Economics of reaching zero-dose children

INTERVENTION SELECTION CRITERIA

- **Effective interventions only**: we will aim to focus on interventions that are proven to be effective, or at least have a high likelihood of being effective at reaching zero-dose children. Economic studies are resource intensive, so focusing on potentially ineffective interventions could be a waste of resources. A helpful resource to guide our selection is Gavi and FHI360's map of pro-equity interventions.[i] We will be flexible in terms of the effectiveness metric that this could entail, and for practical purposes and in cases where literature on the intervention's effectiveness is lacking, available data on simple output metrics such as the additional number of zero-dose children reached could be used as a proxy. Some interventions that are currently being planned have not been evaluated at all yet, and in those cases, we will assess the likely impact that they are making based on consultation with key country-level stakeholders, and any available data.
- **Wide programmatic scope**: selected interventions or improvements can fit anywhere within the IRMMA (Identify – Reach – Monitor – Measure – Advocate) framework[ii] or entail cross-cutting or systems interventions. Interventions can focus on delivery strategy modifications (e.g. periodic intensification of routine immunization or integration with other services), changes in planning and reporting (e.g. a more nuanced microplanning process), demand-side interventions (e.g. enhanced social mobilization, engaging religious leaders, etc.), or systems improvement (e.g. improved tracking and reporting systems). The intervention could also simply be improved financing (more funding, faster disbursements) to improve the implementation of existing strategies.
- **Filling evidence gaps**: our preference will be to focus on interventions for which currently no cost evidence exists from any low- or middle-income setting. We will leverage existing systematic reviews to determine where the cost evidence gaps around interventions to reach zero-dose children are.[iii] However, given the dearth of economic evidence on most interventions aimed at improving coverage among zero-dose communities, this likely does not substantially narrow down the scope.
- **Scalable interventions**: in case of more innovative interventions that are still in pilot stage, we will only consider interventions that are setup in a way that reasonably allows for scale-up. This means that the pilot is either already being implemented through government systems, or if managed and implemented by partners, can reasonably be scaled up through government systems through its current set-up and while maintaining effectiveness. Consultations with government and partners will be conducted to assess interventions against this criterion.
- **Sustainability**: we will select interventions that are or can be integrated into, and financed through, countries' primary healthcare systems. For pilots, this means they should not require very large investments to be replicated when scaling up. Recurrent costs should be expected to be manageable, such that if an intervention is currently donor-funded, governments should be able to reasonably assume the costs of the program over the long term.
- **Availability of output measures**: we will only evaluate the cost for interventions for which we can evaluate the incremental cost of implementation against the incremental output (i.e. number of zero-dose children reached) that the intervention achieved. If this is not already built in to design of the intervention itself, with the government we will evaluate if capturing such data can be added on. We will also consider prospective measurement at the time of cost data collection, if feasible. If not possible or for systems interventions where linking incremental output back to the intervention is more challenging, we will explore modelling techniques (see next section).
- **Timing of implementation**: the most ideal scenario will be to choose a strategy that is about to be implemented, so that we can still capture baseline data. However, as that might be challenging, a

second-best option would be an intervention that has recently been implemented, so that the recall bias for the baseline is minimized. We will avoid planned but currently unfunded interventions. We could make an exception if there is very strong government or donor interest in such interventions, and consider a prospective analysis. However, our preference would be to focus on evaluating actual implementation.

- **No conflict settings**: our research will focus on the urban poor and rural remote. Although we recognize that many zero-dose children live in conflict zones, interventions there could be so tailored that they will likely not meet our other criteria outlined in this list, such as sustainability and scalability. Additionally, ThinkWell and our local research partners are not equipped to work in these kinds of settings.

