GAVI Vaccine Investment Strategy

Executive Summary

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VIS Executive Summary

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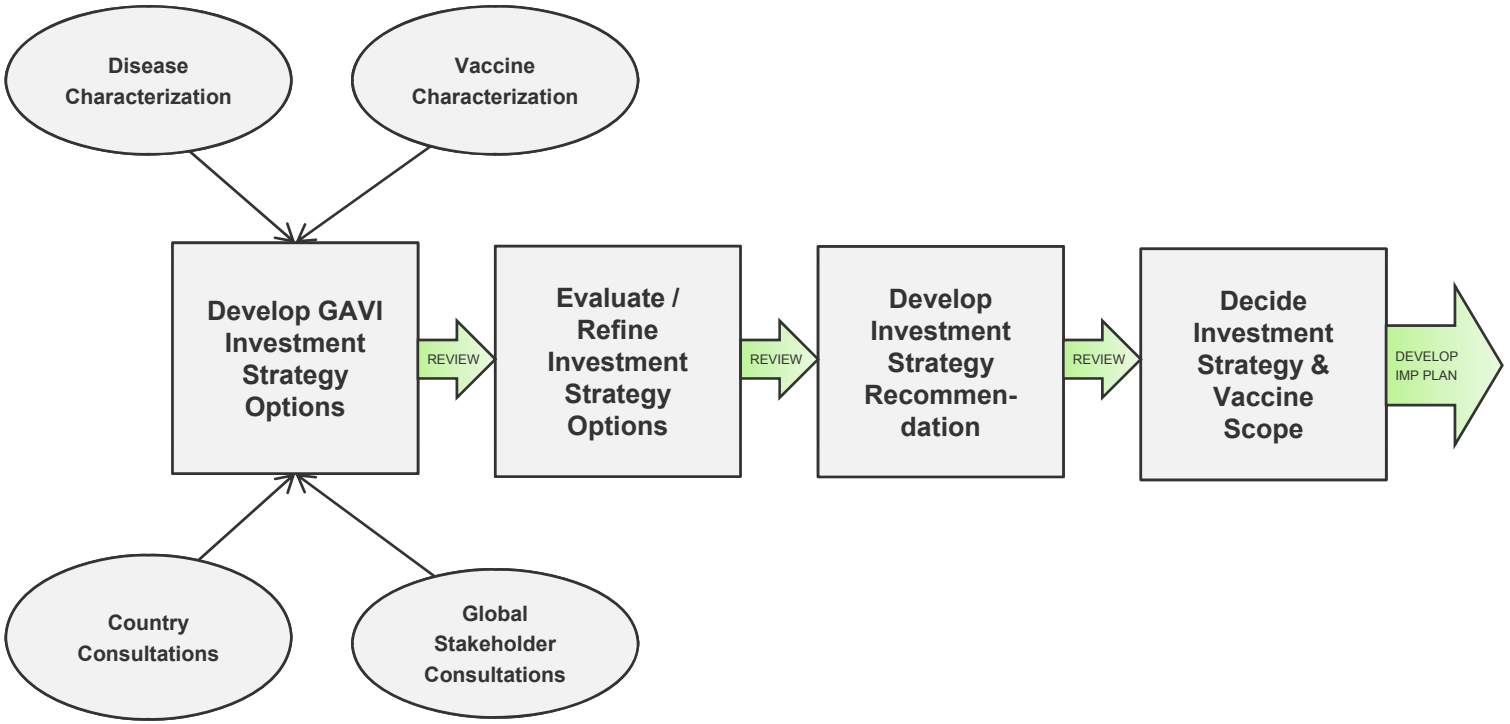
Project Overview

PHASE 1 PROCESS



Project Overview

PHASE 1 OUTCOMES

GAVI Alliance Board:

- Endorsed the Reduce Overall Disease Burden portfolio theme and associated vaccines (Cholera, Japanese Encephalitis, Typhoid, Meningitis A, HPV, Rabies, Rubella) for the years 2009-2013
  - Investment in an individual vaccine will be decided on the basis of a costed implementation plan, to be developed in VIS Phase 2

- Agreed that the vaccine investment strategy should be subject to period review and reassessment on the basis of changing information

- Noted that the strategy should monitor the development of vaccines for malaria and dengue and consider accelerated development and pre-introduction activities for these vaccines

The above decisions do not constitute financial approvals or commitment on behalf of the GAVI Alliance to fund or support any single vaccine.

Project Overview

PHASE 2 PROJECT OBJECTIVES – DISEASE-SPECIFIC

For Each Disease

- Define vaccination strategy options
- Designate options for full VIS evaluation
- Quantify the vaccine cost and health impact implications of each designated option
- Identify and characterize the country implementation-related costs associated with each designated option
- Determine the optimal financing strategy for GAVI

Project Overview

PHASE 2 PROJECT OBJECTIVES – PORTFOLIO-SPECIFIC

- Define vaccine portfolio options
- Quantify the vaccine cost and health impact implications of each portfolio option
- Identify and characterize the country implementation-related costs associated with each portfolio option
- Assess the GAVI partner-related costs associated with each portfolio option
- Provide comparative cost and value-measure analyses of the portfolio options to inform recommendation development

Project Overview

PHASE 2 PROCESS STEPS – VACCINE-SPECIFIC

1 Confirm Potential Vaccination Strategies

- Confirm potential vaccination strategies for each disease
- Identify PDP/expert-preferred vaccination strategy
- Validate vaccination strategy against current policy

2 Develop Integrated Vaccine Adoption Forecast

- Aggregate country adoption forecasts for each vaccine
  - Includes Hib, Pneumo, Rota & MenA
- Identify potential aggregate forecast issues and develop integrated forecast
- Seek country and other expert guidance on integrated forecast
- Develop alternative adoption forecast(s) based on feedback

3 Conduct Vaccine Cost & Health Impact Analysis

- Determine vaccine cost to GAVI for each vaccination strategy
- Quantify potential health impact of each vaccination strategy
- Estimate 'return' on GAVI vaccine investment across various value measures

4 Identify & Characterize Vaccine Implementation Related Costs

- Identify implementation challenges associated with each vaccination strategy
- Characterize potential costs relative to:
  - Historical vaccine introductions
  - Other VIS vaccines
- Assess implementation related costs

5 Determine Optimal Vaccine Financing Strategy

- Given various value measures, priority rank vaccine financing strategies

Seek WHO, CDC, Industry, PDP, PPP, and Other Expert Validation of Key Project Information and Analysis Assumptions

Project Overview

PHASE 2 PROCESS STEPS – PORTFOLIO-SPECIFIC

1 Define Vaccine Portfolio Options

- Develop alternative vaccine portfolio strategies

2 Conduct Portfolio Cost & Health Impact Analysis

- Determine cost to GAVI for each portfolio option
- Quantify potential health impact of each portfolio option
- Estimate 'return' on GAVI portfolio investment across various value measures

3 Assess Portfolio-Related Implementation Related Costs

- Assess implementation related costs for each portfolio option
- Assess GAVI partner related costs for each portfolio option

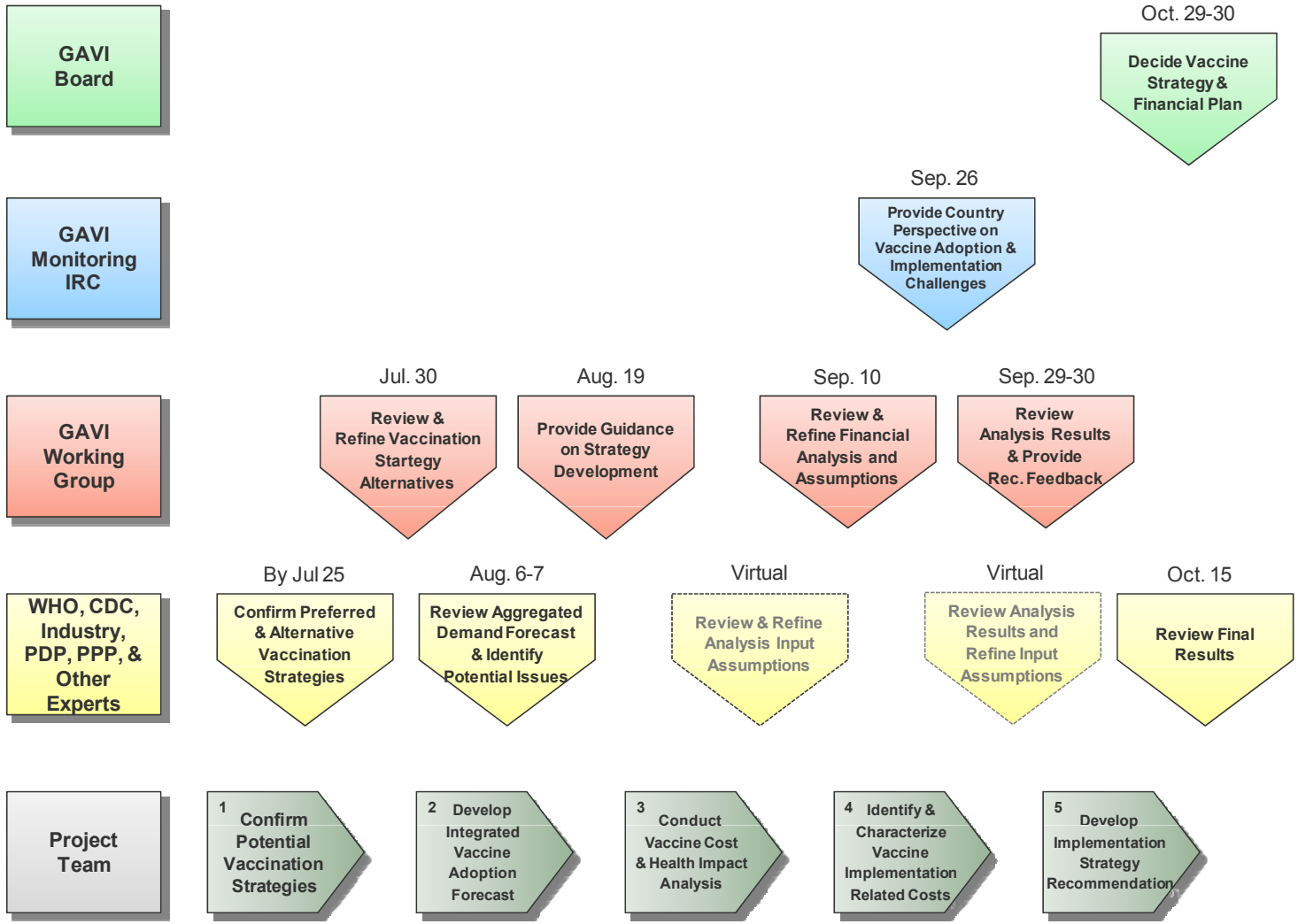
4 Conduct Comparative Financial & Value Measure Analyses

- Comparatively analyze portfolio options across:
  - Cost parameters
  - Health impact parameters
  - Return on GAVI investment parameters
- Provide insightful comparative analysis displays to aid recommendation development

Seek WHO, CDC, Industry, PDP, PPP, and Other Expert Validation of Key Project Information and Analysis Assumptions

Project Overview

PHASE 2 PROCESS



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Disease & Vaccine Landscape Analysis

DISEASE CHARACTERIZATION

JE

Disease Overview

DISEASE PATHOGEN, TRANSMISSION & TARGET POPULATION[1]

- Disease Pathogen
  - Japanese Encephalitis (JE) virus is in the Flavivirus genus
- Transmission
  - Transmitted by Culex mosquitoes (*Cx. tritaeniorhynchus*)

JE

Disease Overview

NON-VACCINE PREVENTION & TREATMENT INTERVENTIONS[8]

- Non-Vaccine Prevention
  - Reduction in cultivation, use of pesticides and centralized pig production may help to prevent the spread of JE, but there is no proof to support these prevention efforts
- Treatment Interventions

JE

Disease Overview

0 = None Reported / Data Not Available or Non-Endemic

DISEASE BURDEN IN GAVI-ELIGIBLE COUNTRIES – MORBIDITY[3-6]

Country	WHO Region	Morbidity (Annual Cases)	Morbidity Rate (Cases/100,000)
Bangladesh	SEARO	15,606	10
Bhutan	SEARO	65	10
India	SEARO	115,492	10
Indonesia	SEARO	23,015	10
Korea, DPR	SEARO	2,404	10
Myanmar	SEARO	4,884	10
Nepal	SEARO	2,758	10
Sri Lanka	SEARO	1,947	10
Timor-Leste	SEARO	109	10
Pakistan	EMRO	7,967	5
Lao PDR	WPRO	198	4
Viet Nam	WPRO	2,979	4
Cambodia	WPRO	489	4
Papua New Guinea	WPRO	213	4
Afghanistan	EMRO		
Angola	AFRO		
Armenia	EURO		
Azerbaijan	EURO		
Benin	AFRO		
Bolivia	AMRO		
Burkina Faso	AFRO		
Burundi	AFRO		
Cameroon	AFRO		
Central African Republic	AFRO		
Chad	AFRO		
Comoros	AFRO		
Congo, Dem. Rep.	AFRO		
Congo, Rep.	AFRO		
Côte d'Ivoire	AFRO		
Cuba	AMRO		
Djibouti	EMRO		
Eritrea	AFRO		
Ethiopia	AFRO		
Gambia, The	AFRO		
Georgia	EURO		
Ghana	AFRO		

Country	WHO Region	Morbidity (Annual Cases)	Morbidity Rate (Cases/100,000)
Guinea	AFRO		
Guinea-Bissau	AFRO		
Guyana	AMRO		
Haiti	AMRO		
Honduras	AMRO		
Kenya	AFRO		
Kiribati	WPRO		
Kyrgyzstan	EURO		
Lesotho	AFRO		
Liberia	AFRO		
Madagascar	AFRO		
Malawi	AFRO		
Mali	AFRO		
Mauritania	AFRO		
Moldova, Rep. of	EURO		
Mongolia	WPRO		
Mozambique	AFRO		
Nicaragua	AMRO		
Niger	AFRO		
Nigeria	AFRO		
Rwanda	AFRO		
São Tomé and Principe	AFRO		
Senegal	AFRO		
Sierra Leone	AFRO		
Solomon Islands	WPRO		
Somalia	EMRO		
Sudan	EMRO		
Tajikistan	EURO		
Tanzania, United Rep. of	AFRO		
Togo	AFRO		
Uganda	AFRO		
Ukraine	EURO		
Uzbekistan	EURO		
Yemen	EMRO		
Zambia	AFRO		
Zimbabwe	AFRO		

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JE

Disease Overview

DISEASE IMPACT[1]

- Total Morbidity
  - At least 50,000 cases of JE are reported annually (~12 million asymptomatic cases)
  - This is an underestimation of disease incidence since incidence rates during outbreaks can reach >100 cases per 100,000 population

JE

Disease Overview

INEQUITIES

- Inequity of Poor
  - Japanese Encephalitis mainly strikes poor rural communities in 14 poor countries of Southeast Asia and the Western Pacific

and

JE

Disease Overview

0 = None Reported / Data Not Available or Non-Endemic

DISEASE BURDEN IN GAVI-ELIGIBLE COUNTRIES – MORTALITY[4-7]

Country	WHO Region	Mortality (Annual Deaths)	Mortality Rate (Deaths/1,000,000)
Bangladesh	SEARO	4,682	31
Bhutan	SEARO	19	31
India	SEARO	34,648	31
Indonesia	SEARO	6,905	31
Korea, DPR	SEARO	721	31
Myanmar	SEARO	1,465	31
Nepal	SEARO	827	31
Sri Lanka	SEARO	584	31
Timor-Leste	SEARO	33	31
Pakistan	EMRO	2,390	15
Cambodia	WPRO	147	11
Lao PDR	WPRO	60	11
Papua New Guinea	WPRO	64	11
Viet Nam	WPRO	894	11
Afghanistan	EMRO		
Angola	AFRO		
Armenia	EURO		
Azerbaijan	EURO		
Benin	AFRO		
Bolivia	AMRO		
Burkina Faso	AFRO		
Burundi	AFRO		
Cameroon	AFRO		
Central African Republic	AFRO		
Chad	AFRO		
Comoros	AFRO		
Congo, Dem. Rep.	AFRO		
Congo, Rep.	AFRO		
Côte d'Ivoire	AFRO		
Cuba	AMRO		
Djibouti	EMRO		
Eritrea	AFRO		
Ethiopia	AFRO		
Gambia, The	AFRO		
Georgia	EURO		
Ghana	AFRO		

