

Measles and Measles-Rubella Combination Vaccines: Supply and Demand Update

UNICEF Supply Division

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This update provides new information on measles and measles and rubella combination vaccines, including supply, demand, and anticipated market developments through 2025. It highlights UNICEF's efforts to continue improving demand forecast accuracy while ensuring supply availability amidst resurgent measles prevalence.

1. Summary

- To prevent measles, the World Health Organization (WHO) recommends routine immunization programmes reach and sustain over 95 per cent coverage with two measles-containing vaccine (MCV) doses. As of 2020, 179 countries (92 per cent of all countries and territories), have introduced a second MCV dose (MCV2) into their expanded programme on immunization (EPI).¹ However, whereas the global coverage rate has remained stable during the COVID-19 pandemic, standing at 71 per cent in 2021, the global coverage rate for the first dose (MCV1) saw a sharp decline over the past two years, falling to 81 per cent in 2021, which is its lowest level since 2008.² This left 24.7 million children unvaccinated, and a further 14.7 million did not receive their MCV2.³ The impact of the pandemic has also resulted in increased rates of malnutrition and interruptions to vitamin A supplementation programmes.⁴
- As communities relax social distancing practices and preventive COVID-19 measures implemented during the height of the pandemic, the risk of large measles outbreaks has increased. Measles cases have increased by 79 per cent worldwide during the first two months of 2022, compared to the same period in 2021.⁵
- UNICEF procured 181 million doses of measles-rubella vaccine (MR vaccine) in 2021 on behalf of 35 countries and 109 million doses of measles vaccine on behalf of 17 countries. Demand for MR vaccine was exceptionally high in 2021 due to an introduction campaign in Pakistan, for which UNICEF supplied 114 million doses. Supplementary immunization activities (SIAs) represent the largest share of demand for MCVs through UNICEF. Demand for measles and MR vaccines is interconnected, with the quantity of MR vaccine procured through UNICEF exceeding that of measles vaccine.
- As countries introduce a rubella-containing vaccine (RCV) into their routine immunization programmes following wide age-range catch-up campaigns, the demand for MR vaccine is gradually replacing the demand for measles vaccine. However, UNICEF anticipates this process will slow down over 2022-2025, whereby the demand for catch-up campaigns will constitute a significantly lower share of the overall demand, and the demand for measles vaccine will remain at levels higher than previously anticipated.
- Current manufacturer production capacity and supply is sufficient to meet the forecasted demand and outbreak response requirements through UNICEF. In 2019, the new market entry of Biological E as a second manufacturer of WHO prequalified MR vaccine significantly reduced the risks associated with a single-supplier market. However, the market remains heavily reliant on a single manufacturer due to significant differences in production capacity between the manufacturers. Prices offered under UNICEF's 2020 tender for supply in 2021-2023 incorporate an average annual increase of ten per cent and indicate a need for continued efforts aimed at increasing market health through strengthening competition and further diversifying the supplier base.
- UNICEF anticipates issuing its next tender in 2023 for supply in 2024 and beyond. UNICEF will issue a market note update should the measles and MR vaccine markets change significantly.

2. Background

Measles is a highly contagious viral infection caused by the measles *Morbillivirus*. It is one of the leading causes of under-five child mortality, despite the availability of safe and cost-effective vaccines.⁶ While the introduction of the measles

¹ Measles and Rubella Initiative, [MRI 2020 Annual Summary](#), MRI, Washington, 2021.

² Measles and Rubella Initiative, [COVID-19 Pandemic Fuels Largest Continued Backslide in Vaccinations in Three Decades](#), MRI, Washington, 2022.

³ Ibid.

⁴ David Durrheim, Andrus, Jon, Tabassum, S, et al., [A Dangerous Measles Future Looms Beyond the COVID-19 Pandemic](#), Nature Medicine, London, February 2021, p. 360-361.

⁵ MRI, [COVID-19 Pandemic Fuels Largest Continued Backslide in Vaccinations in Three Decades](#).

⁶ World Health Organization, [Measles Vaccines: WHO Position Paper](#), WHO, Geneva, April 2017, p. 208.

vaccine in 1963 reduced the occurrence of major epidemics,⁷ measles remains common in many regions of the world, despite global elimination efforts.

WHO reports the failure to vaccinate children with two doses of MCV as the main cause of the increase in measles cases and deaths between 2016 and 2019.⁸ In 2019, The US Centres for Disease Control and Prevention (CDC) and WHO reported that the number of measles cases globally reached 870,000, which was the highest reported number since 1996. The number of deaths reached 207,500, representing a 50 per cent increase from 2016. In 2020, the reported cases of measles dropped to just under 150,000 due to the impact of COVID-19 and related disruptions to measles surveillance.⁹ As communities relax social distancing practices and other preventive measures implemented for COVID-19 at the height of the pandemic, the risk for large outbreaks has increased.¹⁰ Measles cases are reported to have increased by 79 per cent during the first two months of 2022 compared to 2021.¹¹

Rubella is an acute contagious viral infection caused by the *Rubivirus*. It is the leading cause of birth defects and can cause foetal death and congenital defects known as congenital rubella syndrome (CRS) in infants.¹² WHO recommends countries to introduce an RCV into their national immunization programmes. It advises countries that have not yet done so, to introduce an RCV into their immunization programmes should they be able to achieve a coverage rate of 80 per cent or greater either through routine immunization or campaigns.¹³ Countries planning to introduce RCV should have a coverage rate of MCV1 greater or equal to 80 per cent to demonstrate their ability to achieve the same levels of coverage with RCV. WHO's position on rubella vaccines published in July 2020 is accessible [here](#).

As at the end of 2020, 173 countries, representing 89 per cent of all countries and territories, introduced RCV into their routine immunization programmes. This represents an increase from just four per cent in 2012 to 48 per cent in 2020 in lower-income countries, and from 43 per cent to 93 per cent in lower-middle income countries.¹⁴ The Americas have retained their rubella-free status since their certification in 2015, while the introduction of MR vaccine in Pakistan in 2021 marked another important step on the way to rubella control.