RESEARCH DESIGN PRINCIPLES

- **Including the beneficiary perspective**: as many interventions will focus on last mile delivery, and interventions are aimed at reducing barriers from the demand side to get vaccinated at facilities, it is important to capture the costs from the beneficiary or caretakers' perspective, to capture not only the fiscal cost incurred by the provider, but also to understand whether the overall societal cost of vaccine delivery has increased or reduced as a result of the intervention.
- **Timing of data collection:** some newly introduced approaches to reaching zero-dose children are likely to change over time. Practices might still be in a learning phase and not yet have 'stabilized' by the time of the cost evaluation, and it would be hard to determine a single representative moment in time for which to capture cost evidence. In such cases, capturing evolving practices over several points in time might be more informative than highly precise cost evidence for a single point in time, with several caveats that practices have evolved and improved since. Instead, a one-off bottom-up costing exercise could for example be followed by additional light-touch interviews to capture operational changes over the course of the learning phase, to estimate their effect on resource use and cost.
- **Start-up and recurrent costs**: Studies should capture the cost not only of running a given intervention, but also of the cost it takes to set it up. Start-up costs could for example include investment in infrastructure, training and planning activities, but also the cost of resource-intensive design processes. Investments in capital equipment are usually annualized in economic evaluation, to reflect their value to the overall health system over the lifetime of the equipment. However, it is helpful to also report on the total upfront investments required (i.e. total purchase value), to demonstrate the immediate fiscal impact of these start-up investments. When reporting results, it should be made clear which start-up costs must be repeated, and under what conditions and within what timeframe (e.g. when scaling up or replicating the intervention elsewhere).
- **Fixed and variable costs**: studies should report on what costs are fixed and variable, to better understand how costs change with output. Traditionally, immunization costing studies have reported average unit costs, but reaching zero-dose communities likely comes with considerable increasing marginal costs, requiring studies to offer more insight into the volume/cost relationship, to better determine what the most suitable delivery modality is to reach a certain population size.
- **Incremental vs full costs**: to be able to compare costs across settings, studies should not only quantify the incremental costs of an added intervention, but also the full cost of the platform it leverages, or at a minimum, document the existing resources required.
- **Estimating actual resource use**: our aim is to capture actual resource use rather than aspirational scenarios. Therefore, retrospective or simultaneous data collection would be preferred. Where this is not possible, or where the aim is to compare existing practices to potential programmatic changes,

prospective data collection can be used, though the limitations of this (i.e. ideal scenario that might not materialize) would need to be clearly reported.

- **Include a counterfactual**: ideally studies will compare the cost before and after the implementation of a given intervention or investment, either by gathering baseline data ahead of implementation or gathering data retrospectively on former practices. Where this is not possible, we will consider using other quasi-experimental designs (such as a case-control study comparing a different setting with similar characteristics), or through modelling out a hypothetical alternative. In cases where no counterfactual exists, where operational and financial bottlenecks play a large role and plans and practices differ significantly, or where practices change significantly over the course of the study, prospective or normative costing may be deployed in addition.
- **Outcome indicators**: the cost of interventions must be compared with the effect of the intervention. For interventions that have recently been implemented, it will be challenging to fully quantify outcomes and impact, but at a minimum, each study will capture basic output metrics, such as the number of doses delivered. We will also aim to capture the additional number of doses delivered due to the intervention, which might be more challenging to obtain locally, but can also be established either by comparing against a baseline or comparable district or other quasi-experimental research methods. For the same reason, in addition to doses delivered, studies will aim to capture the (additional) number of children reached. In the case of integrated delivery methods, the output for co-delivered health interventions should be collected as well, to capture the full benefits of the intervention.
- **Quantifying inputs**: as costs are driven by local input prices, salaries, etc., the studies will not only report on the final value of these inputs in economic terms, but also on the quantities of inputs used and price assumptions, so that these can be adjusted for use in other settings.
- **Contextualization of findings**: economic evaluations should not be stand-alone, and will be accompanied by at least a light qualitative assessment of the enablers and barriers of the intervention, including documenting the programmatic, resource, and political requirements, for similar interventions to be successful in other settings, and to be scalable.

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[i] Pro-equity Evidence Map (2023). **https://www.equityevidencemap.org/#evidence-map**

[ii] **https://irp.cdn-website.com/44236788/files/uploaded/Gavi_Zero-dose_FundingGuidelines.pdf**

[iii] Engelbert M, Jain M, Bagai A, et al. (2022). Improving routine childhood immunisation outcomes in low-income and middle-income countries: an evidence gap mapBMJ Open 2022;12:e058258. doi: 10.1136/bmjopen-2021-058258
and **https://gapmaps.3ieimpact.org/evidence-maps/routine-immunisation-children-lmics-egm**