

| # | Learning Day Question | Addressed to | Response |
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| 1 | Is it possible to parse out how much of the barriers presented in the living scoping review are related to their real prevalence vs availability of data and author`s bias/perspectives on what has been purposefully studied or the data that is commonly available in the literature? | Mira Johri, Audrey Beaulieu | Roughly half of the primary research studies included in the review (n=40/79) relied on secondary data from large-scale household surveys, such as the Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS). Use of large-scale household surveys such as DHS and MICS greatly enhances generalizability of results, because these surveys are carefully designed and implemented, and nationally representative. In consequence, studies based on these surveys can reliably report true prevalence and temporal trends and elucidate relationships between risk factors. The main findings on barriers presented in the scoping review are therefore extremely well substantiated, as they derive from multiple studies that use highly credible nationally representative data sources and rigorous analytic methods, and yield convergent findings. Of note, standardized household surveys such as DHS and MICS do not contain all risk factors/ barriers to vaccination that are of interest, which may limit the range of possible risk factors/barriers to vaccination being explored. Interest in variables not studied in DHS and MICS is one motivation to conduct smaller primary research studies. Smaller studies collecting primary data are unlikely to be widely generalizable, but well-conducted studies can contribute to understanding of barriers in specific contexts. Although we did not assess the quality of the articles included in the review, our focus on the published literature is a first-stage filter to select higher quality studies. |
| 2 | What level of evidence does Gavi require to make the decision to fund an innovative approach, which may be promising but far from having a series of RCTs completed...? | Gustavo Corrêa | Gavi does not have requirements related to quality of evidence to decide on funding. The funding decision process depends on the processes for each specific Gavi funding lever. For country grants, it involves an assessment and recommendation from an Independent Review Committee of immunization experts. Gavi does recommended specific interventions do address equity gaps in its programmatic guidance documents and those tend to be guided by evidence, but the quality of the evidence is not currently systematically addressed. There are ongoing discussions to improve the evidence base in Gavi programming guidance in the upcoming Gavi 6.0. |

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| 3 | Removing the qualitative papers might mean a lot of rich information is lost. What was the rationale for removal of qualitative work from the literature review? How can we glean some of the lessons documented in qualitative work? | Mira Johri, Audrey Beaulieu | We chose to focus on articles containing quantitative data, aiming to provide preliminary findings in time for discussions on the Gavi 6.0 strategy design, based on our assumption that a high number of studies with quantitative data would be available, and that including those with only qualitative data might not be feasible. However, we also included studies with qualitative evidence if they also contained quantitative data (i.e. mixed methods studies). Studies with only qualitative data may be considered in subsequent rounds of our living scoping review. |
| 4 | Thanks for the great. Finding while are applicable in most context, are there context or country specific findings? | Mira Johri, Audrey Beaulieu | We tried to differentiate findings by context where possible. We compiled findings by Gavi segments (high impact, core, fragile/ conflict, middle-income countries) and by World Bank region. We did not seek to identify country-specific results. An important finding from our review is that 41 studies highlighted variations in the prevalence of ZD children within countries underscores the need for subnational data disaggregation to inform tailored intervention approaches. Another important finding is that seven studies reported that the risk of deprivation varies significantly across contexts, suggesting that not all ZD children face the same risk of failing to survive, thrive, or reach their potential. Twenty-six studies discussed differences in ZD prevalence between urban and rural settings, while five studies documented concentrations of ZD children in conflict-affected areas. The main findings that were charted from each study (pertaining to our scoping review questions) will be included in the supplementary material of the article upon publication. However, we can provide the file prior to publication upon request. To contact: mira.johri@umontreal.ca |
| 5 | Do we have the specific list of the LMICs noted in the studies? | Mira Johri, Audrey Beaulieu | Yes – it will be included in the supplementary material of the article once published. However, we can provide the list upon request. To contact: mira.johri@umontreal.ca |