The Measles and Rubella Initiative (MRI), established in 2001, is a global partnership that leads efforts to control and eradicate both diseases.¹⁵ Founded by the American Red Cross, CDC, UNICEF, the United Nations Foundation, and WHO, it includes many other governments and organizations, such as the Alwaleed Philanthropies, the Bill and Melinda Gates Foundation (the Gates Foundation), Gavi, the Vaccine Alliance (Gavi), and the Lions Club International Foundation, amongst many others that contribute resources and unique expertise. The initiative supports countries to undertake SIAs and respond to measles outbreaks. In 2020, the MRI supported 43 SIAs in 32 countries, immunizing nearly 130 million children, despite the challenges caused by the pandemic.¹⁶

Despite the significant progress countries have made in MCV1 and MCV2 coverage as well as RCV introductions since 2000, the targets set for measles and rubella control and elimination by 2020 in at least five WHO regions were not met.

The MRI adopted in 2020 a new measles and rubella strategic framework (MSRF) for 2021-2030.¹⁷ It falls under the umbrella of WHO's global '[Immunization Agenda 2030 \(IA2030\)](#)',¹⁸ which seeks to '*leave no one behind*'. MRI's MSRF envisions a world free from measles and rubella and sets a goal for all regions to achieve the elimination of measles and rubella with targets and milestones specific to each region. One of its strategic priorities is to ensure the timely availability of sufficient quality-assured and affordable vaccines in the right presentation to meet country and community needs for routine immunization, SIAs, and outbreak response. This requires continued collaboration between national governments, vaccine manufacturers, and global partners to ensure vaccine supply security and improved market health.¹⁹

⁷ World Health Organization, [Measles Key Facts](#), WHO, Geneva, December 2019.

⁸ World Health Organization, [Worldwide Measles Deaths Climb 50 Per Cent from 2016 to 2019 Claiming Over 207,500 Lives in 2019](#), WHO, Geneva, November 2020.

⁹ MRI, [MRI 2020 Annual Summary](#).

¹⁰ World Health Organization, [UNICEF and WHO Warn of Perfect Storm of Conditions for Measles Outbreaks, Affecting Children](#), WHO, Geneva, 2022.

¹¹ Ibid.

¹² World Health Organization, [Rubella Key Facts](#), WHO, Geneva, October 2019.

¹³ World Health Organization, [Summary of the WHO Position on Rubella Vaccine](#), WHO, Geneva, July 2020.

¹⁴ Measles and Rubella Initiative, [MRI 2020 Annual Summary](#), MRI, Washington, 2021.

¹⁵ Measles and Rubella Initiative, [About Us](#), MRI, Washington, 2021.

¹⁶ Measles and Rubella Initiative, [MRI 2020 Annual Summary](#), MRI, Washington, 2021.

¹⁷ Ibid.

¹⁸ World Health Organization, [Immunization Agenda 2030: A Global Strategy to Leave No One Behind](#), WHO, Geneva, April 2020.

¹⁹ Measles and Rubella Initiative, [Measles and Rubella Strategic Framework 2021-2030](#), MRI, Washington, 2021, p.28.

Multiple MCVs are available on the market, including both a monovalent formulation and combinations with rubella (Measles-Rubella - MR), rubella and mumps (Measles-Mumps-Rubella - MMR), and rubella, mumps, and varicella (Measles-Mumps-Rubella-Varicella - MMRV). This market note covers only measles monovalent vaccines (measles vaccines) and MR vaccines, as the demand for MMR vaccines through UNICEF only constitutes a minor share of global demand, and there is currently no demand for MMRV vaccines through UNICEF.

3. Innovation

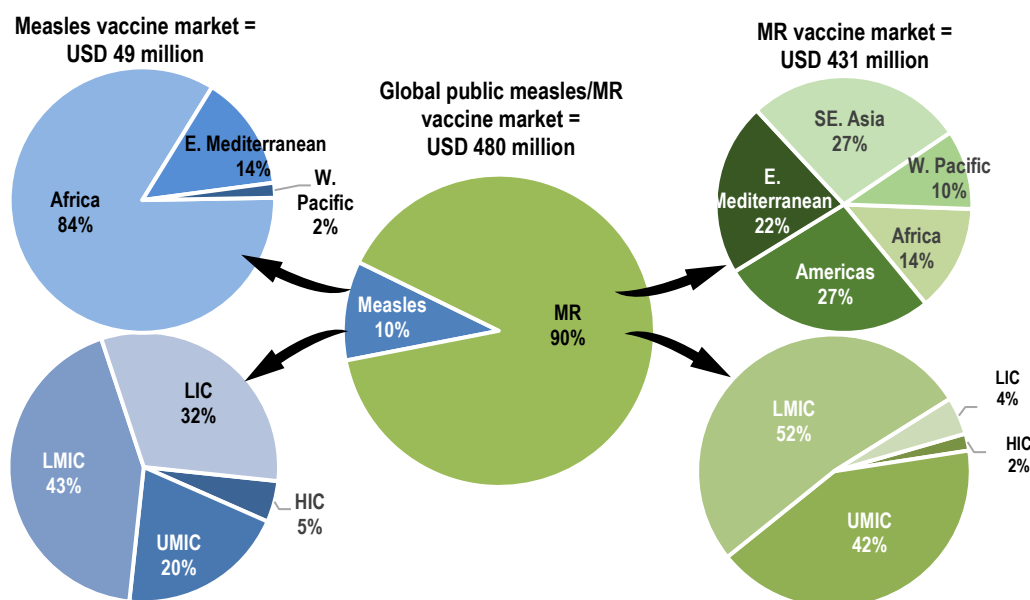
A key focus area of activity under the MRSF 2021-2030 is the development of innovative vaccine delivery platforms, especially in the context of new strategies to reach underserved populations and populations residing in areas of conflict and insecurity.²⁰ Gavi concluded in May 2020 its Vaccine Innovation Prioritisation Strategy (VIPS).²¹ It prioritised three projects in which it plans to help advance the development, policy, and access to:

- Microarray patches (MAPs),
- Heat stable and controlled temperature chain qualified vaccines,
- And barcodes on primary packaging.

