

Global Vaccine Market Report

Executive Summary

This Global Vaccine Market Report provides an annual update to Member States, WHO's international partners and civil society on the state of global vaccine markets.

The report is divided into seven sections: Collection of Global Market Intelligence, Global Market Volumes, Vaccine Supply Dynamics, Vaccine Prices, Vaccine Regulation, Vaccine Stockouts & Shortages, and Global Market Value.

This resource complements other valuable Gavi, UNICEF, PAHO RF (Pan American Health Organization Revolving Fund) and WHO resources (see Annex 1).

Key observations made in this report:

- **Participation in MI4A continues to increase year over year** with 93% (182) of Member States reporting some market information, including 81% (158) reporting price data in 2019 (up from 26% reporting price data just three years ago).
- Estimated **global demand for vaccines totaled 3.5 billion doses in 2018**,¹ up approximately 25% from last year due to growth in SEAR and AFR markets. Self-procuring middle-income countries (MICs) and UNICEF (Gavi) bought the highest volumes of vaccines. D&T- and measles-containing vaccines contributed most to demand.
- **Supply security issues persist**, with 32% of vaccines having fewer than four suppliers and 63% with two or fewer prequalified (PQ'd) products. Developing country vaccine manufacturers (DCVMs) continue to come to market and offer additional choices of products, and countries are leveraging regionally based supply.
- Compared to 2014–15, **average vaccine prices have decreased for DTwP-HepB-Hib, HepB, HPV, PCV and seasonal flu and have increased for DTaP-Hib-IPV**.
- UNICEF's and PAHO RF's **pooled procurement mechanisms achieve lower prices** for 80% of vaccines, compared to self-procurement.
- High-income countries (HICs) pay higher median prices than MICs for vaccines. However, **MICs' prices-paid overlap HICs' prices-paid significantly** and MICs regularly voice affordability concerns.
- The global community is **close to achieving the Global Vaccine Action Plan 2020 target for vaccine quality**, with 98.5% of vaccine doses used in NIPs being of assured quality.
- Maintaining last year's levels, 69 countries reported facing stockouts in 2018. **IPV and OPV vaccines registered the highest number of reported stockouts** this year. WHO has also explored the market dynamics implications of **global shortages of HPV and meningococcal vaccines and potential supply risks for aP-containing vaccines**.
- The estimated **global market value of vaccines was \$26 billion**¹ in 2018. HICs in WHO's AMR and EUR regions account for 68% of value. Analyses predict a substantial growth in market value of HPV vaccines by 2030.



Overview of MI4A

WHO launched MI4A (Market Information for Access to Vaccines) in January 2018 in response to calls by the World Health Assembly, Member States and WHO's Strategic Advisory Group (SAGE) on Immunization to:

- Improve access to market information for health commodities;
- Enhance the understanding of global vaccine demand, supply and pricing dynamics and identify affordability and shortage risks;
- Convene all relevant global health partners to contribute to the development of policies, strategies and guidance to address identified risks;
- Strengthen national and regional capacity for improved access to vaccines supply.

MI4A focuses on addressing the needs of self-procuring countries that benefit from limited international support.

This initiative helps inform dialogue on access in context of WHO's work on Fair Pricing of Medicines.

MI4A information and reports are available at: who.int/immunization/MI4A

You can contact the MI4A project team at MI4A@who.int.

¹ Excluding OPV, seasonal influenza, travel and military markets

1. Collection of Global Vaccine Market Intelligence

Market transparency continues to increase, with more countries reporting information on their vaccine purchases this year than ever before, with 182 countries reporting market information and 158 countries reporting price data.

Price reporting this year marks a 3% increase from last year and more than triple the reporting from three years ago. Notably, six countries reported price for the first time this year. The largest proportion of non-reporters are HICs, with 20% having never reported any market information. WHO continues to work with partial-reporting² and non-reporting countries to better understand their challenges.

WHO's understanding of supply dynamics (i.e. market forces related to supply of vaccines) also improves each year due to regular collection of available products and supply information from manufacturers. WHO uses this market intelligence data in conjunction with other available resources³ to inform global strategy and policy discussions and to support countries' immunization budgeting and procurement decisions.

Global partnerships also saw strong progress on market transparency in 2019 with the 2019 May WHA (World Health Assembly) Resolution⁴ supporting transparency of market information as a way to "facilitate efforts towards affordable and equitable access to health products," following the Director-General's 2018 report on access to medicines.⁵ The same month, IVIR-AC reviewed and endorsed MI4A's methods for market analysis, noting the unique contributions of the project to vaccine market transparency.⁶

Figure 1.1 Countries reporting price data to MI4A

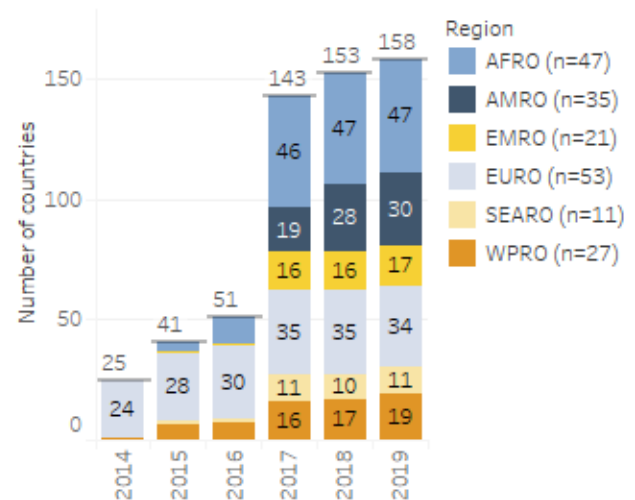
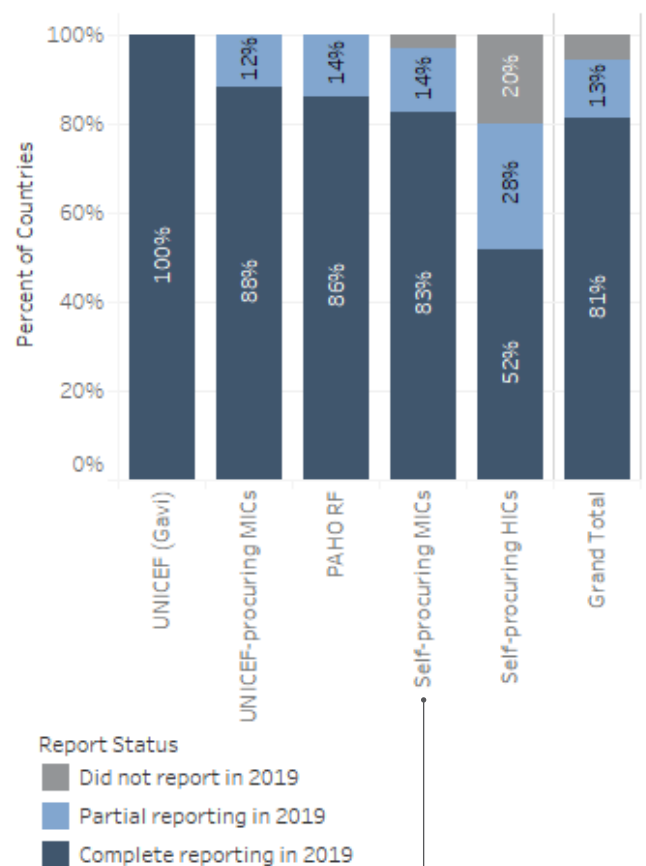


Figure 1.2 Proportion of countries reporting (2019)



Complete reporting from self-procuring MICs increased 12% over last year

2 Complete reporting is defined as reporting all requested market information (products, volumes and prices); some countries exclude price but still report valuable data on products and volumes.

