

INTRODUCTION

The foundation of national immunization programs is routine immunization (RI)—the provision to all children of consistent, timely protection from common childhood diseases through vaccination.¹ A routine immunization system also helps to sustain gains from focused immunization campaigns and to introduce new vaccines. In the past ten years in sub-Saharan Africa,² RI has reached increasingly more children as service delivery systems have gained experience, strength, and resources. The Africa Routine Immunization System Essentials (ARISE) project³ was created to learn from those countries whose immunization systems are performing well. The project documents their experiences and consolidates them into a body of evidence to inform future decisions on how to diffuse and scale up effective strategies for improving RI coverage.

In 2011, ARISE conducted in-depth case studies in three countries (Cameroon, Ethiopia, and Ghana) to explore and describe the factors underlying performance improvement in routine immunization in Africa.⁴ The studies aimed to define the pathways through which specific drivers improved RI system performance (as measured by coverage with the third dose of DTP/Pentavalent vaccine)⁵ by investigating the experience of 12 districts. This ARISE research brief reports the results of these in-depth studies.



Box 1: A **driver of routine immunization system performance** is defined as a structure, resource, or process that works on or through immunization system components and enables the immunization system to perform effectively or to improve its performance.

METHODS

The ARISE study employed a mixed-method multiple case study strategy^{6,7} to identify and explore: 1) which drivers are critical to improving district-level RI system performance; 2) how these drivers influence performance; 3) the contextual factors impeding or promoting a driver's effectiveness; and 4) the relationships among the drivers. In each country, the approach for primary data collection was mainly qualitative and the unit of analysis was the district. The methodology was designed to be iterative: the focus of inquiry expanded, narrowed, and shifted as information saturation and convergence was reached and as new relationships and factors emerged.

SELECTION OF STUDY SITES

Case selection took place in two stages. First, the study team used a step-wise process to identify candidate countries in sub-Saharan Africa based on a review of WHO/UNICEF estimates of national routine immunization performance (trends in DTP3/Penta3 coverage from 2000–2009)⁸ as well as other criteria. Countries were excluded from consideration based on low coverage of DTP3/Penta3; little recent change in DTP3/Penta3 coverage; lack of representativeness on key background variables (e.g., gross national product and population size); and being a conflict or post-conflict setting.

Second, at country level, the study team used a “positive deviance” approach in order to explore the experience of coverage improvement. In each country, ARISE selected three districts that had demonstrated recent positive improvement in DTP3/Penta3 coverage, and, for comparison, one district where DTP3/Penta3 coverage remained “steady” or unchanged over the same three- to four-year period (between 2006–2010).⁹ The study time frame in each country was chosen based on the availability of coverage data and the need to focus on recent patterns of change to reduce recall bias. The case selection criteria purposefully sought baseline coverage levels of at least 60 percent for both types of districts in order to eliminate those that were likely to have serious gaps in basic infrastructure and resources for delivering immunization services. In the nine districts where coverage improved, coverage increased by 15 percent, on average, between 2006 and 2010. Initial reported coverage levels in 2006–2007 ranged from 72 percent to 86 percent. Coverage at the end of the study period (2009–2010) ranged from 87 percent to 98 percent. In districts where coverage remained steady, coverage levels in two districts hovered around 63 percent. In Cameroon, however, coverage in the comparative district began at 48 percent in 2006, and declined to 40 percent in 2009

before rising to 63 percent in 2010. In many cases, the team had to adapt the standard selection criteria because of challenges faced with the availability and quality of coverage data.

DATA COLLECTION AND ANALYSIS

Data collection methods in each country included open-ended and semi-structured key informant interviews; focus group discussions; field observation; review of reports, plans, and studies; review of routine program data; and group prioritization exercises. The study teams, which consisted of local and international researchers and immunization experts, collected data at national, regional/zonal, district, health center, health post, and community levels. Researchers conducted a total of over 300 interviews across the three countries, with an even distribution in each. The study team also reviewed national and district RI documents and administrative records, and conducted a district-level RI situation analysis. The goal of the situation analysis was to provide sufficient information about how the RI system was organized and managed and how it delivered services, rather than provide a comprehensive picture of technical capacity for routine immunization.

