccine

PATH

National RV introductions by geographic region:



What's happened in Asia ?

Austria
Belgium
Estonia
Finland
Georgia
Germany
Latvia
Luxembourg
Moldova
Norway
United Kingdom

Americas

Argentina
Bolivia
Brazil
Cayman Islands
Colombia
Dominican Republic
Ecuador
El Salvador
Guatemala
Guyana
Haiti
Honduras
Mexico
Nicaragua
Panama
Paraguay
Peru
United States
Venezuela

Middle East

Bahrain
Iraq
Israel
Jordan
Qatar
Saudi Arabia
Tajikistan
UAE
Uzbekistan
Yemen

Western Pacific

Australia
Fiji
Kiribati
Marshall Islands
Micronesia
New Zealand
Palau

Africa

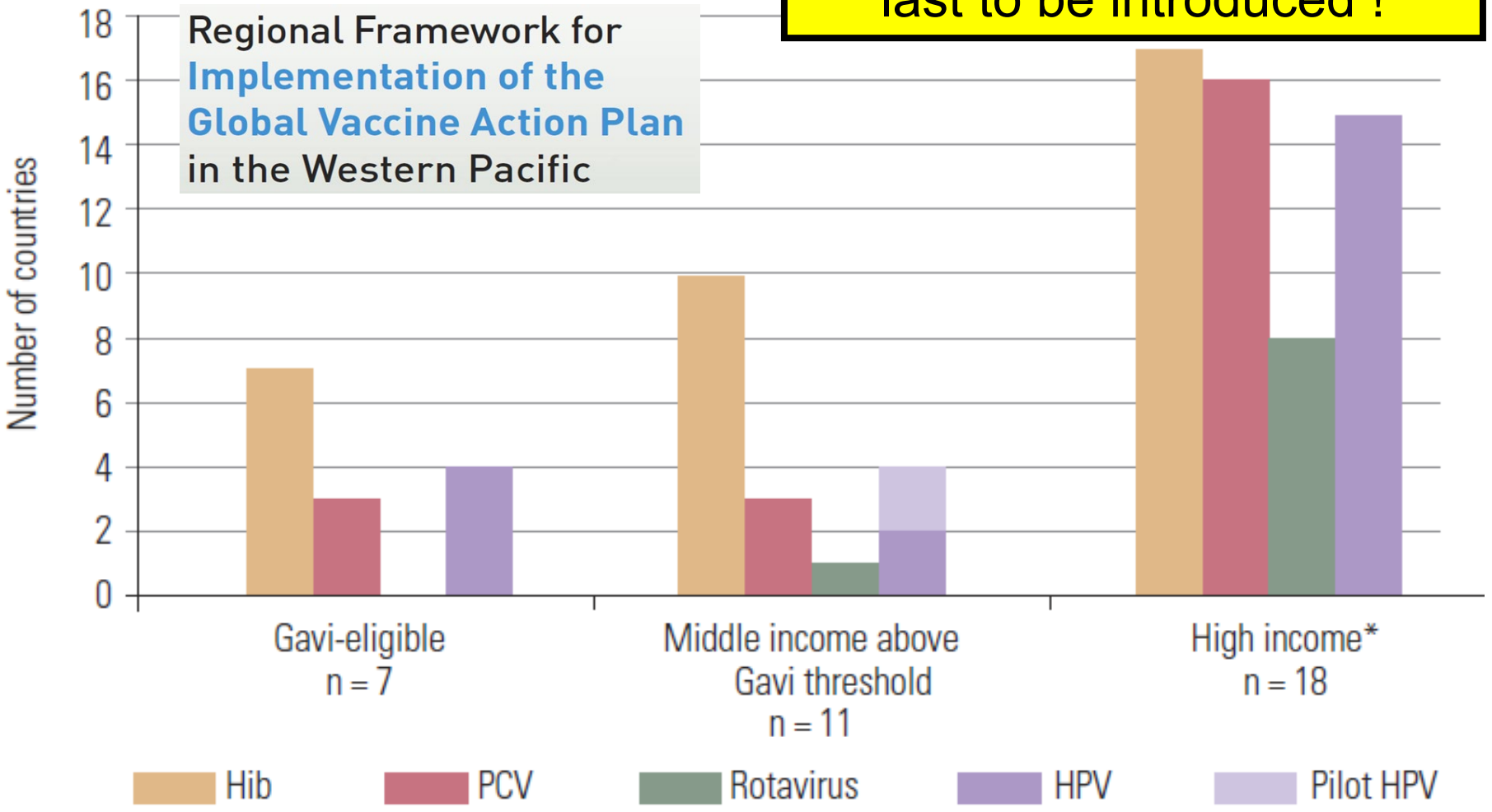
Angola	*Ethiopia*	*Mali*	*Sierra Leone*
Botswana	*The Gambia*	*Mauritania*	South Africa
Burkina Faso	*Ghana*	Morocco	*Sudan*
Burundi	*Guinea-Bissau*	*Mozambique*	Swaziland
Cameroon	*Kenya*	Namibia	*Tanzania*
Congo, Rep.	Libya	*Niger*	*Togo*
Djibouti	*Madagascar*	*Rwanda*	*Zambia*
Eritrea	*Malawi*	*Senegal*	*Zimbabwe*