3 This report leverages data reported by countries to the Joint Reporting Form (JRF), publicly available prices and market information from UNICEF, PAHO RF, and Gavi, and information on global demand, price and products from the Global Vaccine Market Model (accessed September 2019, Linksbridge SPC).

4 WHO. (2019). Improving the transparency of markets for medicines, vaccines, and other health products. http://apps.who.int/gb/ebwha/pdf_files/WHA72/A72_ACONF2Rev1-en.pdf

5 WHO. (2018). Addressing the global shortage of, and access to, medicines and vaccines. http://apps.who.int/gb/ebwha/pdf_files/WHA71/A71_12-en.pdf

6 WHO. (2019). Weekly Epidemiological Record, 94. <https://apps.who.int/iris/bitstream/handle/10665/312312/WER9419.pdf?ua=1>

2. Global Market Volumes

For global market volumes, and all subsequent sections, we divide the market into these sections⁷ to present meaningful segments for analysis:

- UNICEF (Gavi): Countries procuring through UNICEF that are eligible for Gavi support or transitioned from eligibility for Gavi support (not limited to Gavi-supported vaccines)
- UNICEF-procuring MICs:⁸ Middle-income countries (MICs) not eligible for Gavi support that procure most vaccines through UNICEF
- PAHO RF: Countries that procure through PAHO Revolving Fund
- Self-procuring MICs: MICs that self-procure all or most vaccines⁹
- Self-procuring HICs: High-income countries (HICs) that self-procure vaccines

Where relevant, analyses also present the contributions of highly populous countries India, China and Indonesia separately

Global market volumes increased approximately 20% last year to reach 3.5 billion doses in 2018, excluding OPV, seasonal influenza, and travel and military markets. Growth in SEAR and AFR primarily contributed to this increase, due to new introductions across both regions and large-scale campaigns in India. Additionally, this year's volume estimates newly include a more comprehensive estimate of private market volumes for HPV, PCV, meningococcal and acellular pertussis (aP) vaccines.

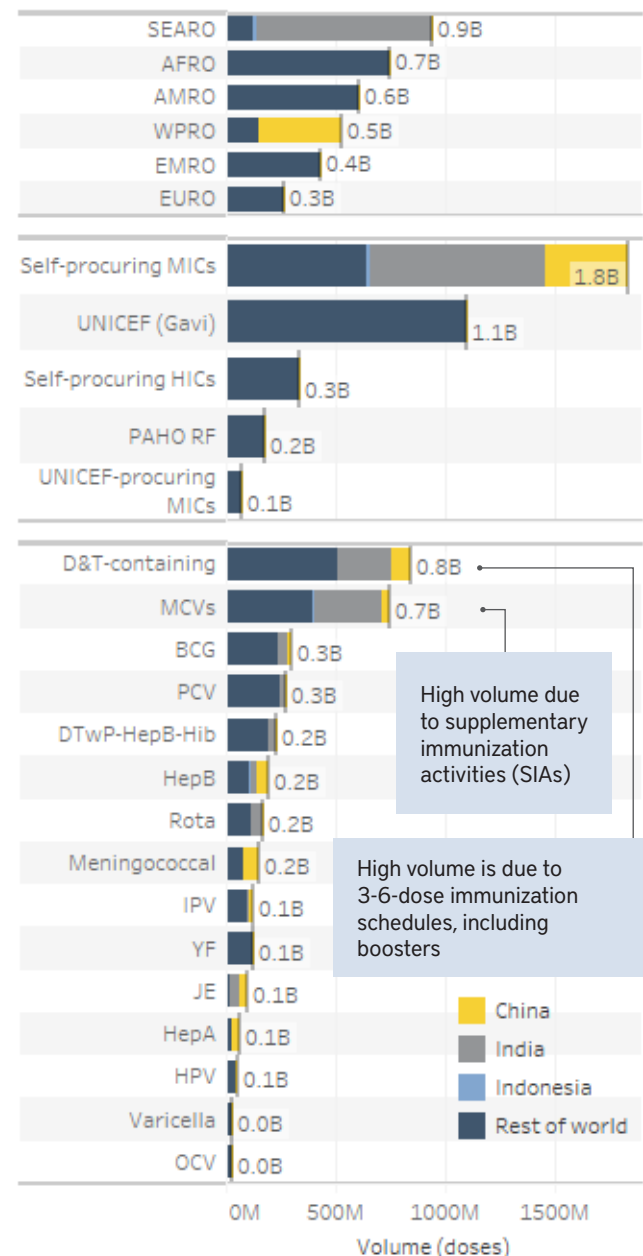
The largest buyers in 2018 were SEAR and AFR (46% of total volumes), driven by self-procuring MICs (53%) and UNICEF (Gavi) countries (47%). Highly populated countries, China and India, contribute significantly to the volumes from self-procuring MICs. However, without these countries, self-procuring MICs still account for 17% of global volumes (compared to UNICEF [Gavi] with 31% and self-procuring HICs with 9%).

The largest vaccine markets continue to be diphtheria- and tetanus-containing (D&T-containing) vaccines¹⁰ and

measles-containing vaccines (MCVs). Combined, these vaccines comprise 43% of global volumes.

MCV and D&T-containing vaccines also saw the greatest growth over 2017. The estimated 30–40% increase is mostly due to new introductions of MCV2 and D&T-containing boosters, large-scale MCV campaigns in India, and larger estimates of aP-containing vaccines used in the private market.

Figure 2.1 Global volume by (a) region, (b) country group and (c) vaccine group (2018)

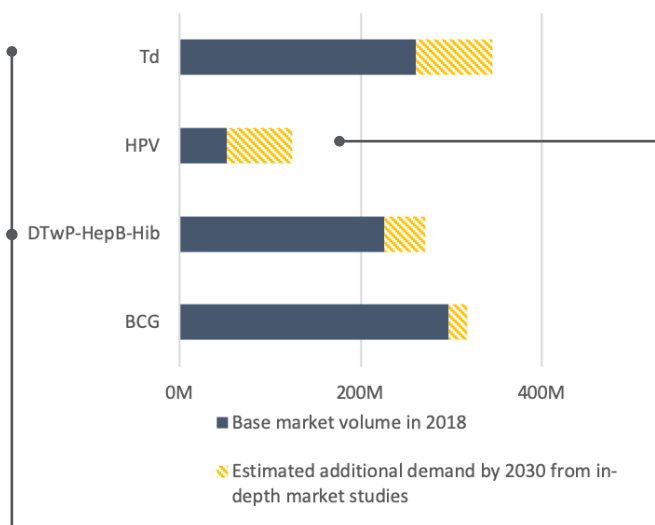


Notes:

Analysis excludes OPV, seasonal flu, military/travel market for all vaccines, and global stockpile for YF, OCV and meningococcal vaccines

Only the top 15 vaccines by market volume are shown in the vaccine group section

Potential Vaccine Market Volume Growth 2019–2030 (from MI4A market studies on BCG, D&T-containing and HPV vaccines)



WHO has conducted in-depth market analyses to forecast supply and demand for BCG, D&T-containing and HPV vaccines.* Based on these analyses, there is significant room for growth in HPV (anticipated 135% growth), Td (32% growth), and DTwP-HepB-Hib (20% growth) markets by 2030. HPV shows significant percent growth due to low current demand, partly because of supply constraints that have inhibited country introductions and high forecasted country adoption needed to meet cervical cancer elimination goals.

