

In February 2021, CARE set out to understand the general costs of vaccine administration and delivery in relationship to the cost of vaccines themselves. The purpose of this research is to help inform the global policy debate and advance national and global conversations to ensure that in the rush to debate who buys doses of vaccine and who pays for them policy makers do not overlook the importance of budgeting for vaccine rollout. As frontline health workers are still the only way vaccines are administered, CARE paid particular attention to understanding the costs of the health workforce as a percentage of total costs.

These figures are illustrative and based on global averages and large datasets. They are intended to showcase the overall importance of thinking more broadly about delivery costs in addition to the vaccines themselves and per-diems for vaccinators and serve as an advocacy guide for starting conversations about how to budget the true cost of vaccination. They are not intended to be exact figures that represent comprehensive economic analysis for every possible iteration of vaccine delivery. To cost an actual vaccine campaign, policy makers will need to work closely with health financing experts and frontline health care workers in their own contexts. Specific costs will vary given the country context, the population demographics, and the existing health capacities and systems. These actual numbers may range from \$2-\$6 invested in rollout for every \$1 invested in vaccines.

### *Key Findings*

Our model shows that **for every \$1 invested in the vaccines themselves it costs \$5.00 to administer vaccines. \$2.50 for that money must go pay, train, equip, and support frontline health workers.** An additional **\$0.65** needs to be invested in social mobilization and education campaigns to increase vaccine acceptance.

These figures represent a middle estimate between 3 possible cost models that showed a low-end estimate of \$2.32 in additional costs for every \$1 invested in vaccines, and a high-end estimate of \$5.38 for every \$1 invested in vaccines.

### *Methodology*

We reviewed more than 100 published studies about vaccine costs. These studies are highly variable, and different studies include different costs of vaccination. There is no universally agreed standard on what costs to include in vaccination models. In particular, there are no guidelines about what costs to include for health workers of any kind or at any level.<sup>1</sup> In this context, providing more information about the comprehensive cost of a fast and fair vaccine rollout is critical to advancing the global conversation. To fill this gap in the conversation, we adopted several core principles to estimate these global illustrative figures:

- 1) **Simplicity:** rather than creating our own methodology for aggregating hundreds of disparate studies on vaccine costing, we searched for the smallest number of sources that would provide reliable estimates of overall global costing.
- 2) **Disaggregation:** we relied on studies that provided data which separated the costs of vaccines themselves from the costs of personnel, infrastructure, education, and other costs.
- 3) **Global scale:** Whenever possible, we relied on the World Health Organizations formal estimates of costing to understand how costs break down in vaccination campaigns across all the contexts where they operate. When there were no numbers available from WHO, we used peer-reviewed

articles or other globally recognized sources that covered as many countries and contexts as possible.

- 4) **Recency:** We used the most recent data available for every possible source. Source data in this model ranges from 2008 to 2020. The 2008 data represents only 1 variable: the estimated costs of training health workers for vaccines. All other data is from 2016 or more recent.
- 5) **Relevance:** we used WHO models on what it would cost to run Ebola vaccines because that was the closest and most recent parallel of having to massively scale a new vaccine at broad scale across the entire population rather than typical vaccine cost models which focus on childhood vaccines before age 2.
- 6) **Comprehensiveness:** We specifically sought to include information about keeping workers safe from COVID-19 as part of vaccine costing models. We also looked for information on what additional support frontline health workers need in the context of COVID-19—particularly around requirements for childcare, since for most families and women who make up 70-90% of the frontline health workforce their regular childcare options are no longer available as a result of quarantine measures.

