IMMUNIZATION COSTING ACTION NETWORK

Supported by the Bill & Melinda Gates Foundation

Immunization delivery costs in low-and middle-income countries: Summary of systematic review methods and findings

DECEMBER 2019

PRESENTATION OUTLINE

- ICAN Background
- Systematic Review: Methods
- Systematic Review: Select findings
- Summarizing and Interpreting the IDCC data

ICAN OVERVIEW

The Immunization Costing Action Network (ICAN) was a research and learning community active from 2016 to 2019 that aimed to help researchers, planners, immunization managers, and other decision-makers access, understand, and use evidence on the cost of delivering vaccines.

Increase the visibility, availability, understanding, and use of evidence on the cost of delivering vaccines

Build country capacity around generation, interpretation, and use of immunization delivery cost evidence

Enhance resources to facilitate evidence-based budgeting, planning, and decision-making

Equipped with relevant and user-friendly cost evidence, immunization managers and policymakers will be empowered in advocacy and fundraising efforts and will make better resource allocation decisions, improving the efficiency and equity of immunization programs.

WHY THE NEED FOR A SYSTEMATIC REVIEW ABOUT IMMUNIZATION DELIVERY COSTS IN LOW- AND MIDDLE-INCOME COUNTRIES?

- **Gaps persisted in immunization cost information**, particularly around the costs of delivery through different delivery strategies and to specific target populations[1]
- **Available cost data were of variable reliability and quality that were difficult to access and use** by program managers, policymakers, and other country-level stakeholders
- **These data problems meant historical expenditures and/or cost norms, rather than cost evidence, were often used to budget immunization programs**
  - May contribute to chronic underfunding of immunization programs[2,3]
- **Evidence-based decision-making, planning, and budgeting is needed** to ensure sustainable, equitable, and predictable financing for vaccine delivery
  - Particularly relevant for the nearly 40 Gavi-supported countries that have transitioned, are currently transitioning, or are close to entering the final, accelerated phase of transition to self-financed immunization programs by 2020[4]

[1] Levin, C. et al. 2015. *Working paper for the convening on immunization delivery costs*. Presentation at a meeting on immunization delivery costs. October 14-15. Seattle, WA.
[2] Ozawa, S. et al., 2016. Funding gap for immunization across 94 low- and middle-income countries. *Vaccine,* 34(50), p. 6408–6416.
[3] Portnoy, A. et al., 2015. Costs of vaccine programs across 94 low- and middle-income countries. *Vaccine,* 33(Supplement 1), p. A99–A108.
[4] Learning Network for Countries in Transition, 2019. *What we do.* [Online]. Available at: https://lnct.global/what-we-do/

Systematic Review: Methods

SYSTEMATIC REVIEW METHODS: OVERVIEW

Identified the problem	Defined the research question	Searched articles, reviewed and extracted data	Defined target audiences	Prepared products for these audiences
Evidence-based decision-making, planning, and budgeting is needed to ensure sustainable, equitable, and predictable financing for vaccine delivery Cost evidence is needed for better decision-making, planning, and budgeting Existing cost evidence is fragmented and difficult to understand	*What are the unit costs of delivering vaccines across different LMICs and through a variety of delivery strategies?* *Delivery costs*: Costs associated with delivering immunizations to target populations, exclusive of vaccine costs *Delivery strategies:* How and where vaccines are delivered	Searched six electronic databases for peer-reviewed articles Solicited grey literature through direct requests and postings to newsletters/CoPs Considered over 17,000 resources published between Jan 2005 and March 2019 Extracted data and information from 68 resources	Country civil servants, policy makers, and decision-makers (Ministries of Health, Finance, and Planning; EPI; NITAG) Global and regional donors and development banks Other development partners Civil society organizations and advocates Researchers	Engaged stakeholders in product development process Converted extracted data to 2016 US$ and packaged it into a cost catalogue for easy accessibility* Provided descriptive and gap analysis of extracted data Developed website and interpretive materials (user guides, videos, webinar sessions)

*Initial release in April 2018, followed by data refreshes in April and December 2019.

ICAN SYSTEMATIC REVIEW DEFINITIONS

Delivery strategies:
How and where vaccines are delivered

May include any of the following strategies:

- Health facility
- School
- Outreach/Mobile
- Campaign
- Child health day/week
- Multiple Strategies*

* Refers to costing a combination of two or more delivery strategies

Delivery costs:
Costs associated with delivering immunizations to target populations, exclusive of vaccine costs

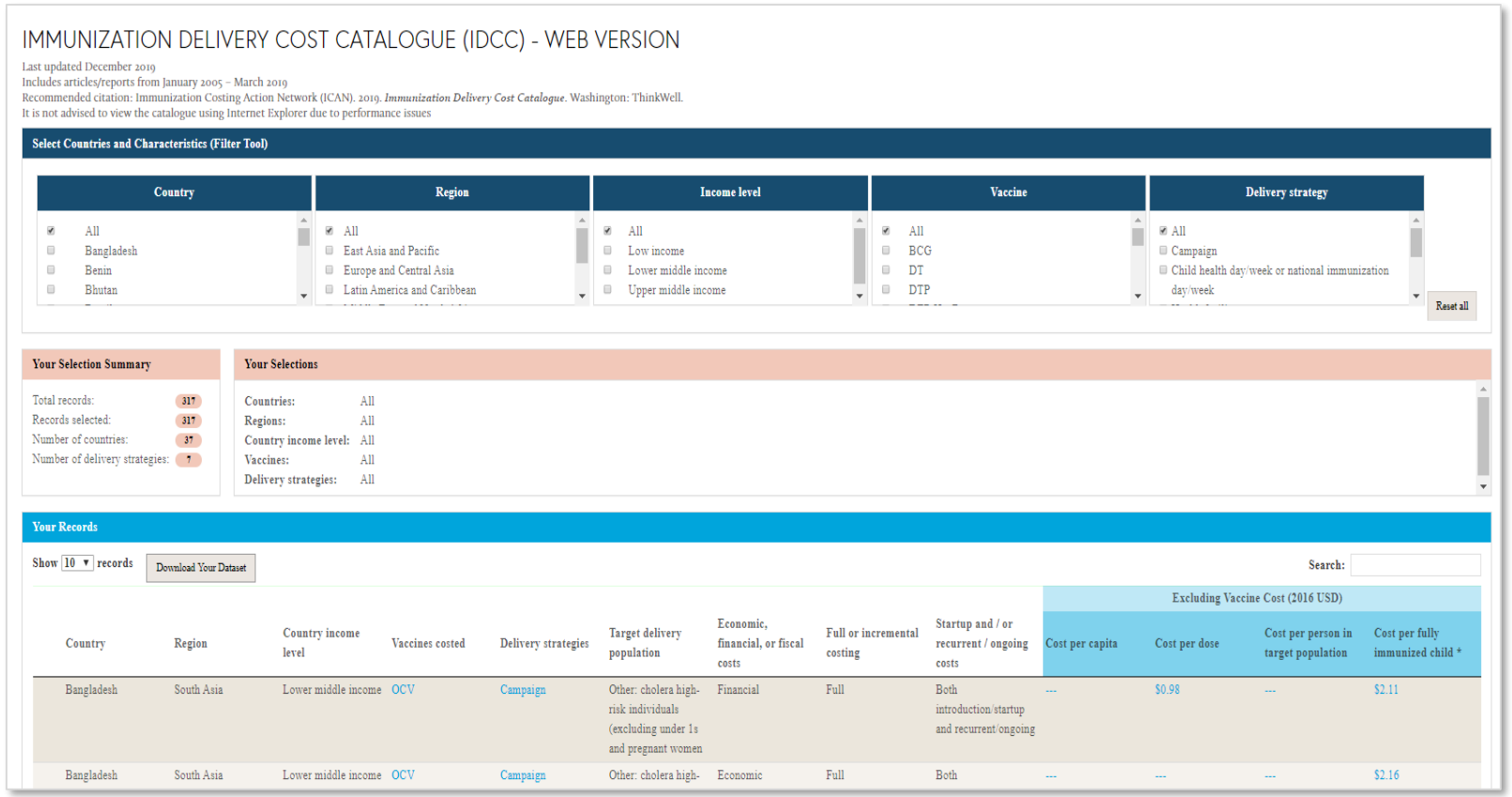
May include any the following cost categories:

- Paid and volunteer resources
- Per diem and travel allowances
- Cold chain equipment and overheads
- Program management
- Training and capacity building
- Social mobilization and advocacy
- Other*

* Refers to Adverse event following immunization (AEFI) and disease surveillance; Buildings, utilities, other overhead, and shared costs; Vaccine supplies (e.g. safety boxes, diluents, reconstitution syringes), Waste management, Other supplies and recurrent costs; and Other non-vaccine costs

IMMUNIZATION DELIVERY COST CATALOGUE (IDCC)

AVAILABLE AT **IMMUNIZATIONECONOMICS.ORG/ICAN**



IMMUNIZATION DELIVERY COST CATALOGUE (IDCC) - WEB VERSION

Last updated December 2019
Includes articles/reports from January 2005 – March 2019
Recommended citation: Immunization Costing Action Network (ICAN). 2019. *Immunization Delivery Cost Catalogue*. Washington: ThinkWell.
It is not advised to view the catalogue using Internet Explorer due to performance issues