Of particular interest to the MCV market are microarray patches.²² While the product has shown a potential to increase coverage and reduce programmatic costs,²³ a number of significant technical and commercial barriers need to be addressed before MAPs can be implemented on a mass scale.²⁴

4. Current Market Situation

Figure 1 Measles and MR Vaccine Global Estimated USD Revenues and Market Share 2021



Source: Global Vaccine Market Model (GVMM) 2021

In 2021, the global public markets for measles and MR vaccines reached an estimated combined value of USD 480 million, of which the MR vaccine accounted for approximately 90 per cent (Figure 1).²⁵ The introduction of the MR vaccine in India, Indonesia, and Pakistan effectively dissolved the market for measles vaccines across Southeast Asia by 2021, which accounted for 24 per cent of combined market value as recently as 2018.²⁶

²⁰ Ibid., p. 31.

²¹ Gavi, the Vaccine Alliance, [The Vaccine Innovation Prioritisation Strategy \(VIPS\)](#), Gavi, Geneva, July 2020.

²² Microarray patches are patches with microscopic needles that are applied to the body like a small bandage, painlessly penetrating the skin's very top layer to deliver a drug or vaccine.

²³ PATH, [Microarray Patch Resources](#), PATH, Seattle, 2021.

²⁴ Gavi, [The Vaccine Innovation Prioritisation Strategy \(VIPS\)](#).

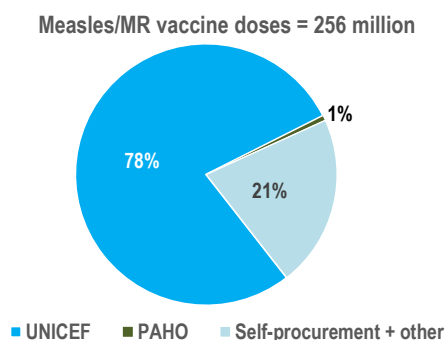
²⁵ Linksbridge, [Vaccine Almanac September 2021](#), Linksbridge, Seattle, October 2021.

²⁶ UNICEF, [Measles-containing Vaccines Supply and Demand Update](#), UNICEF, Copenhagen, August 2019.

In aggregate, over 80 per cent of the measles vaccine market is now concentrated in Africa, where the three most populous countries yet to introduce MR vaccine are located. Low-income countries (LICs) and low-middle-income countries (LMICs) account for 75 per cent of the measles vaccine public market, while LMICs alone account for over half of the MR vaccine public market. Middle-income countries (MICs) combined dominate the public market for MR vaccine, with a market share of nearly 95 per cent.

In 2021, UNICEF’s combined procurement value for measles and MR vaccines reached USD 158 million. This is an unusually high level of procurement due to the MR vaccine introduction campaign in Pakistan, which required the second highest quantity of MR vaccine procured through UNICEF for a campaign. Therefore, UNICEF does not consider 2021 representative of a typical year in terms of the global public sector demand for measles and MR vaccines.

Figure 2 Combined Global Procurement in Doses of Measles and MR Vaccines 2021



Globally, countries reporting to WHO report having procured approximately 256 million doses of measles and MR vaccines during 2021.^{27,28} This information is based on countries self-reporting and includes data on self-procurement, pool procurement mechanisms, procurement through the Pan American Health Organization (PAHO), and through UNICEF (Figure 2). Even though UNICEF may not consider the accuracy of this data to be certain, it does provide a good indication of approximate global volumes procured.

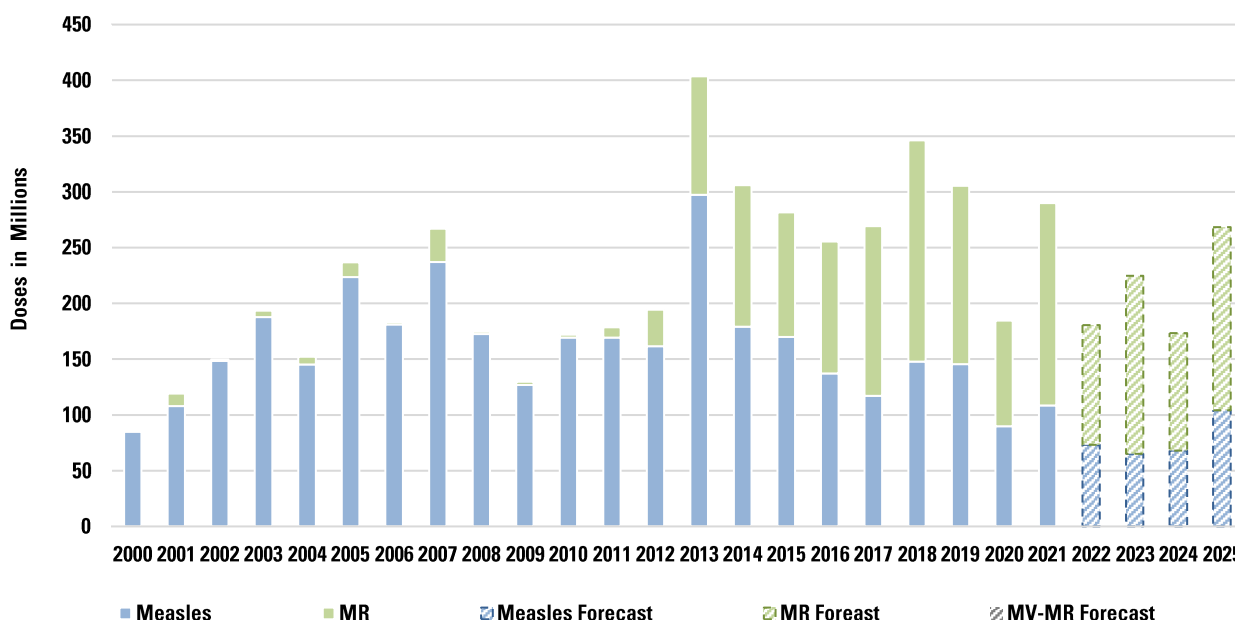
Source: WHO

The data reports that in 2021 approximately two million doses of measles and MR vaccines were procured through PAHO (representing one per cent), while 79 million doses were self-procured by countries.