* Forecasted growth in demand for these vaccines assumes high-growth conditions, forecasting introduction of HPV in all countries by 2030, and Gavi support of D&T-containing boosters for second year of life, children and adolescents.

The replacement of TT with Td and the anticipated introduction of booster doses drive the significant expected growth for Td and DTwP-HepB-Hib.

The highest percent growth is expected for HPV due to many countries left to introduce (including highly populated ones), given ongoing supply constraints.

The greatest decline in volumes was seen for TT, given that many countries are replacing these products with Td, in line with WHO recommendations.

Future growth can be expected in markets with growing populations and lagging vaccine adoption: AFR, UNICEF (Gavi), and UNICEF- and self-procuring MICs. See the chart above for more detail on vaccine-specific market growth from MI4A's in-depth market studies.

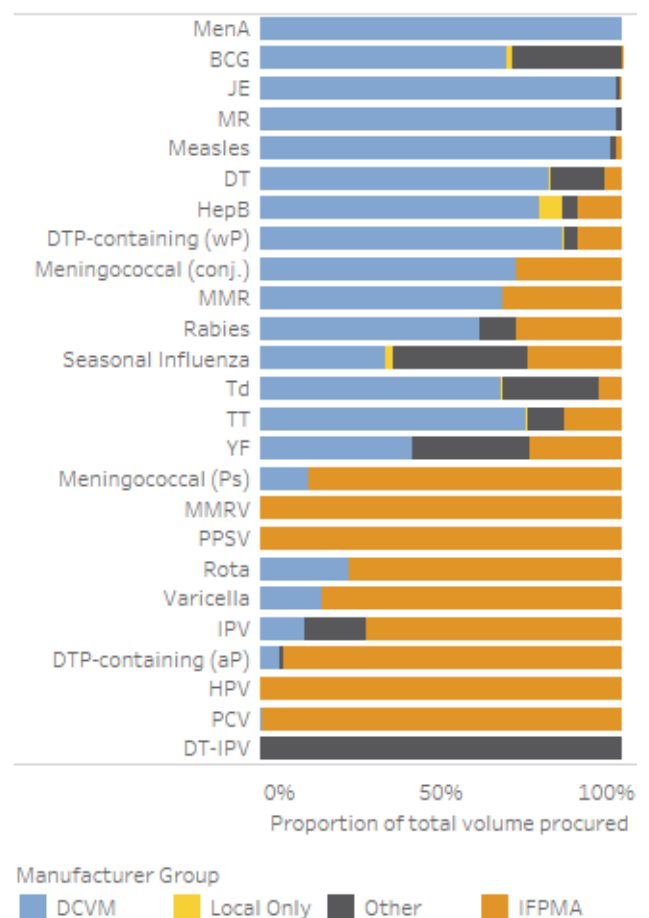
3. Vaccine Supply Dynamics

MI4A vaccine purchase data indicates potential supply security challenges in two key areas: 1) where there are too few suppliers of individual vaccines or vaccine components and 2) where countries are limiting their available choices by relying predominantly on supply from certain manufacturers or manufacturer groups.

Few markets are true monopolies; 68% of vaccines have more than four manufacturers and 37% have three or more PQ'd suppliers. Vaccine markets with few marketed products and high or variable demand, such as meningococcal vaccines or PPSV, may face supply security risks if production is interrupted for one or more key suppliers (Table 3a).¹¹ Vaccine supply security may also be at risk if the manufacture of vaccine components, such as adjuvants or singular antigens in combination products, is concentrated in one or few manufacturers.

DCVMs continue to come to market and offer additional choice across almost all vaccine groups (92%) (Figure 3.1). In 2018

Figure 3.1 Manufacturer type by vaccine



¹¹ While products are PQ'd by WHO, manufacturers may not actually be producing

MI4A purchase data, only HPV and PCV were made solely by IFPMA (International Federation of Pharmaceutical Manufacturers & Associations) manufacturers. The market has already evolved, as a DCVM entered the Rota market in 2018. Clinical pipeline data shows more suppliers are entering concentrated or monopoly markets such as HPV and meningococcal vaccines.¹²

Additionally, countries are leveraging the availability of regional products, with AMR and EUR showing a large proportion of procurement from regionally based manufacturers and SEAR relying almost exclusively on Indian manufactured products (Figure 3.2). However, individual countries may find fewer options than indicated in MI4A purchase data if there is a predominant reliance on specific manufacturers or manufacturer groups.

Finally, there is an increasing risk of market segmentation within indications due to product differentiation, which further complicates supply dynamics.

12 MI4A HPV and Meningococcal Vaccine Market Studies: https://www.who.int/immunization/programmes_systems/procurement/mi4a/platform/module2/en/

