OPPORTUNITIES TO STRENGTHEN THE IMPLEMENTATION AND INSTITUTIONALIZATION OF MICROPLANNING FOR ROUTINE IMMUNIZATION IN LOW- AND MIDDLE-INCOME COUNTRIES

A Mixed Methods Landscape Analysis

USAID FROM THE AMERICAN PEOPLE

MOMENTUM A Global Partnership for Health and Resilience

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MOMENTUM works alongside governments, local and international private and civil society organizations, and other stakeholders to accelerate improvements in maternal, newborn, and child health services. Building on existing evidence and experience implementing global health programs and interventions, we help foster new ideas, partnerships, and approaches and strengthen the resiliency of health systems.

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BACKGROUND AND INTRODUCTION

Microplanning, in the immunization context, is a process used to define the activities, resources, timing, and location of immunization services systematically. It is widely considered a core component of expanding routine immunization services and ensuring equity for "reaching every district" (RED) (WHO 2017). Program managers use microplans to:

- Identify people eligible for immunization services for the next year and calculate required supply needs.
- Design graphic mapping and collect demographic data that illustrate well-defined catchment areas and identify where eligible populations live.
- Develop and prioritize plans and leverage resources to reach all intended populations, including those living in hard-to-reach communities, with immunization services continually and according to the national schedule.
- Define realistic local actions and solutions to improve and sustaining coverage.
- Generate demand to promote community engagement.
- Reduce inequities and improve service quality.

According to the World Health Organization (WHO), "an operational microplan is not just a collection of spreadsheets and budgets. Rather it acknowledges the human, financial, and logistical resources, as well as the geographical, demographic, and socio-cultural attributes of the resident population and target community groups" (2023). Microplanning was introduced to immunization programs as a component of polio eradication activities, but the development of the RED approach in 2002 established it as a core component of routine immunization programming. As the approach has evolved, microplanning has been incorporated into subsequent iterations of guidelines, including the field guide on implementing the RED approach (WHO 2008) and the RED guide from the WHO Regional Office for Africa (WHO 2017).

As the focus of immunization programming has shifted increasingly to reducing inequities, so has the ideal approach to microplanning. In the early days of RED implementation, ministries of health and technical partners emphasized the development of the microplan as the primary end point. This was achieved through a top-down approach in which workshops for facility and district-level immunization program managers or focal points convened and microplans were drafted and later aggregated at higher health system levels.

However, there has been a growing realization that the existence of a microplan does not guarantee that the plan itself is used to guide implementation, particularly in the resource-constrained context of routine immunization. In line with the growing efforts to reach missed communities and zero-dose children, a new approach to microplanning, sometimes referred to as "bottom-up microplanning," has emerged. As reflected by a growing emphasis on community engagement in the 2017 RED guide and through case studies (MCSP 2019b), the bottom-up approach starts at the health facility level and emphasizes community engagement in mapping target populations and identifying barriers to immunization.

Despite the availability of high-quality guidance on how to develop a microplan (WHO 2017) and decades of immunization program experience, rigorous studies measuring the effectiveness of microplanning are lacking (Gavi 2023). Further, anecdotal evidence suggests that microplanning remains sub-optimally implemented and institutionalized in routine immunization programs.

MOMENTUM Routine Immunization Transformation and Equity (the project) applies best practices and explores innovations to overcome entrenched obstacles in immunization and increase equitable immunization coverage. This project is USAID's flagship technical assistance mechanism for immunization in more than 20 countries and seeks to contribute to the global evidence base on interventions to improve routine immunization coverage.

The project reviewed the evidence on microplanning, with a focus on the drivers of implementation and institutionalization of it in routine immunization programs (see Box 1 for a definition of institutionalization). The project also sought to understand whether adaptations to microplanning, including digital and for integrated health services, helped overcome any of the known challenges. The primary objective of this analysis was to identify, synthesize, and disseminate evidence related to the drivers of implementing and institutionalizing microplanning in routine immunization programs.

BOX 1. INSTITUTIONALIZATION

Institutionalization of effective processes and practices is crucial to long-term programmatic sustainability, especially for interventions that have been introduced with financial support from funders and/or technical assistance from partners. Institutionalization is defined by Zida et al. (2018) as "the process by which a set of activities become an integral and sustainable part of a formal system. It can be seen as a sequence of events leading to new practices becoming standard practice." In the context of microplanning, the process of developing and implementing should become routine, with microplans updated at regular intervals and implementation adjusted as needed. According to the World Bank (2010), institutionalization requires: 1) an institutional framework; 2) consistent production of relevant reports; and 3) adequate resources. Although this framework was not developed with microplanning in mind, the categories are still useful when considering the drivers of institutionalization for microplanning and other interventions and practices. Careful consideration of these various drivers will be critical to ensuring that microplanning is sustained over the long term.

METHODS

The project used a mixed methods approach in this analysis, consisting of a literature review that was augmented by an online survey and a small number of key informant interviews of stakeholders with microplanning experience. To guide the analytic approach, the project adopted the Consolidated Framework for Implementation Research (CFIR) (Damschroder et al. 2022), an implementation science framework to understand factors that enable uptake of evidence-based practices such as microplanning in real-world contexts. The project obtained an exemption from the PATH institutional review board, as this was determined not to be human subject research. Data collection and analysis methods proceeded in four steps.

Step 1: Review peer-reviewed and gray literature on microplanning for routine immunization

The project searched PubMed, CABI Web of Science, and ProQuest using the search terms in Table 1., and snowballed by reference mining and using Google to identify gray literature sources not captured in database searches. The project reviewed English language articles only and did not restrict articles by publication date, but most were published from 2010 onward.