Not Gavi-eligible [43]
Gavi-eligible [37]

PATH

FIGURE 3. Countries and areas that have introduced new and underutilized vaccines, by income level, Western Pacific R

Rotavirus –lowest coverage, last to be introduced !



*Including Pacific island countries and areas associated with the United States

Source: World Health Organization, Regional Office for the Western Pacific

Myint Htwe
Minister of Health and Sport

Congratulations for your support for the EPI program and for putting Rotavirus and HPV on the schedule in 2020 !

Vaccine Hesitancy : The need to create awareness and demand

- RV is not serious
- RV can be easily treated
- RV is the pediatricians bread and butter
- Vaccine is not essential because there are few deaths here
- Vaccine is risky – for intussusception
- Natural immunity is better
- Vaccine cost is too high
- Too many other vaccines competing for funds

Recent Global Partnerships

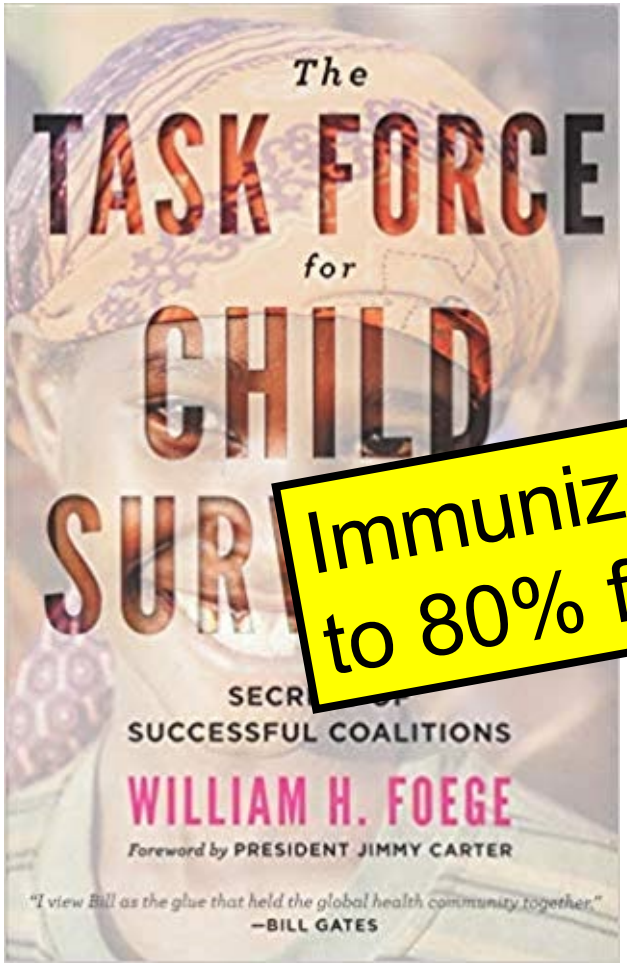
The last case of natural Smallpox in the world, Smallpox
Ali Maow Maalin, Somalia, 1976