Select Countries and Characteristics (Filter Tool)

Country	Region	Income level	Vaccine	Delivery strategy
All	All	All	All	All
Bangladesh	East Asia and Pacific	Low income	BCG	Campaign
Benin	Europe and Central Asia	Lower middle income	DT	Child health day/week or national immunization day/week
Bhutan	Latin America and Caribbean	Upper middle income	DTP	

Reset all

Your Selection Summary

Total records:	317
Records selected:	317
Number of countries:	37
Number of delivery strategies:	7

Your Selections

Countries:	All
Regions:	All
Country income level:	All
Vaccines:	All
Delivery strategies:	All

Your Records

Show 10 records | Download Your Dataset | Search:

Country	Region	Country income level	Vaccines costed	Delivery strategies	Target delivery population	Economic, financial, or fiscal costs	Full or incremental costing	Startup and / or recurrent / ongoing costs	Excluding Vaccine Cost (2016 USD)			
									Cost per capita	Cost per dose	Cost per person in target population	Cost per fully immunized child *
Bangladesh	South Asia	Lower middle income	OCV	Campaign	Other: cholera high-risk individuals (excluding under 1s and pregnant women	Financial	Full	Both introduction/startup and recurrent/ongoing	---	$0.98	---	$2.11
Bangladesh	South Asia	Lower middle income	OCV	Campaign	Other: cholera high-	Economic	Full	Both	---	---	---	$2.16

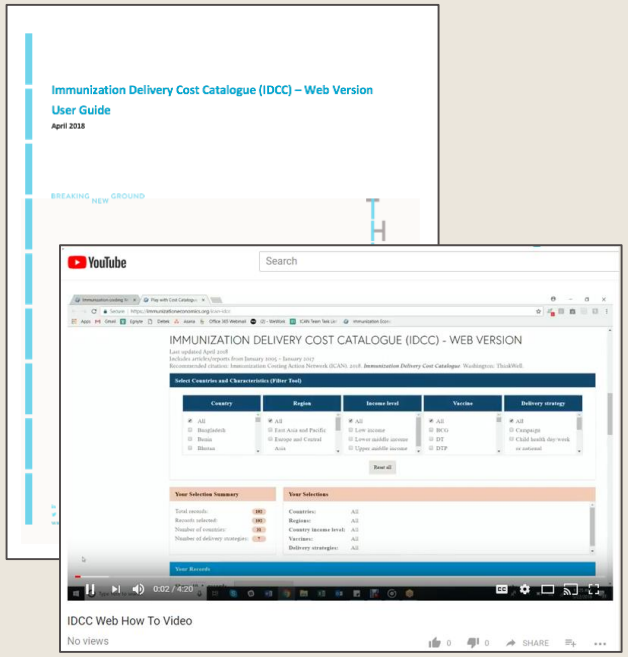
IDCC features

- Excel and web-based tools that provide a standard presentation of existing unit cost data in 2016 US$
- Include information for interpretation: study methods, costing results, quality assessment, other contextual information
- Quality assessment criteria in 3 categories: methodological rigor and reporting standards, uncertainty of results, and risk of bias and limitations
- Reclassification of author-reported costs into standard set of 14 cost categories
- No interpolation

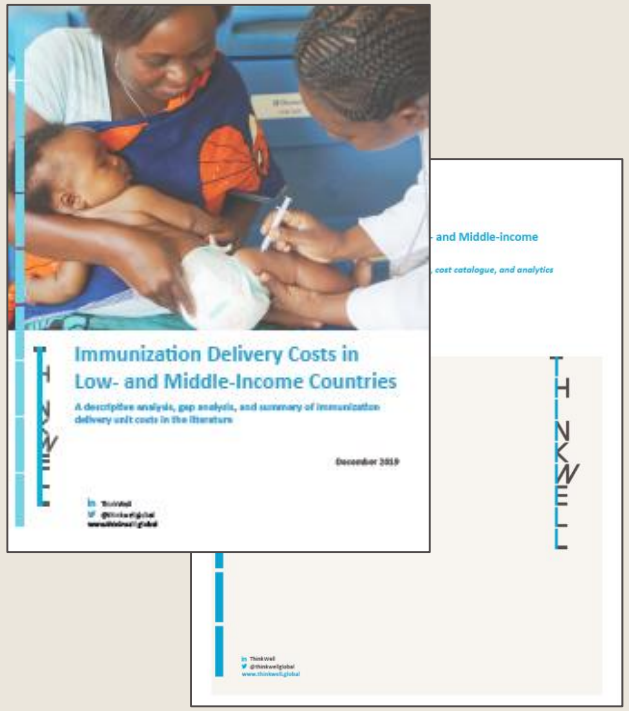
COMPANION INTERPRETIVE PRODUCTS

AVAILABLE AT **IMMUNIZATIONECONOMICS.ORG/ICAN**

How-to User Guides and Videos



Summary Report and Methodology Note



Publication in *Vaccine: X*

doi: 10.1016/J.JVACX.2019.100034

Systematic Review: Select findings

SYSTEMATIC REVIEW: FINDINGS OVERVIEW

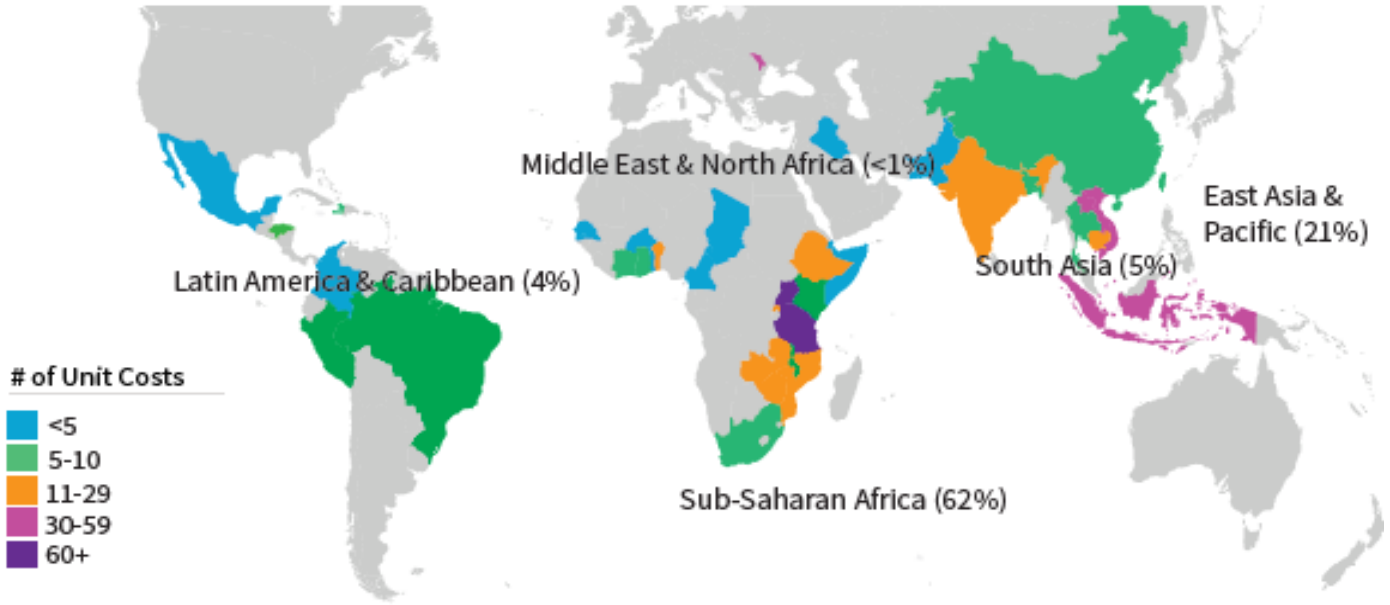
- **The IDCC is the most comprehensive, current, and standardized global evidence on the cost of delivering vaccines**
- The IDCC includes **over 600 immunization delivery unit costs** from the grey and published literature between January 2005 and March 2019
- All unit costs are presented in a standard format, converted to 2016 US$, to facilitate comparison. Unit costs include:
  - Cost per dose
  - Cost per capita
  - Cost per fully immunized child (FIC)[1]
  - Cost per full immunization of a vaccine[2]
  - Cost per person in the target population

1 FIC refers to the provision of required vaccines to a specific group by a clear point in time (e.g., infants who received all vaccines in the schedule before reaching one year of age, or girls who received three doses of HPV vaccine)

2 Full immunization of a vaccine refers to provision of all required doses of a specific vaccine (e.g., two doses of oral cholera vaccine (OCV))

SYSTEMATIC REVIEW: FINDINGS (1/10)