TABLE 1. SEARCH TERMS AND RESULTS

TERMS	AND	DATABASE	RESULTS
Vaccine Immunization Immunization program Routine immunization	Microplan Micro plan	PubMed	35
		CABI Web of Science	19
		ProQuest	50
		Snowballing	13

We cataloged titles in Excel, reviewed titles and abstracts, and applied our inclusion criteria to determine whether to include or exclude each article (see Table 2). To minimize exclusion bias, we double reviewed a random selection of abstracts. In the end, 39 articles, reports, and briefs were included for full text review. Of these, 31 came from the published literature and eight from the gray literature. Of these sources, 27 described experiences with microplanning in Africa, 10 in Asia, and two in Latin America and the Caribbean. During the full text review, we extracted text data into Excel and coded it according to the six domains of the CFIR framework,[*] seeking to distill factors that constrained and enabled the microplanning process.

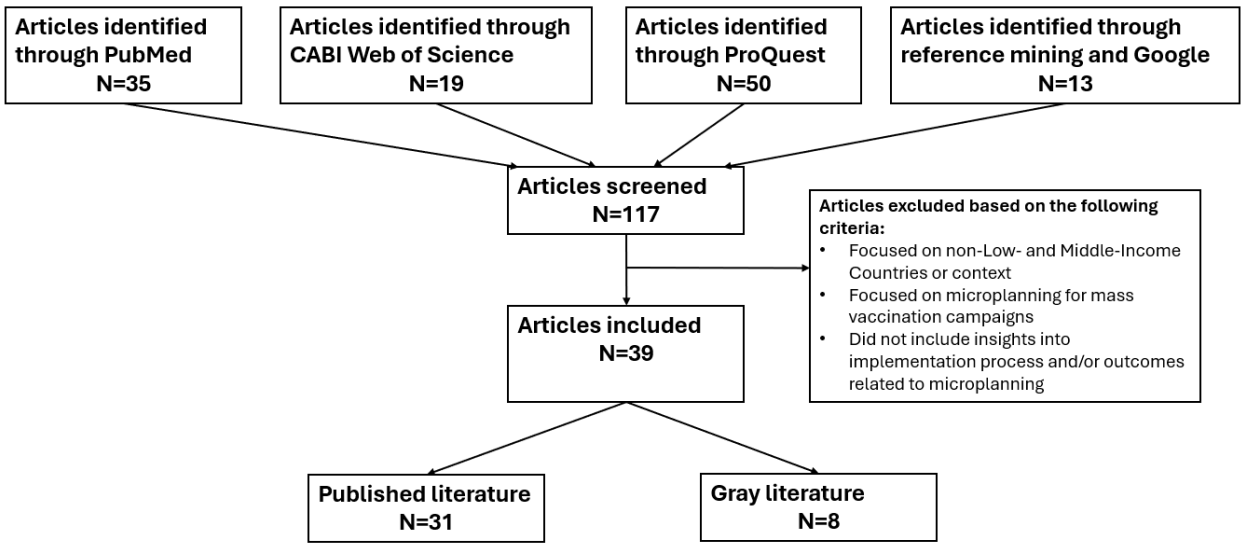
TABLE 2. INCLUSION/EXCLUSION CRITERIA

INCLUSION CRITERIA	EXCLUSION CRITERIA
Focused on microplanning for routine immunization. Focused on low- and middle-income countries (LMIC).[†] Included insight into implementation process and/or outcomes related to microplanning. Included evidence of microplanning experience gained through campaigns and special immunization activities being applied to routine immunization programming.	Focused on microplanning for mass vaccination campaigns. Focused on non-LMIC countries.

[*] Innovation, outer setting, inner setting, individuals, implementation process, and implementation outcomes.

[†] Based on the World Bank classification of economies into four income groups: low, lower middle, upper middle, and high income (Metreau, Young, and Eapen 2024.)

FIGURE 1. FLOW CHART DIAGRAM OF ARTICLE SELECTION



Step 2: Online survey

We conducted an online survey from June to August 2023 to understand the extent to which microplanning is institutionalized in immunization programs. Respondents included national and subnational immunization program managers and implementers in LMIC and technical partners. The survey tool was designed to elicit insight into the factors driving microplanning at three stages: development, implementation, and institutionalization of the process over time. The survey was disseminated via the Boost Community, Zero-Dose Community of Practice, and TechNet-21—all of which are online forums that include national and subnational immunization program managers. The survey data provided preliminary insight, supported the identification of respondents for in-depth interviews, and informed the development of interview guides.

Step 3: Key informant interviews

To fill gaps in the available literature, we interviewed individuals involved in the implementation of microplanning at the subnational level, as well as technical partners and national-level immunization program staff. We selected a set of countries based on the pool of survey respondents. These countries reflected different immunization and health systems resource contexts, characterized by varying levels of partner support for routine immunization. We conducted 19 key informant interviews with individuals in the Democratic Republic of the Congo, Ethiopia, Kenya, Mozambique, Nigeria, Switzerland, Uganda, the United States of America, and Vietnam. Although we interviewed multiple key informants in some countries, each person was interviewed separately.

We developed an interview guide to probe the issues constraining and enabling implementation and institutionalization of microplanning in the context of routine immunization programs. Like the survey tool, the interview guide contained questions for respondents about the development, implementation, and institutionalization stages. We conducted interviews remotely in English and French and recorded them with participant consent. Interview transcripts were coded in Dedoose, a qualitative analysis program, according to the six CFIR domains.