Country	WHO Region	Mortality (Annual Deaths)	Mortality Rate (Deaths/1,000,000)
Guinea	AFRO		
Guinea-Bissau	AFRO		
Guyana	AMRO		
Haiti	AMRO		
Honduras	AMRO		
Kenya	AFRO		
Kiribati	WPRO		
Kyrgyzstan	EURO		
Lesotho	AFRO		
Liberia	AFRO		
Madagascar	AFRO		
Malawi	AFRO		
Mali	AFRO		
Mauritania	AFRO		
Moldova, Rep. of	EURO		
Mongolia	WPRO		
Mozambique	AFRO		
Nicaragua	AMRO		
Niger	AFRO		
Nigeria	AFRO		
Rwanda	AFRO		
São Tomé and Principe	AFRO		
Senegal	AFRO		
Sierra Leone	AFRO		
Solomon Islands	WPRO		
Somalia	EMRO		
Sudan	EMRO		
Tajikistan	EURO		
Tanzania, United Rep. of	AFRO		
Togo	AFRO		
Uganda	AFRO		
Ukraine	EURO		
Uzbekistan	EURO		
Yemen	EMRO		
Zambia	AFRO		
Zimbabwe	AFRO		

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** WHO, expert, PDP, PPP reviewed*

Disease-specific summaries can be found in the disease analysis presentations posted on GAVI's website
http://www.gavialliance.org/vision/strategy/vaccine_investment/index.php

Updated Since VIS Phase 1

Disease & Vaccine Landscape Analysis

DISEASE IMPLICATION SUMMARY*

Category		Cholera	HPV	JE	Rabies	Rubella	Typhoid
Vulnerable Populations		<10yo & elderly most vulnerable	Pre-sexually active females	<15yo	5 – 15yo most vulnerable	WCBA for Congenital Rubella Syndrome	2-15yo must vulnerable
Inequity of Poor		Yes	Yes	Yes	Yes	Yes	Yes
Gender Inequity	Do genders suffer differently?	No	Yes	No	No	No	No
	Prevalence greater in one gender?	No	Yes (♀)	No	Yes (♂)	Yes (♀)	No
	Adverse affects in pregnant women?	Yes	No	No	No	Yes	No
Long-Term Sequelae	Severe	-	√	√	-	√ (CRS)	-
	Moderate	-	-	-	-	-	-
	Mild-None	√	-	-	√	-	√

♀$_{Pg}$ = Pregnant Women; ♂ = males; WCBA = women of childbearing age; Severe Long-Term Sequelae = > 5% of cases result in neurological complications (e.g., meningitis); Moderate Long-Term Sequelae = less impact but long-term (> 1yr) (e.g. deafness); Mild Long-Term Sequelae = rare severe cases or mild long-term effects (e.g., decrease in fertility)

Updated Since VIS Phase 1*

Disease & Vaccine Landscape Analysis

VACCINE CHARACTERIZATION

JE

Vaccine Landscape

LICENSED VACCINES

Supplier (1 Partner)	Chengdu (Wuhan, Lanzhour, Shanghai Instit for Biol Products)[9]	Biken (GreenCross, NIPM, GPO, NIHE)[10]	Beijing, Inst of Biolo
Vaccine	SA14-14-2 Attenuated	JE-Vax	Inactivat
Strain / Antigen	SA 14-14-2 strain	Beijing strain	P3 Str
Adjuvant / Platform	Live, attenuated, primary hamster kidney cell culture derived	Inactivated, mouse brain-derived	Inactivated, prim kidney cell cult
Administration Route	SQ	SQ	SQ
Formulation	Lyophilized	Lyophilized	Liqui
Presentation	1 & 5-dose vials	1 dose vial	2, 5, 10-dos
	1 dose at 9mo; boost 1 yr later	2 doses at 1-3 yrs (0, 1mo); boost after 1yo	2 doses at 12 mo at 2,

JE

Vaccine Landscape Analysis

COST EFFECTIVENESS LITERATURE SUMMARY (IV)

- Analysis of JE in Cambodia showed JE to cause 7,339 DALYs over 10 years, costing $28 (Range: $0-$347) (out of pocket only) per case treated. The cost-effectiveness of SA 14-14-2 vaccine in a 2009 population cohort (1-10 yo and 9-mo) over 10 years, demonstrated that the total cost per case treated was $1,660, and loss of earning related to long-term sequelae was $154,935-169,878. Vaccination prevented 3,099 cases and 403 deaths, saved $92,752 in out of pocket medical expenses, $42 per DALY averted, and $5,093 per death averted.[17]

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JE

Vaccine Landscape

VACCINES IN CLINICAL DEVELOPMENT

Supplier (1 Partner)	Intercell AG (Biological E, WRAIR)[11]	Acambis (Sanofi-Pasteur)[12]	Kaketsuken (Japan)[9]	Biki (Japa
Vaccine	SA14-14-2 Inactivated	Chimerivax-JE	KD-287	BK-V
Strain / Antigen	SA14-14-2 strain	SA14-14-2 strain	Beijing-1 strain	Beijing-
Adjuvant / Platform	Inactivated, Vero cell-derived	Live, attenuated, chimeric Vero cell-derived-YF	Inactivated, Vero cell-derived	Inactivated, deriv
Administration Route	IM	SQ	SQ	SC
Formulation	Liquid	Lyophilized	Lyophilized	Lyophi
Presentation	multi-dose vials; pre-filled syringe	multi-dose vials	1 dose vials or multi-dose vials	1 dose vials o via
Dosing Schedule	2 doses (0, 1mo or 1yr)	1 dose	3 doses (0, 1, 6-24mo)	3 doses (0,
Target Population for Licensure	≥ 9mo	≥ 9mo	≥ 6mo	≥ 6r
Safety	No major safety concerns	No major safety concerns	No major safety concerns	No major safe
Efficacy	Comparable Immunogenicity	Comparable Immunogenicity	up to 100%	up to
Expected Duration of Protection				
Stage of Development	Ph 3 (adults)*; Ph 2 (1-3 yo)	Ph 3 (adults); Ph 2 (age <15)	Phase 3	Phas
Estimated Licensure Date	4Q08 (adults) 4Q09 (> 9mo)	2009 (adults) 2010 (≥ 9mo)	2009 (Japan)	2009 (J
Estimated WHO Prequalification Date	4Q10	2011	Assume will not seek WHO PQ	Assume seek WH

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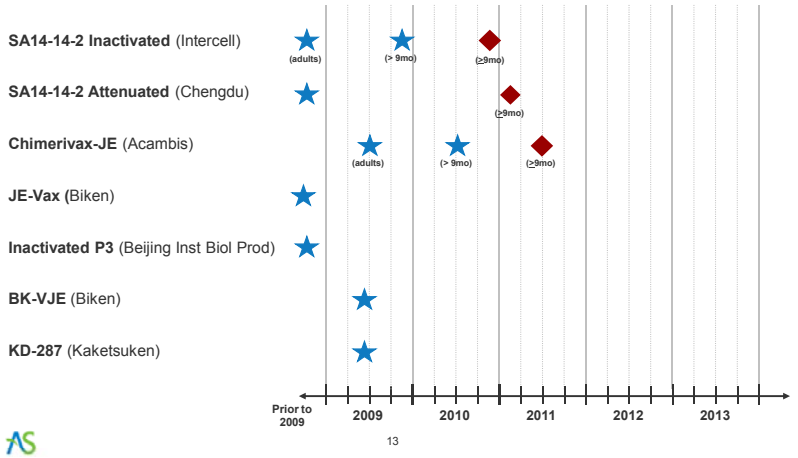
JE

Vaccine Landscape

ESTIMATED VACCINE AVAILABILITY



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* *Supplier, expert, PDP, PPP reviewed*

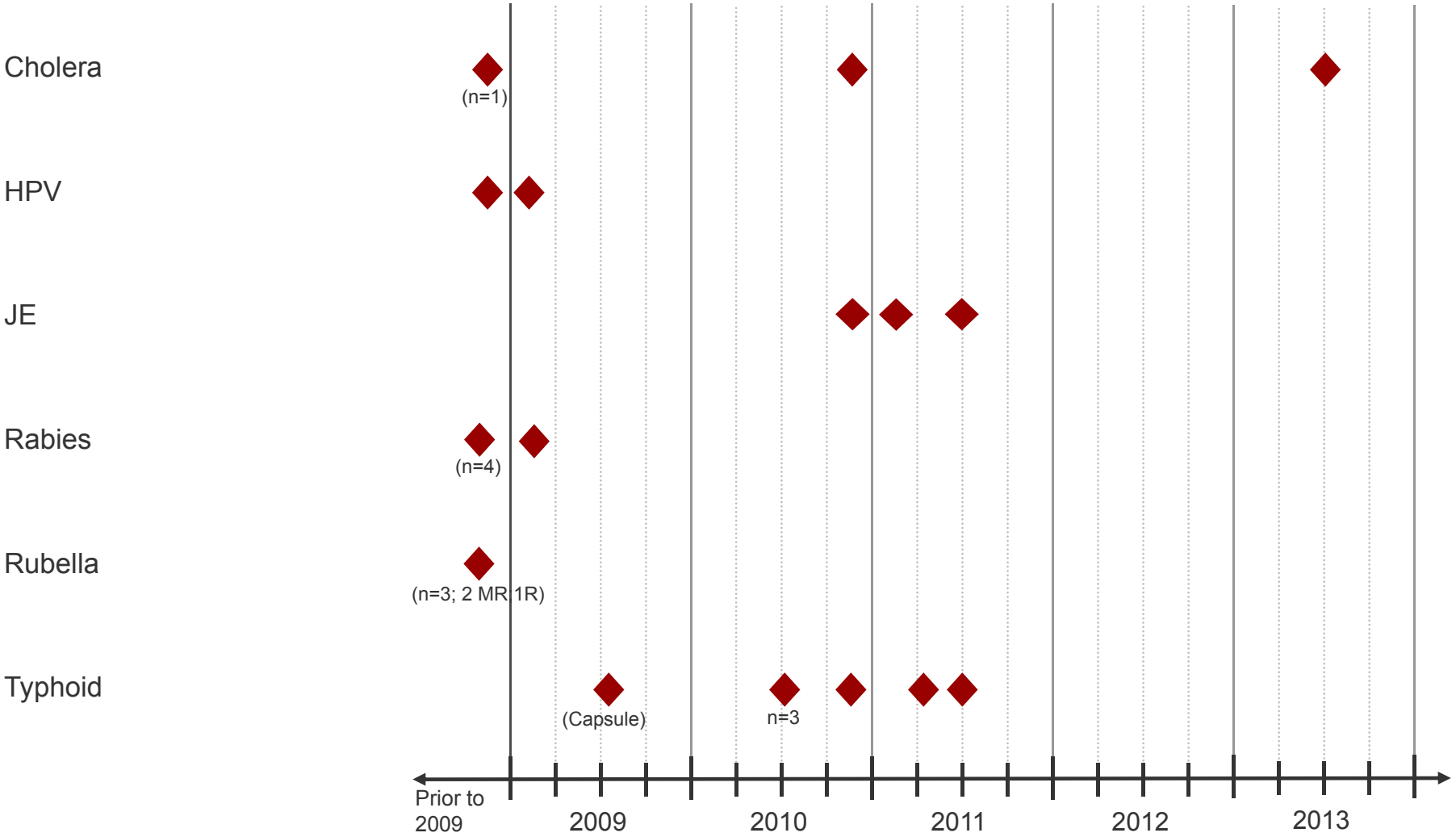
Disease-specific summaries can be found in the disease analysis presentations posted on GAVI's website
http://www.gavialliance.org/vision/strategy/vaccine_investment/index.php

Updated Since VIS Phase 1*

Disease & Vaccine Landscape Analysis

WHO Pre-Qual Approval ◆

VACCINE AVAILABILITY



** WHO, supplier, expert, PDP reviewed*

Updated Since VIS Phase 1

Disease & Vaccine Analysis

VACCINE IMPLICATION SUMMARY *

Category	Cholera	HPV	JE	Rabies	Rubella	Typhoid
Impacts MDG4	√	-	√	-	-	-
Impacts MDG5	√	√	-	-	√	-
Integrates into EPI	-	-	√	-	√	√
Integrates into IMCI	√	-	√	-	√	√
Integrates into IMAI	-	√	√	-	-	√
Integrates into Other Existing Health Programs	Maternal Health Programs	Maternal Health Programs	-	-	Maternal Health Programs	-

**IMCI = Integrated Management of Childhood Illness (WHO)*
IMAI = Integrated Management of Adolescent and Adult Illness (WHO)

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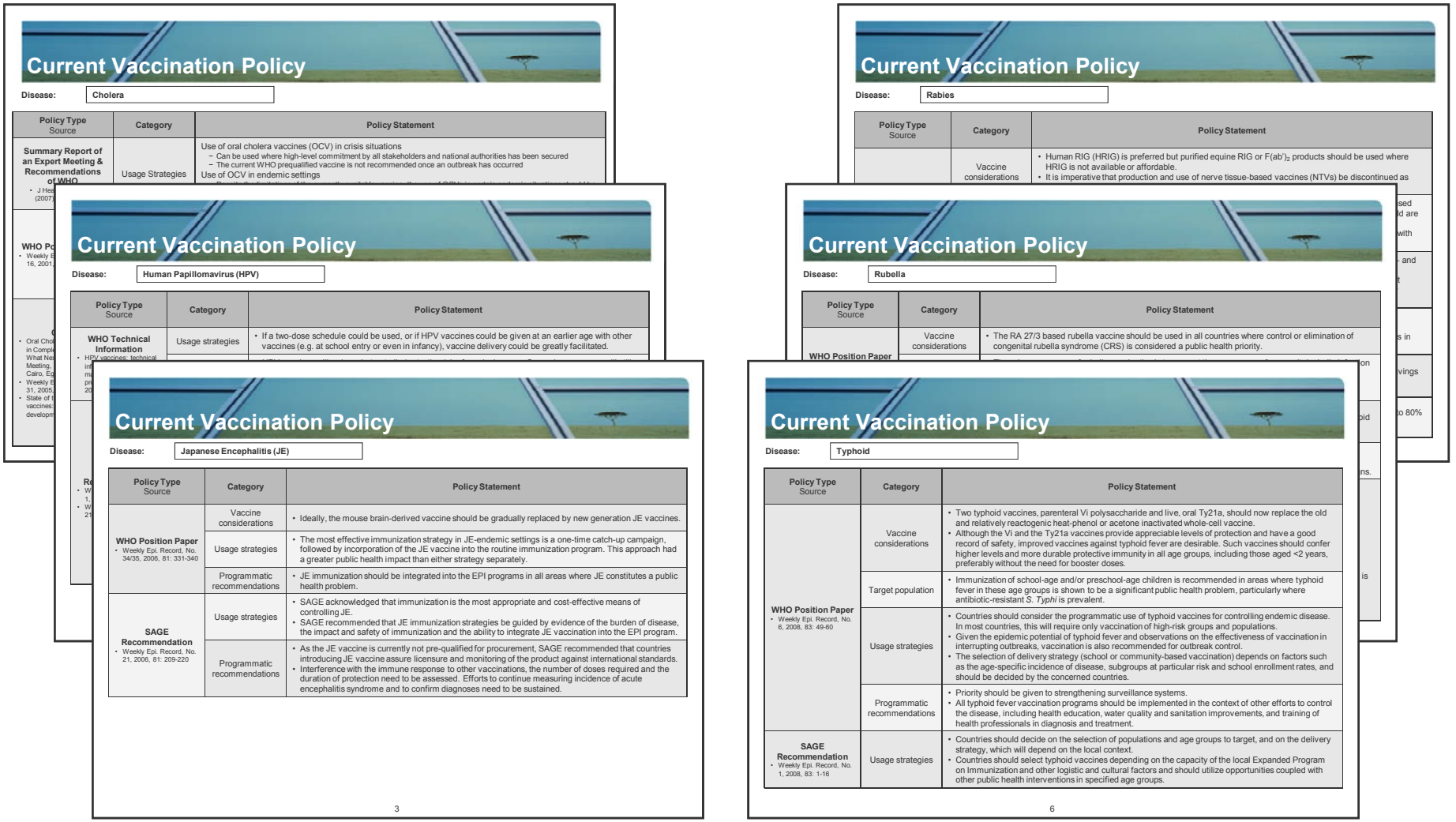
Vaccine Policy and Strategies

POLICY SUMMARY*



Current Vaccination Policy

Disease: Cholera

Policy Type Source	Category	Policy Statement
Summary Report of an Expert Meeting & Recommendations of WHO	Usage Strategies	Use of oral cholera vaccines (OCV) in crisis situations – Can be used where high-level commitment by all stakeholders and national authorities has been secured – The current WHO prequalified vaccine is not recommended once an outbreak has occurred Use of OCV in endemic settings

Current Vaccination Policy

Disease: Human Papillomavirus (HPV)

Policy Type Source	Category	Policy Statement
WHO Technical Information	Usage strategies	• If a two-dose schedule could be used, or if HPV vaccines could be given at an earlier age with other vaccines (e.g. at school entry or even in infancy), vaccine delivery could be greatly facilitated.