### *Formula*

To arrive at these numbers, we used WHO's costing annex on proposed Ebola vaccine rollout in 2016 as the basis for our model, adding other variables to that core model to ensure a more comprehensive picture. That model started with a base of \$834,244 in vaccine costs and \$2,546,200 in non-vaccine costs. From that base, we included the following components:

- The Ebola vaccine model itself allowed us to estimate the equipment, training, and per-diem cost of surge capacity—which totaled 51% of the cost of vaccines themselves.
- The Ebola model also showed necessary investments in cold chain and systems strengthening as being 207% the value of the vaccines themselves
- WHO's standard that 13% of the non-vaccine cost of scaling up childhood vaccinations is required for training, a component that was not included in the Ebola pricing model. This 13% was applied to the non-vaccine costs of the Ebola model.
- On average 40% of non-vaccine costs are labor costs in standard vaccine rollout, which were not included in the surge capacity model. This 40% was applied to the non-vaccine cost in the Ebola model (Portnoy 2020).
- The Ebola vaccine model showed that social mobilization is 47% the cost of vaccines.
- The additional cost of COVID-19 community mobilization adds 20% to the cost of vaccinations. There is also an additional 27% of the vaccination cost required to implement other COVID-19 safety measures in the context of vaccine campaigns (Banks 2020).
- Childcare costs are an estimated 17% of a woman's income, so this was applied to the base personnel cost (OECD).

This initial model provided an overall cost of \$5.38 of additional costs for every \$1 invested in vaccine doses. Once we calculated this model, we triangulated the results using 2 additional models.

The first method of triangulation was to take WHO's 2016 estimates of the Ebola vaccine rollout costs and add the additional COVID-19 safety costs to this model. That model provided a cost of \$3.53 for every \$1 in vaccines. The Ebola model has the advantage of taking the context of a broad-scale rollout in

an epidemic to a population that does not traditionally receive vaccines. The disadvantage of this model is that it does not include long-term system costs and focuses instead on surge capacities.

Our second source of triangulation was to use WHO's 2008 cost estimates of standard vaccination campaigns and add the additional costs of COVID-19 safety measures. The second model provided a cost estimate of \$2.32 in delivery costs for every \$1 in vaccines. This model has the advantage of being tested and validated in dozens of countries in every region in the world. The disadvantages are that it is somewhat older, and only focuses on standard costs of vaccinating a well-known population that systems are designed to serve.

These two sources of triangulation are somewhat lower than the CARE estimate, although neither of them includes the full set of components we consider necessary to a fast and fair rollout of the COVID-19 vaccine that includes the rights and needs of frontline health workers. With that in mind, we revised our number to \$5 as an overall estimate, understanding that depending on the context, the exact cost may range from \$2 to \$6 per \$1 invested in vaccine. This number could be even higher in particularly fragile contexts, chronically underserved areas, or places where the health system is especially weak.

### *Results*

Using WHO's costing models for both Ebola vaccinations and for standard vaccination campaigns, combined with peer-reviewed articles on the costs of personnel as a component of vaccination campaigns and the additional costs of COVID-19 safety measures required in vaccination campaigns, we found that for every \$1 spent on vaccine doses, effective vaccine rollout requires an additional \$5.00 other expenses. These additional expenses include:

- \$1.70 to strengthening and maintaining health infrastructure such as cold chains, vaccine tracking systems, power supplies, and administrative costs.
- \$2.50 to supporting health workers, including training, equipment, and salaries. It includes both full-time salaries for staff and short-term surge capacity in the form of per-diems for vaccinators. Because of the particular crisis that COVID-19 has caused for women in terms of increased unpaid care responsibilities, this number includes \$0.15 for childcare costs to make it possible for frontline health workers to function effectively.
- \$0.65 to social mobilization and education campaigns to increase vaccine acceptance.
- \$0.15 to making health workers safe from COVID, including the increased time it takes to administer vaccine campaigns while enforcing social distancing and higher needs for personal protective equipment.

### *Implications:*

Policy makers deciding on budgets and vaccine rollout plans must consider debates around how to fund not only the vaccines, but also the additional costs of supporting health systems and frontline health workers if they hope to contain the COVID-19 pandemic. These numbers provide overall guidelines for beginning to understand and plan for the full cost of a fast and fair vaccine rollout.

### *Sources*

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<sup>i</sup> Vaughan, K., Ozaltin, A., Moi, F., Griffiths, U., Mallow, M., & Brenzel, L. (2020, July 18). “Reporting gaps in immunization costing studies: Recommendations for improving the practice.” <https://thinkwell.global/wp-content/uploads/2020/07/ICAN-publication-in-Vaccine-X-July-2020.pdf>