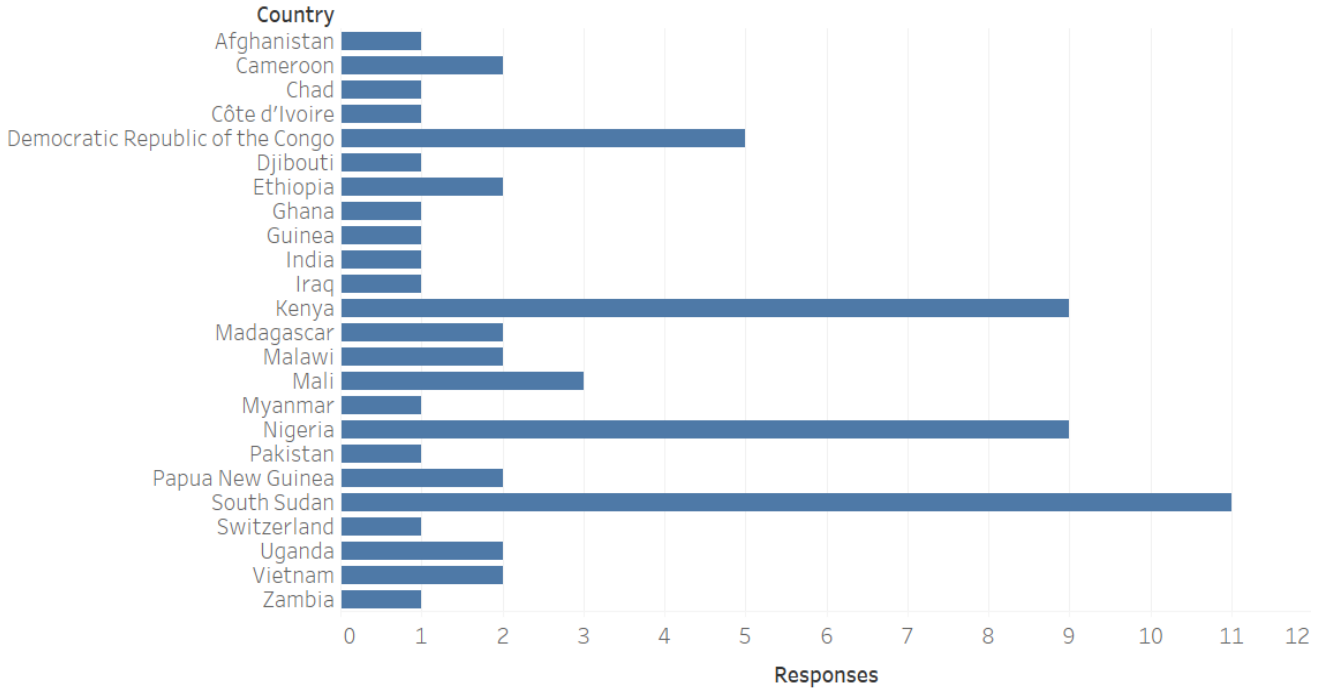
Step 4: Data analysis—root-cause analysis and synthesis of findings

Coded interview excerpts were exported from Dedoose, synthesized, and triangulated with insight from the literature review. We conducted a root-cause analysis (RCA) to identify the factors underlying implementation and institutionalization of microplanning systematically. RCA is "the process of discovering the root causes of problems in order to identify appropriate solutions" (Tableau 2024). RCA allows us to move beyond describing what happened to find out why it happened and propose solutions. RCA was conducted iteratively as the study team synthesized the coded data related to the barriers and enablers of implementation and institutionalization of microplanning processes. We created an RCA diagram in Microsoft PowerPoint and refined it as we obtained feedback from technical advisors. The RCA was used to inform the overall structure of findings and the presentation of results.

FINDINGS

The findings are informed by data from the literature review, online survey, and key informant interviews. Respondents to the online survey included 63 individuals from 24 countries (Figure 2).

FIGURE 2. COUNTRIES/NUMBER OF RESPONSES TO ONLINE SURVEY



Our review of the published and gray literature found few studies that examined microplanning in the context of routine immunization. Among those that did, even fewer described the factors that constrain and enable implementation of the activities in the microplans. Even in the context of campaigns, there is a notable lack of rigorous measurement of how and why microplanning contributes to immunization outcomes. This observation is bolstered by a recently published evidence review of pro-equity interventions that found microplanning to be a promising intervention, but noted the lack of rigorous analysis of the effectiveness of microplanning on immunization outcomes (Gavi 2023).

Nearly half the 39 articles included in our review related to digitally enhanced microplanning, which involves the use of tools such as digital mapping, mobile applications, online training forums, and electronic registries. It is used to

help map catchment areas, identify target estimates, train health care workers (HCWs), develop budgets, and monitor vaccine status (WHO 2023).

Through RCA, we identified two broad categories of factors that constrain and enable the implementation and institutionalization of microplanning processes in routine immunization programs. The first relates to shortcomings in the microplan development process, resulting in microplans that are of variable quality, may be considered aspirational, and do not reflect community priorities or needs. The second category relates to implementation of the plans. Evidence from each category is presented in the following sections.

Microplan development

TOOLS AND TEMPLATES

The initial development of microplans is widely perceived as being highly resource-intensive, requiring substantial funding for data collection, technical know-how, and stakeholder engagement at multiple levels. Many of the tools and templates that guide the information requirements and structure of microplans are perceived as being too complicated, even if the information required in those forms is needed to develop high-quality plans to reach zero-dose children.

In India, data access challenges resulted in incomplete microplanning forms, with consequences for their quality (Ismail et al. 2017). In Uganda, a qualitative assessment of the microplanning processes in Kapchorwa and Luwero Districts found that the complex and bulky nature of the microplanning tool contributed to only 57 percent of health facilities having an updated microplan (Mafigiri et al. 2021). According to key informants in Ethiopia, "Tools are not friendly for the lower levels. They need simplification for health care workers; making tools friendly for health care workers is important" (technical partner, Ethiopia). According to another key informant:

> *"Challenges related to microplanning were related to the templates. They are Excel-based, and for those staff who were not used to Excel, it was difficult for them to use. Nothing was automated on the Excel templates; they were just using it as a table. So it wasn't as useful as it has the power to be."*
>
> **TECHNICAL PARTNER, ETHIOPIA**

The project found some evidence in the peer-reviewed literature and key informant interviews of teams that adapted guidelines, tools, and templates to make them more user-friendly, context-appropriate, and/or to support bottom-up microplanning. For instance, in Nigeria, guidelines for polio eradication microplanning were adapted to reflect a decision to focus data collection on households, rather than children (Gali et al. 2016). In Tanzania, the microplanning tools were adapted for and integrated with Comprehensive Council Health Plan tools for resource mobilization and accompanied by tailored, concise guidance (MCSP 2019b). In Uganda, similar efforts have been made to simplify the microplanning process. One key informant said:

> *"Over the years there's been a bit of evolution of microplanning, and it has been more simplified. And it has sort of narrowed and tends to be a bit more specific and focused. I think we are looking for ways on how best to simplify it so it does not become a very big burden to the health worker. We started noticing the health workers were losing interest in the bigger detailed microplanning. Then we said, 'Can't we develop a simplified microplanning?'"*
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> **TECHNICAL PARTNER, UGANDA**

ACCESS TO HIGH-QUALITY, UP-TO-DATE DATA

Microplanning requires high-quality, up-to-date data on target populations and catchment areas, as well as data on barriers to underserved communities and zero-dose children immunization service access. However, in practice, the required data are often unavailable and/or of poor quality.