There were two levels of data analysis: country and cross-country synthesis. At the country level, data analysis to identify and explore performance drivers took place in stages. As the researchers progressed from district to district, they developed and then tested theories of driver-to-performance pathways by reviewing interview notes, holding team discussions, constructing pathway diagrams, and cross-referencing interview data with data collected from the RI situation analysis and from observation at service delivery sites. The study team compared the experience of each district where coverage improved to find common or contrasting patterns related to strategies and decisions that influenced coverage improvement. The researchers then analyzed data from the district where coverage had not improved—the “steady” district—to determine whether patterns observed in the other districts were present or absent. Draft findings were presented and verified at stakeholder workshops in each country.

Cross-country analysis was used to identify common patterns related to the drivers of RI performance at the district level, key contextual influences on performance improvement, and the role of essential health system components. The analysis involved several steps including a joint three-day workshop with the three country study teams and coding of interview transcripts, thematic grouping and classification of the data generated by each country, data review and construction of driver journals by theme, identification of the pathway from driver to improved performance,

comparison of drivers in all districts where coverage improved with drivers in all steady coverage districts, and review of data to identify areas where drivers clustered. NVivo 9 software¹⁰ was employed as a data management tool for the storage, coding, and sorting of data.

FINDINGS

When district findings were compared and synthesized, six drivers of RI performance improvement emerged as common to the nine study districts where coverage improved:

- Political and social commitment to routine immunization
- Actions of development partners
- Cadre of community-centered health workers
- Health system and community partnership
- Regular review of program and health worker performance
- Immunization services tailored to community needs

Although the way in which these drivers contributed to improved coverage varied by district, each was present in some way in the better-performing districts and was either absent or weaker in the three study districts where coverage remained steady. In addition to identifying, exploring, and categorizing the common drivers of improved coverage in each district, the case studies also set out to understand how the district context influences both driver effectiveness and coverage improvement, and which elements of the health and immunization system facilitate the work of performance drivers.

The discussion below describes four common contextual factors that were present alongside the six RI performance drivers in each district where performance improved. The document then introduces the performance drivers, traces their pathways to improved coverage and illustrates the different ways that drivers work in different districts. Finally, the description focuses on the relationship among the drivers. As researchers compared country and district experience, it became clear that no single driver could independently explain performance improvement. Rather, the cases revealed how the six common drivers were often connected, and in some instances, dependent on each other for achieving results. Drivers worked in synergy using specific mechanisms to bring about conditions or actions that resulted in:

- **a more effective and appropriate supply** of immunization services, and
- **an increased acceptance and use** of immunization within communities.

These driver pathways resulted in **improved RI coverage**.

Figure 1 depicts the relationship between common contextual factors, two key components of the health and immunization system that facilitated driver performance, and the six RI performance drivers along the pathway to improved immunization coverage. We characterized drivers as enabling and direct drivers of performance, depending on their role.