4.1 Demand

Over the last ten years, procurement through UNICEF has averaged approximately 280 million doses of measles and MR vaccines a year, of which MR has increasingly represented a growing share, reaching over 60 per cent (Figure 3)

Figure 3 Demand for Measles and MR Vaccines through UNICEF 2000-2025

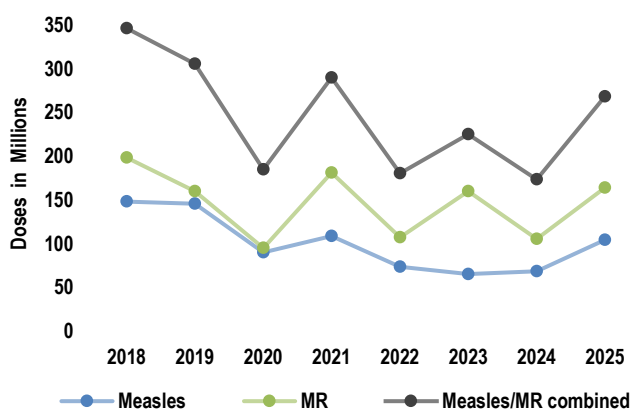


Source: UNICEF Supply Division

²⁷ World Health Organization, *MI4A Vaccine Purchase Data*, WHO, Geneva, 2021.

²⁸ Data adjusted to reflect 290 million doses procured through UNICEF in 2021, and not 174 million as reflected by WHO.

Figure 4 Demand for Measles and MR Vaccines through UNICEF in 2018-2025 * †



In 2021, UNICEF procured 181 million doses of MR vaccine on behalf of 35 countries and 109 million doses of measles vaccine on behalf of 17 countries (Figure 4). In contrast, the quantities supplied in 2020 were at a historic low for both vaccines for reasons unrelated to the COVID-19 pandemic, as demonstrated by the low variation between forecasted and procured quantities (Figure 6, page 7). The low 2020 demand was forecasted as early as 2018 and was reflected in the awarded supply in 2020. It was due to the low number of scheduled SIAs in countries with relatively small populations. All campaign quantities forecasted for 2020 were manufactured and supplied on time despite the onset of the pandemic.

Source: UNICEF Supply Division

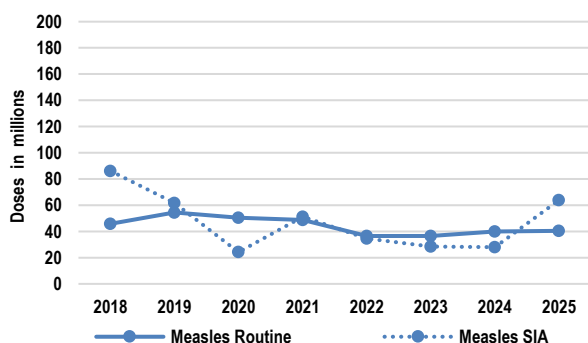
Note *: Doses in 2018-2021 are supplied doses and include quantities for outbreak and humanitarian response.

Note †: Doses in 2022-2025 are forecast doses and exclude quantities for outbreak and humanitarian response.

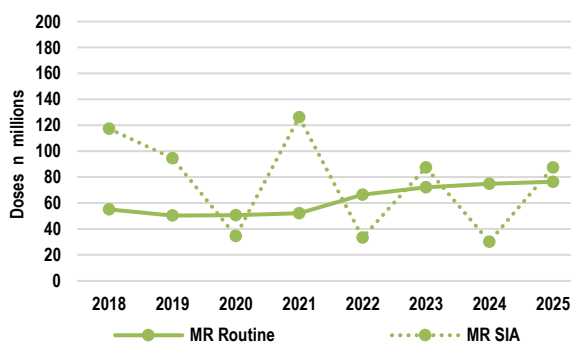
Figure 5 shows the large variations in demand between 2020 and 2021 and highlights the impact of SIAs on year-to-year demand. SIAs are a source of significant variation in demand between years.

Figure 5 Demand for Measles and MR Vaccines through UNICEF by Activity Type in 2018-2025 * †

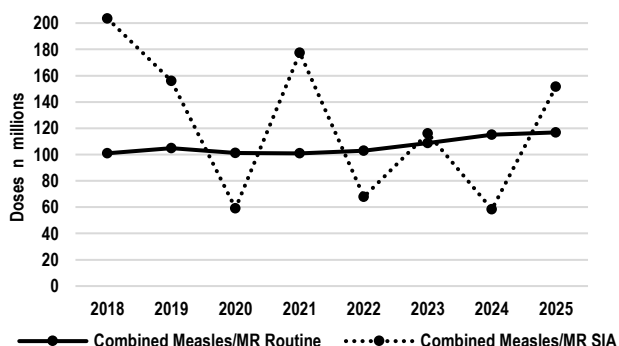
Measles Vaccine Demand by Activity 2018-2025



MR Vaccine Demand by Activity 2018-2025



Combined MCV Demand by Activity 2018-2025



The peak for combined MCV demand in 2018 is attributable to SIAs in India, Nigeria, and Pakistan, and the forecasted peak in 2025 to forecasted demand for SIAs in a number of populous countries, including Bangladesh, DR Congo, Ethiopia, Nigeria, and Pakistan. On average, SIAs represent between 50 and 65 per cent of the combined demand for measles and MR vaccines through UNICEF and are primarily funded by Gavi. Changes to Gavi's policy for campaign support made in 2019 introduced more flexibility, allowing countries to receive support for operational costs for sub-national campaigns as if they were nationwide.

Source: UNICEF Supply Division

Note *: Doses in 2018 – 2021 are supplied doses

Note †: Doses in 2022 – 2025 are forecast doses

These changes are expected to incentivize countries with high MCV coverage to move towards tailored interventions with smaller target groups. However, as most countries that are currently eligible for support have small populations, UNICEF expects the effect of this new approach on vaccine demand for follow-up campaigns to be limited over the next five years.