Evidence from the literature review and from key informants revealed several reasons for this. One key informant noted that although census data used for estimating target populations are known to be outdated and inaccurate, particularly for the hard-to-reach (such as urban slums) and far-to-reach communities (such as islands), those developing the microplan are compelled to use official data because the health system uses them for all programs. This has consequences for implementation, such as over- or under-estimating the amount of vaccine and other supplies needed; producing inaccurate coverage rate data; and failing to reach underserved populations (Mafigiri et al. 2021). In Nigeria, estimating reliable denominators as part of the microplanning process was described as being tedious and expensive and demanded a significant investment of human and financial resources from many partners and government agencies, causing microplanning to not be institutionalized (Umeh et al. 2018).

Key informants said:

> *"During microplanning, the problem is the denominator. Most places use the census for population estimations, but the census is old. And anyways, there is massive population movement. So having the right denominator for planning is one factor that enables or hinders microplanning."*
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> **TECHNICAL PARTNER, ETHIOPIA**

> *"If you look at the typical microplanning tools, the tools from WHO, they start off and seem pretty detailed. But column one of form one says, 'What is your target population?' It seems easy, but it is not easy. Our staff found that people were getting derailed, right from the very get-go, with the microplanning process. They would say, 'We know there are problems with estimation.' That's going to mess up everything downstream with the rest of the tools that you're supposed to use for microplanning."*
>
> **GLOBAL TECHNICAL PARTNER**

Consequently, some key informants reported that facilities developed two microplans: one using official data and another using unofficial sources of data from community registration by HCWs and which was known to be more accurate. However, these unofficial data are challenging to reconcile with official figures at later stages. Therefore, key informants noted that using data generated by HCWs should also contribute to institutionalizing the microplanning process, while acknowledging that HCWs need support and a quality-check mechanism for their work.

Digital tools, especially geospatial technologies, are increasingly deployed to support target population mapping. However, some key informants cautioned that digital tools should not be promoted as a replacement for community engagement, but rather as an enhancement to the microplanning process. They also noted such tools may prove to be most appropriate for updating microplans, not for the initial development (see Box 2 for more detail). Digital tools alone, without community insight, are unable to capture migration patterns and community movement accurately or community views on where and when outreach services should be provided.

HEALTH CARE WORKER CAPACITY TO DEVELOP MICROPLANS

The complexity of the tools for microplanning is exacerbated by a lack of experience among HCWs and other individuals tasked with developing them. High rates of turnover among HCWs in particular was commonly identified as draining capacity to develop microplans. For newly hired HCWs, key informants identified a lack of training, supportive supervision, and mentorship in microplanning (and other core immunization program functions, to a lesser degree) as constraining the development of high-quality microplans.

Mafigiri et al. (2021) found that although many HCWs in two districts of Uganda had received some training on microplanning, the quality of the training was inconsistent and considered insufficient for understanding how to use the microplanning tools. Furthermore, because typically a limited number of HCWs in each facility were trained, not everyone could participate in the microplanning process.

A key informant in Uganda noted, "I did an orientation mentorship training for health care workers. Next time when I go [to the health facility], the same health worker has been taken away, and therefore there's a gap. There's a lack of knowledge. I have to retrain again now" (technical partner).

Another key informant from Kenya said:

> *"The majority of staff are new employees and have no immunization background, no experience in microplanning, and no operational-level trainings for the majority of facilities. We need to build the capacity of our health care workers. This is the bit that we need to achieve as part of their Terms of Reference. Part of the job contract should actually be development and implementation of microplans to every level."*
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> **SUBNATIONAL IMMUNIZATION PROGRAM STAFF**

Key informants in Uganda, the Democratic Republic of the Congo, and Vietnam gave examples of capacity-strengthening activities such as cascade training, mentorship, and supportive supervision. For instance, in Uganda, projects funded by the U.S. Agency for International Development (USAID) and the Bill & Melinda Gates Foundation to introduce an approach called 'Reaching Every District Using Quality Improvement' (RED-QI) made concerted efforts to strengthen individual capacity at the subnational level through peer exchanges to sustain program improvements beyond the life of the project.

Other partners such as UNICEF expanded some aspects of the RED-QI approach to 15 districts after the projects funded by USAID and the Bill & Melinda Gates Foundation ended (JSI 2020). However, key informants said that sustaining such efforts after projects end is an ongoing challenge, underscoring the need for thoughtful planning for sustainability and institutionalization.

ENGAGING COMMUNITY MEMBERS AND NONTRADITIONAL HEALTH STAKEHOLDERS

Multi-sectoral engagement, including with community members and nontraditional health stakeholders,[‡] was broadly acknowledged as critical to the development of microplans that reflect local needs and priorities, and to the timing and frequency of immunization sessions. Interviewees reported that the involvement of community and nontraditional partners helped generate broader acknowledgment of microplanning's value and enabled advocacy for additional immunization programming resources. The acknowledgment and advocacy facilitated microplan implementation and institutionalization.

[‡] Actors typically outside or underutilized by public sector health programs and may include civil society organizations, other government ministries, politicians, and the private sector.

In Tanzania, microplanning was an interactive and consultative process, engaging community members to provide input on obstacles to better immunization coverage and equity. Health facility governing committees enabled HCWs and community health workers and representatives to participate in the microplanning process (Frumence et al. 2023). However, key informants emphasized that involving communities in the microplanning process may require additional resources (such as reimbursement for transportation costs), and funds for those resources are often lacking.

