Cost of delivery estimates for new maternal vaccines in Bangladesh, Ghana, Kenya, Mozambique, and Nepal

Informing introduction decision-making and health system planning

When countries consider introducing new vaccines, immunization program cost and affordability are key questions. Data are limited on what vaccinating pregnant populations costs. To help fill this gap, PATH conducted prospective studies in collaboration with ministries of health and other partners to understand cost of delivery (COD) and introduction implications for new vaccines given in pregnancy in Bangladesh, Ghana, Kenya, Mozambique, and Nepal. The estimates will help inform policy decisions in low- and middle-income countries (LMICs) where MI-preventable diseases often hit hardest.

Background

Vaccination in pregnancy, or maternal immunization (MI), protects pregnant populations and/or their infants from certain infections. MI enhances maternal antibodies, which pass to the baby and protect in early life when some diseases are particularly dangerous to infants due to their immature immune systems. MI has helped most countries eliminate maternal and newborn tetanus (MNT)[1] and is also used against diseases like COVID-19[2], influenza, and whooping cough (mainly in higher-income markets). Now, new maternal vaccines against other high-risk diseases for infants such as respiratory syncytial virus [RSV] and Group B *Streptococcus* are licensed or in development, respectively, and could be globally available in the next few years. These new tools come with considerations (e.g., recommended gestational age administration and disease seasonality) that may require health system adaptations.

Our COD studies aim to understand the economic feasibility of implementing new maternal vaccines in various LMIC contexts, taking into account the natural intersection between immunization and antenatal care (ANC) programs. Results clarify costs of establishing a MI platform and recurrent delivery costs – informing affordability and sustainability of integrating new MI interventions into health systems and broader cost-effectiveness analyses.

Study process & methods

We prospectively explored the incremental costs associated with maternal vaccine introduction and recurrent operational costs at all levels of the health system (see Figure 1). Our study process included:

1. **Stakeholder workshops:** We convened a stakeholder workshop in each country to inform costing. These discussions with ministry of health representatives (national and regional) and other in-country stakeholder groups identified an appropriate MI delivery platform in each country.

Key cross-country takeaways

- New maternal vaccines are expected to be **delivered using existing service delivery platforms**, though systems will need strengthening and programmatic mechanisms may differ by country.
- Excluding commodity costs, estimated **financial costs** of delivering one dose of maternal vaccine range from **US$0.45 to $3.42**.
- Excluding commodity costs, estimated **economic costs** of delivering one dose of maternal vaccine range from **$2.01 to $4.49**.
- Estimated costs of delivering new maternal vaccines are **within the range of other routine childhood vaccine costs**, though comparisons should be made cautiously given differing contexts.