1980 Declaration of the eradication of smallpox

Meetings on Disease eradication
Fogarty International Center, NIH
1980 & 1983

Task force for child survival -1984-1990

Bill Foege
Lasker Awardee
2001



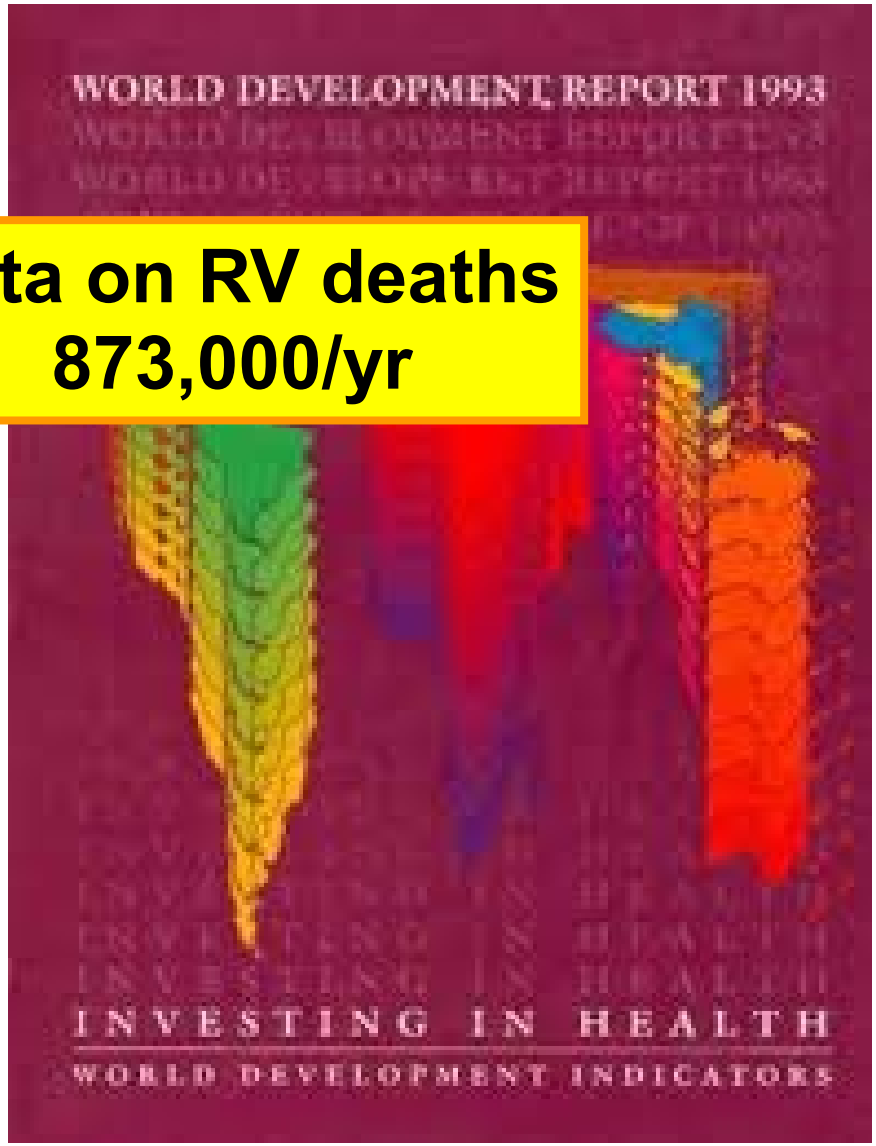
- 4000 preventable childhood deaths/day
- e

Immunization rates increased to 80% for at least one vaccine !

we do better together?