Current Vaccination Policy

Disease: Japanese Encephalitis (JE)

Policy Type Source	Category	Policy Statement
WHO Position Paper • Weekly Epi. Record, No. 34/35, 2006, 81: 331-340	Vaccine considerations	• Ideally, the mouse brain-derived vaccine should be gradually replaced by new generation JE vaccines.
	Usage strategies	• The most effective immunization strategy in JE-endemic settings is a one-time catch-up campaign, followed by incorporation of the JE vaccine into the routine immunization program. This approach had a greater public health impact than either strategy separately.
	Programmatic recommendations	• JE immunization should be integrated into the EPI programs in all areas where JE constitutes a public health problem.
SAGE Recommendation • Weekly Epi. Record, No. 21, 2006, 81: 209-220	Usage strategies	• SAGE acknowledged that immunization is the most appropriate and cost-effective means of controlling JE. • SAGE recommended that JE immunization strategies be guided by evidence of the burden of disease, the impact and safety of immunization and the ability to integrate JE vaccination into the EPI program.
	Programmatic recommendations	• As the JE vaccine is currently not pre-qualified for procurement, SAGE recommended that countries introducing JE vaccine assure licensure and monitoring of the product against international standards. • Interference with the immune response to other vaccinations, the number of doses required and the duration of protection need to be assessed. Efforts to continue measuring incidence of acute encephalitis syndrome and to confirm diagnoses need to be sustained.

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Current Vaccination Policy

Disease: Rabies

Policy Type Source	Category	Policy Statement
	Vaccine considerations	• Human RIG (HRIG) is preferred but purified equine RIG or F(ab')$_2$ products should be used where HRIG is not available or affordable. • It is imperative that production and use of nerve tissue-based vaccines (NTVs) be discontinued as

Current Vaccination Policy

Disease: Rubella

Policy Type Source	Category	Policy Statement
WHO Position Paper	Vaccine considerations	• The RA 27/3 based rubella vaccine should be used in all countries where control or elimination of congenital rubella syndrome (CRS) is considered a public health priority.

Current Vaccination Policy

Disease: Typhoid

Policy Type Source	Category	Policy Statement
WHO Position Paper • Weekly Epi. Record, No. 6, 2008, 83: 49-60	Vaccine considerations	• Two typhoid vaccines, parenteral Vi polysaccharide and live, oral Ty21a, should now replace the old and relatively reactogenic heat-phenol or acetone inactivated whole-cell vaccine. • Although the Vi and the Ty21a vaccines provide appreciable levels of protection and have a good record of safety, improved vaccines against typhoid fever are desirable. Such vaccines should confer higher levels and more durable protective immunity in all age groups, including those aged <2 years, preferably without the need for booster doses.
	Target population	• Immunization of school-age and/or preschool-age children is recommended in areas where typhoid fever in these age groups is shown to be a significant public health problem, particularly where antibiotic-resistant *S. Typhi* is prevalent.
	Usage strategies	• Countries should consider the programmatic use of typhoid vaccines for controlling endemic disease. In most countries, this will require only vaccination of high-risk groups and populations. • Given the epidemic potential of typhoid fever and observations on the effectiveness of vaccination in interrupting outbreaks, vaccination is also recommended for outbreak control. • The selection of delivery strategy (school or community-based vaccination) depends on factors such as the age-specific incidence of disease, subgroups at particular risk and school enrollment rates, and should be decided by the concerned countries.
	Programmatic recommendations	• Priority should be given to strengthening surveillance systems. • All typhoid fever vaccination programs should be implemented in the context of other efforts to control the disease, including health education, water quality and sanitation improvements, and training of health professionals in diagnosis and treatment.
SAGE Recommendation • Weekly Epi. Record, No. 1, 2008, 83: 1-16	Usage strategies	• Countries should decide on the selection of populations and age groups to target, and on the delivery strategy, which will depend on the local context. • Countries should select typhoid vaccines depending on the capacity of the local Expanded Program on Immunization and other logistic and cultural factors and should utilize opportunities coupled with other public health interventions in specified age groups.

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** WHO reviewed*

Disease-specific summaries can be found in the disease analysis presentations posted on GAVI's website
http://www.gavialliance.org/vision/strategy/vaccine_investment/index.php

Updated Since VIS Phase 1*

Vaccine Policy and Strategies

VACCINATION STRATEGIES

Decision Framework Status
CHOLERA

GAVI VIS Decision Framework | Vaccination Strategies for Financial Planning Purposes

Decision Framework Status
JE

Decision Framework Status
RABIES

GAVI VIS Rabies Decision Framework | Support Strategies for Financial Planning Purposes

- Offer Vaccine Financing to GAVI-Eligible Countries → PEP Only ★
- Provide Alternative Investment Support
  - Pilot Regional Bite Center & District Hospital Studies to Demonstrate Impact of GAVI Support ★
    - Develop & implement pilot programs in 2-3 countries
    - Monitor & evaluate impact and develop recommendations
  - Pilot Rabies Education Programs to Demonstrate Reduced Disease Burden Impact ★
    - Develop educational programs aligned with national rabies prevention control strategies
    - Implement pilot programs in 2-3 countries
    - Monitor & evaluate impact and develop recommendations
  - Fund RIG Capacity Building in GAVI Countries To Eliminate Shortages and Reduce Treatment Costs ★ (if time Allows)
    - Accelerate tech transfer of RIG to emerging suppliers
    - Motivate supplier capacity development
- Don't Support in 2009 - 2013

★ Phase 2 Analysis scope

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Decision Framework Status
HPV

GAVI VIS Decision Framework | Vaccination Strategies for Financial Planning Purposes

Decision Framework Status
RUBELLA

Vaccination Strategies for Financial Planning Purposes

Decision Framework Status
TYPHOID

GAVI VIS Decision Framework | Vaccination Strategies for Financial Planning Purposes

		Vaccine*	Doses	Cohort	DOP	
Offer Vaccine Financing to GAVI-Eligible Countries	Mass Campaigns every 3 years: 2 – 15yo	IM Vi PS	1	2 – 15yo	3yrs	★
		IM Vi-DT	1+B	2 – 15yo	≥5yrs	★
	Mass Campaigns every 3 years: 5 – 15yo	Oral Ty21a	3	5 – 15yo	7yrs	
		IM Vi PS	1	5 – 15yo	3yrs	★
		IM Vi-DT	1+B	5 – 15yo	≥5yrs	
	Routine + 1-15yo Catch-up (2 dose + 1 dose, boost after 1yr)	IM Vi-DT				★
	Routine Infant Vaccination	IM Vi-DT	2	Infants	NA	★
Do Not Support in 2009 - 2013						

★ Phase 2 Analysis scope

*Ty21a – Vivotif
PS – polysaccharide
Vi-DT - conjugate

DOP = Duration of Protection
B = 1-dose Boost

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* WHO, CDC, PDP and other expert reviewed

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Vaccine Policy and Strategies

VACCINATION STRATEGY SUMMARY

Vaccine	Vaccination Strategy Components			
	Routine	Catch up campaign	Periodic campaign	Other
Cholera			1-15yo or 1-49yo every 3 years	2M dose annual stockpile
HPV	10yo females			
JE	EPI with boost after 12mo	1 – 15yo		
Rabies				Post-exposure vaccination with immunoglobulins
Rubella	1 yo with MR	± 1 – 19yo	2nd dose every 4 years	20 – 29 yo females or 15-39yo females (child bearing age)
Typhoid	EPI with Boost after 12mo	± 1 – 15yo	2 – 15yo or 5 – 15yo every 3 years	

VIS Executive Summary

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Vaccine Need, Adoption, & Demand Forecasts

DEFINITIONS

- Vaccine Need
  - Identifies the GAVI-eligible countries that suffer from a specific disease, either because of high mortality or high morbidity
- Vaccine Adoption Forecast
  - Identifies which countries are likely to adopt which vaccines and when
- Vaccine Demand Forecast
  - Determines how many treatments and doses are required given a country adoption forecast

VIS Executive Summary

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Updated Since VIS Phase 1*

Vaccine Need

VACCINE NEED BY DISEASE

Country Vaccine Need

Disease: CHOLERA

Vaccine Need: 32
VISP Scope: 31

- Assumed to be endemic[1] if the estimated country morbidity is ≥ 25,000 or morbidity rate is ≥ 100 cases/100,000 annually (International Vaccine Institute, Jul08)

Country Vaccine Need

Disease: Japanese Encephalitis (JE)

Vaccine Need: 14
VISP Scope: 13

- JE is the most important form of viral encephalitis in Asia (WHO position paper, Aug06); Pakistan has also been included based on evidence of JE (PATH JE Team)

Country Vaccine Need

Disease: RUBELLA

Vaccine Need: 72
VISP Scope: 46

- Rubella occurs worldwide with the greatest burden of congenital rubella syndrome (CRS) occurring in developing countries (WHO position paper, May00)

Category (# out of 72)	GAVI-Eligible Country Vaccine Need							
	AFRO (36 of 36)			AMRO (6 of 6)	EMRO (6 of 6)	EURO (8 of 8)	SEARO (9 of 9)	WPRO (7 of 7)
Least Poor (12 of 12)	Cameroon			Bolivia Guyana Honduras	Djibouti	Armenia Azerbaijan Georgia Ukraine	Indonesia Sri Lanka	Kiribati
Intermediate (16 of 16)	Ghana Kenya	Nigeria Zimbabwe		Cuba Nicaragua	Pakistan	Kyrgyzstan Moldova Tajikistan Uzbekistan	India Korea DPR	Mongolia PNG Viet Nam
Poorest (31 of 31)	Benin Burkina Faso Chad Comoros Ethiopia Gambia Guinea Guinea-Bissau	Lesotho Madagascar Malawi Mali Mauritania Mozambique Niger Rwanda	Sao Tome & Principe Senegal Sierra Leone Tanzania Togo Uganda Zambia		Yemen		Bangladesh Bhutan Myanmar Nepal	Cambodia Lao Solomon Islands
Fragile (13 of 13)	Angola Burundi CAR	Congo DR Congo Côte d'Ivoire	Eritrea Liberia	Haiti	Afghanistan Somalia Sudan		Timor-Leste	

BLUE: Countries with rubella vaccine program in place (n=14)
ORANGE: countries not eligible based on MCV coverage rates <80% (n=12)

Source: WHO

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Country Vaccine Need

Disease: Human Papillomavirus (HPV)

Vaccine Need: 60
VISP Scope: 60

- Cervical cancer is the most common cancer affecting women in developing countries (HPV vaccines: technical information for policy-makers and health professionals, WHO,

Country Vaccine Need

Disease: RABIES

Vaccine Need: 49
VISP Scope: 49

- The vast majority of deaths due to rabies occur in Asia and Africa (WHO position paper, Dec07); the current countries in scope represent countries with high rabies incidence or

Country Vaccine Need

Disease: TYPHOID

Vaccine Need: 25
VISP Scope: 24

- Typhoid fever continues to be a public health problem in many Asia, Africa and Latin American developing countries (WHO position paper, Feb08); high disease burden countries were defined by incidence rates > 100 cases/100,000 annually (SAGE, background paper, Nov07)

Category (# out of 72)	GAVI-Eligible Country Vaccine Need							
	AFRO (8 of 36)			AMRO (0 of 6)	EMRO (2 of 6)	EURO (3 of 8)	SEARO (8 of 9)	WPRO (4 of 7)
Least Poor (2 of 12)							Indonesia (25%) Sri Lanka	
Intermediate (8 of 16)		Zimbabwe			Pakistan (25%)	Kyrgyzstan Tajikistan Uzbekistan	India (25%)	PNG Viet Nam[1]
Poorest (12 of 31)	Comoros Lesotho	Madagascar Malawi	Mozambique Zambia				Bangladesh Bhutan Myanmar Nepal	Cambodia Lao
Fragile (3 of 13)	Angola				Afghanistan		Timor-Leste	

[1] Using locally produced vaccine; will not seek GAVI financing support

Source: SAGE & IVI Typhoid Team

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* WHO, CDC, PDP, PPP, and other expert reviewed

Disease-specific summaries can be found in the disease analysis presentations posted on GAVI's website
http://www.gavialliance.org/vision/strategy/vaccine_investment/index.php

Vaccine Need

VACCINE NEED BY COUNTRY (I)

Country	Cholera	HPV	JE	Rabies	Rubella	Typhoid
Afghanistan				√	√	√
Angola	√	√		√		√
Armenia		√		√	MMR	
Azerbaijan				√	MMR	
Bangladesh	√	√	√	√	√	√
Benin		√		√	√	
Bhutan		√	√75%R	√	√	√
Bolivia		√		√	MMR	
Burkina Faso	√	√		√	√	
Burundi	√	√			√	
Cambodia	√	√	√	√	√	√
Cameroon		√		√	√	
CAR	√	√		√		
Chad	√	√		√		
Comoros		√			√	√
Congo, DR	√	√		√	√	
Congo, Rep.		√			√	
Côte d'Ivoire		√		√	√	
Cuba		√		√	MMR	
Djibouti	√	√			√	
Eritrea		√			√	
Ethiopia	√	√		√		
Gambia	√	√			√	
Georgia		√		√	MMR	
Ghana	√	√		√	√	
Guinea	√	√			√	
Guinea-Bissau		√				
Guyana		√			MMR	
Haiti		√		√	√	
Honduras		√		√	MMR	
India	√25%	√	√1	√	√	√25%
Indonesia	√25%	√	√75%R	√	√	√25%
Kenya		√		√	√	
Kiribati					MR	
Korea, DPR		√	√	√	√	
Kyrgyzstan		√		√	MR, MMR	√

√# = subnational

[1] Adopted in 2006; procure directly from Chengdu; will not seek GAVI financing support

Vaccine Need

VACCINE NEED BY COUNTRY (II)

Country	Cholera	HPV	JE	Rabies	Rubella	Typhoid
Lao PDR		√	√	√		√
Lesotho		√			√	√
Liberia	√	√				
Madagascar		√		√		√
Malawi	√	√		√	√	√
Mali		√		√	√	
Mauritania		√				
Moldova		√			MMR	
Mongolia		√			√	
Mozambique	√	√		√	√	√
Myanmar	√	√	√	√	√	√
Nepal	√	√	√60%R; 40%C	√	√	√
Nicaragua		√		√	MR, MMR	
Niger	√	√			√	
Nigeria	√			√		
Pakistan	√25%		√25%R	√	√	√25%
PNG		√	√40%R		√	√
Rwanda		√		√	√	
São Tomé	√				√	
Senegal		√		√	√	
Sierra Leone	√	√			√	
Solomon Island		√			√	
Somalia	√					
Sri Lanka		√	√	√	MR	√
Sudan	√			√		
Tajikistan				√	√	√
Tanzania	√	√		√	√	
Timor-Leste			√		√	√
Togo	√	√		√	√	
Uganda	√	√		√	√	
Ukraine		√		√	MMR	
Uzbekistan				√	MMR	√
Viet Nam	√[1]	√	√100%R; 70%C	√	√	√[2]
Yemen					√	
Zambia	√	√		√	√	√
Zimbabwe		√		√	√	√

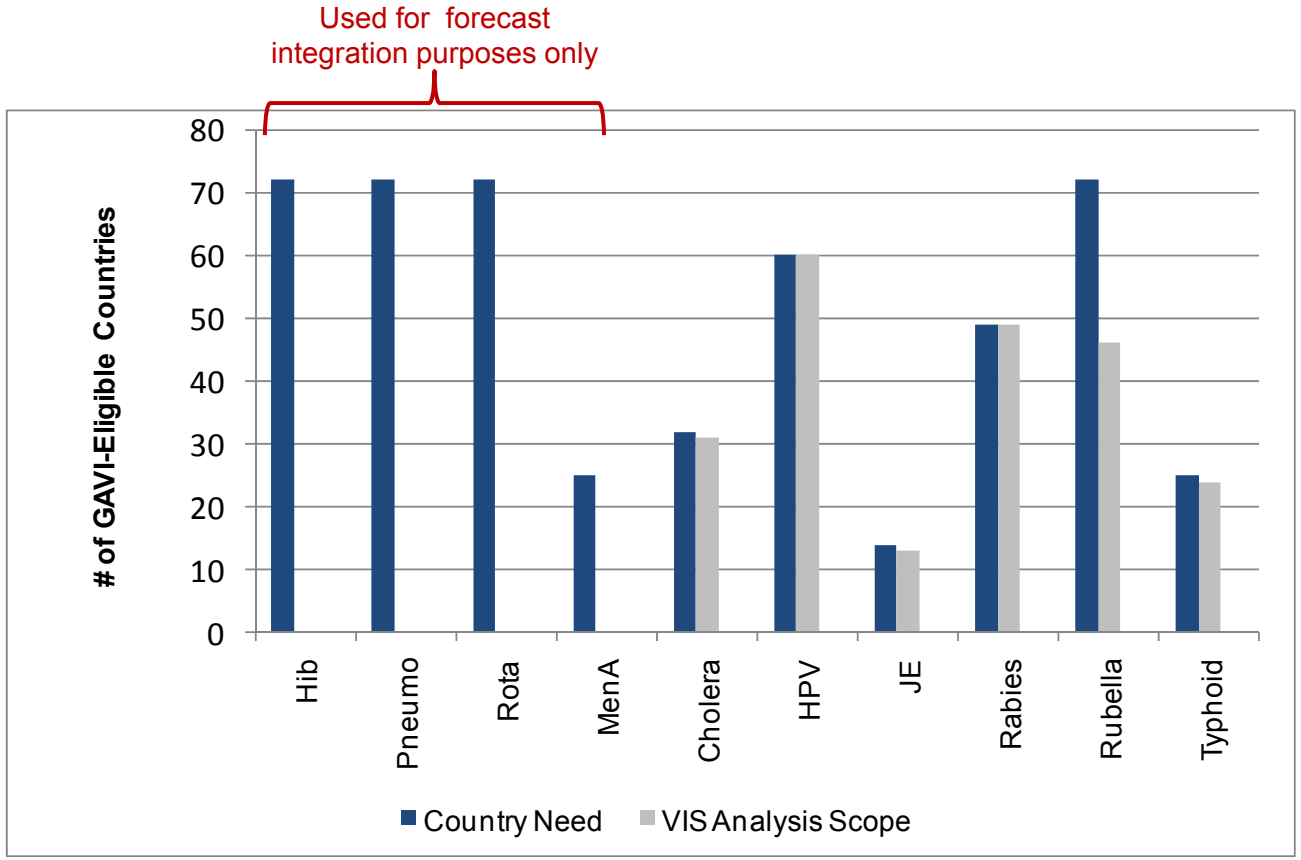
√# = subnational

[1]Adopted in ~1997 with locally produced vaccine; will not seek GAVI financing support;
[2]Using locally produced vaccine; will not seek GAVI financing support