SHARED CONTEXT

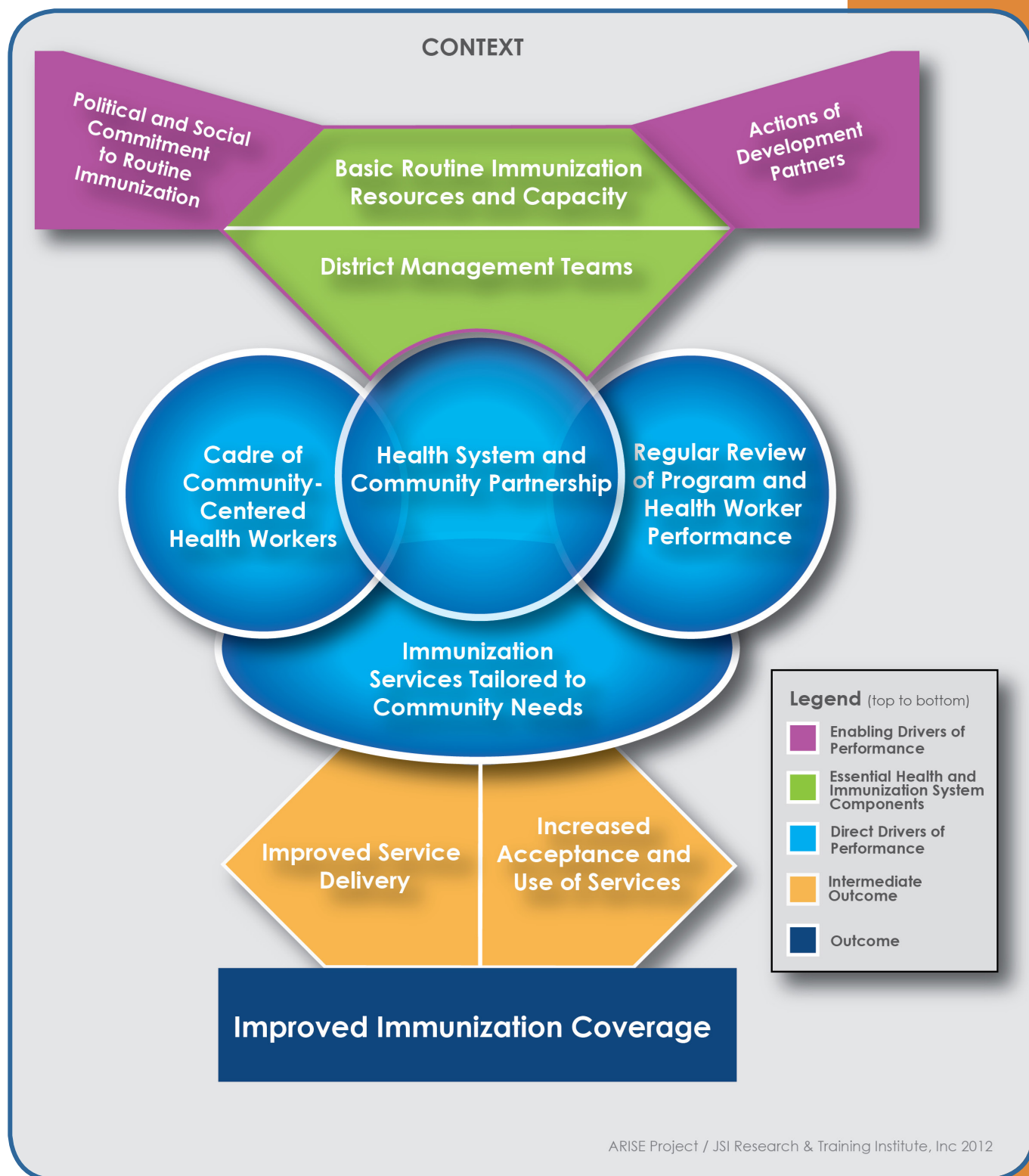
The three case study countries shared many contextual variables. However, four key aspects of the district context supported the improved performance of the RI system: 1) decentralization of the health system to at least the district level (including the establishment of district health teams to manage decentralized health services); 2) a recent policy or strategy that extended primary health care services through a community-based network; 3) the introduction or implementation of an integrated package of basic health services which includes RI; and 4) the prioritization of DTP3/Pentavalent3 coverage as a key indicator of health and development. This indicator had gained prominence in national health plans, in the GAVI Alliance funding agreements, and generally in the global context of commitment to achieving the Millennium Development Goals.¹¹ These contextual variables were present to some degree in all 12 study districts, both those with recently improved coverage and those with steady coverage.