Geographic spread of data



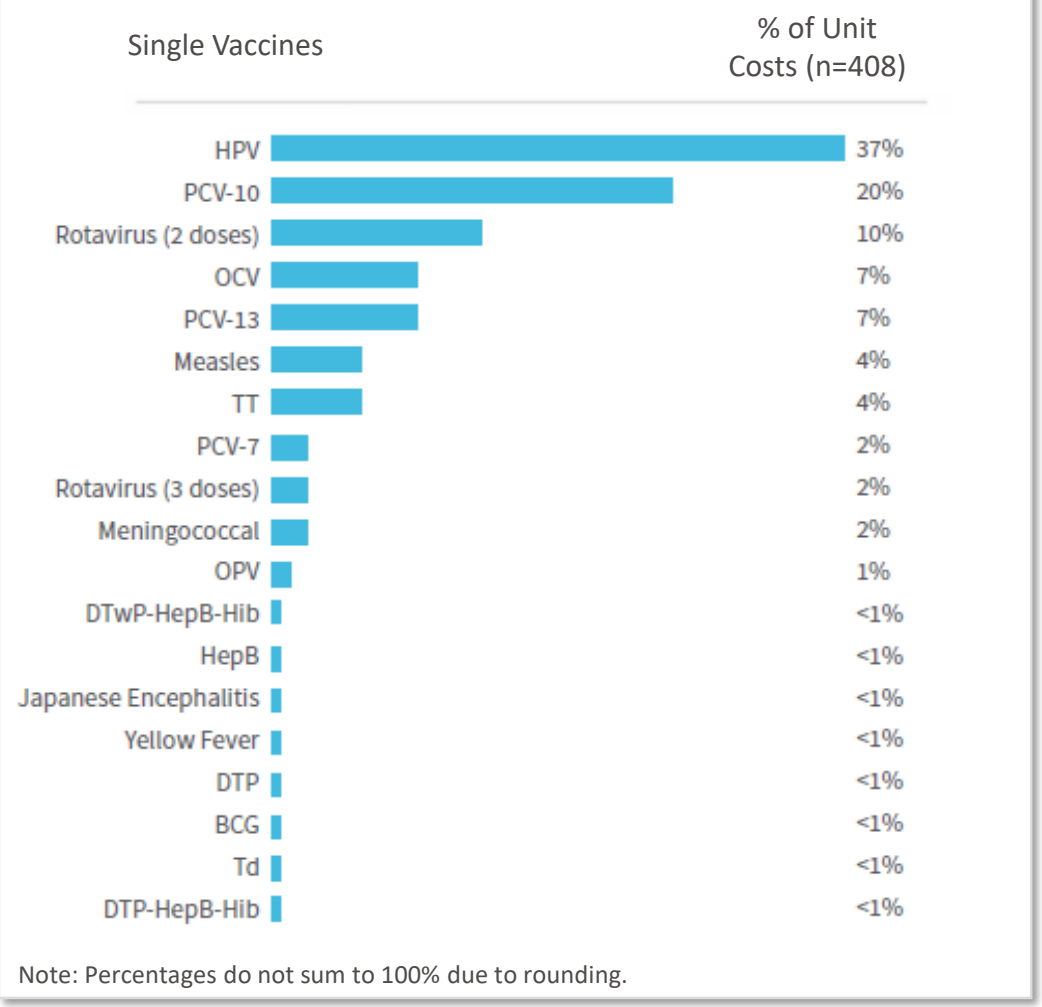
Distribution by Country Income Level

Country	Unit Costs (#)
Tanzania	141
Uganda	91
Vietnam	45
Moldova	44
Benin	42
Lao PDR	36
Indonesia	34
Zambia	25
Rwanda	24
Zimbabwe	22
India	19
Cambodia	16
Ethoipia	14
Mozambique	11
Ghana	8
Cote d'Ivoire	7
Honduras	7
Bangladesh	7
South Africa	6

Country	Unit Costs (#)
Haiti	6
China	6
Thailand	6
Brazil	5
Bhutan	5
Kenya	5
Peru	5
Malawi	5
Cameroon	4
Colombia	4
The Gambia	4
Burkina Faso	2
Chad	2
Iraq	2
Mexico	2
Togo	2
Pakistan	1
Senegal	1

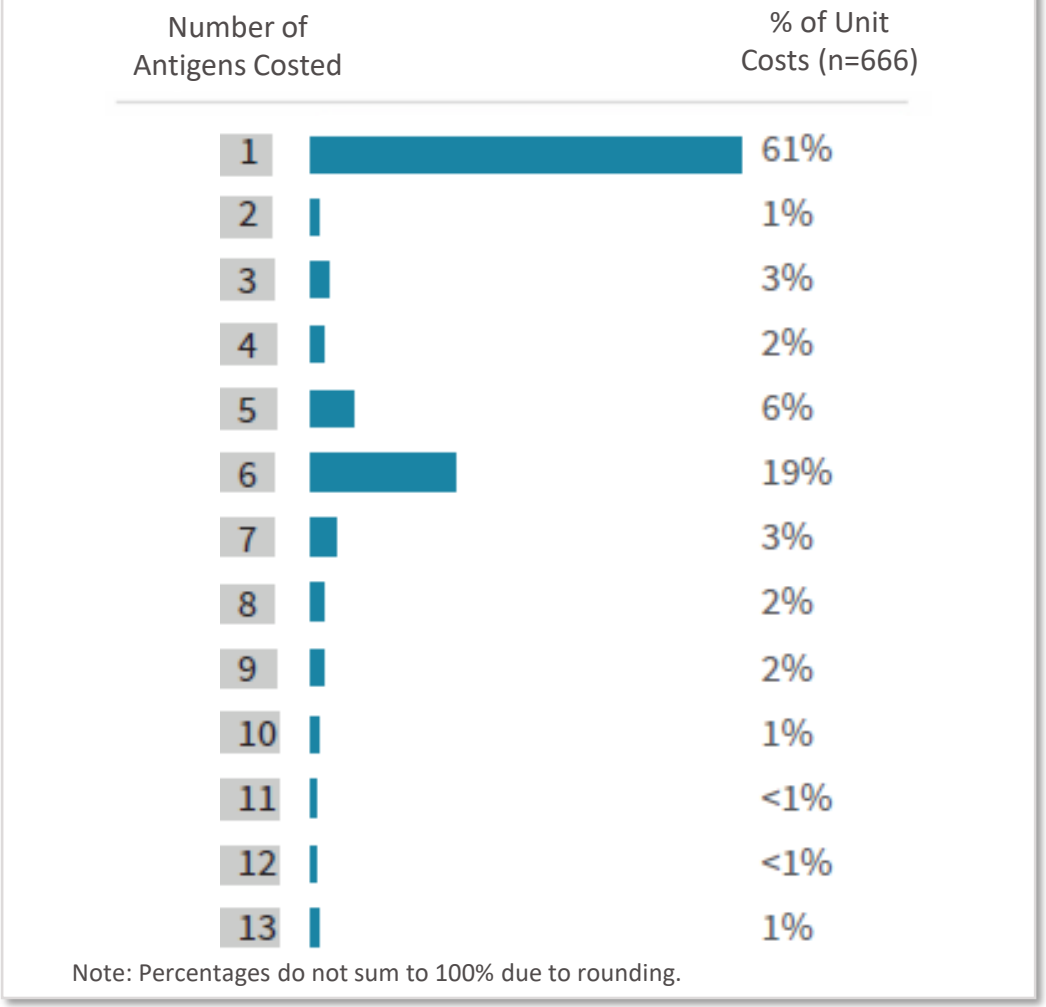
SYSTEMATIC REVIEW: FINDINGS (2/10)

Single vaccines costed



Note: Percentages do not sum to 100% due to rounding.

Multiple vaccines and vaccine schedules costed



Note: Percentages do not sum to 100% due to rounding.

SYSTEMATIC REVIEW: FINDINGS (3/10)

New vaccine introductions

Over half of the unit costs relates to new vaccine introduction.

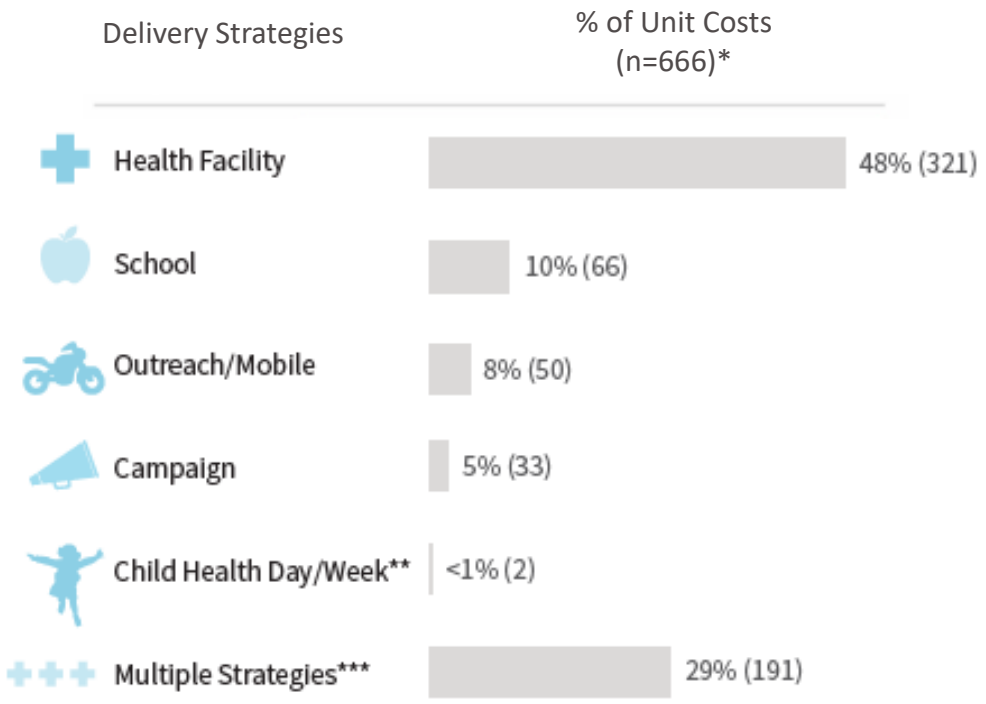
Most unit costs on new vaccine introductions (296, or 85%) represent vaccines costed incrementally.