Updated Since VIS Phase 1

Vaccine Need

VACCINE NEED VS. VIS ANALYSIS SCOPE



Need vs. Analysis Scope Rationale

Cholera
- Viet Nam uses local vaccine

JE
- India adopted without GAVI

Rubella
- 14 countries have programs
- 12 countries not currently eligible

Typhoid
- Viet Nam uses local vaccine

VIS Executive Summary

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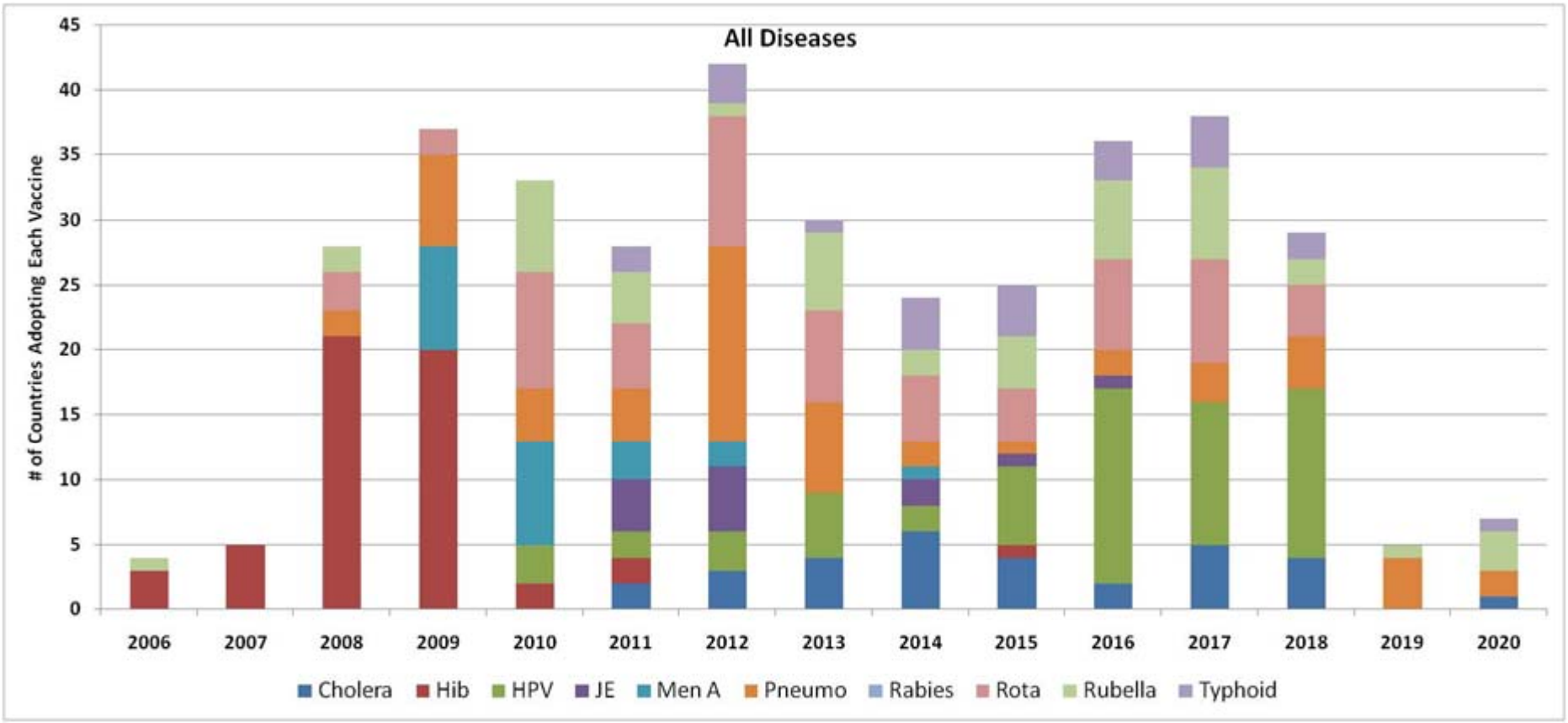
Vaccine Adoption

ADOPTION FORECAST DEVELOPMENT PROCESS

- Gathered individual vaccine adoption forecasts from PDPs and vaccine experts
  - Aggregated forecasts across all 10 vaccines (Hib, pneumo, rotavirus, menA, cholera, HPV, JE, rabies, rubella, typhoid)

Vaccine Adoption

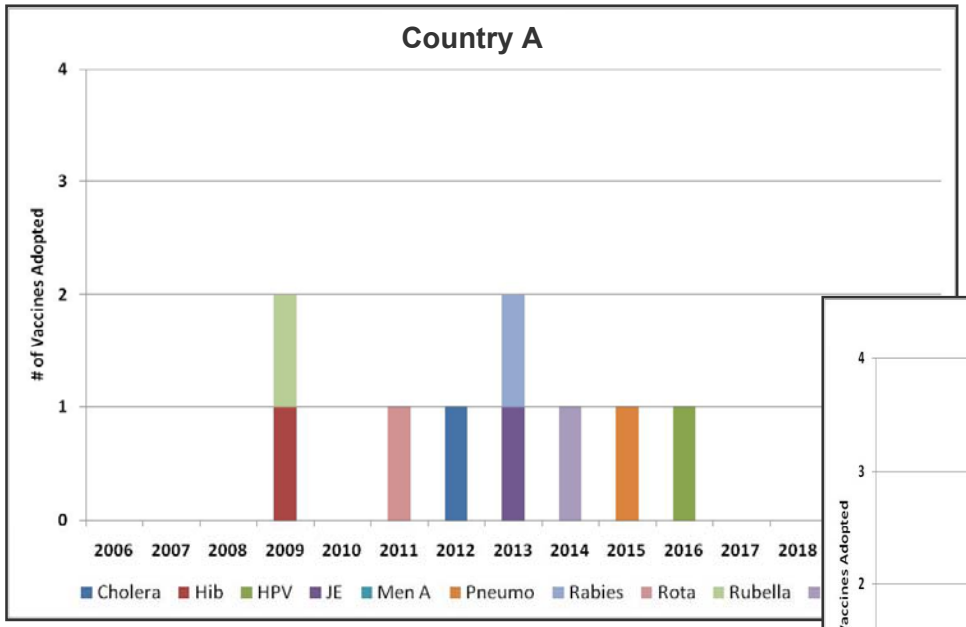
AGGREGATED ADOPTION FORECAST

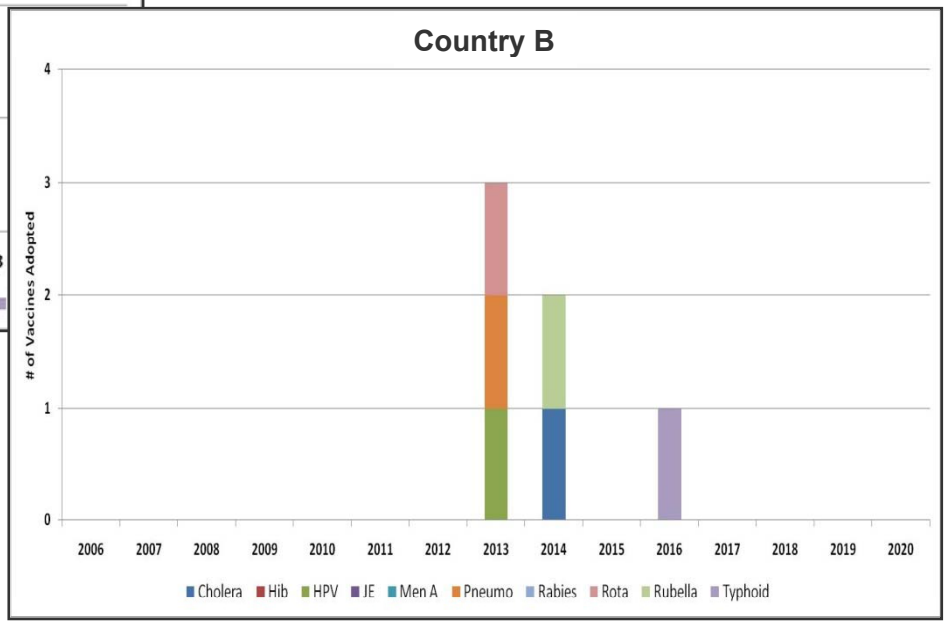


Vaccine Adoption

AGGREGATED FORECAST – BY COUNTRY

EXAMPLES





When examined at country level, the aggregated forecast was clearly aggressive, and perhaps unrealistic

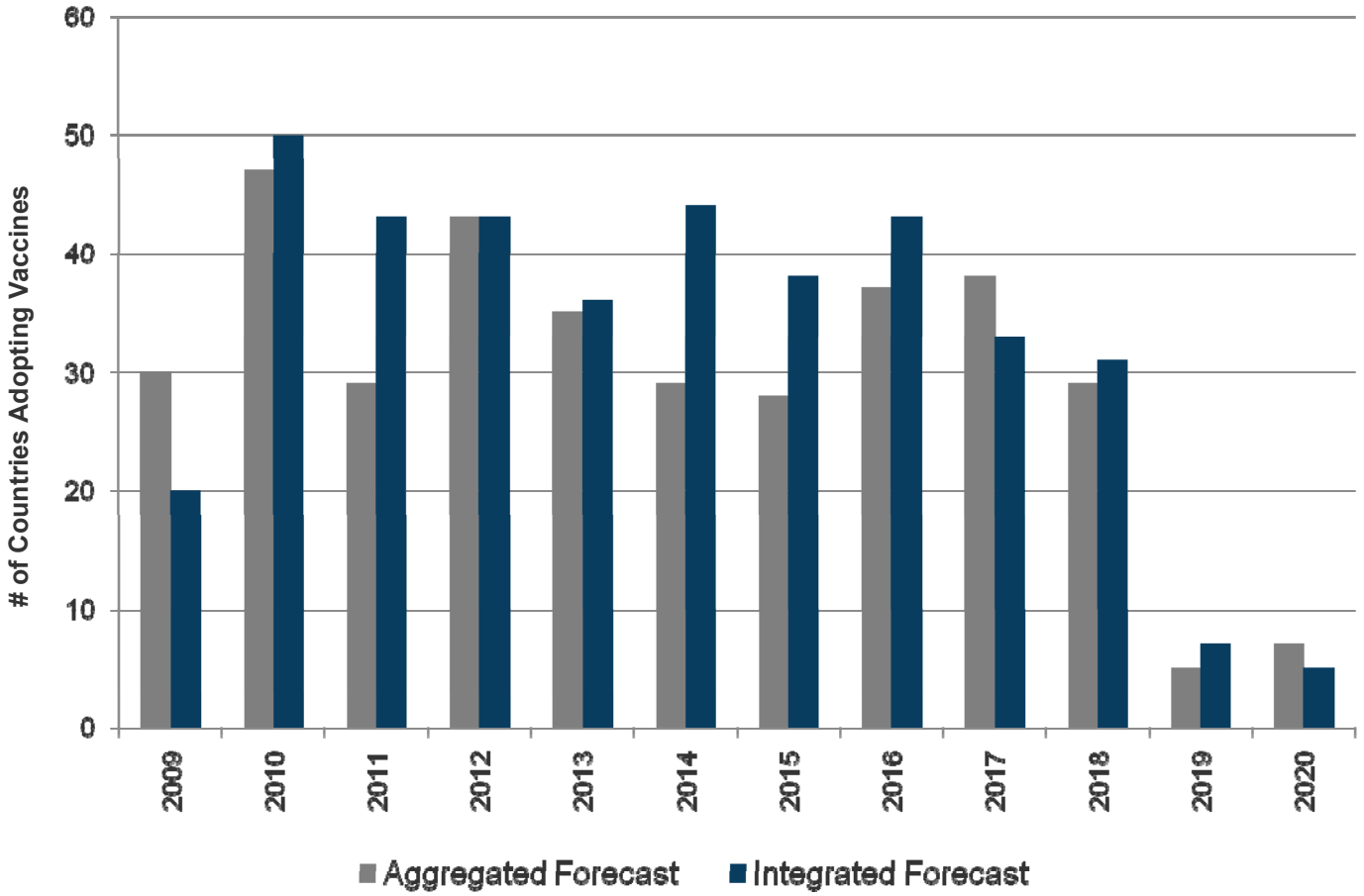
Vaccine Adoption

ADOPTION FORECAST DEVELOPMENT PROCESS (continued)

- Gathered individual vaccine adoption forecasts from PDPs and vaccine experts
  - Aggregated forecasts across all 10 vaccines (Hib, pneumo, rotavirus, menA, cholera, HPV, JE, rabies, rubella, typhoid)
- Held meeting with WHO, UNICEF, CDC, PDPs and vaccine experts representing all 10 diseases
- Discussed and modified the aggregated adoption forecast to create an *Integrated* Adoption Forecast
  - 'Rule-of-thumb' applied: one vaccine adopted per year, except for rubella (switch from MCV to MR) & rabies (vaccine delivery in rabies centers for post-bite subjects) since these are considered underutilized vaccines that generally do not require setting up new immunisation programmes and could be added without much delay

Vaccine Adoption

INTEGRATED VS. AGGREGATED FORECAST



Disease-specific forecasts can be found in the disease analysis presentations posted on GAVI's website
http://www.gavialliance.org/vision/strategy/vaccine_investment/index.php

Vaccine Adoption

POST-INTEGRATED FORECAST DEVELOPMENT PROCESS

- Vetted Integrated Adoption Forecast with GAVI Country Support Team
  - Agreed forecast was very aggressive
  - Disagreed with some country-specific adoption profiles
  - Suggested we seek country feedback to create a “Country-Influenced” adoption forecast

- GAVI sent letter to countries requesting non-binding adoption forecast
  - Asked to designate interest in adopting current and VIS vaccines
  - If interested in adopting, asked to specify earliest likely adoption year
  - Have received 32 responses to date

Vaccine Adoption

COUNTRY ADOPTION SURVEY – RESPONDENTS TO DATE

	AFRO (36)	AMRO (6)	EMRO (6)	EURO (8)	SEARO (9)	WPRO (7)	Total
Least Poor (12)	Cameroon	Bolivia			Indonesia Sri Lanka		4
Intermediate (16)	Kenya	Nicaragua	Pakistan	Moldova Uzbekistan	Korea	Viet Nam	7
Poorest (31)	Benin Burkino Faso Comoros Guinea Madagascar Mali Sao Tome & P Senegal Togo Uganda				Bangladesh Bhutan Myanmar Nepal	Cambodia	15
Fragile (13)	Angola Burundi Congo DR Congo Cote d'Ivoire				Timor Leste		6
TOTAL	**17**	**2**	**1**	**2**	**8**	**2**	**32**

Vaccine Adoption

COUNTRY ADOPTION SURVEY – INPUT TO DATE

Vaccine	Already Adopted?	Plan to Adopt in Year													Do Not Plan to Adopt Because:			Adoptions out of 32 total	Responses out of 32 total
		No Date	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Product Profile	DB Unknown	NA or Low DB		
Hib	16	1	12	2	1													32	32
Pneumo			4	9	9	6		1										29	29
Rota		1	1	2	12	3	2	1	2	2								26	26
Rubella	2	1		4	3	3		2										15	15
Rabies	3	1	3	4	1	1							1					14	14
HPV		2		2	4	2	1			1	1					1		13	14
MenA	1	1		2	1	3	1	1								1	1	10	12
Typhoid			3	1	1		2		1				1			1		9	10
JE	2	1	4		1	1												9	9
Cholera			1	1	2	1	2								1		1	7	9
	24	8	28	27	35	20	8	5	3	3	1	0	2	0	1	3	2		

Vaccine Adoption

INTEGRATED VS. COUNTRY SURVEY FORECAST INSIGHTS

- A “country influenced” adoption forecast was determined to be comparable to the Integrated forecast
  - Country-specific survey results were either more aggressive, similar, or more conservative than the Integrated Adoption Forecast
  - Aggregated across all countries, the country influenced forecast was similar to the integrated forecast
- Nevertheless, the Integrated Forecast is perceived to be aggressive, so an additional, more conservative adoption forecast was developed