UNICEF
WHO
World Bank
UNDP
Rockefeller Foundation

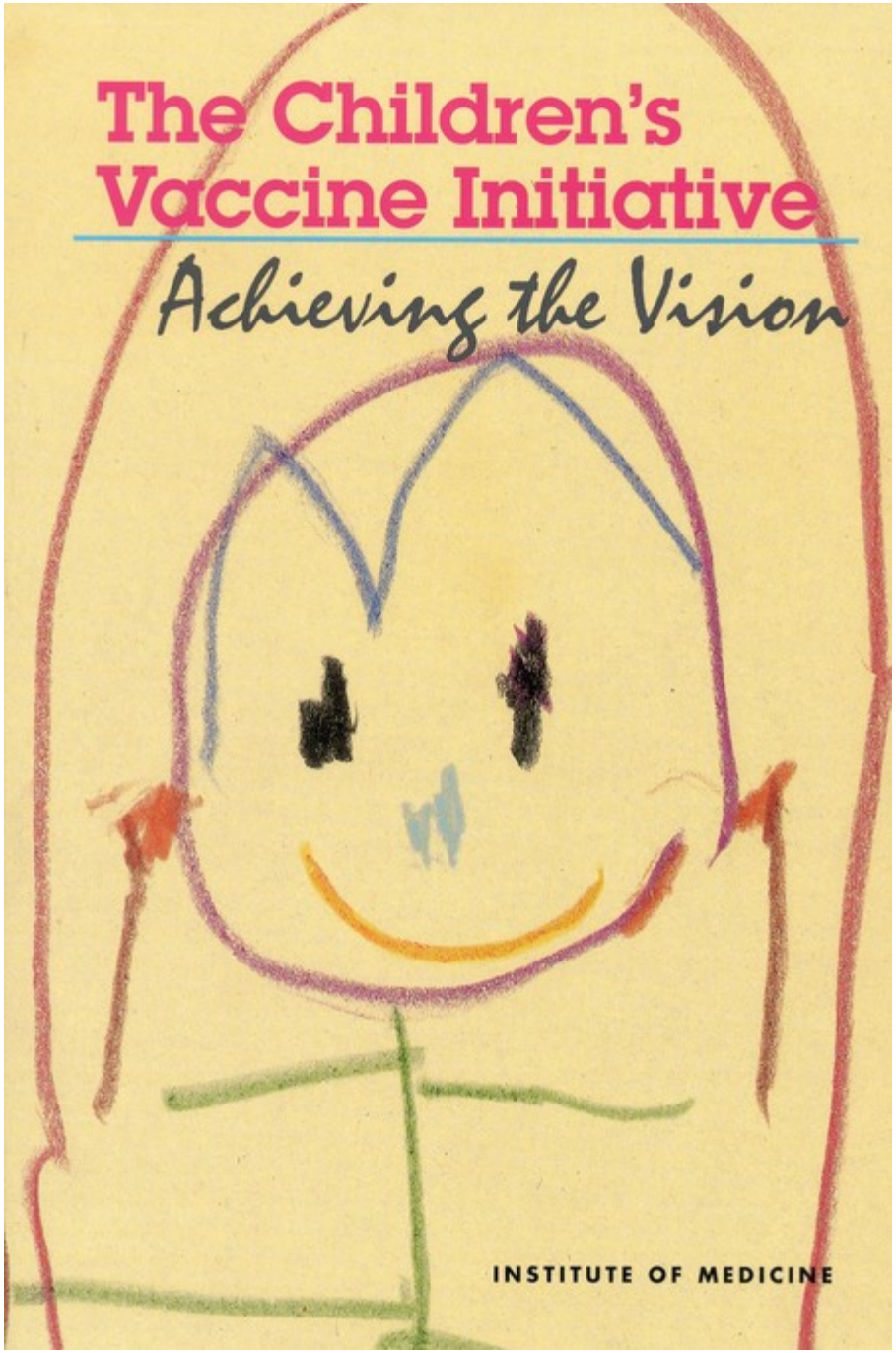
World Bank Report 1993



Data on RV deaths 873,000/yr

Data on the Global Burden of disease

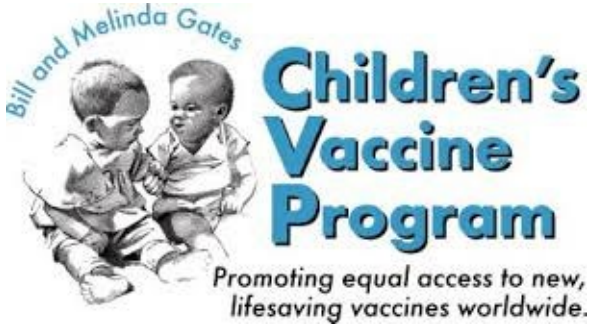
Why investing in health makes economic sense !



Goals -1990s

- Single dose
- Heat stable
- Multiple antigens
- Research

Transitioned to GAVI Global Alliance for Vaccine Initiative



BILL & MELINDA GATES foundation

1999

Accelerated Development & Introduction Plan

$100 Million for Hep B, Hib Pneumo and RV Vaccines

- Accelerated Development and Introduction Plan (ADIP) established with generous grant from GAVI Alliance.
- Partnership with WHO and US CDC.
- Mission: *To reduce child mortality and morbidity from diarrheal disease by accelerating the availability of rotavirus vaccines appropriate for use in developing countries.*

CDC

PATH

How can we make vaccines affordable ?

"...[new] vaccines will be too expensive in the beginning to have developing countries buying them with their own governmental funds. But there is a renewed commitment from the international community to help."

Dr Marie-Paule Kieny, Director, WHO Initiative for Vaccine Research, as quoted in UN health agency concerned over rising cost of vaccines for poor. *Agence France Presse*, 25 May 2005.