As countries switch from measles to MR vaccine, the demand for MR vaccine is expected to gradually replace the one for measles vaccine in follow-up campaigns as well. MR vaccine introduction campaigns are one-time and usually fall in the years when countries would otherwise conduct follow-up campaigns using the measles vaccine.

However, the quantities required for one-time MR vaccine introduction campaigns are significantly larger than the quantities required for follow-up campaigns due to the difference in the target age groups: which are nine months to 14 years for introduction campaigns versus nine months to 59 months for follow-up campaigns. Hence, MR vaccine introduction campaigns cause:

- Large one-time spikes in MR vaccine demand and smaller, permanent drops in measles vaccine demand for SIAs,
- Switches from measles to MR vaccine for routine immunization and,
- Increases in the number of doses required for routine immunization, as some countries wait to introduce an MCV-2 until after introducing MR vaccine.

Uncertainty around the timing of MR vaccine introduction campaigns has a significant impact on forecast accuracy in terms of demand for both routine programmes and campaigns, and consequently, also on the supply side of the market in terms of vaccine production and expected revenue.

Over the course of 2018-2020, MR vaccine introductions proceeded at a slower pace than what was forecasted in 2017. Out of the 15 countries UNICEF anticipated would introduce MR vaccine during 2018-2020,²⁹ only five did so, along with two others that had not been initially forecasted.³⁰ India, the largest of these countries, does not procure the MCV for its routine immunization programme through UNICEF. The others only had a combined cohort of 2.8 million children, which was significantly lower than the 17.2 million foreseen in the nine countries that ended up not introducing the MR vaccine. As such, the switch in the demand from measles to MR vaccine for routine immunization over the course of 2018-2020 was not as significant as forecasted in 2017.

In 2021, Pakistan introduced the MR vaccine for which UNICEF supplied 114 million doses. This represented 63 per cent of UNICEF's total procured quantity of MR vaccine that year. UNICEF anticipates a requirement of similar magnitude to occur with Nigeria's MR vaccine introduction, which is not anticipated until after 2025. MR vaccine introductions are not anticipated before 2025 in DR Congo or Ethiopia. As such, representing a combined cohort of approximately 14 million children with a two-dose routine immunization schedule, with frequent measles follow-up campaigns, DR Congo, Ethiopia and Nigeria will continue to drive demand for the measles vaccine in the coming years. Among the remaining less populous countries, six MR vaccine introductions are anticipated in 2022-2025.³¹

4.1.1 Demand for the Five-dose Vial Presentation

Studies have shown that health workers are reluctant to open a ten-dose vial to immunize fewer children in attendance during a routine immunization session. It is cited as one of the reasons why they fail to vaccinate children. Besides running out of vaccine stock, they are concerned about contributing to high wastage rates, as it may be an indicator of their job performance. In a 2011 CDC-led study of vaccine wastage-related knowledge and practices in Nigeria, health workers reported that they only opened measles vaccine vials when six or more children were in attendance, and only on certain days of the week.³² While this practice is aimed at reducing wastage, it also misses the opportunity to vaccinate children when fewer are in attendance. It goes against WHO's policy advising health workers to open a vial '*at every opportunity to vaccinate a child*', irrespective of the number of doses in the vial, even if there is only one child present.³³ Although this policy exists to increase coverage, health workers may be reluctant and feel obliged to balance the immediate concern of vaccinating a single child with wasting the opportunity to vaccinate more children at a later time and run out of stock.

²⁹ Which excluded Angola, Burundi, Côte d'Ivoire, Mauritania, Mozambique, and Togo, as they received vaccines in 2017 to support their MR vaccine introduction campaigns in 2018.

³⁰ Benin, Congo, DPR Korea, Eritrea, India, Sierra Leone, and Uganda.

³¹ Afghanistan, Guinea-Bissau, Madagascar, Mali, Niger, and Sudan.

³² Wallace AS, Willis F, Nwaze E, et al, [Vaccine Wastage in Nigeria: An Assessment of Wastage Rates and Related Vaccinator Knowledge, Attitudes, and Practices](#), National Library of Medicine, Bethesda, December 2017.

³³ World Health Organization, [Immunization in Practice: A Practical Guide for Health Staff](#), WHO, Geneva, 2015, p. (1)30.

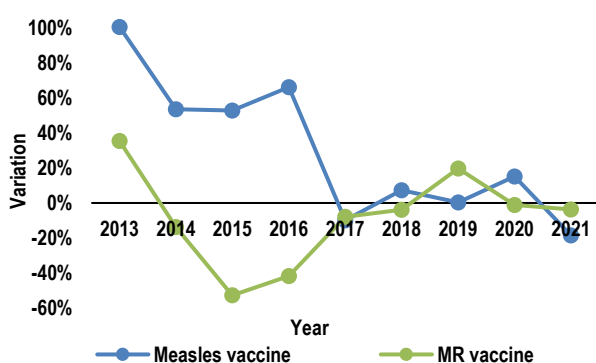
WHO first prequalified a measles vaccine in a five-dose vial presentation in 1993, and an MR vaccine in 2000. Lowering the number of doses in a vial aims to encourage health workers to open a vaccine vial even if only one child is present, to reduce open vial wastage and improve coverage. A study completed in Zambia in 2018 found that health workers were more willing to open a five-dose vial. Those districts using a five-dose vial also reported increased coverage rates and reduced wastage.³⁴ Countries procuring measles and MR vaccines through UNICEF have been able to access five-dose vial presentations since 2018.

The uptake of this presentation has been slower than initially anticipated at the time when it first became available through UNICEF. However, demand has been growing steadily, with a marked increase between 2021 and 2022, due to two large-population countries switching from using the ten-dose vial to the five-dose vial presentation in their routine immunization programmes. While the combined quantity of measles and MR vaccines in five-dose vials supplied through UNICEF in 2019 through 2021 did not exceed 10 million, UNICEF's forecast for 2022 is for 10 million doses of measles vaccine in a five-dose vial on behalf of three countries, and 15 million doses of MR vaccine in a five-dose vial on behalf of 12 countries.