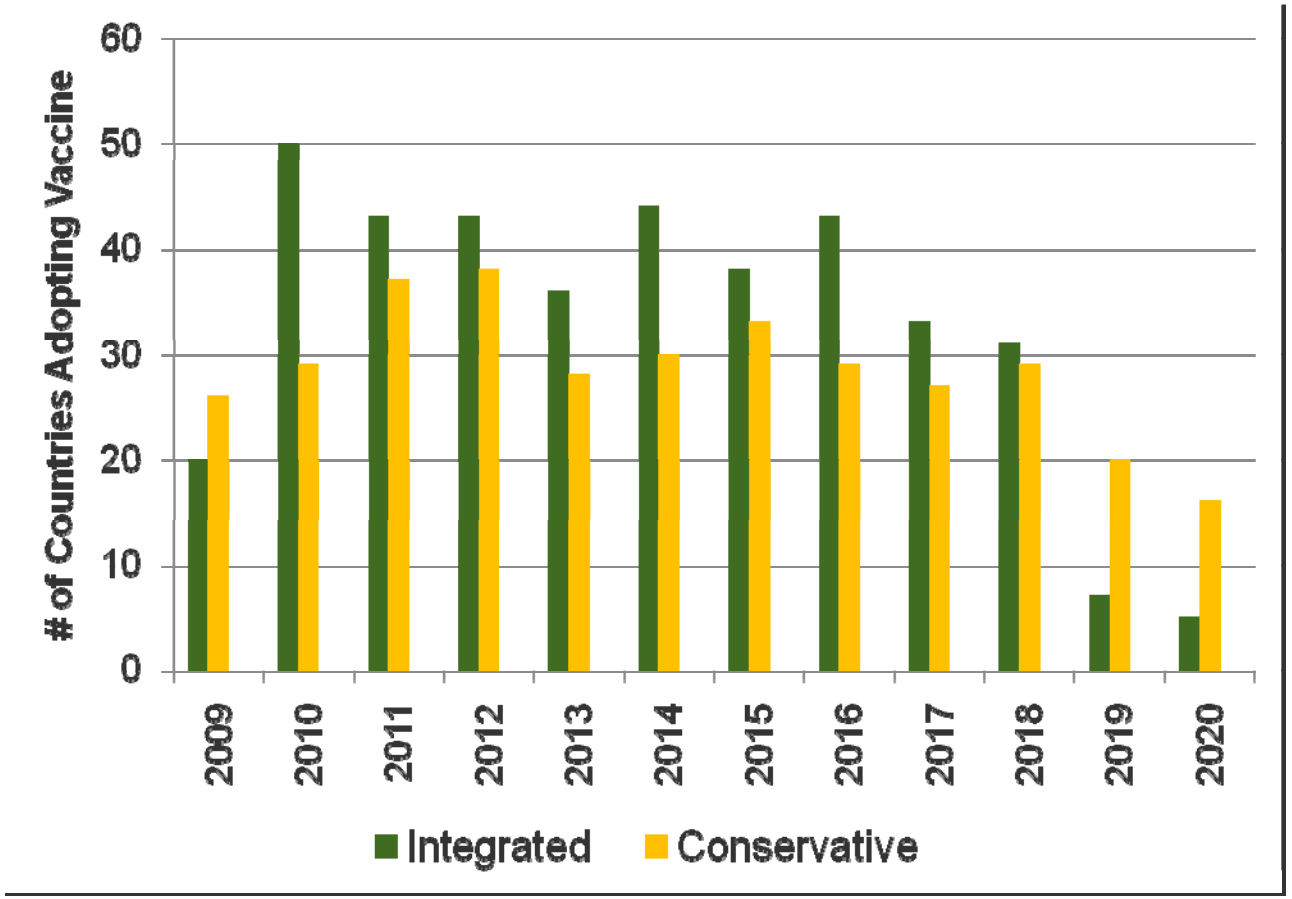
Vaccine Adoption

CONSERVATIVE FORECAST DEVELOPMENT PROCESS

- Began with Integrated Forecast
- Applied Conservative Forecast Rules
  - Hib forecast same as Integrated Forecast, wherever possible
  - No more than 1 new vaccine adoption every three years (UNICEF “rule of thumb”)
    - Rabies and Rubella considered underutilized vaccines, so do not follow every three year rule, therefore, same as Integrated Forecast, where possible
    - If two or more vaccines still in same year:
      - Country survey results dictate vaccine priority order
      - If country survey results not available, Integrated Forecast results dictate vaccine priority order
      - If still multiple vaccines in same year, current GAVI vaccines take priority over new vaccines

Vaccine Adoption

INTEGRATED VS CONSERVATIVE ADOPTION FORECAST



Vaccine Adoption

INTEGRATED VS CONSERVATIVE ADOPTION FORECAST IMPLICATIONS

- All vaccine and portfolio analyses were conducted given both the integrated and conservative forecast

- Although the conservative forecast resulted in lower vaccine cost forecasts and metric values, it did not lead to a change in the prioritisation of vaccines and composition of portfolio options

- The Integrated Adoption Forecast was chosen as the “planning” forecast, representing:
  - *A ‘worst case’ scenario from a financial perspective*
  - *A ‘ best case’ scenario from a public health perspective*

VIS Executive Summary

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Vaccine Demand

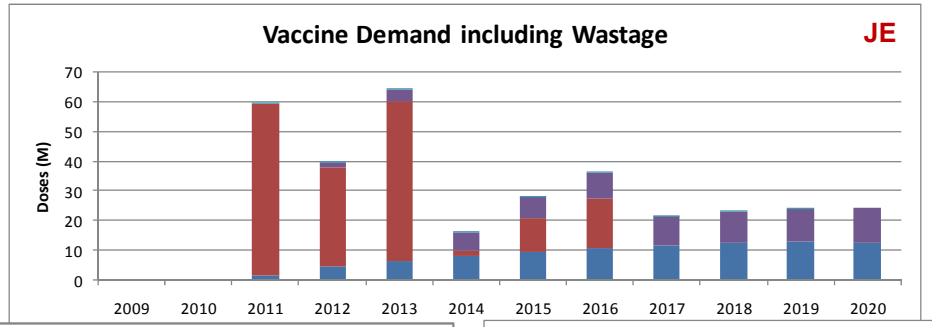
METHODOLOGY

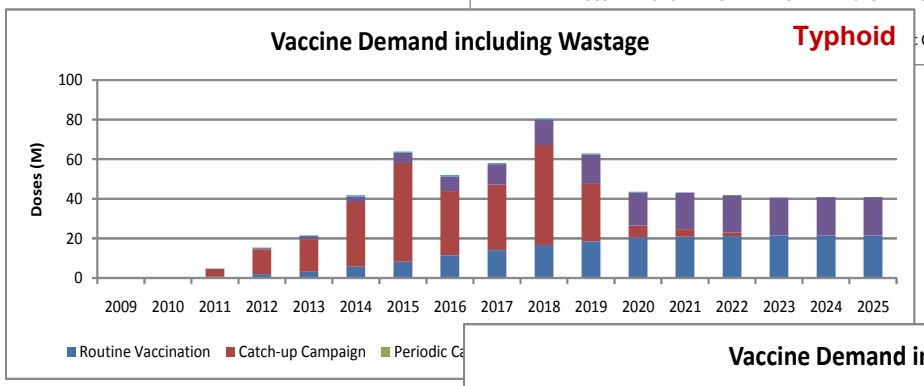
- Vaccine Demand Forecast = function of:
  - 1st Vaccine Availability (WHO Pre-Qual date)
  - Country Adoption Forecast
  - Country Vaccine Coverage Rates
  - Vaccine Doses/Treatment
  - Vaccine Wastage Factors
  - Country Time to Peak Coverage or Campaign Duration

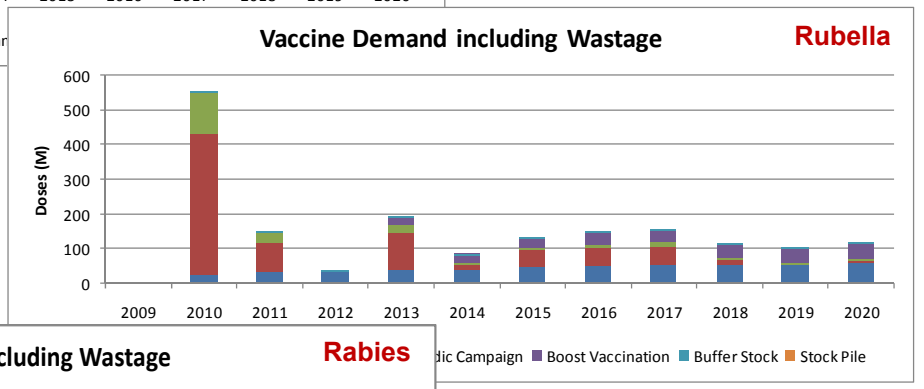
Updated Since VIS Phase 1*

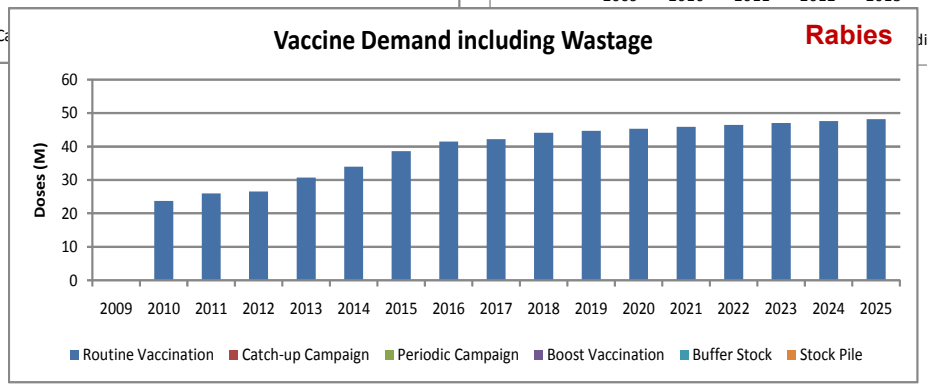
Vaccine Demand

DEMAND FORECASTS









** WHO, UNICEF, CDC, PDP and other expert reviewed*

Disease-specific forecasts can be found in the disease analysis presentations posted on GAVI's website
http://www.gavialliance.org/vision/strategy/vaccine_investment/index.php

VIS Executive Summary

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Updated Since VIS Phase 1*

Vaccine Cost & Health Impact Analysis Methodology

TOTAL VACCINE COST – METHODOLOGY

- Total Vaccine Cost = function of:
  - Vaccine Demand Forecast
  - Vaccine Price Forecast by Vaccine
  - Vaccine Product Share

Provides Weighted Average Vaccine Price

EXAMPLE

Low Vaccine Price Forecast

Vaccines	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Vaccine A	$0.75	$0.75	$0.75	$0.75	$0.75	$0.75	$0.50	$0.50	$0.50	$0.50	$0.50
Vaccine B				$0.70	$0.70	$0.70	$0.50	$0.50	$0.50	$0.50	$0.50
Vaccine C							$0.70	$0.70	$0.70	$0.70	$0.70

Low Vaccine Price Distribution Assumptions

Vaccines	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Vaccine A	100%	100%	100%	95%	95%	95%	85%	80%	80%	80%	80%
Vaccine B				5%	5%	5%	5%	5%	5%	5%	5%
Vaccine C							10%	15%	15%	15%	15%

Weighted Average Low Price Forecast	$0.75	$0.75	$0.75	$0.75	$0.75	$0.75	$0.52	$0.53	$0.53	$0.53	$0.53

** PDP, PPP, and Industry reviewed; industry input kept confidential*

Updated Since VIS Phase 1

Vaccine Cost & Health Impact Analysis Methodology

VACCINE COST TO COUNTRY

- Vaccine Cost to Country = function of:
  - Demand Forecast
  - GAVI Country Co-Pay
  - *Total Vaccine Product Cost (when GAVI support ends)**

Country Copay by GAVI Financing Tier

Last GAVI Financing Year: 2020

	Co-pay for Country in terms of Years since Vaccine Adoption[1]											
	0	1	2	3	4	5	6	7	8	9	10	11
Least Poor[2]	$0.15	$0.17	$0.20	$0.23	$0.26	$0.30	$0.35	$0.40	$0.46	$0.53	$0.61	$0.70
Intermediate	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15
Poorest	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15
Fragile	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15	$0.15

[1] Co-pay is for second or greater GAVI vaccine; Country co-pay is not impacted by inflation

[3] Grows at 15% per year until it meets or exceeds vaccine price.

* *Least poor countries should be paying for Rubella vaccines within 5 years of adoption ($0.30 co-pay > $0.28 vaccine price per dose)*

Vaccine Cost & Health Impact Analysis Methodology

VACCINE COST TO GAVI

- Total Cost to GAVI = function of:
  - Vaccine Demand Forecast
  - Weighted Average Vaccine Price
  - Country Co-Payment
  - Vaccine Equipment Costs
  - Vaccine Shipping & Insurance

Vaccination Equipment Cost

Autodisable Syringe ($/dose):	0.05
Reconstitution Syringe/Needle ($/dose):	0.10
Safety Box ($/dose):	0.01

Other vaccine Costs

Shipping & Insurance ($/dose):	0.05

Vaccine Cost & Health Impact Analysis Methodology

HEALTH IMPACT – VALUE MEASURES

Value Measure	Benefit	Concern
Potential Deaths Averted	• Common measure of vaccine impact on infectious diseases • Important variable in tracking impact on MDGs	• Mortality often under-reported, especially in developing countries • Generally estimated from country trials and extrapolated to rest of world, therefore, may not accurately reflect regional/disease burden differences
Potential Cases Averted	• Common measure of vaccine impact on infectious diseases • Important variable in tracking impact of disease on morbidity, especially in diseases with long-term sequelae	• Morbidity often under-reported, especially in developing countries • Generally estimated from country trials and extrapolated to rest of world, therefore, may not accurately reflect regional/disease burden differences
Cost per Potential Death or Case Averted	• Important measure for evaluating return on investment	• Subject to strengths/ weaknesses associated with estimates derived for deaths & cases averted (above) as well as estimates on cost of the intervention

Updated Since VIS Phase 1*

Vaccine Cost & Health Impact Analysis Methodology

POTENTIAL DEATHS AVERTED

- Total Potential Deaths Averted = function of:
  - Vaccine Demand Forecast
  - Doses/Treatment

  } **Provides Subjects Vaccinated**

  - Deaths Averted per 1000 Vaccinated
  - <5yo Deaths Averted per 1000 Vaccinated

* *PDP and expert reviewed*

Disease-specific inputs can be found in the disease analysis presentations posted on GAVI's website
http://www.gavialliance.org/vision/strategy/vaccine_investment/index.php

Updated Since VIS Phase 1*

Vaccine Cost & Health Impact Analysis Methodology

GAVI COST PER DEATH AVERTED

- GAVI Cost per Death Averted = function of:
  - Vaccine Cost to GAVI
  - Total Potential Deaths Averted

* PDP and expert reviewed

Disease-specific results can be found in the disease analysis presentations posted on GAVI's website http://www.gavialliance.org/vision/strategy/vaccine_investment/index.php

Updated Since VIS Phase 1*

Vaccine Cost & Health Impact Analysis Methodology

POTENTIAL CASES AVERTED

- Total Potential Cases Averted = function of:
  - Demand Forecast
  - Doses/Treatment

  } **Provides Subjects Vaccinated**

  - Cases Averted per 1000 Vaccinated

* *PDP and expert reviewed*

Disease-specific inputs can be found in the disease analysis presentations posted on GAVI's website
http://www.gavialliance.org/vision/strategy/vaccine_investment/index.php

Updated Since VIS Phase 1*

Vaccine Cost & Health Impact Analysis Methodology

GAVI COST PER CASE AVERTED

- GAVI Cost per Case Averted = function of:
  - Vaccine Cost to GAVI
  - Total Potential Cases Averted

* PDP and expert reviewed

Disease-specific results can be found in the disease analysis presentations posted on GAVI's website
http://www.gavialliance.org/vision/strategy/vaccine_investment/index.php

Updated Since VIS Phase 1*

Vaccine Cost & Health Impact Analysis Methodology

MODEL INPUT SUMMARY

CHOLERA

*Used a weighted average Deaths & Cases averted to account for vaccine differences in the model

Vaccine Evaluation Summary

ANALYSIS INPUT SUMMARY (II)

VARIABLE	VACCINATION STRATEGY					RATIONALE/SOURCE
	Periodic Campaign				Stockpile	
	Dukoral		Reformulated Bivalent			
	5 – 15yo	5 – 49yo	1 – 15yo	1 – 49yo	1 – 49yo	
Doses per Treatment	2					Established dosing schedule based on published data; current WHO recommendation

JE

Vaccine Evaluation Summary

ANALYSIS INPUT SUMMARY (II)

RUBELLA

Vaccine Evaluation Summary

ANALYSIS INPUT SUMMARY (II)