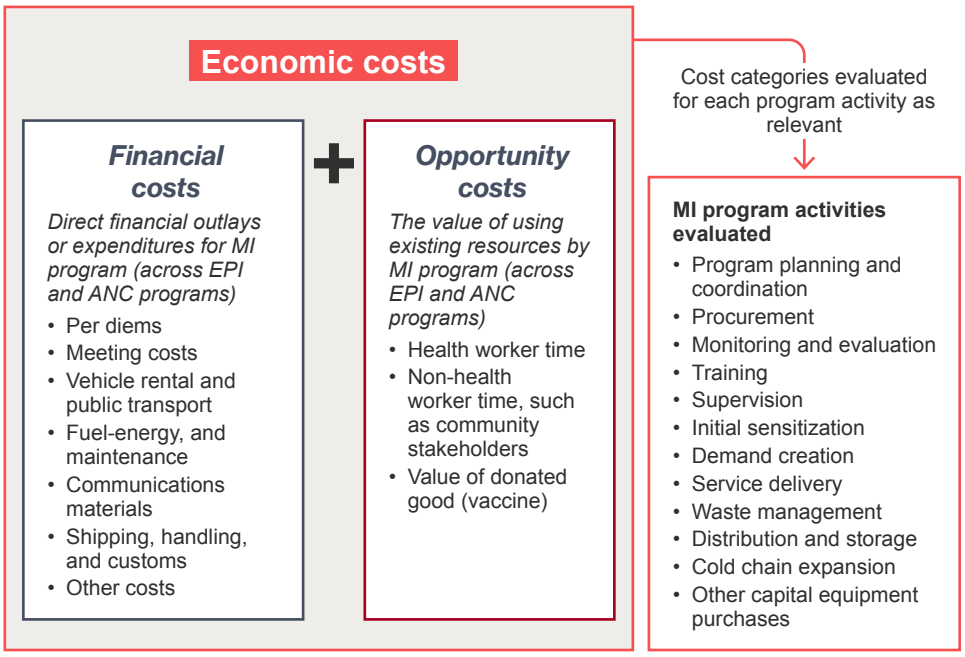
Key terms

- ***Financial costs:*** Direct expenses for introducing & delivering new maternal vaccines (e.g., staff allowances for trainings, printing of communications materials).
- ***Opportunity costs:*** Entail the value of existing resources (e.g., health worker time) & value of donated goods.
- ***Economic costs:*** Financial costs plus opportunity costs.
- ***Activity-based costing:*** Identifies & costs each activity associated with intervention introduction and delivery.
- ***Incremental costs:*** Costs additional to existing program operations that are necessary to implement new maternal vaccines (e.g., planning & organizing meetings, training).
- ***Commodity costs:*** Vaccine & immunization supplies/product costs.

2. **Prospective costing:** Informed by the workshops, we projected MI product introduction and delivery costs from the health system perspective. Analyses constituted only incremental costs; an ingredient-based activity approach; a five-year period; assumed national introduction across all regions and districts; and financial and economic costs (see Figure 1). Cost/resource needs were considered, but not financing mechanisms/donor support.

3. **Validation:** National program representatives validated the study inputs, assumptions, and results.

Figure 1. Maternal immunization cost categories and program activities evaluated



Data collection took place between June 2022 and May 2023 at regional/district, and facility levels in each country. Interviews with Expanded Programme on Immunization (EPI) and ANC program leads enabled the team to identify the activities and resources needed to implement new maternal vaccines and strengthen existing service delivery platforms. Additional data came from representative health administrative units, vaccine storage records, and health facility administrative records.

Findings

Key workshop learnings that informed the costing analyses

All five countries have experience vaccinating pregnant populations and existing service delivery mechanisms (i.e., for MNT) can be leveraged for any future MI platform. Health workforces providing immunization and ANC services have similar basic training and transferable skills that can be leveraged. Also, most ANC visits across countries occur later in pregnancy, supporting the chances of reaching pregnant populations during the optimal late vaccination windows for forthcoming maternal vaccines (i.e., for RSV). Also, EPI and ANC roles and MI delivery models differ between countries and even within a country. For instance, pregnant women in Kenya, Mozambique, and Ghana receive vaccines through ANC, whereas, pregnant women are referred to EPI sessions for vaccination in Bangladesh and Nepal. These and other programmatic insights from the workshops provided valuable context that helped identify key MI delivery elements to include in the costing analyses.

Cost projections for MI introduction & delivery

We projected the total financial and economic costs of introducing and delivering new maternal vaccines for all study countries over a five-year period (see Table 1). Cost estimates assume a vaccine price of $3 USD per dose. Costs are reported in 2023 USD.