Figure 3.2 Regional procurement by manufacturer type

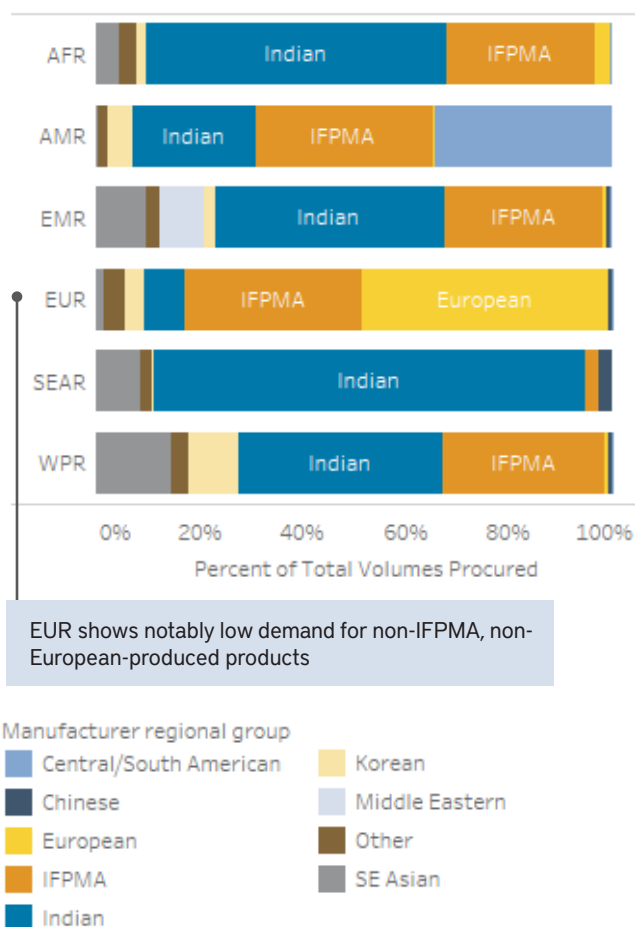
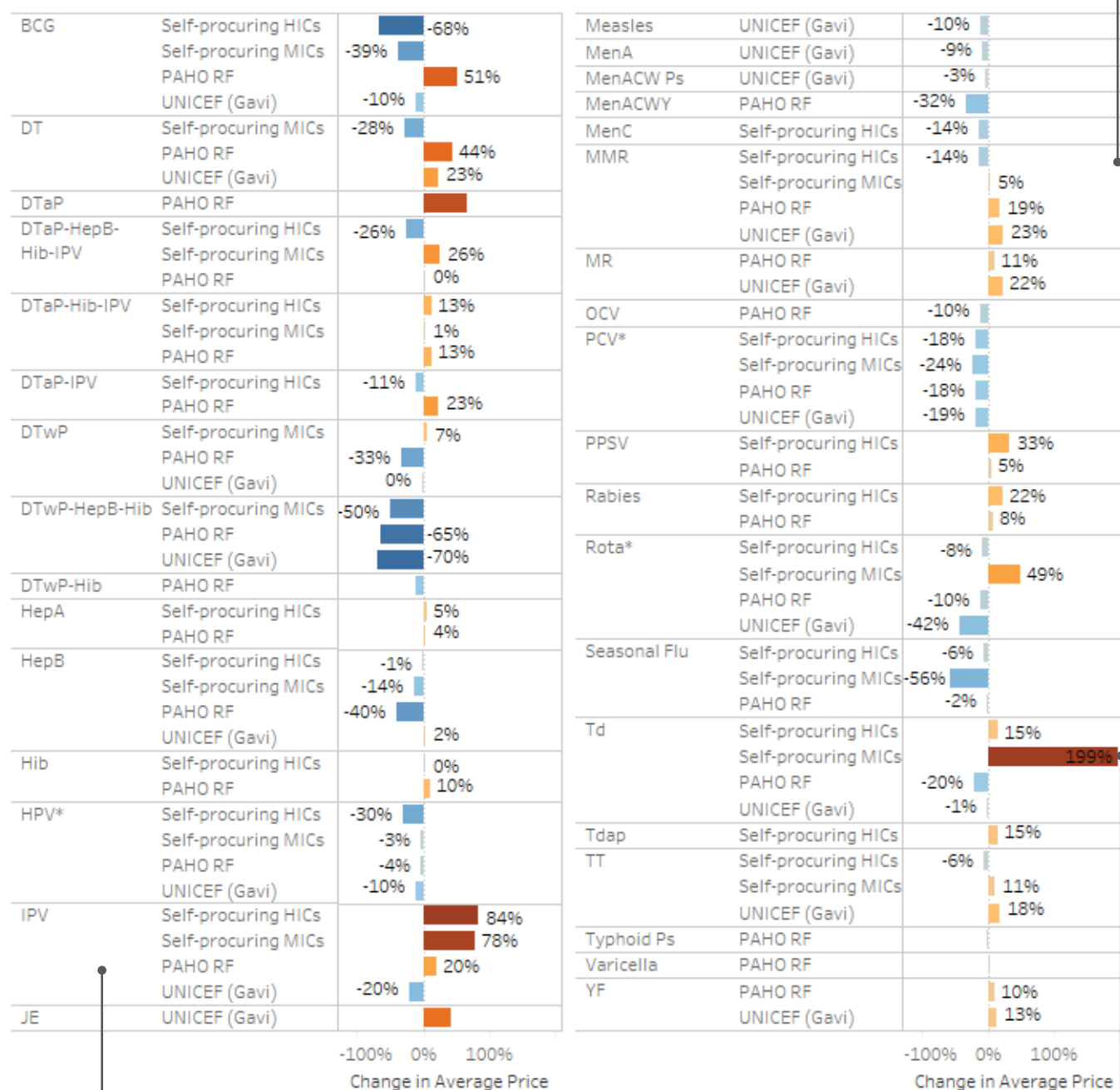


Table 3a Number of companies and PQ'd product by vaccine market

Total Number of Companies	W/ PQ'd Product	Vaccine
1	0	DTaP-HepB-Hib
		DTaP-HepB-IPV
		MenC Ps
		DTaP-HepB
		MenBC
	1	MenA
2		DTwP-HepB-Hib-IPV
		MenAC-Hib
		MenACW Ps
		Tdap-IPV
		MenB
		MMRV
		PPSV
		Typhoid (Other)
	1	DTaP-HepB-Hib-IPV
	2	HPV
3	0	DTaP-Hib
	1	Ebola
	2	PCV
	3	MenACWY
4		MenA Ps
		DTaP-Hib-IPV
	0	MenC
		TBE
		MenAC
	1	DTwP-Hib
5	1	Tdap
6	1	TCV
	3	OCV
	4	Rota
		YF
7	0	DTaP-IPV
		Pandemic Flu H5N1
8	0	MenAC Ps
		MenACWY Ps
	3	MMR
9	2	MR
	3	JE
10	1	DTwP-HepB
	5	IPV
11	1	DTaP
		Varicella
	2	Measles
	5	Pandemic Flu H1N1
	7	DTwP-HepB-Hib
13	2	HepA
14	8	bOPV
16	5	Hib
20	3	DTwP
		DT
	5	Td
22	6	TT
24	4	BCG
26	4	Rabies
	9	Seasonal Influenza
28	5	HepB

Figure 4.1 Average Percent Change in Price 2014/15–2018

Across all groups except self-procuring HICs, MMR prices increased



Notes:

*UNICEF prices for HPV, PCV and Rota are the prices offered to Gavi-supported countries only

Groups are based on the method of procurement for each purchase and the income level of the country purchasing

Vaccines are included where there are at least three data points for both 2014/15 and 2018 data for the same reporting countries

The same countries must have reported purchases in both 2014/15 and 2018 to have the reported price included

Average price is adjusted for cumulative inflation in the same time period

The significant change in Td price for self-procuring MICs is driven by one country that procured Td from a new manufacturer in 2018 for ~5x what they typically pay when procuring from another manufacturer