> *"By doing this, at least we can have a good microplan. Successful microplans need to involve community members and community-based organizations to help with outreach. Have people come to a selected place, whether it's the health facility or the leader's home. However, you need transportation, preparation, and meals—resources in general—to involve the community."*
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> **TECHNICAL PARTNER, NIGERIA**

> *"There is a huge element of community involvement when developing the microplan. They will give the situational analysis. The health facility picks all of the issues the community wants to be addressed, prioritizes them, and puts them in the microplan. Health facilities are attached to community units. Within community units, there is a dialogue phase. The health facility picks issues from the community, and dialogue allows the community to raise their concerns using their community leaders. After raising issues, they are captured by health care staff and then during the action day, they prioritize their issues together with the community. The challenge faced by the health center is limited resources to facilitate engagement."*
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> **SUBNATIONAL IMMUNIZATION PROGRAM STAFF, KENYA**

In Uganda, efforts were made to engage both community members and non-health government officials in the microplanning process. This heightened understanding of immunization among these actors, as well as the steps they could take to support microplan implementation.

Microplan implementation

CULTIVATING A SENSE OF OWNERSHIP AMONG HCWS AND OTHER IMPLEMENTERS

Key informants noted that cultivating a sense of ownership among HCWs and health facility managers by involving them in the plan development and thoughtful capacity-strengthening activities increased motivation to implement the activities in the plan.

Mafigiri et al. (2021) found that while HCWs in Uganda recognized the value of microplanning to improve immunization services, many had not participated in microplan development and therefore did not understand how to implement them. Conversely, in settings in Uganda where HCWs were engaged in the microplan development process, key informants reported they had a higher degree of ownership over the plans themselves and, therefore, greater responsibility for implementation (JSI 2019).

"Being committed to carry out a plan that people themselves developed wound up being really important. And we also found that it was important to involve the clinic managers in some aspects of the microplanning process, because ultimately, they could control where some of the resources went and played a really important role in implementation. And that is something where, if you just take the immunization focal points to a district level and ask them to put together a microplan, some of those really important elements don't get captured."

GLOBAL TECHNICAL PARTNER

"We find the bottom-up approach is a more comprehensive way of implementing the microplan. Of course, you need a lot of partners to come on to support this financial need. The bottom-up approach is expensive, but it's a better way of learning because it identifies the problem and also creates ownership."

TECHNICAL PARTNER, UGANDA

SUPPORTIVE SUPERVISION, MENTORSHIP, AND ACCOUNTABILITY FROM THOSE AT HIGHER LEVELS OF THE HEALTH SYSTEM

HCW ownership of and motivation to implementation of microplan activities were also found to be enhanced by supportive supervision and mentorship, and accountability mechanisms from those at higher levels of the health system.

To incentivize microplan monitoring and updating in Uganda, a WhatsApp group sends reminders to immunization focal points at the subnational level.

"The ministry started tagging a lot on microplanning. The ministry started being a bit tough on the lower-level facility. … You will only get support on the condition that you have a microplan to show your need, and your coverage, and your target, and all of that."

SUBNATIONAL HEALTH STAFF

In Ethiopia, the absence of follow-up from those at higher levels of the health system was perceived as a constraint.

"Microplanning has not been advocated very well. … It still needs follow-up from the high levels to be institutionalized. It is not well aligned with existing mechanisms like woreda [district] based plans. There are competing tools that sometimes the higher levels use instead of microplans."

TECHNICAL PARTNER

OPERATIONAL FUNDS AND OTHER RESOURCES TO SUPPORT MICROPLAN IMPLEMENTATION

Microplan activity outreach implementation is constrained by a consistent shortfall of operational funds at the subnational level.

This is not a shortcoming of microplanning itself, but reflects larger resource constraints for immunization (and indeed health programming more broadly) in many countries, including those with high numbers of zero-dose children. This shortfall issue was the focus of a recent evidence review of strategies to overcome insufficient operational funding (MOMENTUM Routine Immunization Transformation and Equity 2022).

The 2017 RED guide from the WHO Regional Office for Africa recommends preparing budgets that carefully balance resources *needed* with those *available* to implement strategies to reach zero-dose children. Where government funding shortfalls exist, efforts should be made to mobilize resources from other sources—funders, community, and the private sector—and activities should be prioritized so that those most critical to reaching zero-dose children are most likely to be implemented.

To improve budgeting for the recurrent costs of immunization program delivery in Tanzania, the USAID Maternal and Child Survival Program piloted an approach in which sites conducted bottom-up microplanning in the context of the annual Comprehensive Council Health Plan development process. This improved the availability and accuracy of budgeting substantially, with annual Comprehensive Council Health Plan budgeting matching the funds required for outreach, vaccine distribution, and more (MCSP 2019c).

However, when budgets do reflect actual needs, resources are insufficient. Several key informants reported adapting implementation of plans to match available resources, for instance, by reducing the overall number of outreach sessions conducted. However, they emphasized that the plans should reflect the true cost of programming required to reach zero-dose children, even if it is unlikely that implementation resources will ever be sufficient.

> *"The funding will never be adequate. There are moments when we don't have enough vaccine carriers. We would go ahead and borrow it from a private facility and eventually we will take it back. What you have put in the microplan sometimes could not be 100% facilitated. Because there are very many priorities in place. So we tend to use the available resources, whatever there is."*
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> **SUBNATIONAL HEALTH STAFF, UGANDA**

> *"The challenges are more prominent for the routine immunization side. For campaigns, there will be available funds. In most times, for routine immunization there are hardly any funds available. For campaigns, it is being done by others [e.g., implementing partners]. For routine, there are no allocated funds."*
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> **TECHNICAL PARTNER, NIGERIA**

To address the funding shortfalls, many key informants emphasized the need for advocacy at all levels to generate increased political will among health and non-health stakeholders. Other reviews of strategies to address shortfalls in operational funding also identified advocacy to generate political will as a best practice (MOMENTUM Routine Immunization Transformation and Equity 2022).