4.1.2 Forecast accuracy

While measles and MR vaccines country forecast accuracy remains a challenge, UNICEF made notable improvements from 2017 through to 2021 by triangulating data and information on country plans and priorities from several different sources (Figure 6). The annual MRI demand forecast meeting discusses and validates country forecasts. It also reviews a countries' ability to meet Gavi's criteria for support, as well as the recommendations that are set out with regards to WHO's position on rubella immunization.³⁵ In addition, Gavi's engagement has helped make SIA funding more predictable, and Gavi's requirement for countries to submit a five-year plan for all their measles and rubella immunization activities as part of their application process has also improved visibility on country plans.

Figure 6 Forecast and Actual Procurement Variations through UNICEF 2013-2021



Source UNICEF Supply Division

Note: Actual quantities include outbreak response.

There are a small but significant number of MICs that seek to access vaccine supply through UNICEF when they are not able to secure it on their own. Part of UNICEF's procurement variance in 2018-2021 reflects such instances (Figure 6). In addition, the number of unpredictable outbreak response requirements was at a historical high in 2018 and 2019. While it is not possible to forecast the timing and magnitude of measles outbreaks, the disruptions to routine immunization and increased malnutrition due to COVID-19 are expected to lead to an increase in outbreak response requirements unless countries act fast to eliminate the immunity gaps.³⁶

4.1.3 Gavi Measles and Rubella Programme

2017 marked the first year of Gavi's current measles and rubella strategy. It provides comprehensive support for the following immunization activities.³⁷

- Support for the first and second dose of MR vaccine, as well as second dose of measles vaccine, for which countries are to co-finance the cost of these vaccines.
- Measles and MR vaccine follow-up campaigns with a target age range of nine to 59 months, aimed at addressing population immunity gaps.
- MR vaccine introduction campaigns with a target age range of nine months to 14 years, followed by an introduction of MR vaccine into routine immunization programmes
- Measles outbreak response through the MRI.

³⁴ Krudwig, Kirstin, Barbara Knittela, Ali Karima, et al., *The Effects of Switching from 10- to 5-dose Vials of MR Vaccine on Vaccination Coverage and Wastage: A Mixed-method Study in Zambia*, Elsevier, Amsterdam, August 2020.

³⁵ WHO, *Summary of the WHO Position on Rubella Vaccine*.

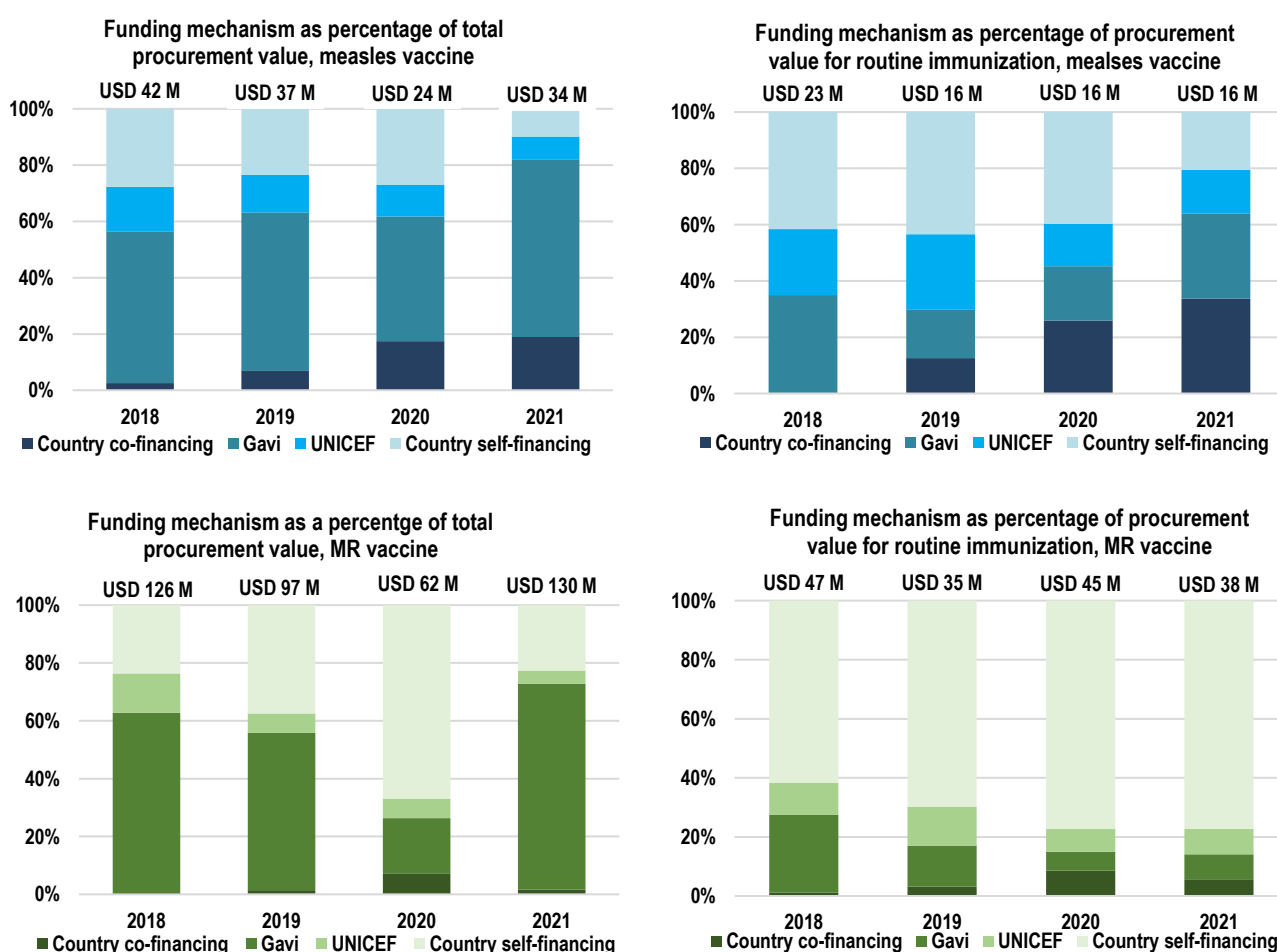
³⁶ David Durrheim, et al., *A Dangerous Measles Future Looms Beyond the COVID-19 Pandemic*.