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| 6 | Is there anyway funding for PHC could be put in the same basket rather than stratified per activity? | Gustavo Corrêa | Gavi does not have specific funds for PHC, but countries are expected to integrate immunization investments in PHC approaches. Many Gavi supported countries have pooled funds schemes to better enable PHC integration, but that tend to happen at the country level though country owned approaches based on their national health strategies. |
| 7 | When it comes to access. What % of ZD children live at what distances from the nearest health service? Any specific exploration around this? | Mira Johri, Audrey Beaulieu | Regarding this theme, we found six studies that reported long distance/travel time to health facilities as a barrier to vaccination services for ZD children. However, we did not find evidence that would permit us to answer your specific query concerning what % of ZD children live at what distance from the nearest health center. The main findings that were charted from each study (pertaining to our scoping review questions) will be included in the supplementary material of the article upon publication. However, we can provide the file prior to publication upon request. To contact: mira.johri@umontreal.ca |
| 8 | To improve access, what specific strategies do you think will be the most cost effective to reach them? | Mira Johri, Audrey Beaulieu | We are not yet in a position to answer this question. The evidence on the cost-effectiveness of reaching ZD children was reported in only one study included in our review. This study by Clarke-Deelder et al. (2024) was on a Periodic Intensification of Routine Immunisation (PIRI) intervention aiming to reach under-immunised children but which also reported specific evidence on reaching ZD children. The study can be found here: https://doi.org/10.1093/heapol/czae024 . |
| 9 | I'm curious for the panelists' thoughts on the recommendation regarding cost-effectiveness studies -- these seem important to understand how to scale what works for ZD, but it is by definition more difficult/costly to reach | Logan Brenzel, Laura Boonstoppel | This is a great point. Cost-effectiveness evidence can be very helpful in choosing among various options for interventions that offer the best value for money, but indeed your concern has often been raised, that because the cost of reaching zero-dose children is likely to be much greater, this may scare off policymakers from prioritizing this. First, it will be important to recognize that despite the higher cost, various modalities of reaching ZD children will likely still be very cost-effective. Second, the integration and catalyzing aspects of reaching zero-dose children will be important i.e. zero-dose communities are deprived not only of immunization services but also family planning, nutrition, water and sanitation, etc. Figuring out how to |

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| | ZD...so how to convince policymakers with restrained funding? | | systematically and sustainably reach ZD communities with vaccines will also facilitate the delivery of other PHC services, which in turn makes it more cost-effective. Third, some interventions may have high upfront cost but lower recurrent cost in the long run, it will be important that researchers costing out interventions demonstrate cost efficiencies over time. And last, convincing policymakers to invest in reaching ZD may require a broader focus than only on simple cost-effectiveness metrics to better reflect the equity factor. |
| 10 | For my own understanding, what is Gavi's definition of zero-dose? What is the age to declare a child as zero dose? | Heidi Reynolds | For the operational definition of ZD, it is children who have not had DTP1 among children ages 12-23. But in practices there are different definitions for different purposes. Here is an article that discusses why and when flexibility in the definition may be needed: https://www.mdpi.com/2076-393X/12/2/195 . |
| 11 | What is the next step as the evidence is gathered? Is it compiled as a best practice document or systematic review? Then recommended to the RITAGs for NITAGs and SAGE for application in country programs? How do we ensure it is 'applied' in practice? | Gustavo Corrêa | We are indeed considering a number of dissemination and knowledge translation activities based on the ZD Learning Week evidence. It will involve discussions with Alliance Technical Working groups, inputs in Gavi 6.0 and HSS strategies, connection with peer-to-peer models and the regional level among many others. There is ongoing discussions on a future ZD SAGE. There are also ongoing discussions on structuring rapid reviews of the ZD programmatic evidence in Gavi 6.0. |

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| 12 | <p>Fantastic presentation, many thanks! Taking into account that ZDC are likely to be also neglected in terms of nutrition, scholarisation, other diseases... do cost studies consider the savings in synergies that may happen when those children are reached by a larger scope of PHC interventions, including vaccination?</p> | <p>Logan Brenzel</p> | <p>There is no reason why evaluations could not broaden the scope to assess the added benefits of bringing ZDC closer to other health services. This expands the complexity and cost of doing these studies which may preclude them being done on a regular basis. This would make for an excellent PhD thesis.</p> |
| 13 | <p>Great presentation, keen to understand panel's view on if and how cost to reach zero dose children vary with gender?</p> | <p>Logan Brenzel</p> | <p>We are trying to get at that issue by looking at the financial burden to households for bringing their ZDC to get vaccinated and comparing that with non ZDCs, and looking at the gender of the child in question. Facility-based ZD costing studies may not have much of a gender dimension, unless there are issues around access related to the gender of the vaccinator.</p> |