VARIABLE	VACCINATION STRATEGY					RATIONALE/SOURCE
	Rapid Impact			Delayed Impact		
	Routine Vx (Surviving infants)	Catch-up Campaign (2-19yo)	Mass Campaign (20-29yo fm)	Routine Vx (Surviving infants)	Mass Campaign (15-39yo fm)	
Doses per Treatment	1					Routine: single dose + boost, based on package inserts; Campaigns: single dose
Proxy Coverage Rate	MCV	90% MCV	80%	MCV	50%	WHO (P. Strebel) and CDC (S. Reef)
Time to Peak Coverage	1					Assume a switch from M to MR for routine, and ≤ 1yr duration for campaigns
Deaths Averted (per 1000 vaccinated)	0					No mortality associated with rubella
Years to Deaths Averted	-					NA
% Deaths Averted < 5yo	-					NA
Cases Averted (per 1000 vaccinated)	TBD					
Years to Cases Averted	0					Immunoprotection after 1 dose
% Cases Averted < 5yo	100%					Assume vaccines provide life-long protection
Average Cost per Case	$55,000					Median lifetime cost estimate to treat a child with CRS (Hinman, et.al., Bull WHO, 2002, 80:264-270)

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HPV

Vaccine Evaluation Summary

ANALYSIS INPUT SUMMARY (II)

VARIABLE	VACCINATION STRATEGY		RATIONALE/SOURCE
	Routine Vaccination (10yo fm)	Catch-up Campaign (11 - 14yo fm)	
Doses per Treatment	3		Based on Gardasil (Merck) & Cervarix (GSK) package insert

RABIES

Vaccine Evaluation Summary

ANALYSIS INPUT SUMMARY (II)

TYPHOID

*Used a weighted average Deaths & Cases averted to account for vaccine differences in the model

Vaccine Evaluation Summary

ANALYSIS INPUT SUMMARY (II)

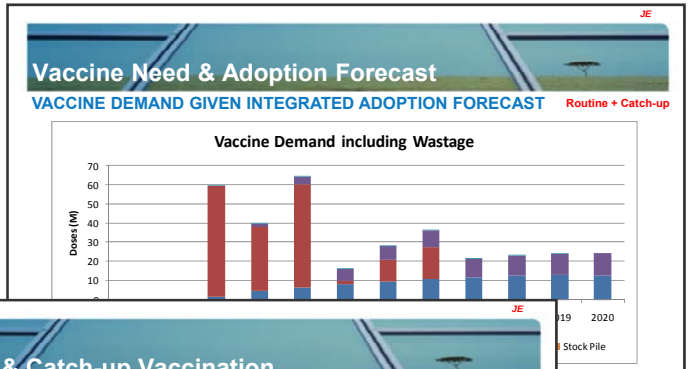
VARIABLE		VACCINATION STRATEGY			RATIONALE/SOURCE
		Routine Vx	Periodic Campaign		
		Infants	2 – 15yo	5 – 15yo	
Doses per Treatment	Ty21a	-	-	3	Ty21a vaccine (Vivotif)
	Vi-PS	-	1	1	Vi polysaccharide vaccine
	Vi-DT	1	1 + boost	1 + boost	Source: V. Reddy, Shantha
Proxy Coverage Rate	Ty21a	-	50% MCV	50% MCV	IVI estimate
	Vi-PS	-	86% MCV	86% MCV	IVI estimates; using weighted average to account for vaccine differences
	Vi-DT	MCV	50% MCV	50% MCV	Proxy for DTP2 (within 3% across GAVI countries)
Time to Peak Coverage		1			Assume campaign duration is for 1yr
Time Between Campaigns (yrs)	Ty21a	-	-	3	Based on duration of protection and need to vaccinate new cohorts
	Vi-PS	-	3	3	Based on duration of protection and need to vaccinate new cohorts
	Vi-DT	-	-	-	Routine and catch-up campaigns only
Deaths Averted* (per 1000 vaccinated)	Ty21a	-	-	0.5	IVI estimate
	Vi-PS	-	0.2	0.2	IVI estimate
	Vi-DT	1.7	-	-	IVI estimate
Years to Deaths Averted		0			Assumes immunoprotection after 1st dose
% Deaths Averted < 5yo		100%	21%	0%	Infants only; 2 – 4yo only (3/15 of 2-15yo); and ≥ 5yo only
Cases Averted* (per 1000 vaccinated)	Ty21a	-	-	50.4	IVI estimate
	Vi-PS	-	21.6	21.6	IVI estimate
	Vi-DT	171	-	-	IVI estimate
Years to Cases Averted		0			Assumes immunoprotection after 1st dose
% Cases Averted < 5yo		100%	21%	0%	Infants only; 2 – 4yo only (3/15 of 2-15yo); and ≥ 5yo only
Average Cost per Case		$99			IVI estimate; median of cost studies done in all Asian sites ($15 - $182), SAGE paper, Nov07

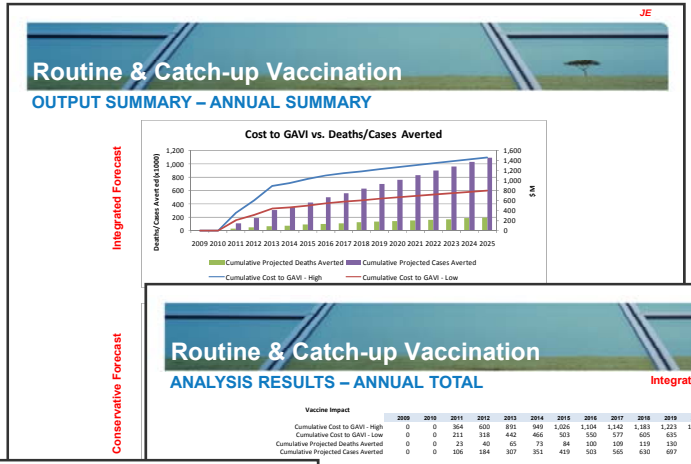
* WHO, UNICEF, CDC, PDP and other expert reviewed

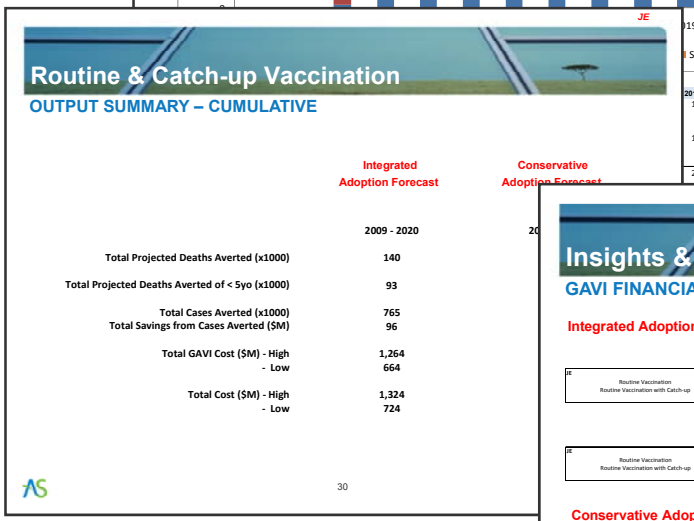
Disease-specific inputs can be found in the disease analysis presentations posted on GAVI's website
http://www.gavialliance.org/vision/strategy/vaccine_investment/index.php

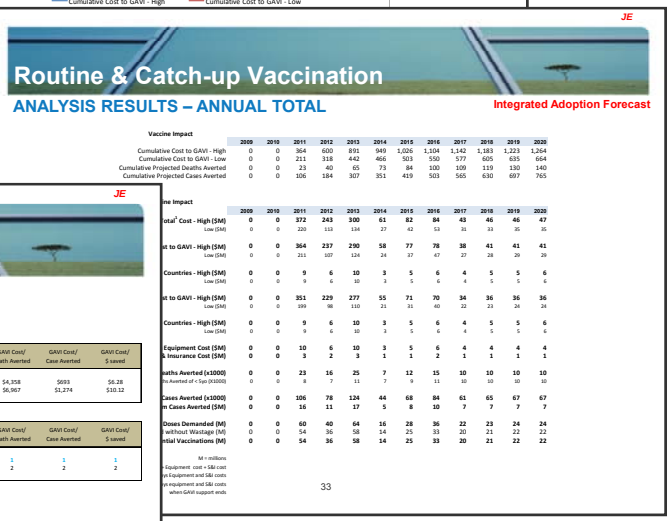
Vaccine Cost & Health Impact Analysis Methodology

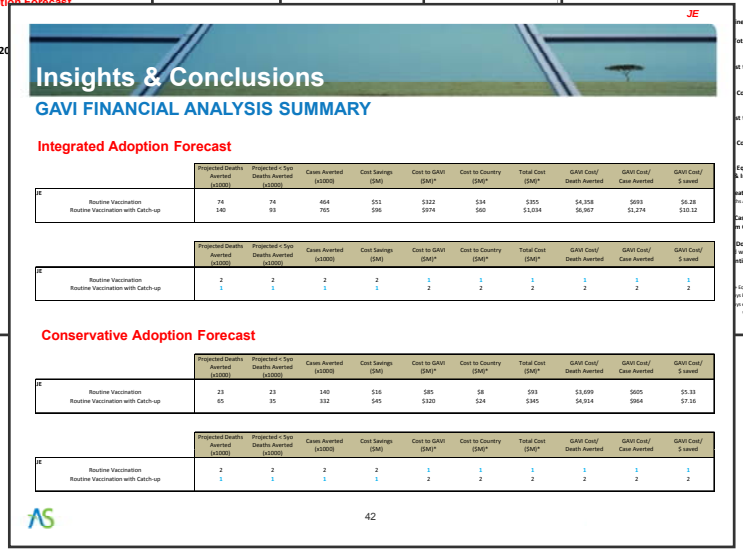
MODEL OUTPUT SUMMARY











Disease-specific results can be found in the disease analysis presentations posted on GAVI's website (http://www.gavialliance.org/vision/strategy/vaccine_investment/index.php)

Vaccine Cost & Health Impact Analysis Methodology

Vaccination Strategy	Total Vaccine Cost ($M)	GAVI Vaccine Cost ($M)	Country Vaccine Cost ($M)	Deaths Averted (x1000)	<5 Deaths Averted (x1000)	Cases Averted (x1000)	GAVI Cost ($)/ Death Averted	GAVI Cost ($)/ Case Averted
Cholera 1-15yo Campaign Every 3 Years	$1,480	$1,227	253	130	33	6,654	$9,462	$184
Cholera 1-49yo Campaign Every 3 Years	$3,198	$2,659	$538	132	10	6,046	$20,075	$440
HPV Routine 10yo Female Vaccination	$1,293	$1,261	$31	707	n/a	870	$1,784	$1,449
JE Routine Infant Vaccination with boost after 12 mos + 1-15yo Catch-up Campaign	$1,034	$974	$60	140	93	765	$6,967	$1,274
Rabies Post-Exposure Prophylaxis	$2,945	$2,882	$63	483	24	n/a	$5,970	n/a
Rubella (rapid impact) Routine 1yo Vaccination with boost at 4yo + 2-19yo Campaign + 20-29yo WBCA Campaign	$884	$608	$276	74*	31*	417*	$8,222*	$1,459*
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Rubella Incremental From Delayed to Rapid	$344	$238	$106	52*	18*	307*	$4,577*	$775*
Typhoid Routine Infant Vaccination with boost after 12mos	$211	$182	$29	154	154	15,485	$1,182	$12
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Typhoid 2-15yo Campaign Every 3 Years	$443	$364	$79	39	8	4,248	$9,259	$86
Typhoid 5-15yo Campaign Every 3 Years	$510	$432	$78	36	n/a	3,855	$11,985	$112

** Includes CRS deaths and cases only*

VIS Executive Summary

CONTENTS

Implementation Cost Analysis Methodology

PROCESS STEPS

1 Identify Implementation Cost Categories

- Identify country implementation cost categories, beyond vaccine procurement,

2 Identify Challenges & Potential Vaccine Synergies

- For each vaccine, identify typical and unique country vaccine implementation challenges
- For each vaccine, identify potential synergies with:
  - Traditional EPI vaccines
  - Currently supported GAVI vaccines
  - Potential new GAVI supported vaccines
- Aggregate synergies across all vaccines

3 Assess Relative Implementation Associated Costs

- Given challenges, assess implementation costs relative to traditional EPI vaccine implementation

4 Assess Actual Implementation Associated Costs

- For each vaccination strategy, determine actual potential implementation associated cost

Seek WHO, UNICEF, CDC, PDP and Other Expert Validation of Key Project Information and Analysis Assumptions

Implementation Cost Analysis Methodology

STEP 1: COST CATEGORY IDENTIFICATION

- Thoroughly reviewed literature and other publically available information to identify potential cost categories
- Initial cost category draft reviewed with WHO implementation cost experts
- Based on WHO consultation, chose GIVS model* cost categories

Cost Categories	Category Examples
Cold Chain	• cold boxes, cold rooms & ice packs • cold chain equipment (e.g., refrigerators, freezers, generators, voltage stabilizers) • maintenance & running costs
Waste Management	• incinerators & recurrent costs
Transport	• purchasing vehicles • cost of operating & maintaining vehicles • fuel costs
Personnel Training	• development & production of training materials • training course costs (e.g., instructor fees) • travel cost reimbursement
Communication, Education, Social Mobilization	• communication strategy and materials development • staff and volunteers recruiting, training & support costs • media costs (e.g., radio, TV, newspaper, booklets, flyers) • social mobilization program costs
Monitoring & Evaluation, Surveillance	• strategy development support • monitoring program costs (e.g., SOPs, immunization cards, coverage surveys, training) • surveillance program costs (e.g., computer hardware, lab equipment, personnel, training)
Service Delivery	• outreach immunization services (e.g., additional personnel at district and health facility levels)

* *Wolfson LJ, Gasse F, et.al., Estimating the costs of achieving the WHO-UNICEF Global Immunization Vision and Strategy, 2006-2015. Bull World Health Organ 2008;86:27 http://www.who.int/bulletin/volumes/86/1/07-045096/en/index.html*

Implementation Cost Analysis Methodology

GIVS MODEL BACKGROUND*

- The GIVS model is designed to provide input on:
  - Cost-effectiveness analyses of new vaccines in broad groups of countries
  - Vaccine-specific GAVI Investment cases (or alternative submissions that the GAVI Board may request),
  - The GIVS update in 2010,
  - Cost analysis of new vaccine(s) introduction globally or by region
  - Scenario analyses for the above

* *Summary Notes: Technical Review Meeting on MiniGIVS Costing Tool, WHO, June 18-19, 2008*

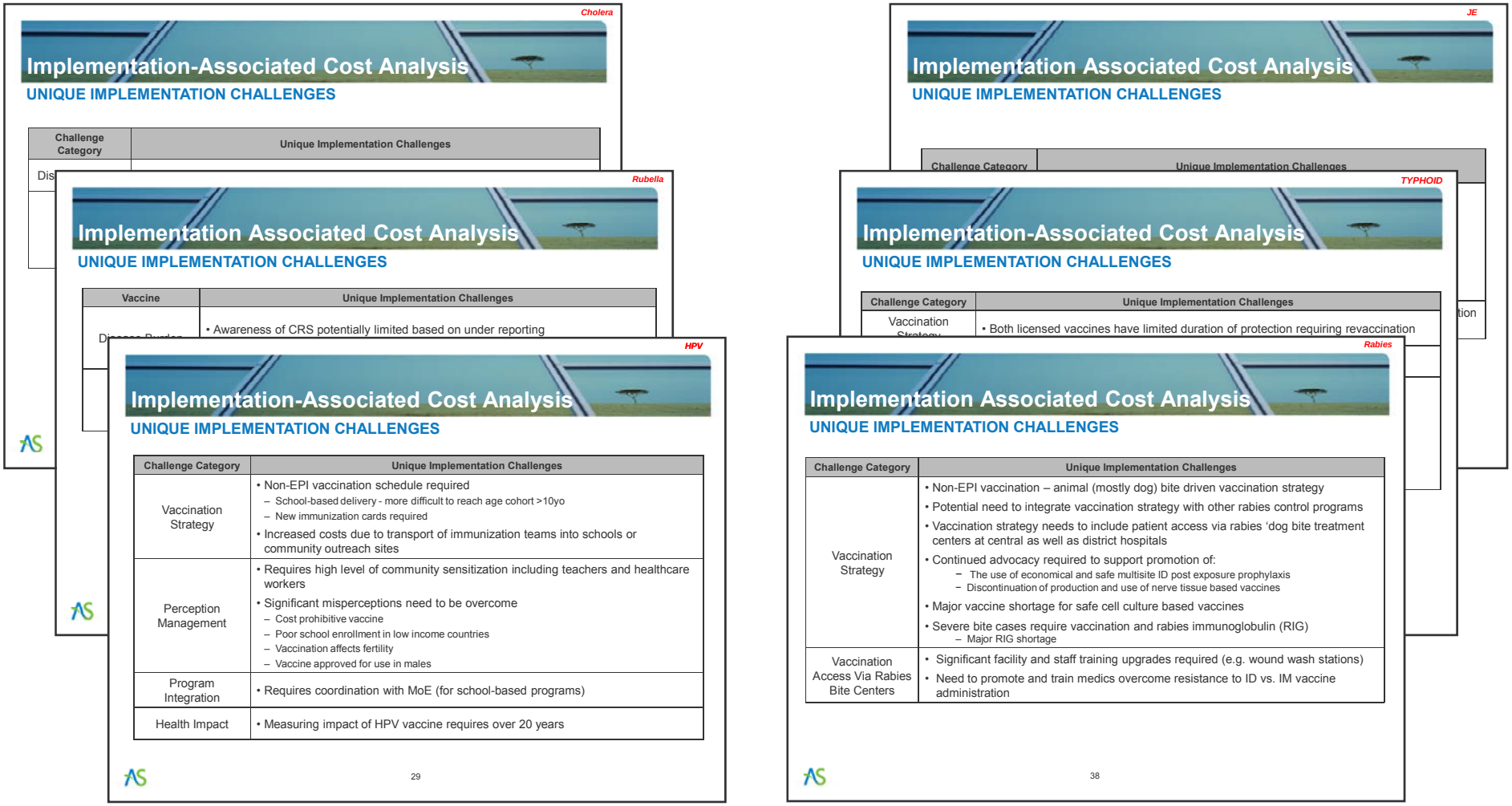
Implementation Cost Analysis Methodology