³⁷ Gavi, the Vaccine Alliance. *Measles and Measles-Rubella Vaccine Support*, Gavi, Geneva.

As a result of its increased engagement in the measles and rubella programme, Gavi continues to be a major funding source for measles and rubella activities in countries eligible for Gavi support. The impact of campaigns, which are mostly Gavi-funded, is visible in the difference between Gavi's share of financing in 2020 and 2021 for both measles and MR vaccines (Figure 7). The limited number of campaigns in small-population countries in 2020 translated into a share of Gavi-funded measles vaccine equal to 40 per cent of the total value procured through UNICEF. For MR vaccine, the Gavi-funded share was around 20 per cent. In 2021, two large campaigns in Nigeria (measles vaccine) and Pakistan (MR vaccine) brought the Gavi-funded share of the total procurement value to 60 per cent for measles vaccine and over 75 per cent for MR vaccine.

In terms of the total value of procurement for routine immunization activities over 2018-2021, there is a notable difference between the average share of Gavi funding for measles vaccine (25 per cent) and MR vaccine (14 per cent), with the latter decreasing steadily since 2018 to below 10 per cent in 2020 and 2021. The decrease of the country self-financing share of measles vaccine between 2018 and 2021 is attributable to countries accessing Gavi support through MCV-2 introduction.

Figure 7 Share and Sources of Measles and MR Vaccines Financing Procured through UNICEF 2018-2021



Source: UNICEF Supply Division

4.2 Supply

In September 2019, Biological E became the second manufacturer to have their MR vaccine prequalified by WHO (Table 1, next page). It marked an important milestone in improving market health through increased competition and diversification by increasing the number of WHO-prequalified measles and MR vaccines to four being offered in 20 different presentations. However, depending on demand, not all presentations may be in production. Currently, UNICEF procures measles and MR vaccines in five- and ten-dose vials.

There are several other manufacturers of non-WHO-prequalified measles and MR vaccines, one of which has applied for the WHO prequalification of its measles vaccine and two have indicated plans to do so by 2023, one for MR vaccine, and one for measles vaccine.

Table 1 List of WHO Prequalified Measles and MR Vaccines

Manufacturer	Vaccine Type	Course	WHO PQ	Presentation	Form.	Shelf life	VVM	Cold chain vol (vial)	Cold chain vol (diluent)
Bio Farma (Indonesia)	Measles	2-dose	1997	10-dose vial	Lyophilized	36 months	14	3.30 cm ³	2.53 cm ³
	Measles	2-dose	2006	20-dose vial	Lyophilized	36 months	14	1.74 cm ³	-
Serum Institute of India	Measles	2-dose	1993	1-dose vial	Lyophilized	30 months	14	21.09 cm ³	12.53 cm ³
	Measles	2-dose	1993	2-dose vial	Lyophilized	30 months	14	10.55 cm ³	6.25 cm ³
	Measles	2-dose	1993	5-dose vial	Lyophilized	30 months	14	4.22 cm ³	5.48 cm ³
	Measles	2-dose	1993	10-dose vial	Lyophilized	30 months	14	2.11 cm ³	3.14 cm ³
	MR	2-dose	2000	1-dose vial	Lyophilized	30 months	14	21.09 cm ³	12.53 cm ³
	MR	2-dose	2000	2-dose vial	Lyophilized	30 months	14	10.55 cm ³	6.26 cm ³
	MR	2-dose	2000	5-dose vial	Lyophilized	30 months	14	3.16 cm ³	5.48 cm ³
Biological E (India)	MR	2-dose	2019	1-dose vial	Lyophilized	24 months	14	14.09 cm ³	7.80 cm ³
	MR	2-dose	2019	5-dose vial	Lyophilized	24 months	14	2.76 cm ³	3.25 cm ³
	MR	2-dose	2019	10-dose vial	Lyophilized	24 months	14	1.78 cm ³	2.12 cm ³

Source: World Health Organization

Note: All listed vaccines are immunogenically interchangeable.

UNICEF's vaccine procurement is guided by the principle of vaccine security, defined as being the sustained and uninterrupted supply of affordable vaccines of assured quality. In 2020, UNICEF concluded its 2021-2023 MCV tender and awarded long-term arrangements (LTAs) to two manufacturers of measles vaccine and two manufacturers of MR vaccine, reaching a total of 781 million doses (Table 2). This was UNICEF's first tender awarding two LTAs for the supply of MR vaccine, which was made possible following the market entry of Biological E. In addition to Biological E, Serum Institute of India (SII) was also awarded an LTA for the supply of MR vaccine, and both SII and Bio Farma were awarded LTAs for the supply of measles vaccine.

Table 2 UNICEF Long-term Arrangements 2021-2023

Supplier	Doses
Total measles vaccine	319 million
Total MR vaccine	462 million
Total award	781 million

The current production capacity of manufacturers of WHO prequalified vaccines is sufficient to meet all forecasted demand for measles and MR vaccines, as well as for outbreak response requirements, which are expected to increase as a consequence of the negative impact of the COVID-19 pandemic on routine immunization activities.

Source: UNICEF Supply Division

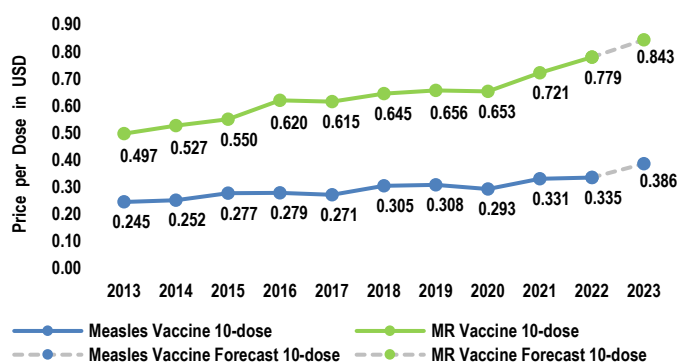
In 2021, Pakistan's introduction of the MR vaccine helped protect more than 90 million children against measles and rubella. The demand for measles vaccine through UNICEF was also high due to Nigeria's follow-up campaign having reached approximately 40 million children. Close cooperation and communication between countries, partners, and manufacturers ensured that the requirements for these two campaigns did not impact supply availability through UNICEF for routine immunization activities, other SIAs, or outbreak response. It should be noted that supply met the entire demand through UNICEF for both MR vaccine and measles vaccine in 2021 despite all manufacturers commencing production of COVID-19 vaccines.