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| 14 | Thank you. In costing, how would you recommend splitting the cost to 'run' a PHC. And what recommendation would you give for campaigns, including Big Catch-Up (that also targets ZDCs/UICs). | Laura Boonstoppel | <p>There are several guidance documents that discuss costing methods, incl allocating shared costs such as those of running a primary health center, and how to allocate a portion of those costs towards the immunization program, and towards specific interventions. This one covers routine immunization program generally: https://immunizationeconomics.org/recent-activity/2020/12/23/how-to-cost-guide/</p> <p>And this one is specific to immunization campaigns: https://immunizationeconomics.org/recent-activity/2021/8/10/advanced-method-to-cost-an-immunization-campaign/</p> <p>With regards to costing out interventions that target ZD as well as a wider age cohort, such as the Big Catch Up, as is the case for any other kind of intervention that delivers more services than only vaccines to ZD, we would ideally want to evaluate both how many ZD children they managed to reach, as well as how many vaccines were delivered to others (under-vaccinated/on time), and any other services that were co-delivered, to recognize the benefits of integration. Where various different initiatives are ongoing at the same time, it might be difficult to separate out the contribution of individual interventions to reductions in ZDCs. We need to be intentional about measuring the specific interventions that are being put in place and recognizing the other activities that are ongoing. So we can cost the bundle of activities and compare the cost and impact of the full set of interventions, or we can parse out the costs for a specific activity and use techniques to try to get at what would have been the number of ZD children without the intervention.</p> |
| 15 | if the unit cost of increasing coverage is lower at lower levels of baseline coverage, what are the implications for equity and optimal resource distribution given subnational differences in ZD prevalence? | Laura Boonstoppel | <p>Excellent question: we know that resources are currently not optimally distributed given the variation in coverage and level of performance, and much can be done to improve resource allocation of existing funding within countries. At subnational level, cost and cost-effectiveness evidence can be leveraged to identify and tailor the package of interventions that is most cost-effective at reaching ZD children under their specific baseline conditions and in their specific setting. As coverage increases and the marginal cost of reaching the final ZD children increases, countries will need mobilize additional resources to reach those and/or face tough tradeoffs as the ZD agenda competes with many other existing and new cost-effective health programs.</p> |

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| 16 | From your experience, what recommendations can you share to ensure accurate and reliable data for zero dose costing and planning across geographic context. What types of data and data sources do you recommend for immunization managers to collect that could encourage better costing for the future? | Laura Boonstoppel | Accurate and reliable records are often a challenge, especially in areas where ZD prevalence is high. An ingredients-based approach complemented by budget or expenditure information for specific line items is usually the approach taken. Focusing on the biggest cost drivers when collecting data might be helpful (personnel, incentives, transport). Ideally, to granularly evaluate the number of ZD identified and reached through the various approaches, immunization managers would track immunization records by individual child, by delivery strategy, and individual outreach/facility-based session, etc. but we know this is often not feasible. The research principles document here discusses some ways to address common data challenges: https://immunizationeconomics.org/wp-content/uploads/2024/09/Research-principles-ZD-costing-2-Sept-2024.pdf |
| 17 | Is there any cost data/ evidence would you like to share about the how cost-effective or benefit of new innovations such as Microarray Patches? | Logan Brenzel, Laura Boonstoppel | You can find a few studies on the economic benefits of microarray patches here: https://immunizationeconomics.org/resourcelibrary/?srch=patches |
| 18 | What's the operational definition of a zero-dose community? | Heidi Reynolds | Gavi refers to "missed communities" as those that are home to clusters of ZD and UI children. They may be communities facing multiple deprivations and vulnerability. In practice in the application phase, countries have been triangulating data sources to identify subnational areas (usual district/admin2) where there are high numbers and proportions of ZD children. But additional programmatic efforts will be needed (e.g., through microplanning, targeted surveys, stakeholder/CSO engagement) to identify those smaller areas that are systematically missed and to understand barriers and determinants. https://www.gavi.org/our-alliance/strategy/phase-5-2021-2025/equity-goal/zero-dose-children-missed-communities . |