ADVANCE MARKET COMMITMENTS

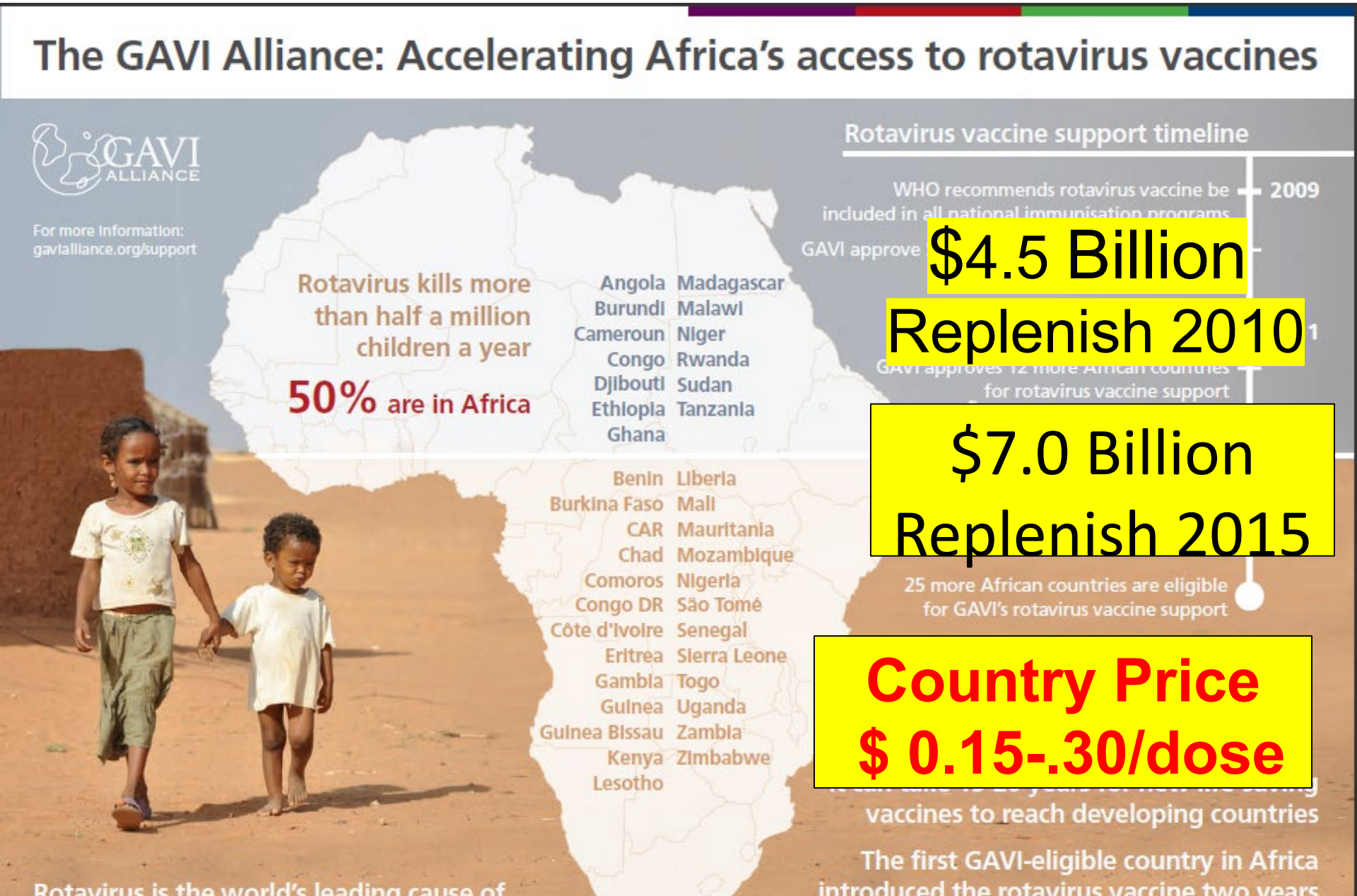
GAVI ALLIANCE

IFFIm SUPPORTING GAVI

New vaccines co-financing

Vaccine	*Examples*	*Poorest*	*Intermediate*	*Least Poor*	*Fragile States*
No. 1	1st vaccine, single or combination vaccines (including yellow fever)	$0.20	$0.30	$0.30	$0.10
No. 2	2nd additional vaccine (single or combination)	$0.15	$0.15	$0.15 (+15% annually)	$0.15
No. 3	3rd additional vaccine (single or combination)	$0.15	$0.15	$0.15 (+15% annually)	$0.15