ENABLING DRIVERS

Two drivers—**political and social commitment to RI** and the **actions of development partners**—are considered *enablers* of RI coverage improvement rather than forces that directly influence performance change. These enablers created supportive conditions in the district and worked through health system structures to facilitate the effectiveness of other drivers. In addition, these enabling drivers often pre-dated the period of coverage improvement in the study districts. In Ghana, for example, long-term collaboration with development partners helped build the current, robust RI system.

Political and social commitment to RI encompasses the policies and investments made in routine services and the prominence given from national to local levels to achieving higher coverage. Such political commitment to RI was found at the national and district levels across the three countries and nine districts. At the national level it emanated mainly from the central government, politicians, and managers who moved beyond policy statements to allocate funds, create cadres of workers dedicated to primary and preventive care, and urge and empower lower level managers to achieve health targets. In Ethiopia, for example, the Prime Minister

Figure 1. A Pathway to Improving Routine Immunization Coverage at District Level in Africa



requested regular updates on immunization coverage from local levels and the Federal Minister of Health personally called the zones with a large number of unimmunized children to tell them to improve. In Cameroon, the Ministry of Health recognized the good work of health personnel and communities with a congratulatory letter.

In all of the countries, political commitment to improving immunization coverage was translated from the national level to the community by way of the health sector and local government, and via partnerships with community-level institutions who then became committed and engaged in the process of improving the delivery and acceptance of RI. From sharing responsibility for RI and regularly working together to make the intervention successful, social commitment to RI emerged. In Alage district, Ethiopia, for instance, health and local government offices joined forces to support routine services by conducting supervision and regular review meetings to check on progress and solve problems. This social commitment to improve coverage went beyond political mandates to link communities to the fight to improve health through immunization.

The **actions of development partners**, the second enabling driver, represents the national and local-level support provided by development agencies of various sizes in the form of funding, technical advice, capacity building, and commodities and equipment. Tracking and parsing overall funding flows for RI was beyond the scope of the ARISE studies. However, respondents often noted instances where development partners' funds made significant contributions alongside government, such as the support provided for training and introducing a cadre of health extension workers in Ethiopia and financing some vaccine costs in all countries. From the vantage point of district-level actors, respondents reported that development partners filled essential gaps in financial and material resources if local funds were scarce or delayed. At times, they literally fueled vehicles and enabled supervision visits to take place. They trained facility—and community—based health workers and volunteers in cold chain practices or methods of communicating immunization messages. In addition, they helped design and test new practices—supportive supervision, volunteer management, analysis and display of data to measure activities against targets—bolstering the government's efforts to extend quality care to all women and children. Several national-level and some district respondents reported that recent support from development partners for immunization was linked to the Reaching Every District (RED) strategy.¹²

KEY HEALTH AND IMMUNIZATION SYSTEM COMPONENTS

Figure 1 illustrates how the two enabling drivers influence and work through two essential health and immunization system components—the **district management team** and **basic RI resources and capacity**.

These system components provide the foundation for performance drivers to emerge and function effectively.

In all districts where coverage improved, basic RI resources or inputs were consistently in place. Basic functions like cold chain and vaccine supply were adequate and reliable, and stock-outs were negligible. Appropriately trained staff were available to manage and provide immunization services, basic transportation was limited but available, and financing to support routine operations was both available and sustained. Although district teams faced occasional budgetary shortfalls, broken vehicles, and disruptions of vaccine supply, in all cases they were able to overcome these challenges through creative problem solving. The presence of this *minimum capacity to provide a basic immunization service* was supported by the data collected during the RI situation analysis and evident in the basic coverage levels attained prior to the start of the study.

In the context of a decentralized health system, the district-level management team represents the group that plans, manages, and oversees immunization and other health services, frequently coordinating and collaborating with non-governmental actors as well as working closely with local government. In the ARISE study districts, RI performance hinged on the decisions and the behavior of the district teams and their management of limited resources for providing local health services. In many cases, these teams were given leeway to plan strategies, engage stakeholders, and manage staff, commodities, equipment and vehicles. In all cases they were held accountable for the effectiveness of RI service delivery. The key part that district-level management teams play in the execution of performance drivers gives them a critical place on the pathway to improved RI coverage.