"In Kenya, because of devolution, counties operate very differently from the national level, and they vary. In some counties, you'll find the microplan is developed and updated regularly, and the funding is there to actually support the activity. And in some counties, it isn't. This is where you see the importance of high-level advocacy, including [outside] the health sector. Players like parliamentarians are very important, because at the end of the day they're the ones who deliver these budgets. We have to think about how the budget process goes on in the country. We've traditionally just engaged ministries of health, and sometimes not the ones who make the decisions at a national level."

GLOBAL TECHNICAL PARTNER, KENYA

"Clan leaders in pastoral communities were essential, and the involvement of non-health stakeholders as well, such as the financial sector in each district. These are the ones who can say how much money can be allocated for each health facility. These institutions are not in the health sector, but they have a direct role in facilitating implementation."

TECHNICAL PARTNER, ETHIOPIA

Several key informants reported a lack of funds even to print microplans. Often the only paper-based copy of the plan is taken by those at higher levels for aggregation, leaving facility and district staff without access to the plans that they themselves developed and are expected to implement. Some subnational informants reported having to use their own resources to print plans. In some cases, they reported that digitizing microplans in Excel mitigated this problem, but health worker lack of access to the microplans remained a widespread challenge.

"They are leaving the health facility without a microplan for one or three months until the next quarter again. So yes, microplans are being developed. Yes, it will be used for a summary, which is good. But then it has been laying there probably at the district level and at the state level for quite a long time without even being used at the operational level."

TECHNICAL PARTNER, NIGERIA

"The health facilities were compelled to send their microplans to the district level without any copy left for their own reference. They weren't sent back. It left the facilities that had developed their microplans and that were committed to carrying them out, that knew what they were going to do with them—it left them without those microplans."

TECHNICAL PARTNER, UGANDA

Adaptations to microplanning

With a view to future directions in microplanning, our review examined two specific areas: digitally enhanced microplanning and integrated approaches to microplanning that incorporate health areas beyond routine immunization.

DIGITALLY ENHANCED MICROPLANNING

The application of digital tools to support microplanning, referred to as digitally enhanced microplanning, is on the rise. One of the most common forms is the application of geospatial technologies to support mapping and target population estimation.

According to key informants, the reported benefits of digitally enhanced microplanning include improved mapping, better estimation of target populations, optimized vaccinator assignments, and enhanced resource allocation calculations. Barriers include poor technological infrastructure and internet connectivity, low information technology (IT) capacity of HCWs and other staff, high costs of making updates, and ongoing reliance on technical assistance from partners. Much of the peer-reviewed literature explained various forms of digital microplanning, which is described in Box 2. However, key informants cautioned that digital tools are enhancements and do not replace the need for community engagement in defining priorities and identifying missed communities.

In Vietnam, microplanning processes and forms are digitized in the national immunization information system, which also manages routine immunization service delivery data. However, key informants reported that at the subnational level, HCWs often lack the required IT capacity so still use paper-based forms for data entry. The subnational-level data then has to be reconciled with the national immunization information system. Even so, key informants thought the use of a digital system for microplanning contributed to higher-quality microplans and reduced wastage of vaccines and other materials.

BOX 2. DIGITALLY ENHANCED MICROPLANNING

Digitally enhanced microplanning includes tools such as mapping software, mobile applications, online training forums, and electronic registries. It can be used to map catchment areas, identify target estimates, train HCWs, develop budgets, and monitor vaccine status (WHO 2023). This was the focus of 17 of the 39 articles included for full text literature review.

The most common application of digitally enhanced microplanning identified in our review of the literature was geo-enabled micoplanning, which “involves developing digital health systems maps using geospatial data and geographic information system (GIS) applications. These digital maps are based on layered satellite imagery that reports information such as geographic terrain, infrastructure, settlements, accessibility using motorable road networks (for motorized two- and four-wheelers and bicycles) and other transportation modes (e.g., walking, boat, or working animals such as donkeys and camels) and the distance and travel times between storage facilities and vaccination sites” (WHO 2023).

Tools used include satellite systems (like GPS) to collect coordinate data and GIS to visualize, manage, and analyze geography and spatial relationships (Gavi 2023). GIS can generate catchment area maps for microplanning using photos, geocode coordinates, and field data in a way that is more accurate and easier to update than previous manual means (Dougherty et al. 2019; Oteri et al. 2021).

This type of digital microplanning has been documented extensively in Nigeria and has been used in more than 30 countries. Our search yielded country-specific reports for both routine immunization and disease-specific campaigns in Myanmar, Kenya, Mongolia, and Pakistan (Barau et al. 2014; Chaney et al. 2021; Enkhtuya et al. 2009; Ismail et al. 2017).

GIS not only improved mapping, but also contributed to more accurate population estimates for polio eradication programs in Nigeria; informed vaccination strategy by providing vaccinator-to-population ratio estimates; optimized vaccinator assignments; and enhanced resource allocation calculations (Dougherty et al. 2019; Hamisu et al. 2021). Using digital and geo-enabled tools to develop and share maps and microplans gave officials and supervisors a better visualization of the programming and enabled more productive communication and efficient planning (Chaney et al. 2021).

Barriers to implementation of GIS tools included technological infrastructure limitations, the cost of updating infrastructure, and poor data quality. Ali et al. (2020) found digitally enabled microplanning to cost 58–73 percent more than traditional methods in Nigeria, but still determined the innovation to be cost-effective. Successful use of GIS tools can be impeded by inaccurate data inputs. Geographic data collection is not standardized in many countries, and local data often have discrepancies in boundaries and naming conventions (Ajiri et al. 2021). Data and program supervision by health staff managers is reported as being critical to having high-quality data inputs for accurate computations and transitioning from outside consultation to locally led use of GIS programs (Barau et al. 2014; Dougherty et al. 2019). Another key enabler identified in the literature review was community engagement, as local knowledge and individuals were vital for developing nuanced microplans, and reconciling field data (Dougherty et al. 2019).