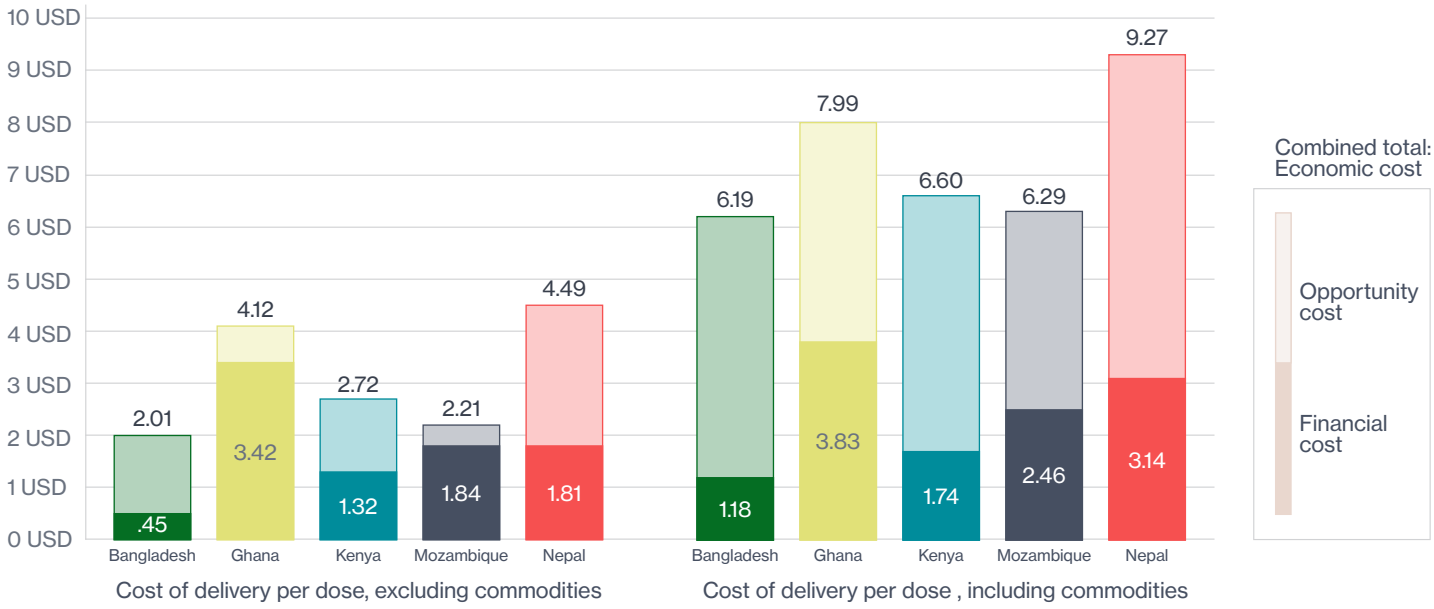
Table 1. Estimated total financial and economic costs of delivering new maternal vaccines to pregnant populations across 5 countries during a 5-year period.

		Bangladesh	Ghana	Kenya	Mozambique	Nepal
Total population estimated to receive maternal vaccine (number)		21,272,020	6,712,240	9,122,631	8,733,451	2,649,687
Total annual average cost over 5 years (USD)	Financial	$5,215,479	$5,669,794	$2,468,386	$3,106,707	$1,458,578
	Economic	$24,618,962	$10,287,088	$7,279,431	$6,529,040	$3,882,569

NOTE: Estimates assume a $3 per dose vaccine price. Actual vaccine price is not yet known. Population sizes estimated to receive maternal vaccine and other cost drivers vary across countries. Higher target populations and higher coverage lead to higher costs due to delivery to more people.

The financial and economic costs of administering one dose of a given maternal vaccine across each of five LMICs are shown in Figure 2. Excluding commodity costs (vaccines and other immunization supplies), estimated financial costs of delivering one dose of maternal vaccine ranged from $0.45 to $3.42. Excluding commodity costs, estimated economic costs of delivering one dose of maternal vaccine ranged from $2.01 to $4.49. Vaccine doses were assumed to be donated and were, therefore, only included in the economic cost estimates.

Figure 2. Financial, opportunity, and economic unit cost estimates for MI delivery across 5 countries



Key MI delivery cost drivers

The cost analyses identified the key programmatic factors driving program costs in each country. While overall cost drivers varied across countries, procurement was consistently the biggest cost driver, ranging between 11% and 60% and 46% and 66% of total financial and economic costs, respectively. (Note: Procurement costs exclude vaccine but include procurement add-ons and other commodities.) As shown in Table 2, training, program planning and coordination, demand creation, and distribution and storage were also major cost drivers depending on the country. To reiterate, the economic costs assume $3 per dose as the vaccine cost.