DIRECT DRIVERS OF RI PERFORMANCE

The remaining four RI performance drivers were found to have a *direct influence* on the supply of immunization services, the demand for immunization in the community, and subsequently improved coverage.

All three countries had a paid **cadre of community-centered health workers** who delivered vaccination through health facilities, outreach services, and sometimes home visits. In Ethiopia they are the Health Extension Workers (HEW), in Ghana, the Community Health Nurse (CHN), and in Cameroon, nurses and vaccinators who work directly on community-based health care. In Ethiopia and Ghana, the government recruited and trained HEWs and CHNs as part of a focused strategy to expand primary care (e.g., the Health Extension Program [HEP] in Ethiopia and Community-based Health Planning Initiative [CHPS]¹³ in Ghana). Ethiopia trained 30,193 HEWs in six years (2003 to 2009)^{14, 15} to deliver an integrated package of health services that includes immunization.

In all study districts these cadres of community-focused health workers were instrumental in bringing vaccination into the heart of the community, and increasing geographic access to services through regular service provision that was planned with the community. By virtue of their proximity (many lived within the community), the health workers become the local authority on the benefits of immunization. Through attending community meetings and events, and by way of daily service delivery, they raised awareness of the benefits of immunization and encouraged timely attendance at facilities and outreach sites. Respondents reported that these workers built up a sense of trust in the community and increased acceptance and use of RI services using mechanisms such as health education, birth registration, and defaulter tracing. Key to their success was the fact that the community-centered health workers in all nine districts were supported well by nearby facilities or health offices through ready access to vaccines and supervision.

The second driver that directly influenced coverage relates to the practice of building a **partnership between the health system and the community**. In all districts where coverage improved, the health sector worked closely with district government, local government, and community groups to plan and execute immunization services, raise awareness of immunization, and define strategies to reach those who lived far from health facilities or who were reluctant to accept immunization. In Ghana (Krachi West district), the district assembly mobilized community members to vaccinate their children and the traditional chief was informed when families failed to cooperate with community health workers or failed to have their children

vaccinated. In Kribi health district in Cameroon, the local health committee collaborated with the nurses, going from door to door to sensitize the community and to gather data. Health workers and volunteers also worked in partnership. Community volunteer networks were extensive and active in all districts, and volunteers regularly worked with no formalized compensation. In Bali health district in Cameroon, health volunteers mobilized the community for immunization sessions, and in all three study districts in Ghana they traced immunization defaulters.

Community volunteers in all districts where coverage improved essentially became an extension of the official health team through their work in communication, organizing immunization sessions, tracing defaulters, and motivating mothers and other family members to take their children to be immunized. In Ethiopia, the Health Extension Worker, as prescribed by the Health Extension Program, was integrated into the fabric of the local government and sat in the kebele (local administration) Cabinet. Because of these close working relationships, the health system, local government, and the community developed a shared sense of purpose and built credibility for immunization based on the social and political authority of the community and the technical capacity of the health system. There were also many instances where these groups pooled resources (human and material) to ensure vaccine availability and strong community turnout during outreach sessions.

Regular review of program and health worker performance. The practice of conducting regular reviews of data and promoting open discussion of performance targets and achievements was identified as a critical factor contributing to improved immunization performance by diverse and numerous respondents across the three countries and nine districts. The mechanisms used for performance review included quarterly district-level program review meetings of health teams, regular supervision of health facilities and health workers, and monthly meetings among health workers, local government, and communities. Managers and supervisors also employed coaching and on-the-job training. In Ghana, regular staff meetings were held with health workers from all health facilities in order to review coverage, to motivate staff through “name and shame” if performance was below expectations, to identify resource gaps, and to plan the next quarter’s activities. One respondent noted that “Gaps in performance were discussed and a problem-solving approach was used.”