44% of unit costs on new vaccine introduction costed the introduction of HPV vaccine.

Vaccines	# of unit costs (Incremental)
HPV	116
PCV-10	81
Rotavirus (2 doses)	38
PCV-13	27
PCV-7	9
Rotavirus (3 doses)	8
Measles	5
Other vaccines with fewer than 5 unit costs	12
Total	**296**

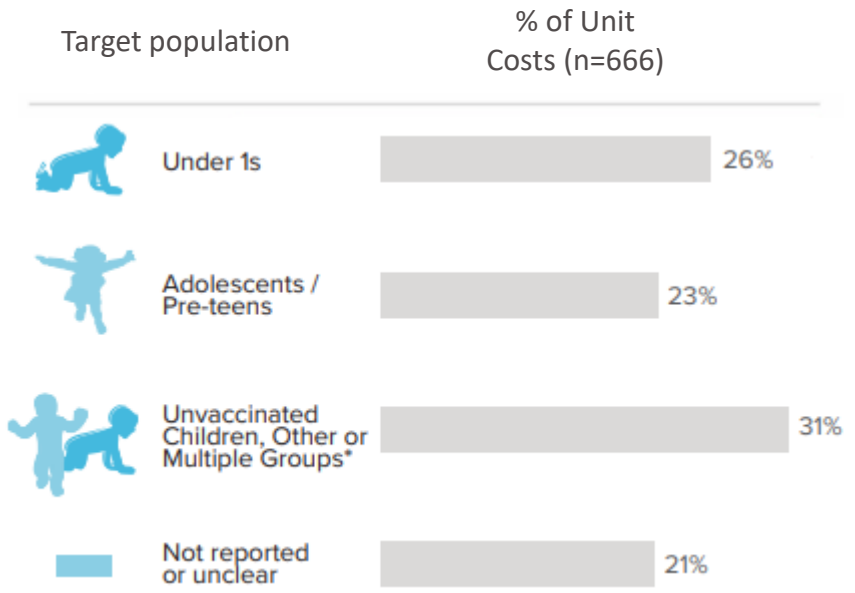
SYSTEMATIC REVIEW: FINDINGS (4/10)

Delivery strategies costed



* Three unit costs (<1%) are not shown in the figure as they did not report the delivery strategy used
** Also includes national immunization days/weeks
*** Refers to costing a combination of two or more delivery strategies

Target population for immunization delivery



* The category "Other or multiple groups" includes a number of other age ranges (e.g., under 5s, 2- to 3-year olds, 6 months to less than 10-year-olds, cholera high-risk individuals, hard-to-reach children, healthy non-pregnant individuals, and combinations of target populations)

SYSTEMATIC REVIEW: FINDINGS (5/10)

Type of cost by economic, financial, and fiscal costs

Type of Costing	Type of Unit Costs				Total Unit Costs
	Economic	Financial	Fiscal	Not reported/ unclear	
Full Costing	151 (49%)	119 (44%)	9 (16%)	24 (69%)	303 (45%)
Incremental Costing	154 (50%)	122 (45%)	46 (84%)	8 (31%)	330 (50%)
Not Reported	4 (1%)	29 (11%)	0 (0%)	0 (0%)	33 (5%)
Total Unit Costs	309 (46%)	270 (41%)	55 (8%)	26 (4%)	666 (100%)

- **Economic costs:** Financial outlays plus opportunity costs, such as heath worker time and any donated items such as vaccines
- **Financial costs:** Financial outlays, usually with straight-line depreciation of capital items
- **Fiscal costs:** Financial outlays, usually without depreciation of capital items

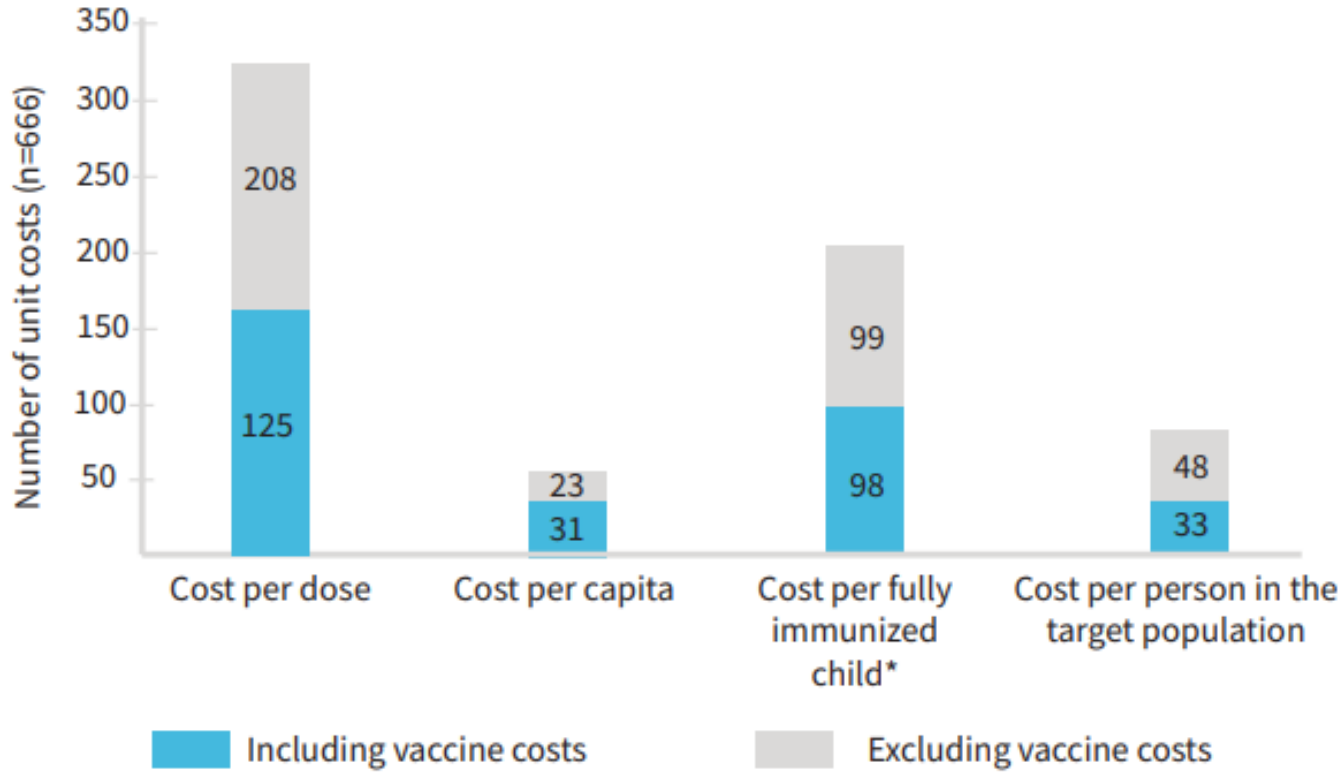
SYSTEMATIC REVIEW: FINDINGS (6/10)

Cost category inclusion by costing type

Cost category	Economic (n=309)	Financial (n=270)	Fiscal (n=55)	Total (n=666)
Paid HR	94%	61%	100%	81%
Volunteer HR	41%	21%	16%	29%
Per diem & travel allowances	72%	74%	56%	72%
Cold chain equipment & overheads	89%	85%	100%	89%
Vehicles, transport & fuel	99%	96%	100%	98%
Program management	59%	70%	35%	60%
Training & capacity building	79%	80%	89%	79%
Social mobilization & advocacy	77%	93%	89%	83%
AEFI and disease surveillance	41%	54%	16%	45%
Buildings, utilities, other overheads & shared costs	58%	49%	100%	57%
Vaccines	77%	57%	76%	69%
Vaccine supplies	72%	67%	76%	70%

SYSTEMATIC REVIEW: FINDINGS (7/10)

Typology of immunization delivery unit costs



* Cost per full immunization of a vaccine or fully immunized child

Cost per dose is the most frequently reported immunization delivery unit cost (50%), followed by cost per full immunization of a vaccine or fully immunized child (30%), cost per person in the target population (12%), and cost per capita (8%).