Across all groups except UNICEF, IPV prices increased

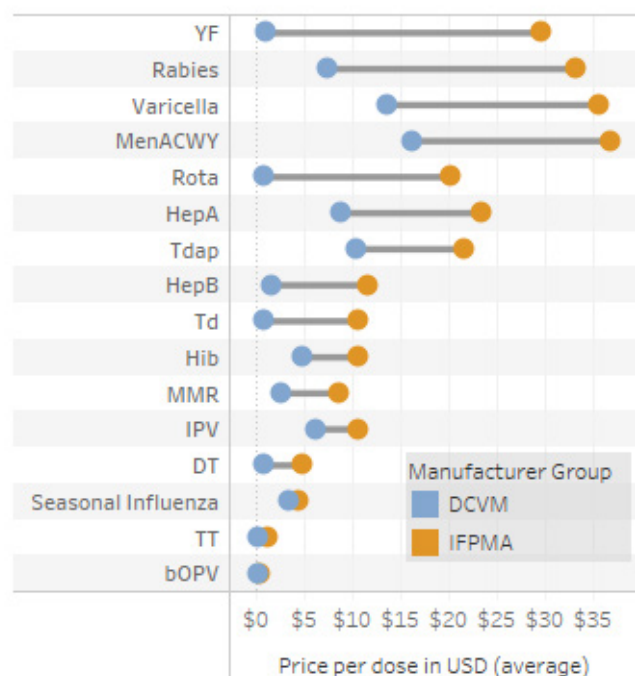
4. Vaccine Prices

MI4A purchase data shows no clear positive or negative trend in vaccine prices over time (see Figure 4.1 on previous page). While there is no consistent trend in prices across all vaccines, some individual vaccines show evidence of rising or declining prices. Average price increased for DTaP-Hib-IPV, potentially influenced by the monopoly position of the supplier and dearth of convenient substitutes. Conversely, average prices decreased for DTwP-HepB-Hib, HepB, HPV, PCV and seasonal flu. Common reasons for decreasing price that may have impacted these markets are donor intervention and increased supplier competition, particularly from new DCVM entrants. Across all vaccines, DCVMs offer a lower average price than IFPMA manufacturers (Figure 4.2). In 2018 purchase data, YF and rabies vaccines had the greatest notable difference in prices.

By country group, self-procuring MICs saw the largest change in average price across all purchased vaccines – a 9% increase. Prices declined 3% for UNICEF (Gavi) and stayed stable (+/- 1%) for PAHO RF and self-procuring MICs.¹³

13 Vaccine prices for PAHO RF and UNICEF used in the price section are as reported by these organizations.

Figure 4.2 Price variance by manufacturer type (2018)



Notes:

Excludes vaccines that have only one type of manufacturer

Excludes manufacturers that only supply to domestic markets

By procurement mechanism (e.g. UNICEF, self-procurement), there must be purchases from both manufacturer types to be included

Figure 4.3 Price per dose (USD) for all vaccines by procurement/income group (2018)

	UNICEF (Gavi)	UNICEF-procuring MICs	PAHO RF	Self-procuring MICs	Self-procuring HICs
BCG	0.11	0.11	0.21	0.20	1.03
bOPV	0.14	0.14	0.15	0.22	0.27
DT	0.16	0.16	0.17	0.35	4.00
DTaP			15.00		14.65
DTaP-HepB-Hib-IPV			20.60	29.52	35.89
DTaP-Hib-IPV			14.20	22.20	26.61
DTaP-IPV			11.50	16.69	20.58
DTwP	0.22	0.22	0.17	0.22	3.82
DTwP-HepB-Hib	0.87	0.87	1.08	1.20	4.96
HepA			10.66	9.59	21.02
HepB	0.27	0.27	0.24	1.40	5.73
Hib			2.05	5.16	9.50
HPV	4.55	13.57	9.04	11.59	50.92
IPV	1.68	2.38	3.65	4.99	8.53
JE	0.41			0.76	10.43
Measles	0.31	0.31		0.90	
MenACWY			20.30	21.17	30.73
MMR	2.50	2.50	3.26	5.65	7.54
MR	0.73	0.73	1.43	0.86	
OCV	1.60	1.60	1.85		20.04
PCV	3.09	14.00	13.68	22.76	45.35
PPSV			7.98		18.93
Rabies			12.80	7.90	20.67
Rota (per course)	7.15	8.00		18.82	41.49
Seasonal Influenza		3.75	2.94	3.32	6.75
TBE				5.35	18.34
Td	0.12	0.12	0.09	0.27	11.43
Tdap			11.47		17.88
TT	0.09	0.09		0.32	3.22
Typhoid Ps				10.83	10.29
Varicella			14.46	24.01	25.02
YF	1.15	1.15	1.35	18.94	20.04

Notes:

UNICEF and PAHO RF prices are average prices as reported by these organizations; self-procured prices are median prices

Groups are based on the method of procurement for each purchase, not country groups

Only included in analysis if there were purchases from >=2 countries for each group

There is strong evidence of price tiering by procurement mechanism. Compared to self-procurement, pooled procurement leads to lower prices for 24 of 30 vaccines (Figure 4.3). Self-procuring MICs pay nearly three times more than non-Gavi MICs procuring through UNICEF and over two times more than countries procuring through PAHO RF.

While price is tiered by income at an aggregate level, there is substantial overlap in prices paid by self-procuring MICs and HICs. Self-procuring HICs pay more than five times more than self-procuring MICs, on average. However, Figure 4.4 shows many cases of lower-income countries paying higher prices than higher-income countries for the same vaccine.

WHO continues to engage with countries and partners to understand where affordability issues exist and support access to vaccines.

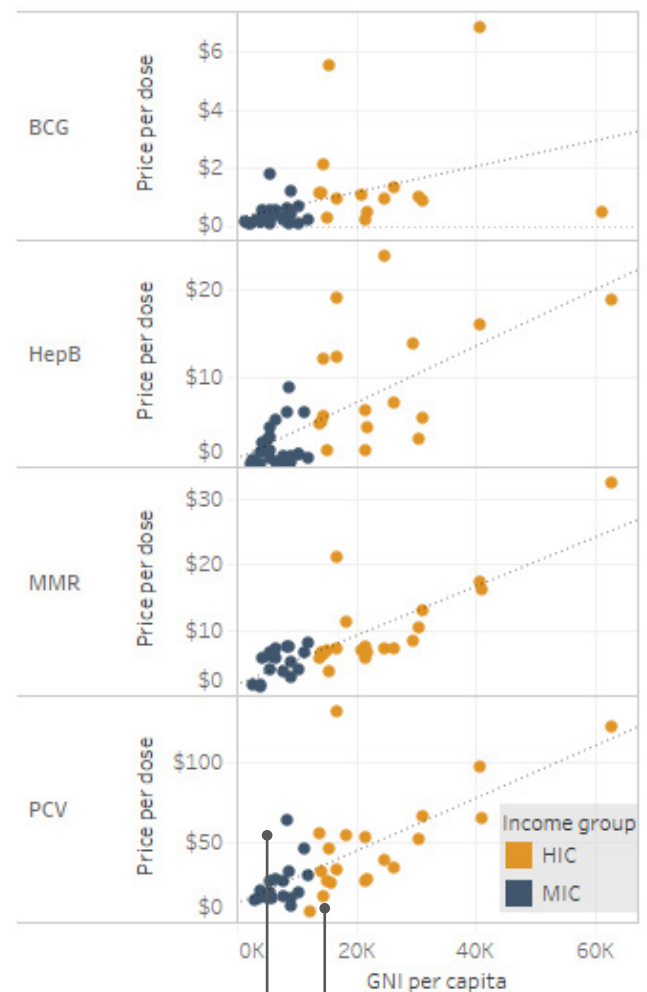
5. Vaccine Regulation

WHO and its partners strive to ensure all countries have access to sufficient doses of vaccine that are of assured quality.¹⁴ Stable, well-functioning, and integrated regulatory systems with streamlined processes and predictable timelines are key to facilitate this access.