STEP 2: IMPLEMENTATION CHALLENGES & SYNERGIES PROCESS

- Vaccine-specific “typical” and “unique” implementation challenges were solicited from WHO, UNICEF, CDC, PDPs and other experts during Seattle Demand Forecasting Workshop and further refined by ASC in consultation with experts
- In Seattle, experts also developed a list of potential implementation synergies associated with introducing their respective vaccine, which was further refined by ASC in consultation with experts

Implementation Cost Analysis Methodology

STEP 2: IMPLEMENTATION CHALLENGES ASSESSMENT



Cholera

Implementation-Associated Cost Analysis

UNIQUE IMPLEMENTATION CHALLENGES

Challenge Category	Unique Implementation Challenges
Dis	

Rubella

Implementation Associated Cost Analysis

UNIQUE IMPLEMENTATION CHALLENGES

Vaccine	Unique Implementation Challenges
	• Awareness of CRS potentially limited based on under reporting

HPV

Implementation-Associated Cost Analysis

UNIQUE IMPLEMENTATION CHALLENGES

Challenge Category	Unique Implementation Challenges
Vaccination Strategy	• Non-EPI vaccination schedule required – School-based delivery - more difficult to reach age cohort >10yo – New immunization cards required • Increased costs due to transport of immunization teams into schools or community outreach sites
Perception Management	• Requires high level of community sensitization including teachers and healthcare workers • Significant misperceptions need to be overcome – Cost prohibitive vaccine – Poor school enrollment in low income countries – Vaccination affects fertility – Vaccine approved for use in males
Program Integration	• Requires coordination with MoE (for school-based programs)
Health Impact	• Measuring impact of HPV vaccine requires over 20 years

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JE

Implementation Associated Cost Analysis

UNIQUE IMPLEMENTATION CHALLENGES

Challenge Category	Unique Implementation Challenges

TYPHOID

Implementation-Associated Cost Analysis

UNIQUE IMPLEMENTATION CHALLENGES

Challenge Category	Unique Implementation Challenges
Vaccination Strategy	• Both licensed vaccines have limited duration of protection requiring revaccination

Rabies

Implementation Associated Cost Analysis

UNIQUE IMPLEMENTATION CHALLENGES

Challenge Category	Unique Implementation Challenges
Vaccination Strategy	• Non-EPI vaccination – animal (mostly dog) bite driven vaccination strategy • Potential need to integrate vaccination strategy with other rabies control programs • Vaccination strategy needs to include patient access via rabies 'dog bite treatment centers at central as well as district hospitals • Continued advocacy required to support promotion of: – The use of economical and safe multisite ID post exposure prophylaxis – Discontinuation of production and use of nerve tissue based vaccines • Major vaccine shortage for safe cell culture based vaccines • Severe bite cases require vaccination and rabies immunoglobulin (RIG) – Major RIG shortage
Vaccination Access Via Rabies Bite Centers	• Significant facility and staff training upgrades required (e.g. wound wash stations) • Need to promote and train medics overcome resistance to ID vs. IM vaccine administration

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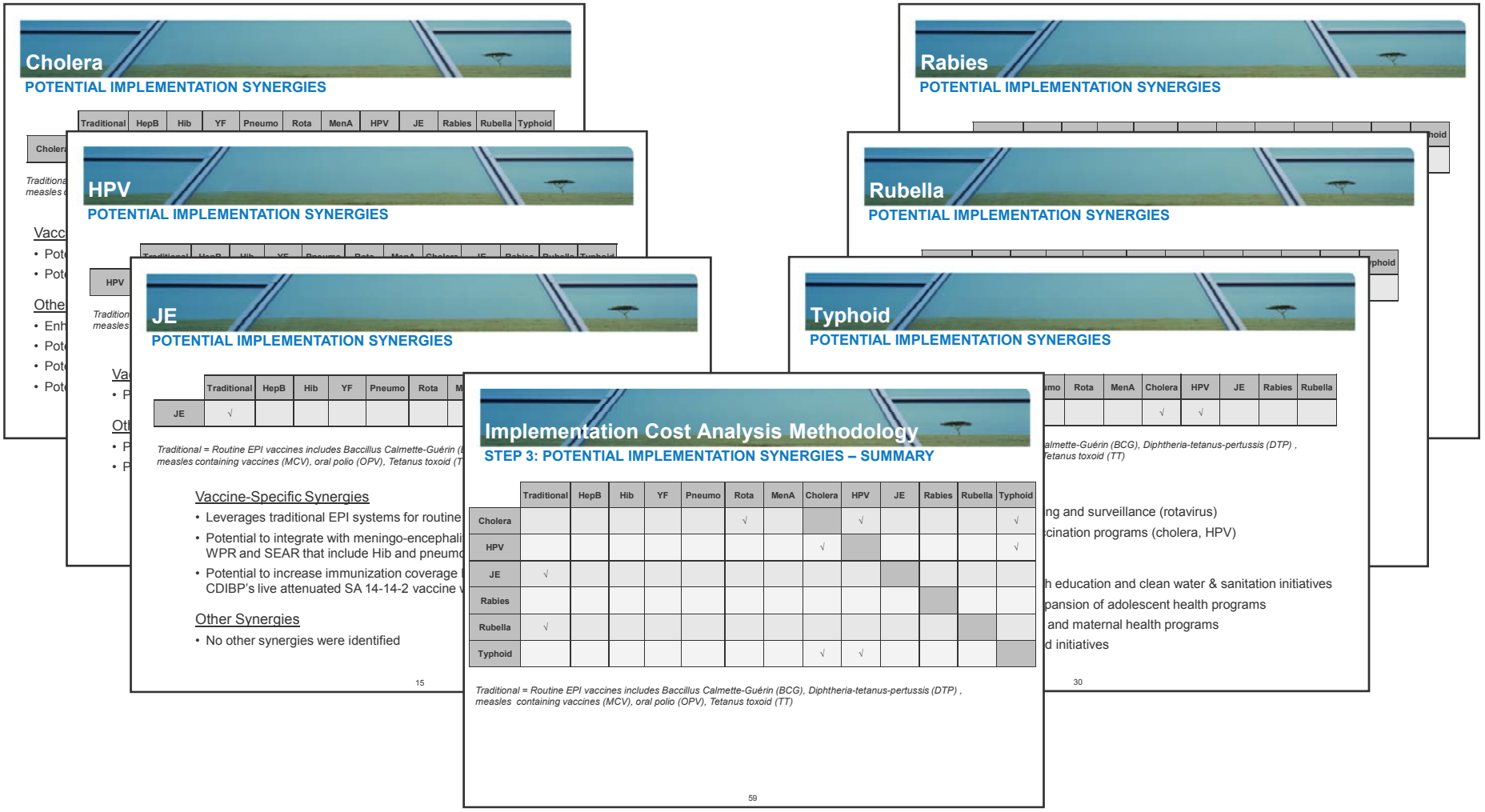
Disease-specific summaries can be found in the disease analysis presentations posted on GAVI's website
http://www.gavialliance.org/vision/strategy/vaccine_investment/index.php

Implementation Cost Analysis Methodology

STEP 2: IMPLEMENTATION SYNERGIES ASSESSMENT



	Traditional	HepB	Hib	YF	Pneumo	Rota	MenA	Cholera	HPV	JE	Rabies	Rubella	Typhoid
Cholera						√			√				√
HPV								√					√
JE	√												
Rabies													
Rubella	√												
Typhoid								√	√				

Traditional = Routine EPI vaccines includes Baccillus Calmette-Guérin (BCG), Diphtheria-tetanus-pertussis (DTP) , measles containing vaccines (MCV), oral polio (OPV), Tetanus toxoid (TT)

Disease-specific inputs can be found in the disease analysis presentations posted on GAVI's website
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Implementation Cost Analysis Methodology

STEP 3: RELATIVE COST ASSESSMENT PROCESS

- Leveraging implementation challenges and synergies insights, ASC assessed implementation costs of each vaccine under consideration relative to traditional EPI implementation costs (i.e., higher, similar, lower)
- Final cost assessment developed in consultation with experts

Implementation Cost Analysis Methodology

STEP 3: RELATIVE COST ASSESSMENT

Cholera

RELATIVE COST ASSESSMENT

Implementation Cost Categories	Incremental Vaccine Implementation Cost Relative to Traditional EPI Costs
	Periodic Campaigns (1 or 5 - 15yo or 1 or 5 - 49yo every 3 years)
Cold Chain	

JE

RELATIVE COST ASSESSMENT

Implementation Cost Categories	Incremental Vaccine Implementation Cost Relative to Traditional EPI Costs	
	Routine (infants + 1 yr boost)	Catch-up Campaign (1 - 15yo)
Cold Chain		
Waste Management	• Typical	• Large short-term capacity need given size of

Rabies

RELATIVE COST ASSESSMENT

Implementation Cost Categories	Incremental Vaccine Implementation Cost Relative to Traditional EPI Costs
	Post-Exposure Prophylaxis
Cold Chain	• Potentially significant impact where supply prior to GAVI support was insufficient to meet demand, especially in newly established regional rabies dog bite treatment centers – Need for vaccine & RIG vial management and usage, particularly in small decentralized dog bite treatment centers
Waste Management	• Less than typical given animal bite-driven demand
Transport	• Less than typical given regional rabies bite centers usually serving large populations where animal bites are more common
Training of Personnel	• More than typical given IM to ID route of administration transition in rabies dog bite treatment centers and potential increased use of RIG
Communication, Education, Social Mobilization	• More than typical given significant impact on disease burden with educational awareness on bite prevention
Monitoring & Evaluation, Surveillance	• Typical, given the need to strengthen systems for monitoring and evaluation given current under reporting of rabies cases
Service Delivery	• Less than typical given regional rabies dog bite treatment centers

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Rubella

RELATIVE COST ASSESSMENT

Implementation Cost Categories	Incremental Vaccine Implementation Cost Relative to Traditional EPI Costs		
	Routine (1yo)	Catch-up Campaign (2-19yo)	Catch-up Campaign (15-39yo or 20-39yo females)
Cold Chain	• Less than typical given		

Typhoid

RELATIVE COST ASSESSMENT

Implementation Cost Categories	Incremental Vaccine Implementation Cost Relative to Traditional EPI Costs
	Periodic Campaigns (2-15yo every 3 yrs or 5-15yo every 3 or 7 years)
Cold Chain	
Waste Management	• Large short-term capacity need given cohort age ranges

HPV

RELATIVE COST ASSESSMENT

Implementation Cost Categories	Incremental Vaccine Implementation Cost Relative to Traditional EPI Costs	
	Routine (10yo)	Catch-up Campaign (11 - 14yo)
Cold Chain	• Less than typical (fewer subjects in 10yo vs. birth cohort)	• Short-term capacity need
Waste Management		
Transport	• More than typical due to both school & community delivery requirements	• Significantly greater short-term capacity need due to both school & community delivery requirements
Training of Personnel	• Common route of administration (IM), but significant disease training required	
Communication, Education, Social Mobilization	• More than typical due to high level of community sensitization required and need for school based and community education	
Monitoring & Evaluation, Surveillance	• More than typical given cervical cancer disease impact cannot be measured for ~20 years or more	
Service Delivery	• More than typical due to need to reach schools and clinics	

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Disease-specific summaries can be found in the disease analysis presentations posted on GAVI's website
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Implementation Cost Analysis Methodology

STEP 4: ACTUAL COST ASSESSMENT PROCESS

- The most notable implementation costing resources (GIVS*, WHO-UNICEF Guidelines, PATH AIM) provide:
  - Costing methodology with examples based on historical expenses and benchmarks (e.g. x% of y expense)
  - Overall costs assessment for a specific vaccine portfolio implemented over a specified time period
- It is difficult to extract benchmarks that can be applied to the implementation cost assessment of another individual vaccine or vaccine portfolio
- However, the GIVs model provides a robust methodological foundation by which to assess VIS vaccines by leveraging proxy disease and vaccine characteristic data

* *Wolfson LJ, Gasse F, et.al., Estimating the costs of achieving the WHO-UNICEF Global Immunization Vision and Strategy, 2006-2015. Bull World Health Organ 2008;86:27 http://www.who.int/bulletin/volumes/86/1/07-045096/en/index.html*

Implementation Cost Analysis Methodology

STEP 4: GIVS MODEL METHODOLOGY – ROUTINE*

Total Average Marginal Systems Scale-Up Cost + **Total Average Marginal Delivery Scale-Up Cost** = **Total Average Marginal Scale-Up Costs**

Cost Categories
Cold Chain
Waste Management
Transport
Personnel Training
Communication, Education, Social Mobilization
Monitoring & Evaluation, Surveillance

Cost Categories
Service Delivery**

- Costs are calculated by determining the difference between the immunization system as is and the immunization system given the adoption of a new routine vaccine
- Underlying data assumptions are both vaccine and country-specific and are based mainly on historical immunization data, country FSPs, WHO ICE-T, investment case projections, and various standard planning and financial variables
- The overall cost is the sum of the individual country costs per dose which are then multiplied by the VIS demand forecasts to produce an annual country-specific and aggregate implementation cost forecast

** Incremental cost added when vaccination strategy requires additional visits outside of the EPI schedule; assumes 10 minute health visits

* *Wolfson LJ, Gasse F, et.al., Estimating the costs of achieving the WHO-UNICEF Global Immunization Vision and Strategy, 2006-2015. Bull World Health Organ 2008;86:27 http://www.who.int/bulletin/volumes/86/1/07-045096/en/index.html*

Implementation Cost Analysis Methodology

VIS PROXY ASSUMPTIONS – ROUTINE VACCINATION*

Disease	GAVI VISP Cohorts	Marginal System Scale-Up (GIVS Model)		Marginal Delivery Scale-Up (WHO: Adams)	
		Doses/Tx	Proxy Cohort	Doses Outside EPI schedule	Service Delivery Cost
HPV	10 yo females	3	HPV (11 yo females)	3	Country specific estimates of cost for 10 minute health facility visit (USD 2004)
JE	Infants (<1 yo)	2 (boost included)	JE (< 1yo)	0	
Rubella	Surviving Infants (1 yo)	2 (boost included)	Rubella (1st & 2nd dose Measles)	1	
Typhoid	Infants (<1 yo)	2 (boost included)	Typhoid (< 1yo)	0	

* *Lara Wolfson provided guidance where possible; initial analysis provided by GIVS programmer Richard Schwab*

Implementation Cost Analysis Methodology

STEP 4: GIVS MODEL METHODOLOGY – CAMPAIGNS*

Total Average Marginal Systems Scale-Up Cost + **Total Average Marginal Delivery Scale-Up Cost** = **Total Average Marginal Scale-Up Costs**

Cost Categories
Cold Chain
Waste Management
Transport
Personnel Training
Communication, Education, Social Mobilization

Cost Categories
Per Diem

* *Wolfson LJ, Gasse F, et.al., Estimating the costs of achieving the WHO-UNICEF Global Immunization Vision and Strategy, 2006-2015. Bull World Health Organ 2008;86:27 http://www.who.int/bulletin/volumes/86/1/07-045096/en/index.html*

Implementation Cost Analysis Methodology

VIS PROXY ASSUMPTIONS – CAMPAIGNS*

Disease	GAVI VISP			GIVS Model
	Cohorts	Campaign Frequency	Doses/Tx	Cost Per Dose Disease Proxy
JE	1-15 yo	Once, upon introduction	1	Measles
Rubella	2-19 yo	1	1	Measles
	15-39 yo females	1	1	Tt (WCBA)
	20-29 yo females	1	1	
Cholera	5-15 yo	Every 3 yrs	2	75% of lowest campaign cost for each country
	1-15 yo	Every 3 yrs	2	
	5-49 yo	Every 3 yrs	2	
	1-49 yo	Every 3 yrs	2	
Typhoid	2-15 yo (50%	Every 3 yrs	1	Measles
	2-15 yo (50%	Every 3 yrs	2	
	5-15 yo (25	Every 3 yrs	3	
	5-15 yo (50	Every 3 yrs	1	
	5-15 yo (25%	Every 3 yrs	2	
	1-15 yo	Once, upon introduction	2	