SYSTEMATIC REVIEW: FINDINGS (8/10)

Quality assessment

Quality Attribute	Mean Score
Methodology and reporting	
Quality of input data/data source	2.6
Sample strategy in relation to conclusion and generalizability	2.8
Data analysis strategy	1.2
Allocation of shared costs	1.9
Annualization of capital items	2.0
Replicability: methods	2.2
Replicability: study purpose	3.1
Reporting of results	2.5
Accuracy of reported findings: Does sum capital and recurrent items match total?	3.0
Accuracy of reported findings: Does sum of cost categories match total?	2.7
Uncertainty of results	
Sensitivity analysis	1.4
Missing cost categories	2.7
Contextual factors	3.1
Risk of bias/limitations	
Author-stated limitations	2.3
Extractor-perceived limitations	2.5
Overall Total	2.3

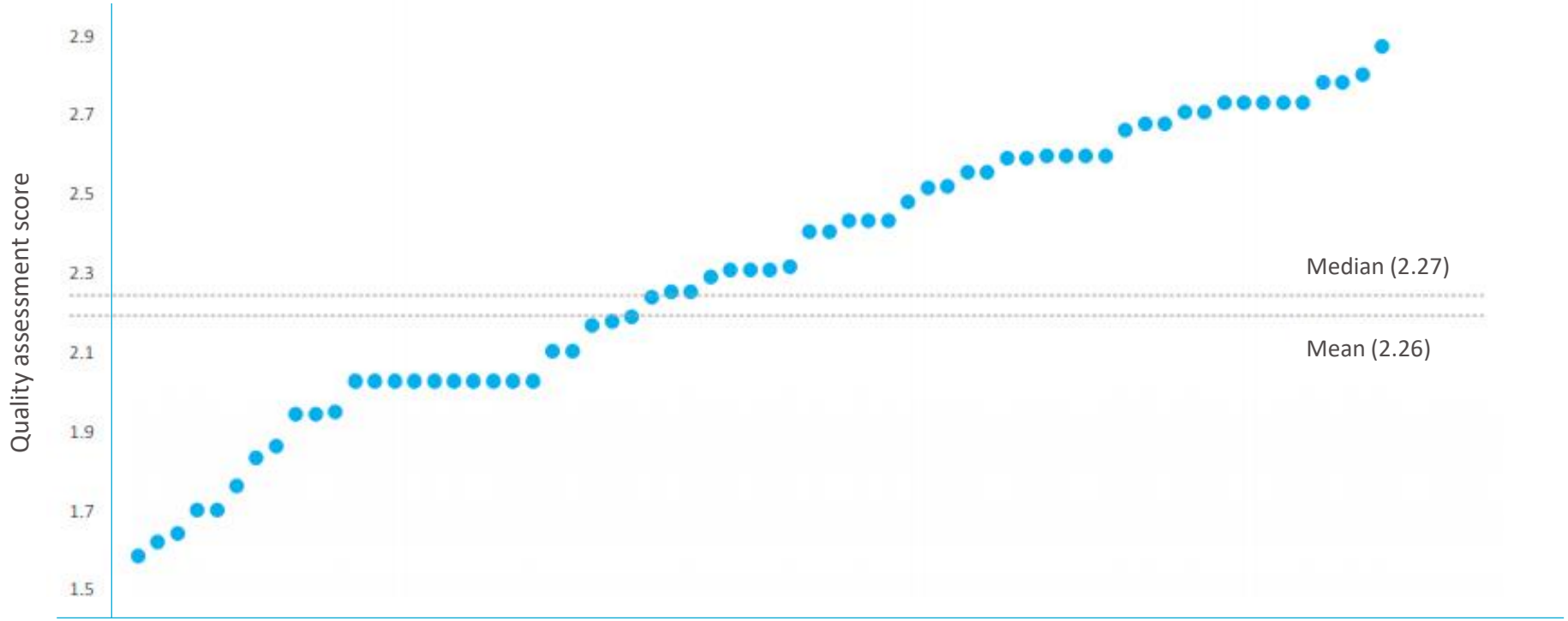
Each of the 15 attributes making up the three quality dimensions was given an individual quality score of 1 (lowest), 2, or 3 (highest); for some attributes there was also a “not applicable” option.

Scores for all items were summed and averaged, excluding any “not applicable” answers, to produce an overall total for each resource on the same 1 to 3 scale.

The quality review found an overall mean score to be 2.2 out of 3 for all reviewed articles/reports, with 1 representing the lowest score and 3 the highest.

SYSTEMATIC REVIEW: FINDINGS (9/10)

Quality assessment



SYSTEMATIC REVIEW: FINDINGS (10/10)

Peer-reviewed article

- The ICAN team published an article in *Vaccine: X* entitled “The costs of delivering vaccines in low- and middle-income countries: Findings from a systematic review”
- The article discusses systematic review methods and findings as of April 2019
- The article can be found here: **https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6697256/**

SUMMARY OF FINDINGS: MAIN GAPS

- No immunization delivery cost data from the majority of LMICs
- Limited evidence from regions other than Sub-Saharan Africa and East Asia and the Pacific
- The greatest need for cost evidence by country income level is for upper-middle income countries
- Limited evidence about the cost of single vaccines other than HPV, PCV, and Rotavirus vaccines
- Limited evidence on the cost of schedules of vaccines
- Limited evidence on the cost of delivery via outreach/mobile strategies and immunization campaigns

Summarizing and Interpreting the IDCC Data

USING THE IDCC UNIT COST DATA

- **There are two ways to use the IDCC unit cost data:**
  1. Look at unit cost results from a particular study to understand that single study's findings
  2. Look at unit costs across multiple studies to understand what the literature says about different topics of interest (e.g., the cost of delivering a particular vaccine, or the cost of one delivery strategy compared to another)
     - This requires looking at comparable unit costs in the IDCC
     - We explored 14,000+ combinations of unit costs to identify those that are comparable
     - We developed immunization delivery unit cost ranges, comprised of comparable unit costs

IMMUNIZATION DELIVERY COST RANGES – METHODS

- **Cost ranges include four or more unit costs that match on a set of variables:**
  - Economic, financial, or fiscal costs
  - Full or incremental costing
  - Supply chain only costs
  - Delivery platform (routine vs. SIA)
  - Introduction/startup costs, and/or recurrent/ongoing costs, or both
  - Highest level of costs included
  - Delivery scale (pilot/project or full scale)
- **Additional variables were used to check validity of unit costs comprising a cost range:**
  - Vaccines costed
  - Vaccine delivery strategy
  - Inclusion of major cost categories
  - Etc.
- **9 cost ranges in total**
  - Incremental cost per dose for single, newly introduced vaccines (3)
  - Incremental cost per dose for introducing HPV vaccine to an existing schedule (2)
  - Full cost per dose for full schedule of vaccines (supply chain only costs) (1)
  - Full cost per dose for full schedule of vaccines (3)

IMMUNIZATION DELIVERY COST RANGES EXPLAINED

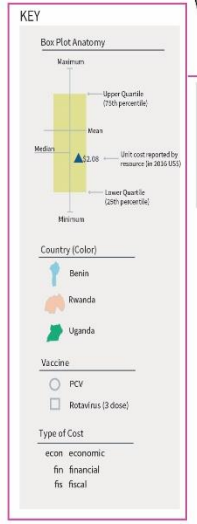
What does this **title** mean?

The **title** identifies the immunization delivery unit cost range(s) depicted in the figure by type of costing (full/incremental), what type of vaccine(s) the range applies to (single, newly introduced vaccines, full schedules or specific vaccines such as HPV) and what costs are included (introduction/startup, recurrent/ongoing or both). The currency and year are also noted.

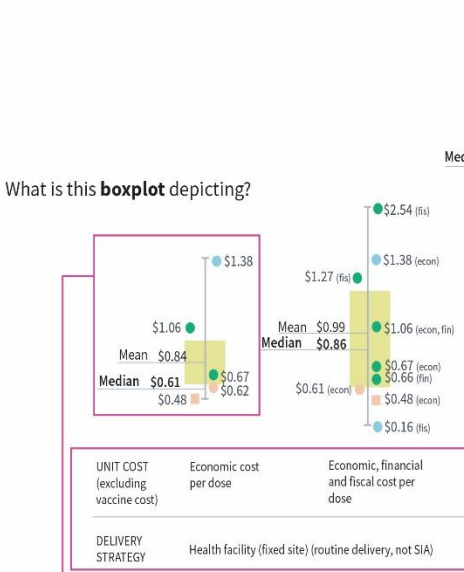
Incremental cost of single, newly introduced vaccines, excluding vaccine cost (2016 US$)

What is in the **key**?

The **key** explains the box plot, the color coding and use of symbols in the figure



What is this **boxplot** depicting?



UNIT COST (excluding vaccine cost)	Economic cost per dose	Economic, financial and fiscal cost per dose	Economic cost per full immunization of a vaccine (3 doses)
DELIVERY STRATEGY	Health facility (fixed site) (routine delivery, not SIA)		

Each **boxplot** figure depicts a pooled unit cost range. The symbols indicate individual unit costs that are part of the unit cost range. The median value of the cost range is indicated in bold. Similar cost ranges are presented side-by-side to allow for easy identification of differences between the unit costs which may explain cost variation.

What is this **bottom section** presenting ?

The **bottom section** identifies the type of unit cost each box plot figure depicts and the delivery strategy(ies) represented by the individual unit costs used in the unit cost range.