In 2018, more than 98.5% of the globally available vaccine doses used in NIPs were of assured quality, up 2.5% from 2017. Additional vaccine-producing countries with functional national regulatory authorities (NRAs) are expected to reduce the remaining 1.5% gap in the coming years. Key remaining challenges that could

14 Vaccines of assured quality include vaccines produced in a country with a stable, well-functioning and integrated national regulatory authority (NRA), including vaccines prequalified by WHO. For more information, please refer to GVAP Secretariat Report 2013; page 80 (http://www.who.int/entity/immunization/global_vaccine_action_plan/GVAP_secretariat_report_2013.pdf#page=80) and WHO Vaccine Supply and Quality Unit GPV policy statement on vaccine quality (<https://apps.who.int/iris/handle/10665/63578>).

Figure 4.4 Price (USD) vs. GNI (gross national income) per capita for self-procured purchases (2018)



Several MICs paid higher prices than HICs for PCV

Notes:
Each dot represents one country

Selected four vaccines that had the most overall data

Only self-procured purchases

Single-product registration and access risks: BCG and Td examples

MI4A's 2017 market studies investigating reported shortages of BCG and D&T-containing vaccines found that registration of a single vaccine product was a risk to vaccine access. The 2018 update of the BCG study revealed that more than one-fifth of countries with BCG in routine immunization schedules have only one or no BCG products registered and do not accept PQ'd vaccines or expedited procedures. Similarly, the 2018 market study update on D&T-containing vaccines highlighted Td as a particular area for concern, with nearly 15% of countries with Td in schedule having one or no Td products registered and requiring full registration for product use.

Countries can mitigate temporary production interruptions from their preferred vaccine manufacturer if clear and efficient emergency import procedures are in place. However, in many countries, these procedures are still not defined.

Global vaccine shortages from MI4A's in-depth market studies

WHO has carried out in-depth market studies for several vaccines (BCG, D&T-containing, HPV and meningococcal) to investigate reported access issues, understand the resulting impacts on the market and identify areas for action. These market studies have identified global shortages* for HPV and meningococcal vaccines and highlighted potential supply risks for aP-containing vaccines.

HPV supply is currently not sufficient to meet increasing global demand due to insufficient manufacturing capacity, and this likely will not improve until the mid-2020s when additional supply is available, including new products. Issues in accessing meningococcal vaccines have been reported primarily by MICs and HICs for both polysaccharide and conjugate C, W-containing vaccines, specifically MenACWY. Discontinuation of all but one MenACWY polysaccharide product available to the global market, the rising incidence of C and W meningococcal serogroups in all regions, and the requirement for quadrivalent vaccination for Hajj pilgrims have contributed to increased demand for quadrivalent conjugate products and created access issues for countries that cannot afford the much higher-priced conjugate vaccine. While supply of aP-containing vaccines used in the infant schedule and as boosters is anticipated to be sufficient to meet existing demand, significant buffer capacity is not available. Any substantial (10%+) increase in demand (e.g., due to product or schedule changes) may require careful planning and communication from countries, partners and manufacturers.

** A shortage is defined as "the supply of medicines, health products, and vaccines identified as essential by the health system is considered to be insufficient to meet public health and patient needs or when demand exceeds supply at any point in the supply chain." (Source: WHO [2017], Technical Definitions of Shortages and Stockouts of Medicines and Vaccines)*

stall progress are lack of necessary commitment and plans to further strengthen regulatory authorities of concern, insufficient resources at the country level, and inconsistent vaccine production by local manufacturers. WHO continues to work with Member States to strengthen their regulatory capacity and achieve stable, well-functioning and integrated regulatory systems.

Countries' access to sufficient doses of preferred products could be improved by standardizing and streamlining regulatory pathways for registering vaccines. When vaccines are substitutable, flexible legislation to mitigate anticipated risks, such as registering more than one product or establishing faster registration processes, can help countries to avoid stockouts in the case of market exit or supply shortage from the preferred manufacturer. However, countries and suppliers are challenged in achieving this flexibility by lengthy and widely varying registration requirements that prolong timelines and drive up costs. These requirements are more burdensome for lower-cost manufacturers, potentially limiting access to more affordable products. See box on previous page for an example of registration and access risks with BCG and Td vaccines.

WHO has made several investments to alleviate these challenges. For more information about WHO activity in this area, please go to: https://www.who.int/medicines/regulation/benchmarking_tool/en/

6. Vaccine Stockouts & Shortages

Sixty-nine countries worldwide reported a national stockout¹⁵ of one or more vaccines in 2018, representing 46% of 149 total reporting countries (Figure 6.1).¹⁶ Of these 69 countries, 42 (61%) reported national stockouts of two or more vaccines.

The reported causes of stockouts are largely driven by global vaccine shortages (35%) or procurement delays¹⁷ (26%) rather than cold chain issues or distribution issues. For UNICEF (Gavi) and PAHO RF countries, funding delays also played an important role (25% and 27%, respectively). To better understand and prevent stockouts caused by the inability to access vaccines from procurers or manufacturers, WHO is developing a shortage notification system to standardize and accelerate communication of shortages and streamline responses to mitigate or resolve the shortage.

Vaccines with significant reporting of stockouts were YF, measles and IPV/OPV. IPV and OPV had the largest number of countries reporting stockouts. A high proportion of countries using YF and measles vaccines

15 From the 2014 Global Vaccine Action Plan: "A stock-out event is defined when a stock-out of a vaccine occurred for a duration of at least one month... If a stock-out (of at least one month) in one country were reported for two vaccines, these would be considered as two stock-out events for that country." Available at: www.who.int/immunization/global_vaccine_action_plan/gvap_secretariat_report_2014.pdf

16 Stockout data is as reported by countries and not validated by WHO.

17 UNICEF and PAHO procurement delays likely due to delay in transfer of funds from countries.

Figure 6.1 Reported stockouts over time

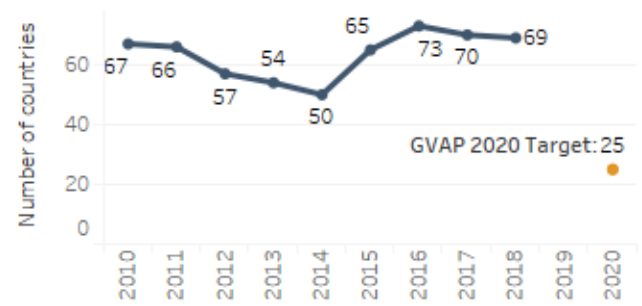


Figure 6.2 Global reporting of stockouts by vaccine (2018)