Other examples of digitally enhanced microplanning found in the literature review featured the use of mobile phones, applications, and online forms to support accurate data collection and calculation. Applications on mobile phones have been used to record population data. Key informants reported that as opposed to paper forms, digital forms can automatically finish calculations and work through skip logic during the questionnaire to reduce data entry errors (in practice, however, our interviewees indicated that if HCWs did not have the capacity or comfort to use such tools, these benefits are unlikely to be realized). The Open Data Kit, an open-source data collection application for Android mobile devices, was a common tool used to record and transmit real-time GPS data and form fulfillment across a range of indicators (Hamisu et al. 2021). Some reports said that the lack of mobile device longevity hindered data collection.

INTEGRATED MICROPLANNING

Although we found few examples of integrated approaches to microplanning in our literature review, among key informants there was evidence of growing momentum for integrated approaches to microplanning, particularly in the context of strengthening primary health care (PHC).

However, the scope and reach of integrated microplanning are highly variable across the countries included in this review. Our review of the peer-reviewed literature found only two articles that described an integrated approach to microplanning. In Mongolia, microplans were developed for immunization and maternal and child health services (Enkhtuya et al. 2009). Although the Mongolia study concluded that microplanning was well suited to interventions beyond immunization, it did not describe unique barriers to or enablers of an integrated approach, or any measure of the effectiveness of this approach. Mafigiri et al. (2021) reported on efforts to integrate maternal health, nutrition, and child health into a microplan but cautioned that doing so could make the tool more cumbersome and increase the workload of already overburdened HCWs.

Other efforts have tried to extend microplanning and other elements of the RED/Reach Every Child (REC) approach. For example, the Maternal and Child Survival Program explored opportunities to adapt RED/REC to other aspects of reproductive, maternal, and newborn health in Haiti, Kenya, and Uganda (MCSP 2019a). The Maternal and Child Health Integrated Program also adapted RED/REC (including microplanning) to prevent vertical HIV transmission (Kanyuuru et al. 2015). Although the 2017 RED guidance from the WHO Regional Office for Africa notes that an integrated planning process will "coordinate approaches to maximize resources and expose potential problems that might arise from integrated service delivery," the step-by-step guidance remains specific to immunization.

As governments acknowledge the need to strengthen PHC to achieve universal health coverage, they must identify and avail opportunities to integrate immunization and other PHC services, including at the program planning stage. For many, integrated microplanning represents more efficient service delivery planning than each health program planning in isolation. In some countries, immunization microplanning is integrated with planning for nutrition services and vitamin A supplementation. In others, the scope is wider, comprising other maternal and child health services and voluntary family planning. In Nigeria, for instance, key informants reported movement to integrated microplanning for PHC.

Key informants reported limited human and financial resources as impediments to integration, particularly as activities are implemented. In Uganda, one reported that identifying zero-dose children and missed communities for immunization microplanning provides an entry point to offer additional services (including maternal and child health and nutrition), but this interviewee noted that implementation requires additional resources:

> *"We are grappling with finding additional resources in delivering the integrated packages, because when I deliver an integrated package, I'm going to need more health workers. I'll need additional transport. I need additional vaccine carriers. So you need more resources, the resources almost double because of the integrated package."*
>
> **TECHNICAL PARTNER, UGANDA**

Another global technical partner noted that microplanning was perceived as a window of opportunity for more holistic planning for immunization as part of PHC, but that people did not avail it as much as it could be. The interviewee attributed this to siloed funding sources and measurement requirements, among other factors.

Limitations

There are several limitations to this work. First, although we employed a systematic approach to searching the literature, it is possible that relevant articles were missed, especially in the gray unpublished literature and non-English sources.

Second, microplanning is just one component of RED/REC guidance and programming. Consequently, discussion of microplanning in the literature tended to be brief and lacking detail, and it was hard to disentangle the factors constraining and enabling microplanning from those affecting routine immunization more broadly.

Third, because of a dearth of published evidence and gray literature related to microplan development and implementation, we relied heavily on key informant interviews, especially for insight related to implementation. Because of time and resource limitations, we were unable to conduct in-depth country case studies that could provide a complete picture of microplanning and truly achieve theoretical saturation. Instead, we interviewed a limited number of key informants across nine countries and were unable to include community members' perspectives. While the key informant insights are illuminating, given in-country variations in microplanning, these perspectives do not represent microplanning experiences within a country or globally.

Despite these limitations, this review provides actionable insight into the factors constraining and enabling microplanning across varied contexts, which can help stakeholders design and implement microplanning.

DISCUSSION

Our review identified a dearth of robust published evidence on microplanning in the context of routine immunization programs. Where microplanning was discussed, it was typically one component of broader efforts to reinforce immunization programs, often in the context of RED, making it difficult to isolate the constraining and enabling factors that relate directly to microplanning design and implementation.

In the last decade, approaches to microplanning have evolved from a predominantly top-down to a more bottom-up approach, characterized by higher levels of community engagement. The 2017 RED/REC guidelines contain a stronger emphasis on community and stakeholder participation in the microplanning process than earlier iterations, and include an assessment tool for mapping nontraditional health stakeholders, such as schools, faith-based organizations, and traditional leaders. In the literature and key informant interviews, community participation was found to be an important enabler of the development of high-quality microplans, and was identified as an enhancement in Gavi's 2023 review of microplanning as a pro-equity intervention.

It is widely perceived that this shift to involve the community more can increase understanding of missed communities and zero-dose and under-immunized children and their particular barriers to accessing immunization services. According to key informants, better understanding of these barriers, interventions needed to reach zero-dose children, caregiver preferences, and ways to enhance ownership by HCWs increases the likelihood that microplans will be implemented and that microplanning processes will be institutionalized. However, key informants also acknowledged that bottom-up microplanning is more resource intensive at the development stage and needs to be funded appropriately. There is a clear need for more robust documentation and evaluation of the costs and benefits of the various approaches.

Key informants and the literature indicated that developing a microplan is complicated, and some highlighted a need to simplify the templates and guidance. However, other key informants emphasized that while identifying missed communities and zero-dose children is inherently complex and resource intensive, doing so is vital to improving equity in immunization. Therefore, it is important to strike a careful balance between an appropriate level of simplification and surety that the plans provide the information and level of detail required to identify zero-dose children, understand their barriers to immunization, and reach them with high-quality immunization services. Updating and improving the quality of microplans also requires concerted and ongoing efforts to strengthen the capacity of those responsible for developing them.