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| 19 | I am curious about the methods used to collect the BeSD related questions, and if there were any facility assessments completed to understand more supply-related barriers at the facility level? | Heidi Reynolds | Yes, there are some facility assessment data from the Learning Hubs. See the Nigeria rapid assessment report https://zdlh.gavi.org/resources/nigeria-zero-dose-situation-analysis and more from other countries is forthcoming. |
| 20 | Curious to hear more about intent to go beyond IRMMA, adding Gender, Coordination / Learning, and PHC / GHI Integration. Intuitively, this makes a lot of sense, and research seems to back that this is how to get to root cause. What do you see as some of the biggest challenges and opportunities as you move in this direction? | Tove Ryman, Mike Brison | I see IRMMA as a framework for how we think about doing the work. It's very aligned with a continuous learning approach. Gender, coordination, and PHC integration are the types of topics or interventions that might be addressed using this process. To date, the bulk of our focus has been on Identifying, and we are just transitioning to Reaching. Looking at other examples, I anticipate that Monitoring and Measuring will be challenging; it's not easy to align on signal measures and use these to shift implementation. |

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| 21 | <p>What's the "so what" around the service contact data? Am I right that the high level of service contact was a surprising finding? And is the implication that there's a missed opportunity with ZD? And what is the Minimum Viable Product from a digital side, meaning, what's the least expensive/ complex digital solution that could potentially to help meet this opportunity to help ZD communities?</p> | Deep Thacker | <p>Great question. The narrative over the past few years has been that ZD children and the communities they reside are deprived of PHC services. But the data that we presented shows that the service contact is actually quite high. This has not been documented adequately till now. These findings also have programmatic implications and open up a completely different set of solutions - more integrated programming - that enable individual level identification of zero dose children. The EPI program should change the question from "Why these children were missed from immunization" to "What did XX program did to reach this community, and what can we learn to deliver immunization services to them?" On the digital system side, there are TWO possible approaches (with examples of people having succeeded with both): 1. Use one system to manage delivery of all services, OR 2. If using a set of digital systems/apps to cover all services - have a unique patient/beneficiary identifier so that the composite "footprint"/record of a beneficiary can be pulled out across all participating apps.</p> |
| 22 | <p>Could BMGF please share more information on how ZD is being incorporated into programming for urban immunization, such as with large populations in India?</p> | Tove Ryman, Mike Brison | <p>Through ZDLA, we have grantees doing ZD work in urban areas of Pakistan, India, Ethiopia, and Nigeria. As findings emerge, our grantees will share within the countries where they work, and we can also share through the urban immunization WG.</p> |
| 23 | <p>What can donors do to better fund and scale effective interventions? We know the barriers and intersectional elements. What needs to change?</p> | Tove Ryman, Mike Brison | <p>Central to our ZDLA work is a hypothesis that maybe we can't effectively scale interventions, instead we can scale processes that support implementation of locally relevant and effective interventions. These may be novel or tweaks on known interventions that allow them to work better in the context.</p> |