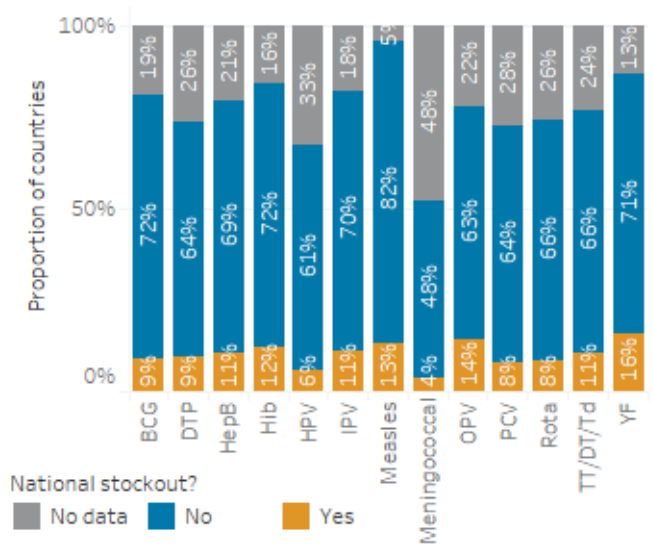
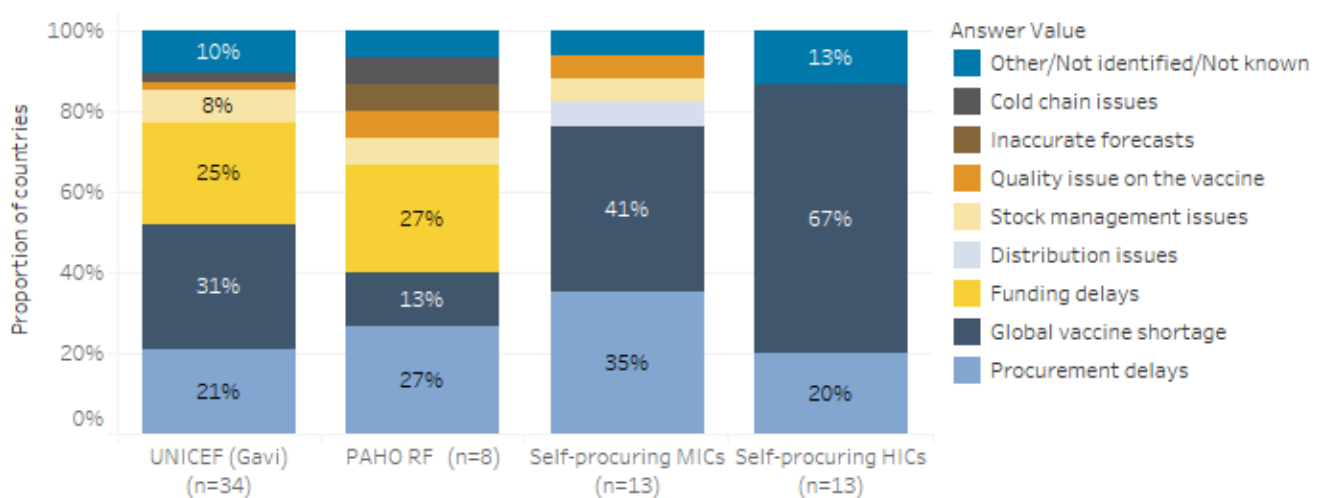


Figure 6.3 Reported stockout causes by country group (2018)



Notes:

Excludes groups with fewer than five countries

Distinct count of countries reporting is provided. However, countries may have reported more than one cause

also reported a stockout of these vaccines, likely due to higher-than-expected procurement from large-scale campaigns carried out in 2017 and 2018 in response to outbreaks in PAHO countries.

Additional information on reported shortages for BCG, D&T-containing vaccines, HPV and meningococcal vaccines can be found in the box on page 9, which outlines findings from MI4A market studies.

7. Global Market Value

MI4A estimates the global market value for vaccines to be \$26 billion in 2018, up approximately 25% from last year.¹⁸

Consistent with 2017, HICs drive global market value, comprising 68% of the total value and contributing to high market value in AMR and EUR regions. Self-procuring HICs typically pay the highest prices for vaccines and select higher-cost vaccines, such as aP over wP (whole-cell pertussis) D&T-containing vaccines and MMRV or MMR over MR or measles. After HICs, self-procuring MICs contribute significant market value – 25% of global value (11%, excluding China and India). China accounts for nearly half of the value for this segment, with substantial private market demand for many vaccines, including high-cost products that are not produced domestically, such as PCV and HPV.

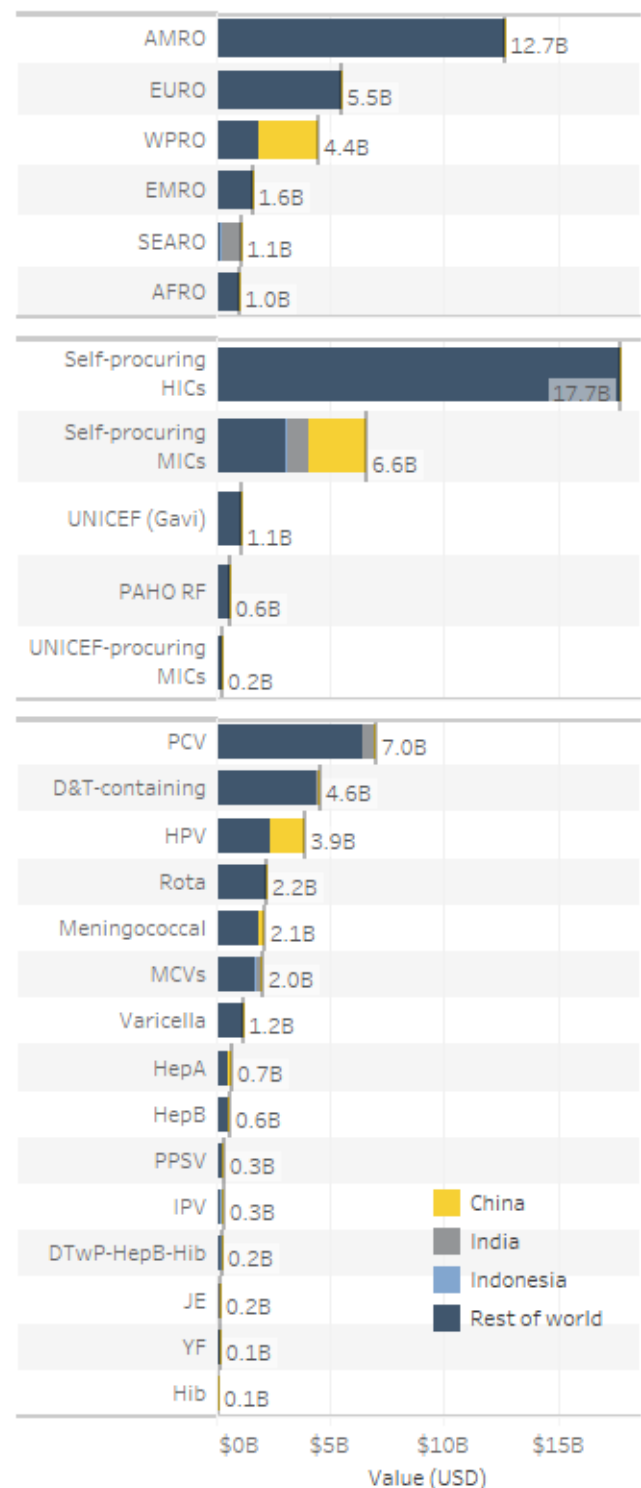
PCV, D&T-containing, and HPV remain the highest value vaccines globally, accounting for more value than all other vaccines combined. Market value for vaccines can derive from large volumes, high prices, or a combination of the two. PCV tops other vaccines in terms of value, with a high price and near-global introduction of a 3-dose schedule. Following PCV, D&T-containing vaccines command substantial volumes, with a 6-dose recommended schedule, and they drive up market value with high-cost combination and aP-containing products. HPV has the third-highest market value, with comparatively low global volumes but very high prices, particularly in the private market.