This immunization delivery cost range includes five individual immunization delivery unit costs, indicated by the colored symbols. They are:

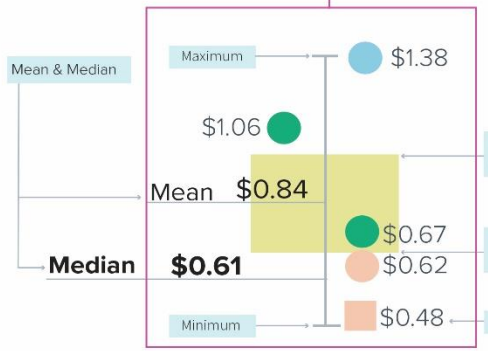
- $1.38 (blue circle, blue indicating the unit cost is from Benin, circle indicating it's for PCV vaccine)
- $1.06 (green circle, Uganda, PCV)
- $0.67 (green circle, Uganda, PCV)
- $0.62 (peach circle, Rwanda, PCV)
- $0.49 (peach square, Rwanda, Rotavirus (3 dose))

The mean is $0.84 and the median $0.67. The 25th and 75th percentile values are roughly indicated by the tan box. Please see table X for the exact values. The maximum individual unit cost estimate ($1.38) and minimum ($0.49) are indicated by the box plot end lines.

Example Cost Range

How to interpret the data points?

Text in the blue boxes defines the anatomy of the boxplot.



Shape signifies the vaccine type. Color denotes the country.

EXAMPLE KEY

Country (Color)
- Benin
- Rwanda
- Uganda

Vaccine Type
- Rotavirus (3 dose)
- PCV

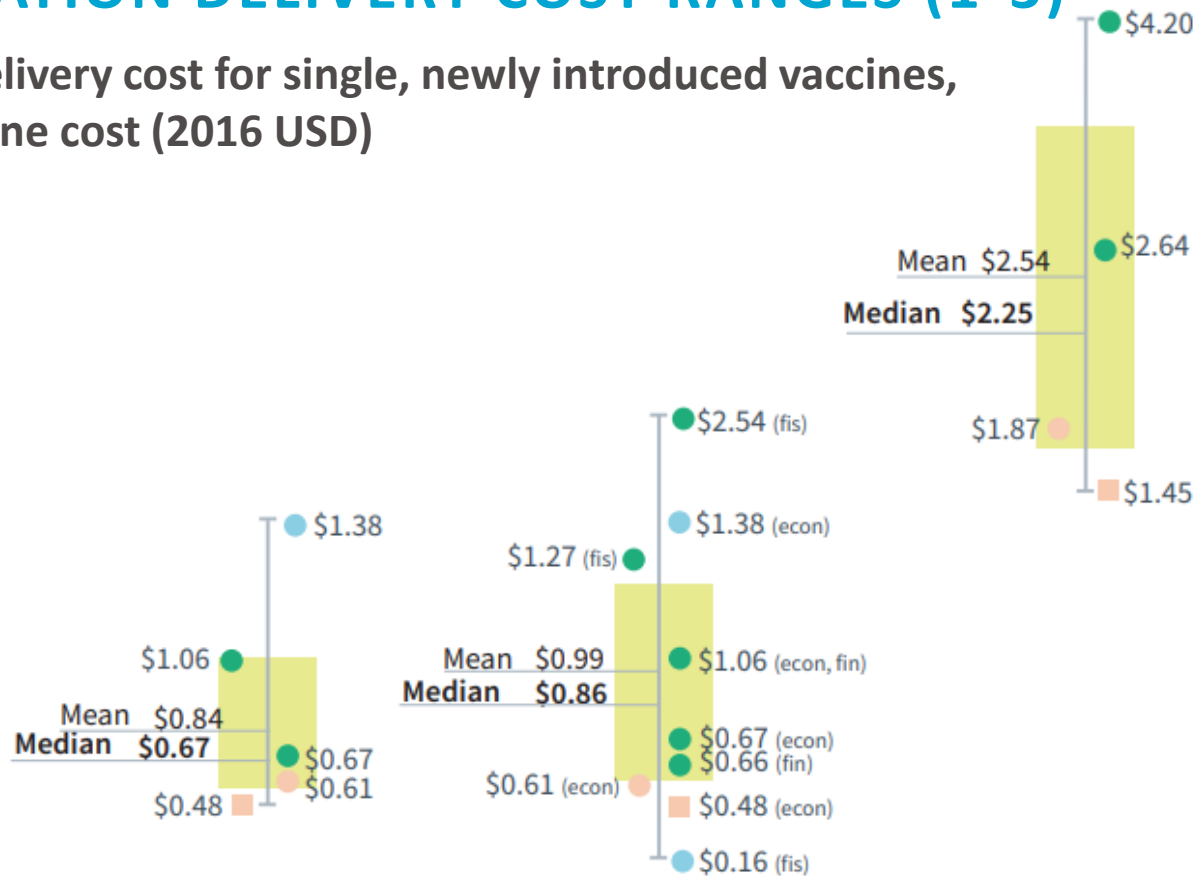
UNIT COST (excluding vaccine cost)	Economic cost per dose
DELIVERY STRATEGY	Health facility (fixed site) (routine delivery, not SIA)
OTHER COST DETAILS	Includes both introduction/startup costs and recurrent/ongoing costs

How to interpret these results?

The **bottom section** shows that the cost range is for the financial cost per dose, excluding vaccine cost. It's applicable for health facility (fixed site) delivery, through the routine program, and not SIA delivery

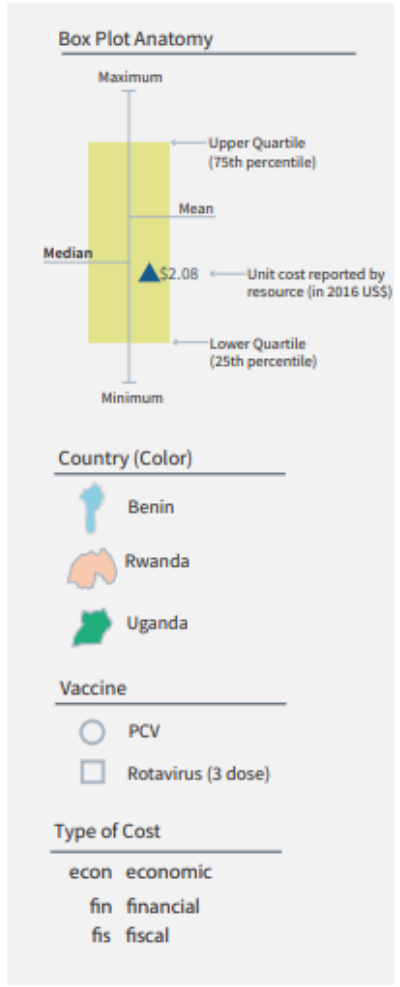
IMMUNIZATION DELIVERY COST RANGES (1-3)

Incremental delivery cost for single, newly introduced vaccines, excluding vaccine cost (2016 USD)



UNIT COST (excluding vaccine cost)	Economic cost per dose - incremental cost	Economic, financial and fiscal cost per dose - incremental cost	Economic cost per full immunization of a vaccine (3 doses)
DELIVERY STRATEGY	Health facility Routine delivery, not SIA		
OTHER COST DETAILS	Includes both introduction/startup costs and recurrent/ongoing costs		

KEY



IMMUNIZATION DELIVERY COST RANGES (1-3 CONTINUED)

Incremental cost for single, newly introduced vaccines, excluding vaccine cost (2016 USD)

Countries	Vaccines costed	Delivery strategy and platform	Delivery unit cost (excluding vaccine cost)	Other cost details	Individual immunization delivery unit costs from articles/reports (2016 USD)	Cost range (2016 USD)	Descriptive statistics (2016 USD)
Benin, Rwanda, Uganda (LICs, SSA region)	PCV 7/10/13 Rotavirus (3 dose)		Economic cost per dose		$0.48 (Rota, Rwanda) $0.61 (PCV, Rwanda) $0.67 (PCV, Uganda) $1.06 (PCV, Uganda) $1.38 (PCV, Benin)	$0.48 - $1.38	Mean: $0.84 25th percentile: $0.61 Median: $0.67 75th percentile: $1.06
Benin, Rwanda, Uganda (LICs, SSA region)	PCV 7/10/13 Rotavirus (3 dose)	Health facility (fixed site) (Routine, not SIA delivery)	Economic, financial, and fiscal cost per dose	National scale implementation Highest level of costs: National Unit costs include both introduction/startup costs and recurrent/ongoing costs	$0.16 (PCV, Benin, fis) $0.48 (Rota, Rwanda, econ) $0.61 (PCV, Rwanda, econ) $0.66 (PCV, Uganda, fin) $0.67 (PCV, Uganda, econ) $1.06 (PCV, Uganda, econ) $1.06 (PCV, Uganda, fin) $1.27 (PCV, Uganda, fis) $1.38 (PCV, Benin, econ) $2.54 (PCV, Uganda, fis)	$0.16 - $2.54	Mean: $0.99 25th percentile: $0.62 Median: $0.86 75th percentile: $1.22
Benin, Uganda (LICs, SSA region)	PCV 7/10 Rotavirus (3 dose)		Economic cost per full immunization of a vaccine		$0.45 (Rota, Rwanda) $1.87 (PCV, Rwanda) $2.64 (PCV, Uganda) $4.20 (PCV, Uganda)	$1.45 - $4.20	Mean: $2.54 25th percentile: $1.77 Median: $2.25 75th percentile: $3.03

References:

AMP. (2014). Costing and financing analyses of routine immunization and new vaccine introduction in Benin Final Report.