Table 2. Estimated drivers of financial and economic costs for new maternal vaccine delivery (annualized set up cost + recurrent cost) by cost share percentage across 5 countries.

	FINANCIAL					ECONOMIC				
Percentage of total cost	Bangladesh	Ghana	Kenya	Mozambique	Nepal	Bangladesh	Ghana	Kenya	Mozambique	Nepal
Procurement										
Program planning and coordination	16%	<1%	7%	11%	15%	68%	<1%	9%	11%	12%
Monitoring and evaluation	21%	1%	4%	1%	7%	10%	<1%	5%	1%	3%
Training	22%	35%	39%	30%	44%	8%	37%	32%	31%	44%
Supervision	1%	4%	9%	8%	3%	1%	4%	13%	9%	2%
Initial sensitization	1%	5%	5%	1%	1%	1%	4%	4%	1%	1%
Demand creation	27%	17%	6%	10%	14%	6%	16%	5%	9%	9%
Service delivery and waste management	<1%	1%	15%	3%	4%	4%	3%	19%	6%	9%
Distribution and storage	5%	17%	6%	27%	7%	1%	15%	8%	23%	17%
Cold chain and other capital purchases	6%	20%	10%	9%	6%	1%	19%	6%	9%	3%

NOTE: "Procurement" is the biggest overall cost driver across countries among the cost categories evaluated in this study, but it is not included in this table so that other key cost drivers can be seen more clearly.

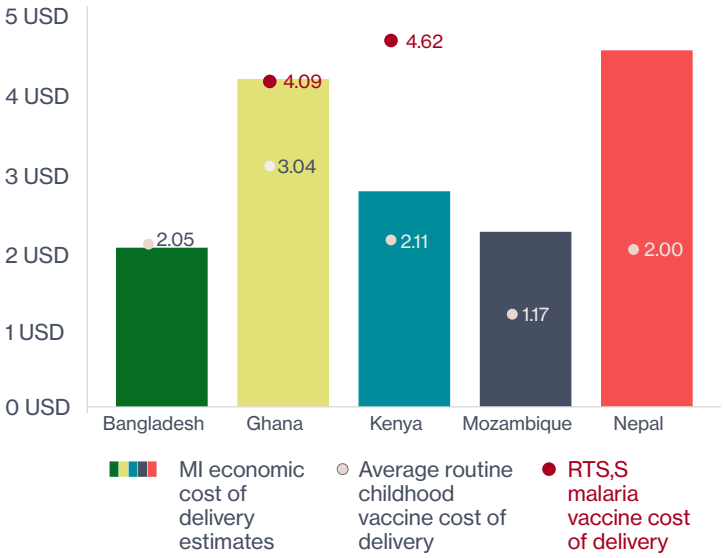
Non-major cost drivers — Major cost drivers

Conclusions

These studies are the first to estimate the costs of delivering maternal vaccines in the study countries and are among very few such studies in LMICs overall. The estimated delivery costs are comparable to the costs of other routine vaccines for children (see Figure 3). The costs of delivering new maternal vaccines in these countries are comparable to the costs of other routine vaccines for children (see Figure 3), though comparisons should be made cautiously given differing contexts.[3,4,5] This means that other new vaccine introduction/delivery costs could be leveraged for decision-making in places where no MI COD data are available. Ideally, doing so would require validation via a retrospective cost analysis in a few study countries upon MI implementation.

The estimates from these COD studies are a starting point for countries to evaluate resource needs as they consider MI intervention introductions and set public health priorities. The information adds value to discussions around funding and financing among governments and the donor community and provides important inputs to other health economic analyses such as cost effectiveness and budget impact analyses – overall supporting informed MI introduction decision-making in LMICs.

Figure 3. Estimated maternal immunization delivery costs (excluding commodity) in comparison to routine childhood and malaria immunization delivery costs.[4,5]



Read the full reports:

Bangladesh and Nepal: Baral R, et al. BMC Public Health. 2025. doi.org/10.1186/s12889-025-25786-3
Ghana and Mozambique: Baral R, et al. Vaccine. 2025. doi.org/10.1016/j.vaccine.2025.1267690X25000660

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