Regional and outbreak vaccines, such as JE and YF, are low-value markets with targeted populations in low-income countries.

Rota, PCV and HPV saw the most significant growth over last year due to new introductions and added private-sector demand. DTwP-HepB-Hib and TT declined in value compared to last year, likely due to slightly lower prices for DTwP-HepB-Hib and due to significantly decreased demand for TT, as countries replace it with Td. See the next page for more detail about the predicted evolution of market value for BCG, D&T-containing and HPV vaccines.

¹⁸ This year's estimate includes a more comprehensive assessment of the value of private market vaccines.

Figure 7.1 Global value by (a) region, (b) procurement and income group and (c) vaccine group (2018)

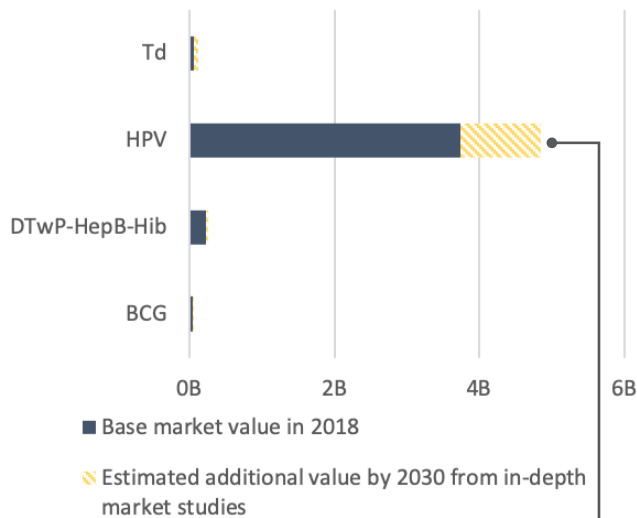


Notes:

Analysis excludes OPV, seasonal flu, military/travel market for all vaccines, and global stockpile for YF, OCV, and meningococcal vaccines

Only the top 15 vaccines by market values are shown in the vaccine group section

Potential Vaccine Market Volume Growth 2019–2030 (from M4A market studies on BCG, D&T-containing and HPV vaccines)



HPV is anticipated to grow by 30% to reach approximately \$4.8 billion, driven by the high price of the vaccine and the substantial increase in adoption that will be required to achieve cervical cancer elimination goals.

Based on in-depth market analyses of demand evolution and current pricing data, HPV, Td and DTwP-HepB-Hib are anticipated to see significant global market value growth by 2030.* Strongest growth is expected for HPV. While accounting for lower overall value, Td and DTwP-HepB-Hib market values are expected to increase by about 90% and 20%, respectively, due to expected adoption of these vaccines for booster doses and replacement of TT.

**Market value projections leverage the same high-growth volume assumptions presented in section 1. For price, market value projections assume the continuation of a country's 2018 reported price for each vaccine. For countries that have not reported to the JRF, price was estimated based on a country's procurement mechanisms and income groups.*

Annex 1: Additional Resources

UNICEF

Immunization Supplies and Logistics publications and data (including vaccine price data used in this report): https://www.unicef.org/supply/index_immunization.html

PAHO RF

Vaccine price data (used in this report): https://www.paho.org/hq/index.php?option=com_content&view=article&id=1864:paho-revolving-fund&Itemid=4135&lang=en

Gavi

Vaccine Roadmap public summaries and other supply and procurement related documents: <https://www.gavi.org/library/gavi-documents/supply-procurement/>

Other WHO MI4A resources

Vaccine purchase data (in Excel format for download) and vaccine-specific global market studies: <http://www.who.int/immunization/mi4a>

Annex 2: Data Sources

The primary data source for the analyses in this report is purchase and schedule data reported by countries through the WHO-UNICEF Joint Reporting Form (JRF). This is supplemented with additional publicly available information from PAHO RF, UNICEF and past WHO MI4A individual vaccine market studies.

Remaining information gaps are filled using the Global Vaccine Market Model (GVMM), which estimates demand and price by country and vaccine across all WHO Member States, leveraging publicly available information.

World Bank provides data for GNI (gross national income) per capita and global cumulative inflation rate:

<https://data.worldbank.org/indicator/NY.GNP.ATLS.CD>

<https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG>

Disclaimer

Information contained in the MI4A database is provided by participating countries that have agreed to share vaccine price and procurement data. Participating countries are solely responsible for the accuracy of the data provided.

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Annex 3: Acronym List

AFR/AFRO	WHO African Region	MMR	Measles, mumps and rubella
AMR/AMRO	WHO Region of the Americas	MMRV	Measles, mumps, rubella and varicella
aP-containing	acellular pertussis-containing	MR	Measles and rubella
BCG	Bacillus Calmette–Guérin (for tuberculosis)	NIP(s)	National immunization program(s)
bOPV	Polio vaccine – oral (OPV) bivalent types 1 and 3	NRA(s)	National regulatory authority/ies
D&T-containing	Diphtheria- and tetanus-containing	OCV	Oral cholera vaccine
DCVM(s)	Developing country vaccine manufacturer(s)	OPV	Oral polio vaccine
DTaP	Diphtheria-tetanus-pertussis (acellular)	PAHO RF	Pan American Health Organization Revolving Fund
DTwP	Diphtheria-tetanus-pertussis (whole cell)	PCV	Pneumococcal conjugate vaccine
EMR/EMRO	WHO Eastern Mediterranean Region	PPSV	Pneumococcal polysaccharide vaccine
EUR/EURO	WHO European Region	PQ'd	Prequalified
GNI	Gross national income	Ps	Polysaccharide
GVAP	Global Vaccine Action Plan	Rota	Rotavirus
GVMM	Global Vaccine Market Model	SE	South-East
HepA, HepB	Hepatitis A, hepatitis B	SEAR/SEARO	WHO South-East Asia Region
Hib	Haemophilus influenzae type b	SIA	Supplementary immunization activities
HIC(s)	High-income country/ies	TBE	Tick-borne encephalitis
HPV	Human papillomavirus	TCV	Typhoid conjugate vaccine
IFPMA	International Federation of Pharmaceutical Manufacturers & Associations	Td	Tetanus-diphtheria (reduced antigen content)
IPV	Inactivated Polio Vaccine	Tdap	Tetanus-diphtheria-acellular pertussis (reduced antigen content)
IVIR-AC	Immunization and Vaccine-related Implementation Research (IVIR) Advisory Committee	TT	Tetanus toxoid
JE	Japanese encephalitis	UNICEF	United Nations Children's Fund
JRF	Joint Reporting Form	WHA	World Health Assembly
MCV(s)	Measles-containing vaccine(s)	WHO	World Health Organization
MCV2	Measles-containing-vaccine second-dose	wP	whole-cell pertussis
MenA, Men B, MenC	Meningococcal A, B, C	WPR/WPRO	WHO Western Pacific Region
MenACW-135 (Ps)	Meningococcal ACW-135 polysaccharide	YF	Yellow fever
MenACWY	Meningococcal ACWY		
MIC(s)	Middle-income country/ies		