Shortcomings in the development process contribute to microplans that are perceived to be of low quality, lack facility-based HCW buy-in, and do not serve their intended communities. Key informants reported that without high-quality data, thoughtful community engagement, and proficiency among HCWs and district managers to use the tools and templates, microplans do not reflect community needs and are unable to reach zero-dose children and missed communities. In numerous settings, key informants reported that microplans were widely available and the microplanning process itself was routinized. However, because the quality is perceived to be poor, their use for guiding implementation of strategies to reach zero-dose children is diminished. When this happens, health care personnel motivation to develop or update microplans lessens.

There is a clear and growing emphasis on digitally enhanced microplanning, especially the use of digital tools and applications to map catchment areas and inform population estimation exercises and vaccination strategies. Although some evidence supports the effectiveness of this approach in arriving at more accurate estimates, it cannot replace community engagement. Communities may not accept figures if they are not involved in developing those estimates.

Furthermore, digital tools may produce estimates that are inconsistent with the officially sanctioned figures that are typically generated using census data and used by different programs across the health system. Therefore, to use digital tools to better estimate target populations, high level policy decisions about officially sanctioned estimation methods and process are needed. Finally, while digitally enhanced microplanning can mitigate some of the challenges identified through this review, it cannot overcome all and may exacerbate some if users do not evaluate the costs and benefits carefully.

Because the literature is particularly sparse on implementation of the activities in microplans, we relied primarily on key informant interviews to explore this stage. Many implementation constraints identified are not specific to microplanning and reflect commonly cited barriers to implementation of routine immunization programming. These include a lack of accountability, insufficient operational funds, and high turnover among HCWs. Consequently, suboptimal implementation of microplans should not necessarily be interpreted as a shortcoming of microplanning, but rather as a reflection of broader weaknesses in routine immunization systems, including insufficient resources.

As noted, institutionalization of an intervention or evidence-based practice requires frameworks to support that practice and consistent production of relevant reports and adequate resources (World Bank 2010). Due to widespread uptake of and adherence to the normative framework laid out in the RED guidance for the last 20 years, microplanning is broadly acknowledged to be part of immunization programming, for both campaigns and routine immunization. Ministries of health and expanded programs on immunization have, to varying degrees, reinforced this uptake by requiring that health districts and facilities engage in microplanning.

However, the consistency with which districts and facilities actually conducted microplanning for routine immunization varies. This inconsistency is, in part, attributed to a lack of consensus on how frequently microplans should be updated, but even more so it is a direct consequence of insufficient resources to develop and implement their activities. This lack of resources disincentivizes high-quality microplan development and update.

Because of the time and other resources required, we found that the level of implementation and institutionalization of microplanning for routine immunization was highly variable between and within countries. In many places, implementation and institutionalization are still highly dependent on partner funding. This reflects insufficient resources for immunization and health programming more broadly. It is therefore important to advocate for increased government recognition of the value of immunization in improving child health and adequate resources. Such government endorsement will also contribute to a virtuous cycle, whereby microplans are developed and implemented and the process is institutionalized, as an essential component of achieving equity in immunization.

RECOMMENDATIONS

This review identified several actionable recommendations for ministries of health, immunization program managers, technical partners at the global and in-country levels, and funders.

TABLE 3. RECOMMENDATIONS

AUDIENCE	RECOMMENDATION
Ministries of health and immunization program managers	1. Strengthen the institutionalization and implementation of microplanning through follow-up from those at higher levels of the health system: national to state or provincial; provincial or state to district; or district to health facility. Appropriate types of follow-up include providing supportive supervision and mentorship. Those at higher levels of the system can also encourage accountability by monitoring implementation of those plans and providing

	opportunities for facility managers to share data-driven progress updates in district or other subnational immunization planning meetings. 2. Continue to assess the true costs of implementing appropriate microplans. These estimates represent the operational costs required to reach unreached communities and zero-dose children. Use this information to leverage funding from other government sectors (e.g., city or other local government authorities), funders, nongovernmental organizations, and the private sector to support immunization activity implementation. 3. Instruct state and district-level authorities not to remove (even temporarily) printed copies of microplans to ensure they are always available at the implementation level. Explore options (and develop supporting policies) for digitizing to enable those at higher levels of the health system to access up-to-date microplans. 4. Explore and test low-cost innovations (such as peer-learning networks) to strengthen the capacity of district health managers and HCWs on microplan development and implementation and local resource mobilization. 5. Support districts and facilities in developing more accurate population estimates, including through the use of digital tools, and promote acceptance of accurate local population estimates arrived at through microplanning.
District-level health managers	6. Provide supervision, mentorship, and routine follow-up to health facilities for developing and regularly updating microplans to include unreached and zero-dose populations. When resources to implement all activities in microplans are insufficient, conduct strategic advocacy with non-health stakeholders, including ministries of finance, to raise money to implement the plan and ensure a robust, evidence-based process for prioritizing activities to align with available funds. 7. Support health facilities to prioritize microplan activities based on available resources and need, so the most critical activities, such as outreach sessions to reach missed communities, are conducted.
Health facility staff	8. Ensure that the HCWs responsible for implementing microplans are involved in their development. Engage thoughtfully with community representatives and health workers to properly estimate population figures, understand barriers to immunization services, and prioritize the strategies most likely to reach those communities.
Global and in-country technical partners	9. Promote, further document, and share learning related to bottom-up, integrated, and digital microplanning. Use these learnings to inform microplanning technical assistance. 10. Identify opportunities to comprehensively integrate critical components of bottom-up microplanning, such as HCW ownership and community and female caregiver engagement, into existing guidance.
Funders	11. Continue to promote microplanning, including by using digital technology and improving data use more broadly, as part of efforts to strengthen routine immunization programming through RED/REC, with an emphasis on institutionalization and adequate resourcing. Consider how such efforts can be sustained beyond the period of grant funding.

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