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| 24 | Mike mentioned that it's easy to write in gender into a program but much harder to operationalize it. "It's not a muscle people are used to using." What's it going to take to get people to use that muscle? | Tove Ryman, Mike Brison | Practice, practice, practice. As part of our ZDLA drivers analysis, we asked grantees to identify any gender considerations for all identified drivers. This slightly more systematic approach identified more drivers, and anecdotally, we heard from grantees that it resulted in the consideration of new gender barriers. This is still a long way from fully operationalizing a shift in how we work, but it is how we are initially aiming to bring gender considerations into our implementation of interventions. |
| 25 | Nice presentation - missed communities or missed opportunities! I think a lot has to do with having a good number and mix of healthcare workers. Most of the facilities are grossly underserved that the available staff are overburdened and just do the mechanical work and have no time to think through the data they collect. | Deep Thacker | Completely agree. But still the question is 'Why did the family avail/receive one service but not immunization?' The answer to this question could lead to solutions. |
| 26 | Very interesting to see the extent of missed opportunities across all these countries. In addition to the use of information by FLHWs there are lots of other barriers including availability of vaccines and improved integration of services so that all HWs take advantage of | Deep Thacker | From the study that we had conducted in UP, we did have this information and the challenges were largely demand side - Apprehension of minor side effects and Knowledge and awareness gaps. But for other countries we have used DHS data, so this cannot be explored. However, this is an area that needs to be further explored. |

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| | the opportunities. Are you able to explore these barriers as well? | | |
| 27 | In applying the IRMMA framework, there has been relatively little attention to the "A" - advocacy. Yet it is an essential bridge to go from Identifying to Reaching missed children and communities - it requires resources and political will. Can the speakers give examples or say more about how they are addressing advocacy in their work? | Tove Ryman, Mike Brison | We see advocacy happening at all levels of EPI. Within our ZDLA countries, grantees must engage with local government counterparts to advocate for shifts based on their findings. Government counterparts will need to advocate with other partners, e.g., Gavi, to support their efforts. At a global level, we are thinking about the critical stakeholders and relevant dissemination channels to share our findings. We are not there yet, but we are intentionally designing our learning agenda to (hopefully) produce the kind of evidence that will allow for compelling advocacy. |
| 28 | The factors affecting willingness or ability to utilize a service (time away from work, other pressing tasks, mistaken belief that there is a cost) are common to many PHC services. How can EPI planning better learn from other PHC-supporting programs on how to identify and remove those barriers? Is it only doing outreaches with service delivery? | Tove Ryman, Mike Brison | Absolutely. It ultimately comes down to providing services in ways that are user-centered. What this means will vary across contexts, with some countries having more or less integrated delivery of services. There is clear value in having a broader system perspective to thinking about how you address these barriers. That said, our initial hypothesis and early findings suggest that these issues are highly contextualized and will require sub-national tailoring. |

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| 29 | <p>What strategy plan is in place to hand over constructed health facilities in Pakistan? Has the Ministry of Finance on board? Is there a signed Gov. agreement to take over?</p> | Katie Stahley | <p>We work with the provincial governments through MOU agreements on the transition of the facilities to government management and financing. The transition of this work is at various stages across provinces, with Sindh furthest along with managing all the facilities and financing some of the staff. One key element was finding land in Karachi for permanent facilities (the MOU facilities either rented space or used pre-fab structures); this has resulted in the changed location of some of the facilities.</p> |
| 30 | <p>Despite high achievements of RISP in Somalia, there is no change in WUENIC estimates since 2018? What could be the reason?</p> | Katie Stahley | <p>Great question, and I'm not sure. The target RISP birth cohort is about 148,000 kids, or about 20% of what WUENIC lists as the total Somalia birth cohort. Our partners do attempt to enter dose administered data into the DHIS2. But, RISP didn't scale to full geographic scope until early 2023, so it may be that the most recent WUENIC estimates don't capture the impact achieved later. I'll look further into this.</p> |
| 31 | <p>How largely countries main service delivery packages or Primary Health Care packages do not contain immunization? Do we have specific country examples where PHC package does not include immunization?</p> | Jessica Baxendale, Louisiana Lush | <p>Good question! We agree that PHC almost always would have immunization embedded within it. So the question is more about how immunization is delivered within PHC: i.e. it can be through campaigns or on specific immunization 'days' rather than available in a more 'integrated' way at all times.</p> |