UNICEF anticipates issuing its next tender in 2023 for supply in 2024 and beyond.

5. Pricing through UNICEF

The current price of MR vaccine is more than twice the current price of measles vaccine (Figure 8, next page). Between 2013 and 2020, the weighted average price (WAP) per dose for a ten-dose vial presentation increased by an average of less than three per cent per year for measles vaccine and a little over four per cent per year for MR vaccine. The pricing offered during the 2020 tender for supply during 2021-2023 did not reflect the anticipated improvements from a market with increased supplier base. In the current tender period, UNICEF projects the WAP per dose for a ten-dose vial presentation to increase by close to ten per cent a year for measles vaccine and close to nine per cent a year for MR vaccine.

Figure 8 Historic and Forecasted WAP per Dose in USD through UNICEF 2013-2023



The price per-dose in a five-dose vial for both measles vaccine and MR vaccine remains higher than the price per dose in a ten-dose vials, with the difference increasing further in 2021-2023 compared to 2018-2020. While the market has facilitated the switch to five-dose vial presentations by responding to programmatic concerns over the five-dose vial such as risk of administration errors and increased cold chain capacity requirements, the higher price per-dose may present a barrier to countries otherwise ready to switch.

Source: UNICEF Supply Division

UNICEF anticipates the significant price increases will affect countries differently, depending on which of the following three categories they belong to:

Countries eligible for Gavi support and currently supported for both MCV1 and MCV2	Countries minimally impacted, as the increase in prices would be covered by Gavi.
Countries eligible for Gavi support, but currently not supported for MCV1 and/or MCV2	Countries incentivized to introduce MR vaccines and/or MCV2 in order to access Gavi support.
Countries not eligible for Gavi support	Countries heavily impacted, as they would have to bear the full burden of the price increase.

While the total cost implications for each presentation depend on the reduction in wastage rate that can be achieved in each country's specific context, at 2022 prices, the cost per administered dose of MR vaccine from a five-dose vial will become equal to the price per administered dose from a ten-dose vial if the switch to a five-dose vial reduces the wastage rate to 25 per cent and all other factors are held constant.

Table 3 UNICEF Long-term Arrangement Prices for 2021-2023 in USD per Dose

Manufacturer	Vaccine	Price per dose 2021 (USD)	Price per dose 2022 (USD)	Price per dose 2023 (USD)
Bio Farma (Indonesia)	Measles 10-dose	0.250	0.260	0.270
Serum Institute of India	Measles 5-dose	0.434	0.476	0.552
	Measles 10-dose	0.350	0.385	0.423
Serum Institute of India	MR 5-dose	0.902	0.992	1.090
	MR 10-dose	0.721	0.793	0.873
Biological E (India)	MR 5-dose	N/A	0.918	0.918
	MR10-dose	N/A	0.720	0.720

Source: UNICEF Supply Division

In 2022, countries procuring WHO prequalified MR vaccine in a ten-dose vial through PAHO's Revolving Fund, access the vaccine at a price of USD 0.78 per dose.³⁸

6. Issues and Challenges

- Despite the market entry of a second MR vaccine manufacturer in 2019, the market remains dominated by one supplier.
- The average annual increase in WAP for both measles and MR vaccines in ten-dose vial presentations is eight per cent during 2021 through 2023. This significant increase in pricing is likely to impact negatively some countries' ability to finance their requirements, which in turn will negatively affect coverage rates and demand forecast accuracy.
- The impact of COVID-19 on immunization and nutrition is expected to contribute to an increase in measles cases and measles outbreaks, unless countries urgently close the immunity gaps. While the unpredictable nature of disease outbreaks makes it impossible to forecast the vaccine requirements for outbreak response activities, it is foreseen that a significant volume of measles vaccine and MR vaccine will need to be available for such activities.

³⁸ Pan American Health Organization, [PAHO Revolving Fund Vaccine Prices for 2022](#) PAHO, Washington, March 2022.

- The delays in and uncertainty around country decisions to introduce MR vaccine, as well as the timing of MR vaccine introduction campaigns in countries with large populations, such as DR Congo, Ethiopia, and Nigeria, continue to have a negative impact on the accuracy of long-term forecasting.

7. Steps Forward

- UNICEF and partners will continue to encourage new market entrants to increase market health, enhance competition, and ensure continued vaccine security. After 2025, potential MR vaccine introductions through wide age-range campaigns especially in DR Congo (41 million doses), Ethiopia (54 million doses), and Nigeria (106 million doses) could translate into one-time spikes in demand for MR vaccine.
- UNICEF will continue to closely monitor all pipeline manufacturers and their progress towards acquiring WHO prequalification.
- UNICEF will continue to seek closer collaboration with countries, WHO, Gavi, and all MRI partners to continually improve and re-adjust country forecasts to inform manufacturers to facilitate their production planning and ensure timely notification of any significant changes.
- UNICEF will continue to monitor monthly production availability, maintaining close collaboration with countries to ensure as much flexibility as possible to meet the priority needs for outbreak response activities.
- UNICEF anticipates issuing its next tender in 2023 for supply in 2024 and beyond. UNICEF will update this note should there be significant changes on the measles or MR vaccine markets.

For further questions or additional information, please contact:

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Other UNICEF information notes can be found at: <https://www.unicef.org/supply/market-notes-and-updates>

UNICEF issues market and information notes on products and supplies that are essential for the needs of children, and by extension their families. While some products are easily available and affordable, the availability of others can be limited, or in some instances, non-existent in the quality and price required. UNICEF places a strategic focus on these supplies to shape healthy markets. UNICEF seeks to influence the market to achieve greater coverage, affordable prices, diversified supplier bases, competitive market landscapes, and product quality that is fit for purpose and in the right form for children.