GAVI Vaccine Finance



The New York Times

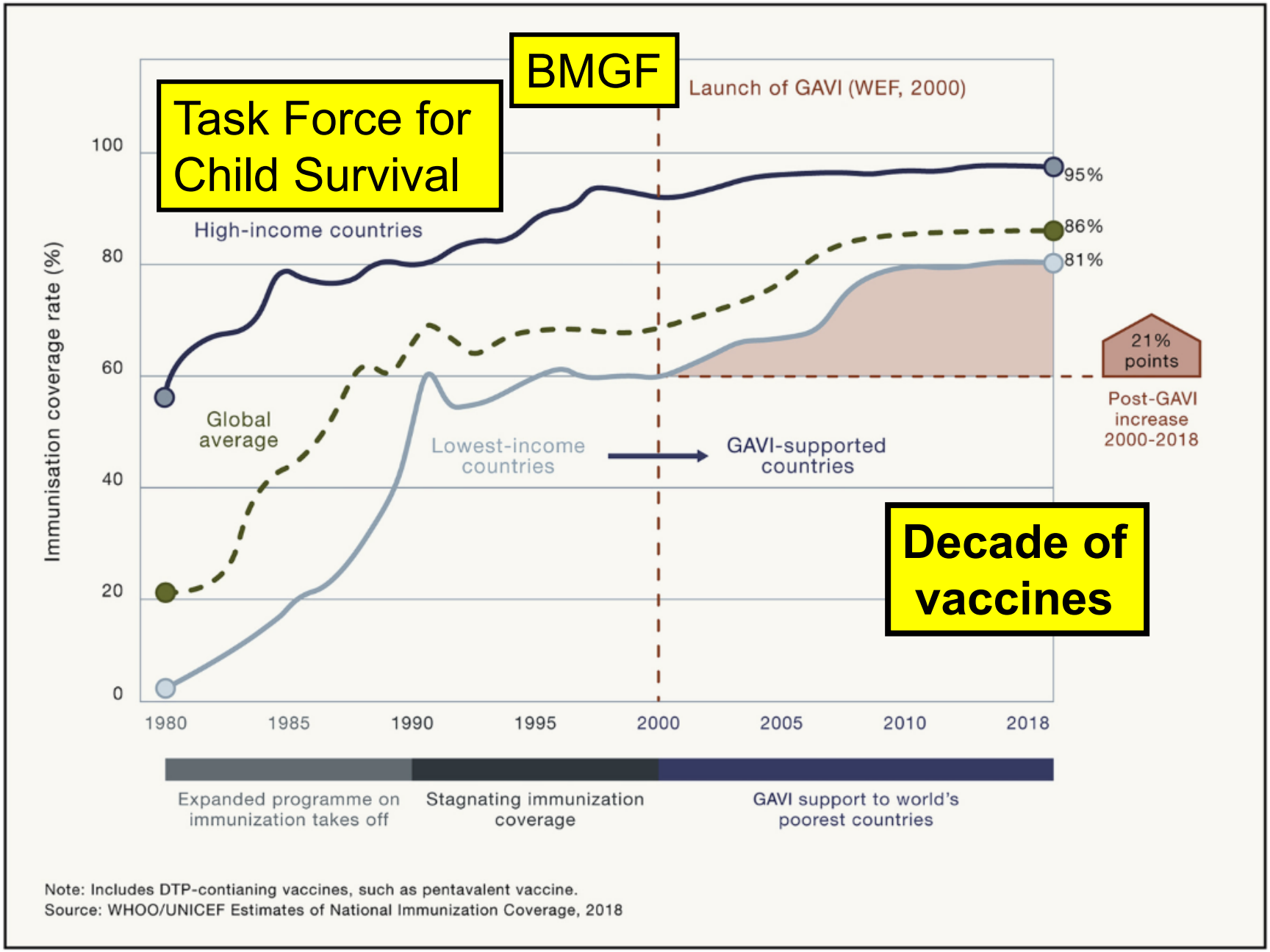
September 10, 2019

2019 Lasker-Bloomberg Public Service Award: GAVI, the Vaccine Alliance

for providing sustained access to childhood vaccines around the globe, saving millions of lives, and highlighting the power of immunization to prevent disease

Gavi
The Vaccine Alliance

Figure 1. Immunization Rates 1980–2018



DECADE of VACCINES
COLLABORATION

The vision for the DoV is a world in which all individuals and communities enjoy lives free from vaccine-preventable diseases. Its mission is to extend, by 2020 and beyond, the full benefits of immunization to all people, regardless of where they are born, who they are, or where they live.