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| 32 | <p>Why were countries resistant to share their advocacy efforts? Was it a question of not wanting to draw attention to lack of progress or poorly defined strategies or were they concerned about jeopardizing progress by discussing it externally?</p> | <p>Jessica Baxendale, Louisiana Lush</p> | <p>This was about the evidence base on whether Gavi grants had funded advocacy activities. Despite the IRMMA prioritizing advocacy activities, in some of the countries examined in the ZD evaluation, advocacy activities had not been funded and therefore there were no activities to evaluate.</p> |
| 33 | <p>What is the correlation between seasonal variations and geographical areas on the prevalence of zero-dose families, and how do these factors influence vaccination uptake and access to healthcare services, particularly in underserved communities?</p> | <p>Tove Ryman, Mike Brison</p> | <p>In most of our sites, we have recorded flooding (seasonal and ad hoc) as limiting geographic access and impacting outreach sessions and the cold chain. In Kenya, we have also seen seasonal migration of ZD families, increasing barriers to accessing services.</p> |
| 34 | <p>RISP. Impressive result. What is the data source for the yearly monitoring of the performance 2019-2023?</p> | <p>Katie Stahley</p> | <p>We use RI coverage surveys. In DRC, we have supported annual surveys for the last 4 years, which is an exceptionally high level of frequency that is not replicated in other geographies. However, in the context of high cVDPV transmission in DRC, the surveys have been an important tool (alongside routine data, programmatic data, and surveillance data) for measuring coverage, identifying gaps in effective coverage, and advocating for continued attention and financing for RI.</p> |

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| 35 | <p>I remember that at the start of the zero-dose focus years ago there was recognition (or a hypothesis, really) that kids who were zero-dose for immunization were also “zero-dose” for other health services. As we’ve learned more, it’s not clear that this is necessarily true – there is some contact with some services. Interfacing this with better understanding of the drivers of utilization (or lack of) to health services would help us put zero-dose for immunization in the broader context of ZD for PHC. Better understanding this “multi zero-dose” context is important for defining effective interventions. To a degree, we’re still at the identification stage – some relatively small fraction of kids will be truly multi-zero-dose. Who are they, and why? So these are the “missed communities”. Are they the ones that need the most attention, i.e. these are the kids most at risk of severe disease and death? How many are they, relative to</p> | Tove Ryman, Mike Brison | <p>As you note, the early ZD work was oriented toward reaching those children and families without any access to immunization services. These can be missed communities, or families / children that are missed due to social or economic barriers. I still believe this is the spirit of ZD, and I worry that, at times, this concept is lost or confused because of how we measure ZD. It’s essential to have a globally measurable way to track progress, which is what the Penta1 proxy provides, but this does not mean that we should limit our understanding of ZD to those children who have not received Penta1. I would hope that immunization practitioners in sub-national areas are looking at their unique context and thinking about how to reach those families that already access services (effectively PHC dropouts) to bring them into the immunization system alongside the critical efforts to identify those completely missed families to understand how we can ensure they can also access services (and not just immunization services).</p> |
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| | kids who have some contact with some services but are still zero-dose for immunization, i.e. the “missed opportunities”? Where do we focus limited resources for the greatest public health impact? | | |
| 36 | In CAR, are there any small wins or progress made? | Katie Stahley | Progress on improving immunization systems and coverage has been very limited in our work in CAR. We were encouraged at the MOH's engagement in carrying out a quality RI coverage survey, their validation of the results despite the poor coverage estimates, and their use of the results to galvanize focus on improving RI. We are also experimenting with active cooler device (e.g., Indigo), and we think this could be a promising tool in delivering vaccine to extremely hard to reach and sparsely populated areas. |
| 37 | Annual coverage survey. Is this annual coverage survey covered by RISP? Is it sustainable by government? | Katie Stahley | The annual coverage surveys are funded by RISP and other partners, depending on the country (e.g., Gavi, UNICEF, USAID). It is not likely that the surveys themselves are financially sustainable by government but we are working on a few things to improve the sustainability of surveys: 1) testing alternate methods, including through head-to-head comparison, to develop approaches that may be less expensive and still provide the level of quality information needed for decision making, 2) supporting capacity strengthening of local institutions and government partners to design and conduct surveys so that TA (a major cost-driver) is reduced, 3) develop a survey costing database to provide increased transparency and information on how much it costs to run various types of surveys so partners can better budget for this as part of their support. |