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Implementation Cost Analysis Methodology

STEP 4: ACTUAL COST ASSESSMENT

Portfolio Option ('A')

ANNUAL COUNTRY IMPLEMENTATION COST FORECAST

Integrated Adoption Forecast 2009-2020

Country Implementation Costs ($					
1	2012	2013	2014	2015	2016
7	11	20	26	39	90
30 6 24	29 18 11	40 29 11	39 39 1	52 46 6	67 54 12
30 16 13	16 16 0	42 32 10	36 35 1	44 38 5	50 45 4
67	$57	$102	$102	$135	$206

Portfolio Option 'B'

ANNUAL COUNTRY IMPLEMENTATION COST FORECAST

Integrated Adoption Forecast 2009-2020

Disease	Country Implementation Costs ($M)												Total ($M)
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
HPV Routine	0	4	7	11	20	26	39						
JE Routine + Catch-up *Routine + boost* *1-15yo Catch-up*	0 0 0	0 0 0	30 6 24	29 18 11	40 29 11	39 39 1	52 46 6						
Rubella Delayed *Routine + boost* *15-39yo WCBA*	0 0 0	66 14 51	30 16 13	16 16 0	42 32 10	36 35 1	44 38 5						
Typhoid Routine + Catch-up *Routine + boost* *15-39yo WCBA*	0 0 0	0 0 0	8 3 5	19 10 9	26 19 7	52 34 18	68 51 18						
Total Partner Costs	**$0**	**$69**	**$75**	**$76**	**$128**	**$153**	**$203**	**$2**					

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Portfolio Option 'C'

ANNUAL COUNTRY IMPLEMENTATION COST FORECAST

Integrated Adoption Forecast 2009-2020

Disease	Country Implementation Costs ($M)												Total ($M)
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
			7	11	20	26	39	90	136	191	238	272	**1,033**
			30 6 24	29 18 11	40 29 11	39 39 1	52 46 6	67 54 12	60 60 0	64 60 0	67 67 0	67 67 0	**516** 452 64
			8 3 5	19 10 9	26 19 7	52 34 18	68 51 18	78 71 7	111 90 21	132 108 24	129 122 7	139 135 4	**762** 642 120
			6	6	7	8	9	10	10	10	10	10	90
			60 16 35 9	17 16 1 0	110 32 71 7	42 35 6 1	65 38 23 4	71 45 23 3	90 49 35 6	62 53 8 1	57 56 0 1	64 39 4 1	**838** 414 357 67
			$111	**$83**	**$203**	**$166**	**$233**	**$315**	**$406**	**$460**	**$501**	**$553**	**$3,241**

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Portfolio Option Summary

COUNTRY IMPLEMENTATION COST SUMMARY

Integrated Adoption Forecast 2009-2020

Cost	Portfolio Option 'A'	Portfolio Option 'B'	Portfolio Option 'C'
Routine Vaccination-Related Costs ($M)	1,898	2,542	2,542
Campaign-Related Costs ($M)	162	281	609
Other Vaccination-Related Costs ($M)	n/a	n/a	90
Total Country Imp Costs ($M)	**$2,060**	**$2,823**	**$3,241**

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* *Lara Wolfson (WHO) provided guidance where possible; initial analysis provided by GIVS programmer Richard Schwab*

Disease-specific and portfolio-specific summaries can be found in the disease and portfolio analysis presentations, respectively, posted on GAVI's website http://www.gavialliance.org/vision/strategy/vaccin_investment/index.php

Implementation Cost Analysis Methodology

Vaccination Strategy	Total Vaccine Cost ($M)	GAVI Vaccine Cost ($M)	Country Vaccine Cost ($M)	Deaths Averted (x1000)	<5 Deaths Averted (x1000)	Cases Averted (x1000)	GAVI Cost ($)/ Death Averted	GAVI Cost ($)/ Case Averted	Country Imp Costs ($M)
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** Includes CRS deaths and cases only*

VIS Executive Summary

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Partner Cost Analysis Methodology

PARTNER COST ASSESSMENT PROCESS (I)

- Leveraged current GAVI Work Plan budget for Strategic Goal #2, to derive proxy cost multipliers from the pneumococcal and rotavirus vaccine implementation cost data
- First segmented SG2 Work Plan line items into one of three categories
  - **"Country-related" Costs:** include activities that were specific to a given number of countries and diseases (e.g., surveillance systems support for pneumo and rotavirus in GAVI countries)
  - **"Disease-related" Costs:** costs which benefit the Pneumococcal and Rotavirus programs but are not country specific (e.g., regional estimation and dissemination of pneumococcal and rotavirus vaccine impact and disease burden data)
  - **"Portfolio-related" costs:** include activities that could be applicable to additional diseases and an expanded AVI platform (e.g. global and regional policies developed to assist countries in making vaccine-introduction decisions)
- Once costs were segmented, the cost multiplier was derived by calculating the annual budget associated with each segment and then applying the appropriate divisor:
  - Country costs were divided by the number of countries underlying the cost estimate
  - Disease costs were divided by 2 (Rota and Pneumo)
  - Portfolio costs were not divided further

Partner Cost Analysis Methodology

PARTNER COST ASSESSMENT PROCESS (II)

- Once multipliers were determined, they were applied to the three VIS portfolios:
  - The proxy country cost was multiplied by the # of countries in each portfolio
  - The proxy disease cost was multiplied by the # of diseases in each portfolio
  - The proxy portfolio cost was applied as a fixed cost to each portfolio with a 5% incremental increase for each new disease in the GAVI portfolio

- Key assumptions guided the application of multipliers
  - Country-related costs were assumed to be one-time “introduction costs” and were not repeated after the year of introduction.
  - Disease-related costs were treated as “time-limited” introduction costs and only applied to the first three years of disease introduction
  - Portfolio-related costs were begun 1 year prior to introduction at 50% of the estimated cost and scaled down to 50% of estimated cost in the final year

Note: This is an indicative costing exercise that may not completely account for economies of scale or appropriately recognize disease-specific funding that may already be in place

Partner Cost Analysis Methodology

PARTNER COST ASSESSMENT

	Partner Cost Category	GAVI Partner Costs ($M)												
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	TOTAL
Portfolio A	Country-Related Costs	0	7	5	4	5	4	7	11	8	8	1	2	60
	Disease-Related Costs	0	4	6	6	2	0	0	0	0	0	0	0	17
	Portfolio-Related Costs	19	38	40	40	40	40	40	40	38	38	36	18	426
	Total Portfolio Cost	**$19**	**$48**	**$50**	**$49**	**$47**	**$44**	**$47**	**$51**	**$46**	**$46**	**$37**	**$20**	**$503**

	Partner Cost Category	GAVI Partner Costs ($M)												
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	TOTAL
Portfolio B	Country-Related Costs	0	7	6	5	6	7	8	12	9	10	1	2	72
	Disease-Related Costs	0	4	8	8	4	0	0	0	0	0	0	0	23
	Portfolio-Related Costs	19	38	41	41	41	41	41	41	40	40	38	19	443
	Total Portfolio Cost	**$19**	**$48**	**$55**	**$54**	**$51**	**$49**	**$50**	**$54**	**$49**	**$50**	**$39**	**$21**	**$537**

	Partner Cost Category	GAVI Partner Costs ($M)												
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	TOTAL
Portfolio C	Country-Related Costs		11	11	6	10	12	10	13	10	11	1	2	97
	Disease-Related Costs		6	9	9	4								28
	Portfolio-Related Costs	20	40	43	43	43	43	43	43	41	41	38	19	459
	Total Portfolio Cost	**$20**	**$56**	**$64**	**$59**	**$57**	**$55**	**$53**	**$56**	**$51**	**$53**	**$39**	**$21**	**$584**

Proxy Cost Segment Multipliers:

Country-Related Activities:	$503,749	per country
Disease-Related Activities:	$1,880,611	per disease
Portfolio-Related Activities:	$34,578,824	for portfolio

VIS Executive Summary

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Portfolio Analysis Results

PORTFOLIO ANALYSIS

Portfolio Option ('A')

PORTFOLIO DEFINITION

Disease	Decision	Vaccination Strategy	Rationale
			sease burden impact portfolio severe long-term sequelae acious vaccines on current or pending alion strategy e to consensus vaccination ipated

Portfolio Option ('A')

METRIC SUMMARY – BY STRATEGY

Integrated Adoption Forecast 2009-2020

Strategy	Total Vaccine Cost ($M)	GAVI Vaccine Cost ($M)	Country Vaccine Cost ($M)	Deaths Averted (x1000)	<5 Deaths Averted (x1000)	Cases Averted (x1000)	GAVI Cost ($)/ Death Averted	GAVI Cost ($)/ Case Averted	Long-Term Sequelae	Country Imp Costs ($M)	Wt. Avg. Country Imp Cost/Tx
HPV Routine 10yo Female Vaccination	$1,293	$1,261	$31	707	n/a	870	$1,784	$1,449	Severe	$1,033	$16.35
JE Routine Infant Vacc with boost after 12 m 1-15yo Catch-up Ca											
Rubella (delayed in Routine 1yo Vaccine with boost at 4yo + 15-39yo WBCA Can											
Strategy											

Portfolio Option ('A')

ANNUAL COUNTRY IMPLEMENTATION COST FORECAST

Integrated Adoption Forecast 2009-2020

Disease	Country Implementation Costs (							
	2009	2010	2011	2012	2013	2014	2015	2016
HPV Routine	0	4	7	11	20	26	39	9
JE Routine + Catch-up *Routine + boost* *1-15yo Catch-up*	0 0 0	0 0 0	30 6 24	29 18 11	40 29 11	39 39 1	52 46 6	6 5
Rubella Delayed *Routine + boost* *15-39yo WCBA*	0 0 0	66 14 51	30 16 13	16 16 0	42 32 10	36 35 1	44 39 5	5 4
Total Partner Costs	**$0**	**$69**	**$67**	**$57**	**$102**	**$102**	**$135**	**$20**

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Portfolio Option ('A')

TOTAL PORTFOLIO COST

Integrated Adoption Forecast 2009-2020

Cost Component	Cost
GAVI Vaccine Cost ($M)	2,606
Country Vaccine Co-Pay Cost ($M)	261
Total Vaccine Cost ($M)	**$2,867**
Country Implementation Cost ($M)	2,060
Partner Associated Cost ($M)	454
TOTAL COST ($M)	**$5,381**

Deaths Averted (x1000)	<5 Deaths Averted (x1000)	Cases Averted (x1000)	GAVI Cost ($)/ Death Averted	GAVI Cost ($)/ Case Averted
869	106	1,745	$2,998	$1,493

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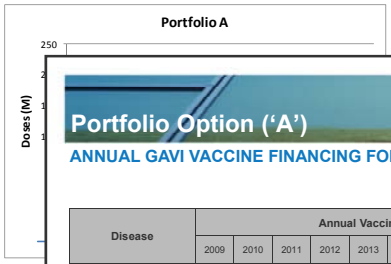
Portfolio Option 'A'

DEMAND FORECAST

Integrated Adoption Forecast 2009-2020



Portfolio Option ('A')

ANNUAL GAVI VACCINE FINANCING FORECAST

Integrated Adoption Forecast 2009-2020

Disease	Annual Vaccine Procurement Costs ($M)												Total ($M)
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
HPV *Routine Immunization*	0	3	7	11	25	35	59	125	184	250	263	300	**1,261**
												35	**974**
												36	**370**
												372	**2,606**
												2,606	

Portfolio Option ('A')

ANNUAL GAVI PARTNER COST FORECAST

Integrated Adoption Forecast 2009-2020

GAVI Partner Costs ($M)											Total ($M)
011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
5	4	5	4	7	11	8	8	1	2	**60**
20	20	7	0	0	0	0	0	0	0	**61**
30	30	30	30	30	30	30	30	30	15	**333**
$55	**$54**	**$42**	**$34**	**$37**	**$41**	**$38**	**$38**	**$31**	**$17**	**$454**

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Portfolio-specific results can be found in the portfolio analysis presentation posted on GAVI's website
http://www.gavialliance.org/vision/strategy/vaccine_investment/index.php

Portfolio Analysis Results

PORTFOLIO DEFINITIONS

Portfolio Option 'A'	Portfolio Option 'B'	Portfolio Option 'C'
• **HPV** – Routine Vaccination • **JE** – Routine Vaccination + Boost – 1-15yo Catch-up • **Rubella Delayed Impact** – Routine Vaccination + Boost – 15-39yo Women of Childbearing Age (WCBA) Catch-up	• **HPV** – Routine Vaccination • **JE** – Routine Vaccination + Boost – 1-15yo Catch-up • **Rubella Delayed Impact** – Routine Vaccination + Boost – 15-39yo WCBA Catch-up • **Typhoid** – Routine Vaccination + Boost – 1-15yo Catch-up	• **HPV** – Routine Vaccination • **JE** – Routine Vaccination + Boost – 1-15yo Catch-up • **Typhoid** – Routine Vaccination + Boost – 1-15yo Catch-up • **Rabies** – Post-Exposure Prophylaxis • **Rubella Rapid Impact** – Routine Vaccination + Boost – 20-29yo WCBA Catch-up – 1-19yo Catch-up

Portfolio-specific rationale can be found in the portfolio analysis presentation posted on GAVI's website
http://www.gavialliance.org/vision/strategy/vaccine_investment/index.php

Portfolio Analysis Results

PORTFOLIO COST SUMMARY

Integrated Adoption Forecast 2009-2020

Cost Component	Portfolio Option 'A'	Portfolio Option 'B'	Portfolio Option 'C'
GAVI Vaccine Cost ($M)	2,606	3,065	6,185
Country Co-Pay Cost ($M)	261	331	499
Total Vaccine Cost ($M)	**$2,867**	**$3,396**	**$6,684**
Country Implementation Cost ($M)	2,060	2,823	3,241
Partner Cost ($M)	503	537	584
TOTAL COST ($M)	**$5,430**	**$6,756**	**$10,509**

Portfolio Analysis Results

PORTFOLIO METRIC SUMMARY

Integrated Adoption Forecast 2009-2020

Metric	Portfolio Option 'A'	Portfolio Option 'B'	Portfolio Option 'C'
Total Projected Deaths Averted (x1000)	869	1,046	1,582
Total Projected Deaths Averted <5yo (x1000)	106	266	308
Total Cases Averted (x1000)	1,745	19,838	20,145
GAVI Cost per Death Averted ($)	$2,998	$2,929	$3,910
GAVI Cost per Case Averted ($)	$1,493	$155	$307

Portfolio Option Summary

PORTFOLIO SUMMARY

Conservative Adoption Forecast 2009-2020

Cost	Portfolio Option 'A'	Portfolio Option 'B'	Portfolio Option 'C'
GAVI Vaccine Cost ($M)	842	965	3,695
Country Vaccine Co-Pay Cost ($M)	175	193	351
Total Vaccine Cost ($M)	1,017	1,158	4,047
Total Projected Deaths Averted (x1000)	200	240	718
Total Projected Deaths Averted <5yo (x1000)	46	80	117
Total Cases Averted (x1000)	572	4,617	4,906
GAVI Cost per Death Averted ($)	$4,207	$4,023	$5,149
GAVI Cost per Case Averted ($)	$1,471	$209	$753

Portfolio Option Summary

PORTFOLIO SUMMARY

Without India

Integrated Adoption Forecast

2009-2020

Cost	Portfolio Option 'A'	Portfolio Option 'B'	Portfolio Option 'C'
GAVI Vaccine Cost ($M)	2,100	2,456	3,785
Country Vaccine Co-Pay Cost ($M)	179	234	329
Total Vaccine Cost ($M)	$2,279	$2,690	$4,114
Total Projected Deaths Averted (x1000)	667	818	1,058
Total Projected Deaths Averted <5yo (x1000)	100	238	259
Total Cases Averted (x1000)	1,460	16,725	16,911
GAVI Cost per Death Averted ($)	$3,149	$3,005	$3,578
GAVI Cost per Case Averted ($)	$1,439	$147	$224

VIS Executive Summary

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Board Recommendation

The Board is asked to:

- Consider at a minimum, prioritizing Portfolio A (HPV, JE and Rubella) for the 2009 – 2020 time period, with potential financial implications of $2.6 billion ($1.1 billion for 2009 – 2015). Fundraising targets would be set accordingly.

OR

- Prioritize Portfolio B (HPV, JE, Rubella and Typhoid) for the 2009 – 2020 time period, with potential financial implications of $3.1 billion ($1.3 billion for 2009 – 2015). Fundraising targets would be set accordingly.*

AND

- Set aside $12 million (if Portfolio B is endorsed) or $18 million (if Portfolio A is endorsed) for operations research on specific vaccine strategies

* GAVI Working Group-preferred portfolio