All review mechanisms were characterized by the use of data to assess performance at different levels, collective identification of weaknesses or gaps, and most importantly the sharing of experience and suggestions on how to improve performance. In Cameroon, respondents noted

that “the secret of supervision is preparation based on data.” Critically, performance review was mainly conducted using a team-oriented, problem-solving approach that encouraged open, constructive discussion, employed strategies of peer learning and friendly competition, and engendered collective accountability for improving RI. The combination of using data to track progress supported by non-threatening, learning-focused management techniques was highly motivating for health workers and community members involved in the immunization program. It also kept the program focused on testing strategies to address coverage gaps and improve demand for RI. An HEW from Ethiopia reported:

“At evaluation/review meetings, the HEWs who have better experience share their ideas, experience, and way of doing things with others who have poor performance. For instance, three years ago the performance of the woreda (district) was low. We questioned ourselves and [asked] what are the reasons for the low performance? We called HEWs and supervisors for meetings and we discussed with them at that meeting. We also identified the problems and meeting participants shared experiences.”

The fourth direct driver of performance improvement emerges from the other three performance drivers and represents a key program strategy employed in each district to improve coverage. It involves deliberate steps by health managers and workers at all levels to **tailor immunization services to community needs**. Based on their knowledge of the community and requests from community members, health workers chose appropriate sites for outreach, adapted the service times and days to encourage maximum attendance, and took services into the home when needed. Community-level respondents also noted that health workers’ adherence to planned outreach visits and service delivery schedules meant the services were predictable and reliable, and mothers found it easier to attend. At integrated health centers in Cameroon, health workers took extra steps to welcome the mothers, and make the services friendly and supportive of social life among mothers. Health workers also formed personal links to the community to gain greater understanding of their needs and increase community trust in health messages. In Cameroon and Ghana, some district teams divided the outreach sites into manageable units or zones, and assigned one health worker to manage this unit and be identified by the community as the health worker who was responsible for immunization services in their area.

Service tailoring also included use of appropriate channels to inform people about immunization and immunization services. Health workers attended

church events and village committee meetings to talk about vaccination. They brought the messages about health to where communities normally gather, and crafted the messages to reach different segments of the population: mothers, fathers, religious leaders, traditional leaders, and local government officials. The results of these strategies were evident not only in increased coverage levels but also the consistent decrease in dropout rates across the nine districts where coverage improved, suggesting that mothers were motivated and able to complete the vaccination series for their children. Tailoring services to community conditions and needs increased geographic and social access to care, improved the community's likelihood of seeking out the service, and built respect for the health service within the community.

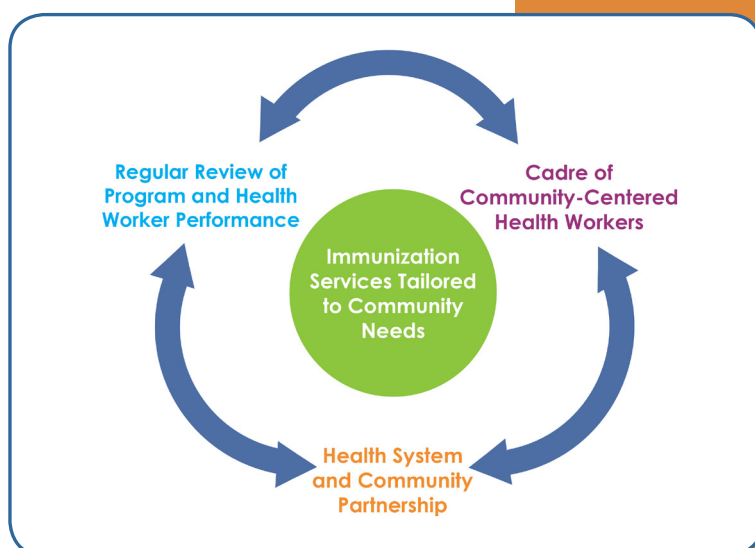
CLUSTERING OF PERFORMANCE DRIVERS

The ARISE case studies suggest that while each of the four direct performance drivers contributes to better RI service delivery and increased demand for RI, it is unlikely that any one of these drivers would have had as positive an impact on immunization coverage on its own. The data indicate that these **drivers clearly work together at the district level**, operating in synergy to bring about positive changes in coverage. The three drivers—performance review, partnering, and community-centered health workers—are particularly closely linked, and this three-part cluster of drivers effectively shapes the strategy of service tailoring and makes it effective and sustainable (Figure 2).