Guthrie, T., Zikusooka, C., Kwesiga, B., Abewe, C., Lagony, S., Schutte, C., … Kinghorn, A. (2014). Costing and Financing Analyses of Routine Immunization in Uganda.

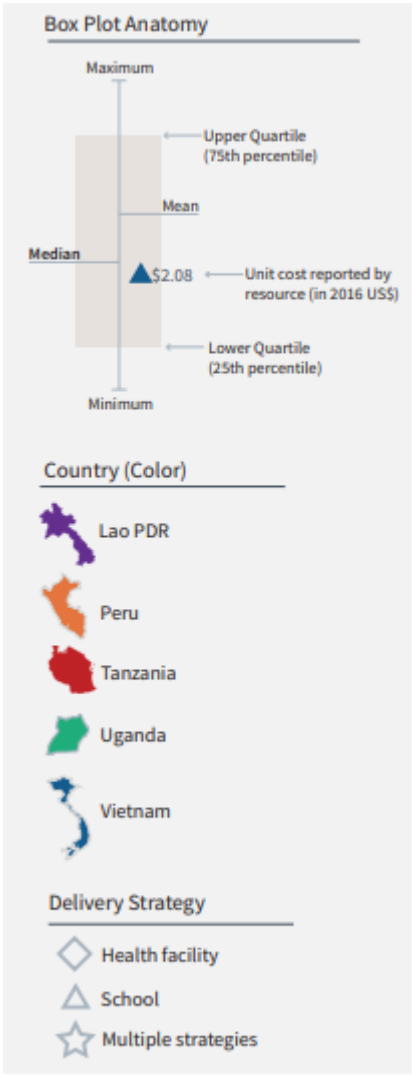
Ngabo, F., Levin, A., Wang, S. A., Gatera, M., Rugambwa, C., Kayonga, C., … Hutubessy, R. (2015). A cost comparison of introducing and delivering pneumococcal, rotavirus and human papillomavirus vaccines in Rwanda. *Vaccine*, 33(51), 7357–7363. https://doi.org/10.1016/j.vaccine.2015.10.022

IMMUNIZATION DELIVERY COST RANGES (4-5)

Incremental delivery cost for introducing HPV vaccine to an existing schedule, excluding vaccine cost (2016 USD)

UNIT COST (excluding vaccine cost)	Financial cost per dose - incremental cost	Economic cost per dose - incremental cost
DELIVERY STRATEGY	Health facility, school and multiple strategies (i.e., two or more delivery strategies) Routine delivery, not SIA Costs are related to pilot/project delivery	
OTHER COST DETAILS	Includes both introduction/startup costs and recurrent/ongoing costs	

KEY



IMMUNIZATION DELIVERY COST RANGES (4-5 CONTINUED)

Incremental delivery cost for introducing HPV vaccine to an existing schedule, excluding vaccine cost (2016 USD)

Countries	Vaccines costed	Delivery strategy and platform	Delivery unit cost (excluding vaccine cost)	Other cost details	Individual immunization delivery unit costs from articles/reports (2016 USD)	Cost range (2016 USD)	Descriptive statistics (2016 USD)
Lao PDR, Peru, Tanzania, Uganda, Vietnam	HPV	Health facility, school and multiple strategies (i.e., two or more delivery strategies) (Routine delivery, not SIA)	Financial cost per dose	Pilot/project scale implementation Highest level of costs: National	$1.72 (Lao PDR) $1.90 (Lao PDR) $1.95 (Vietnam) $2.01 (Uganda) $2.04 (Vietnam) $2.24 (Peru)	$1.74 - $2.24	Mean: $1.98 25th percentile: $1.91 Median: $1.98 75th percentile: $2.04
			Economic cost per dose	Unit costs include both introduction/startup costs and recurrent/ongoing costs	$2.22 (Lao PDR) $2.42 (Vietnam) $2.62 (Vietnam) $2.63 (Lao PDR) $3.02 (Uganda) $3.26 (Tanzania) $4.29 (Peru)	$2.22 - 4.29	Mean: $2.99 25th percentile: $2.52 Median: $2.63 75th percentile: $3.14

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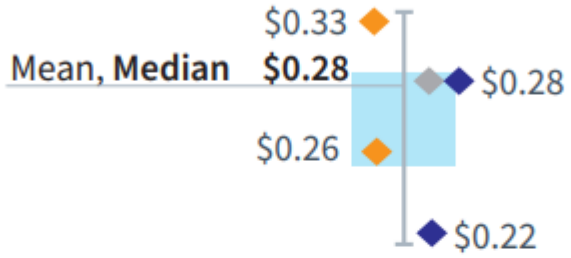
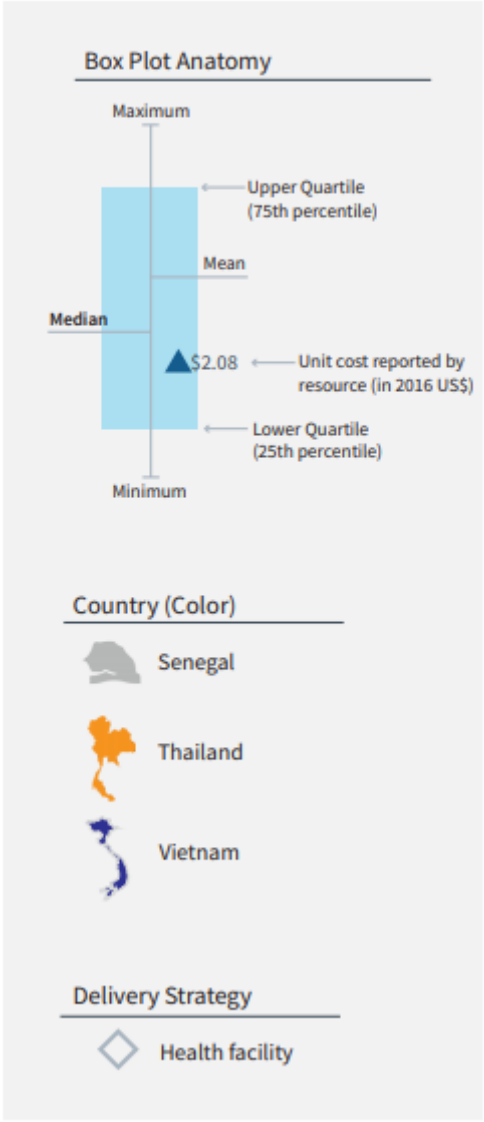
IMMUNIZATION DELIVERY COST RANGES (6)

Supply chain delivery cost for a schedule of vaccines, excluding vaccine cost (2016 USD)



UNIT COST (excluding vaccine cost)	Economic cost per dose
DELIVERY STRATEGY	Health facility Routine delivery, not SIA
OTHER COST DETAILS	Supply chain only costs Includes both introduction/startup costs and recurrent/ongoing costs

KEY



IMMUNIZATION DELIVERY COST RANGES (6 CONTINUED)

Supply chain delivery cost for a schedule of vaccines, excluding vaccine cost (2016 USD)

Countries	Vaccines costed	Delivery strategy and platform	Delivery unit cost (excluding vaccine cost)	Other cost details	Individual immunization delivery unit costs from articles/reports (2016 USD)	Cost range (2016 USD)	Descriptive statistics (2016 USD)
Senegal, Thailand, Vietnam	Vaccination schedules containing 6-7 antigens	Health facility (Routine delivery, not SIA)	Economic cost per dose	National scale implementation Highest level of costs: National Unit costs include both introduction/ startup costs and recurrent/ongoing costs	$0.22 (Vietnam, 6 antigens) $0.26 (Thailand, 7 antigens) $0.28 (Vietnam, 6 antigens3 $0.28 (Senegal, 6 antigens) $0.33 (Thailand, 7 antigens)	$0.22 - $0.33	Mean: $0.28 25th percentile: $0.26 Median: $0.28 75th percentile: $0.28

References:

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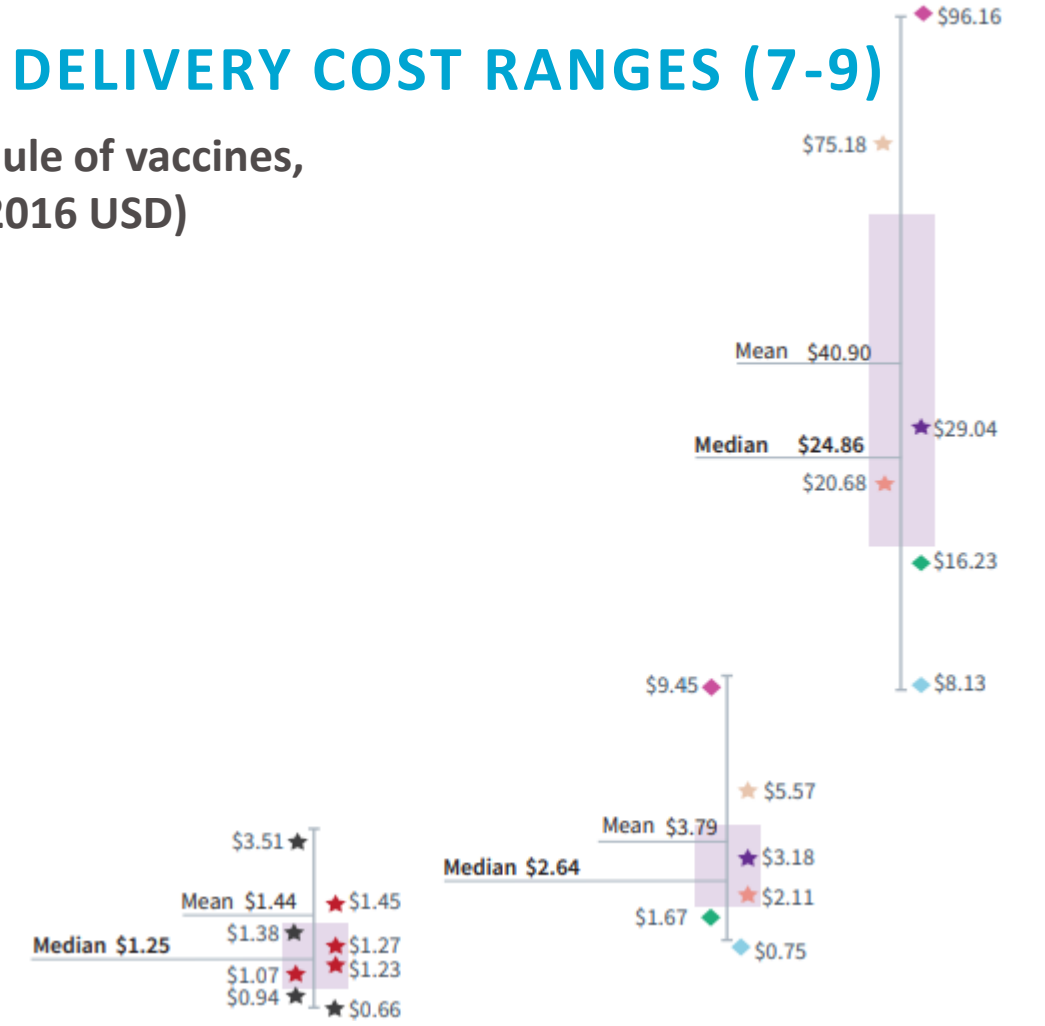
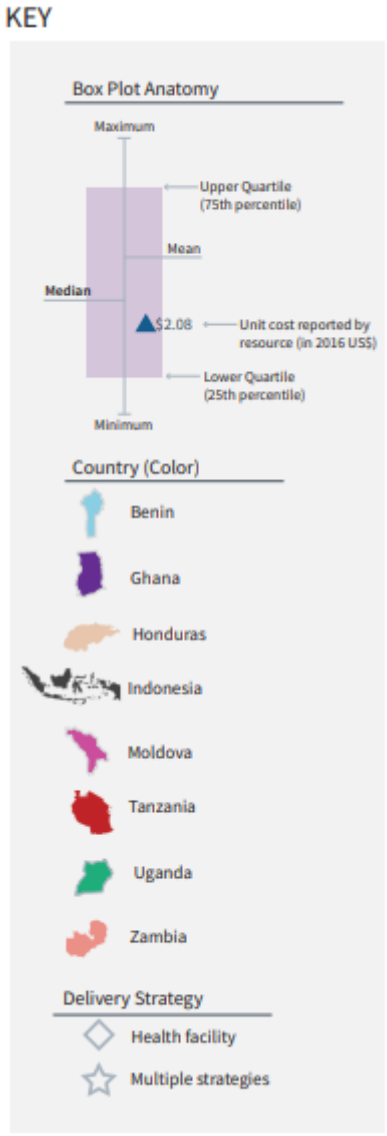
IMMUNIZATION DELIVERY COST RANGES (7-9)

Delivery cost for a schedule of vaccines, excluding vaccine cost (2016 USD)



UNIT COST (excluding vaccine cost)	Financial cost per dose	Economic cost per dose	Economic cost per fully immunized child (defined as children who have received DTP3)
DELIVERY STRATEGY	Multiple strategies (i.e., two or more delivery strategies)	Health facility & multiple strategies (i.e., two or more delivery strategies)	Health facility & multiple strategies (i.e., two or more delivery strategies)
	Routine delivery, not SIA	Routine delivery, not SIA	Routine delivery, not SIA
OTHER COST DETAILS	Includes facility-level only recurrent/ongoing costs	Includes both introduction/ startup costs and recurrent/ongoing costs at facility-level only	Includes both introduction/startup costs and recurrent/ongoing costs at facility-level only



IMMUNIZATION DELIVERY COST RANGES (7-9 CONTINUED)

Delivery cost for a schedule of vaccines, excluding vaccine cost (2016 USD)

Countries	Vaccines costed	Delivery strategy and platform	Delivery unit cost (excluding vaccine cost)	Other cost details	Individual immunization delivery unit costs from articles/reports (2016 USD)	Cost range (2016 USD)	Descriptive statistics (2016 USD)
Indonesia, Tanzania	Vaccination schedules containing 5-6 antigens for under 18 month olds	Health facility (Routine delivery, not SIA)	Financial cost per dose	National scale implementation Highest level of costs: national Unit costs include both introduction/startup costs and recurrent/ongoing costs	$0.66 (Indonesia) $0.94 (Indonesia) $1.07 (Tanzania) $1.23 (Tanzania) $1.27 (Tanzania) $1.38 (Indonesia) $1.45 (Tanzania) $3.51 (Indonesia)	$0.66 - $3.51	Mean: $1.44 25th percentile: $1.04 Median: $1.25 75th percentile: $1.40
Benin, Ghana, Honduras, Moldova, Uganda, Zambia	Schedules of 4-8 antigens for under 1-year-olds	Health facility (fixed site) & Multiple strategies (two or more delivery strategies) (Routine delivery, not SIA)	Economic cost per dose		$0.75 (Benin, health facility (hf)) $1.67 (Uganda, hf) $2.11 (Zambia, multiple strategies (mult strat)) $3.18 (Ghana, mult strat) $5.57 (Honduras, mult strat) $9.45 (Moldova, hf)	$0.75 - $9.45	Mean: $3.79 25th percentile: $1.78 Median: $2.64 75th percentile: $4.97
			Economic cost per fully immunized child (defined as children who have received DTP3)		$8.13 (Benin, hf) $16.23 (Uganda, hf) $20.68 (Zambia, mult strat) $29.04 (Ghana, mult strat) $75.18 (Honduras, mult strat) $96.16 (Moldova, hf)	$8.13 - 96.16	Mean: $40.90 25th percentile: $17.34 Median: 24.86 75th percentile: $63.64

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IMMUNIZATION DELIVERY COST RANGES – SUMMARY OF FINDINGS

- Large variability in the data, even for comparable settings: Different vaccines costed, delivery strategies, country contexts
- Wide cost ranges: Variability may be related to actual cost differences, or differences in study methodology or author reporting
- Cost ranges may be higher than current estimates used in many LMICs for budgeting:

Cost range description	Cost range (2016 US$)	Type of cost notes (all exclude vaccine cost
Cost of delivering single, newly introduced vaccines	$0.16 to $2.54	• Incremental cost per dose • Includes economic, financial, and fiscal unit costs
Delivery cost of introducing HPV vaccine via school and health facility delivery on a pilot/project basis	$1.74 to $4.29	• Incremental cost per dose • Includes economic and financial unit costs
Supply chain-related costs of delivering vaccination schedules containing 6-7 antigens	$0.22 to $0.33	• Full cost per dose • Includes economic unit costs
Cost of delivering schedules of five to six vaccines to children under 18-months-old	$0.66 to $3.51	• Full cost per dose • Includes financial, facility-level unit costs
Cost of delivering schedules of four to eight vaccines to children under one-year-old	$0.75 to $9.45	• Full cost per dose • Includes economic, facility-level unit costs

IMMUNIZATION DELIVERY COST RANGES – USER GUIDANCE

- **Other cost ranges may be possible, depending on the selection of criteria used to consider unit costs comparable**
  - **Be cautious and ensure the unit costs you are comparing are similar enough**
  - Suggested comparability criteria are noted in the table below
  - Consult Excel IDCC User Guide at **immunizationeconomics.org/ican** for suggestions on how to use Excel's filtering function to best work with data

Level	Criteria
Must have	• Economic, financial, or fiscal costs • Full or incremental costing • Startup and/or recurrent/ongoing costs • Delivery platform (routine vs. SIA) • Supply chain only costs
Probably important to have	• Delivery scale (pilot/project or full) • Highest level of costs included

Level	Criteria

Might be important to have	• Number of included cost categories
	• Inclusion of major cost categories:
	  • Paid human resources
	  • Cold chain equipment and their overheads
	  • Vehicles, transport and fuel
	  • Training and capacity building

Depends	• Vaccine • Country income level • Vaccine delivery strategy • Other criteria

THANK YOU