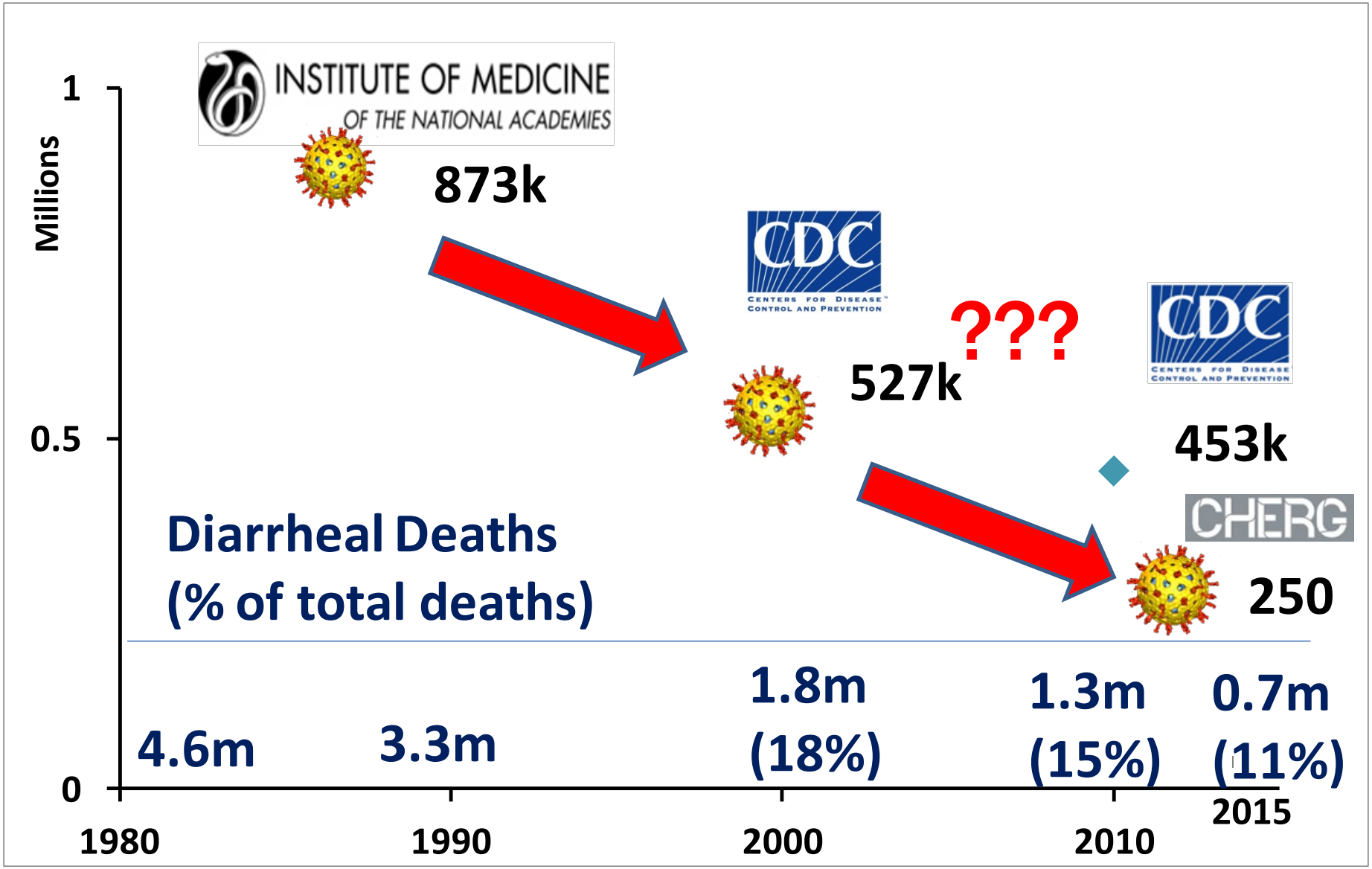
Where do we go next ?

Gavi Board starts framing Alliance's approach to 2021-2025 period

Gavi Board approves in principle a set of new and expanded vaccine programmes.

- Hepatitis B birth dose (stop infection at birth & chronic hep B
- DPT boosters at 12-24 mo, 4-7 years and 9-15 yrs.
- Oral cholera (OCV) –reduce incidence in poor, marginal groups
- Human rabies vaccine for post-exposure prophylaxis
- Meningococcal conjugate vaccine – A,C,W
- Respiratory Syncytial Virus – bronchiolitis/pneumonia infants

Estimates of Rotavirus Deaths: 2012



JAMA Pediatrics | Original Investigation

August 13, 2018

Rotavirus Vaccination and the Global Burden of Rotavirus Diarrhea Among Children Younger Than 5 Years

Christopher Troeger, MPH; Ibrahim A. Khalil, MD; Puja C. Rao, MPH; Shujin Cao, MS; Brigette F. Blacker, MPH; Tahmeed Ahmed, MD; George Armah, PhD; Julie E. Bines, MD; Thomas G. Brewer, MD; Danny V. Colombara, PhD; Gagandeep Kang, MD; Beth D. Kirkpatrick, MD; Carl D. Kirkwood, PhD; Jason M. Mwenda, PhD; Umesh D. Parashar, MD; William A. Petri Jr, MD; Mark S. Riddle, MD; A. Duncan Steele, PhD; Robert L. Thompson, PhD; Judd L. Walson, MD; John W. Sanders, MD; Ali H. Mokdad, PhD; Christopher J. L. Murray, DPhil; Simon I. Hay, FMedSci; Robert C. Reiner Jr, PhD

Chris Troeger

- 128 500 deaths (95% [UI], 104 500-155 600)
- 258 million episodes of diarrhea (95% UI, 193 million to 341 million),
- Incidence - 0.42 cases per child-year (95% UI, 0.30-0.53).

- Vaccine use averted > 28 000 deaths (95% UI, 14 600-46 700)
- Expanded vaccine use uin sub-Saharan Africa, could have prevented approximately 20% of all deaths attributable to diarrhea among children

Final Thoughts --Partnerships & Collaborations

- The world recognizes that vaccines are among the most cost effective interventions in public health
- The vaccine community has come together –from the largest global agencies and donors to regional, national and local programs
- The number of new vaccines and variants is increasing challenging governments to consider each individually
- Anti-vaccine sentiment has grown and needs to be addressed
- Investments in research will be essential to address problems and make improvements over time

Mathuram Santosham
Johns Hopkins Bloomberg School of Public Health, USA

Ciro A. de Quadros
Sabin Vaccine Institute, USA

Core Partners

ROTA COUNCIL
Rotavirus Organization of Technical Allies

Umesh Parashar
US Centers for Disease Control and Prevention, USA

Kathy Neuzil
PATH, USA

Council Members

George Armah
University of Ghana, Ghana

Julie Bines
University of Melbourne, Australi

Shams El Arifeen
ICDDR, B, Bangladesh

Carlo Giaquinto
University of Padova, Italy

Roger Glass
Fogarty International Center, USA

Zulkifli Ismail
KPJ Selangor Specialist Hospital, Malaysia

Gagandeep Kang
Christian Medical College, India

Alexandre C. Linhares
Ministry of Health, Brazil

Erkin Musabaev
Institute of Virology, Uzbekistan

Tony Nelson
Chinese University of Hong Kong, Hong Kong

Vesta Richardson
Ministry of Health, Mexico

Duncan Steele
Bill & Melinda Gates Foundation,

Oyewale Tomori
Redeemer's University, Nigeria

Anita Zaidi
Aga Khan University, Pakistan

Fogarty programs spur noncommunicable diseases research

Fogarty and its NIH partners invested nearly [illegible] to establish noncommunicable diseases resea[illegible] between U.S. and LMIC institutions, and build related research training programs according to a review of Fogarty's NCD programs between 2001 and 2017.

www.FIC.NIH.Gov

MORE >

Latest News

- March / April 2019 *Global Health Matters* newsletter

Funding News

- BLOODSAFE: Research to enhance availability of safe blood for patients with severe anemia and hemorrhagic conditions in low or lower-middle income countries (LLMICs) in Sub-Saharan Africa from NHLBI
  Due June 11
  > Exploratory / Developmental Phased Award (RFA-HL-20-009)
  > Data Coordinating Center (RFA-HL-20-010)
- Global Infectious Disease Research Training
  Due July 25
- U.S.-South Africa Program for Collaborative Biomedical Research

Making a Difference

- Fogarty Fellow Dr Eric J Nelson's cholera research in Bangladesh with icddr,b spawns global projects.

- Scientists inspired by a Fogarty workshop urge cross-cutting stigma research, interventions.

Fogarty Trainees

Fogarty's programs have made significant contributions by filling the pipeline of global health leaders. Featured researchers share how training supported by Fogarty has impacted their careers.

"Fogarty's aim is to develop researchers who can generate the evidence needed to affect policy, and be willing to step in and talk with policymakers about what their evidence shows."

Dr. Jonathan Samet, Dean, Colorado School of Public Health

- More featured Fogarty trainees