For example, the effectiveness of the **partnership** between the health system and the community is tracked and reinforced through performance review. The open approach to learning that typifies the **performance review** mechanisms found in the ARISE study districts creates a shared sense of responsibility for reaching program objectives. It also motivates health workers and community members to find ways to overcome gaps in performance and continue to work together, each focusing on their own tasks.

The **community-centered health worker** is the foundation of this partnership and brings to the table the most intimate understanding

Figure 2. Synergy Among the Four RI Direct Performance Drivers



of community needs and the ability to tailor services directly through fixed and outreach sites. By working with and frequently living within the community, these health workers literally “bring health to every door step,” a phrase that embodies the intent of Ghana’s Community-based Health Planning and Services (CHPS) program. The partnership that health workers form with the community is a catalyst for performance improvement. In Cameroon, the persistent engagement of the health system and the community around immunization and improved access to well-tailored, reliable services appeared over time to transform basic awareness of immunization into felt needs and eventually into expressed demand for routine services. Many respondents in the study districts where coverage improved reported that the community had become vested in the immunization program. They noted that they had seen that fewer children die from measles as a result of vaccination and they appreciate the way in which the health workers care about their children by providing a good, friendly service close to the community.

CONCLUSIONS AND RECOMMENDATIONS

The ARISE in-depth case studies found that improving RI coverage at the district level in Africa is associated with the active presence of four performance drivers working together to increase and improve the quality of immunization services, raise awareness of immunization, and ultimately increase community demand for immunization services. Moreover, the data indicate that no single strategy working alone provides the “magic bullet” for change. Rather it is the synergy among drivers that has a positive influence on coverage. Previous research on routine immunization in Africa mainly studied obstacles to improved performance. The ARISE studies are unique in their focus on positive drivers of change. These results have a number of practical policy implications for other decentralized health systems in sub-Saharan Africa, and in particular for institutions and programs working at the district level.

First, a paid **cadre of community-focused health workers** that brings immunization services close to the community can catalyze efforts to improve the supply and uptake of vaccination. These workers must be well trained, well resourced, and supported by supervision. Linking health workers to the community engenders health worker accountability to the community and motivates workers to tailor services to meet the community’s needs.

Second, building and maintaining **strong partnerships among the health system, local government, and community** is a core strength of an effective district immunization system. Essentially, members of the community work hand in hand with health workers to manage community health and development.

Third, in successful district-level RI programs, **regular, team-oriented performance review** is used to track progress, correct problems, and build accountability into the immunization program among the district management teams, the health work force, and the community. Supervision and use of data strengthen the review process and build strong rapport between health managers and providers.

Fourth, **services must be tailored to community needs**. In the ARISE study districts where coverage improved, the health workers adapted global and national strategies, customized services, and consequently built a strong, committed following for immunization. Reported Penta3 coverage improved an average of 15 percent in three to four years in all these “positive change” districts. Dropout rates showed a downward trend in seven out of the nine districts. Motivated by performance review and community ties, and guided by data and peer review, health workers frequently came up with creative solutions to address problems and maintain service delivery. They pooled resources, used their own money to transport vaccine, walked the extra distance, reached out to other health and local government staff, and made other sacrifices mostly to ensure that services were available in their communities on a predictable basis.

Fifth, RI performance drivers do not work in a vacuum. For these drivers to improve coverage from good to very good, a district requires **the managerial and technical capacity** to deliver RI services. The basic inputs of an RI service (vaccines and related supplies, cold chain equipment, trained health workers, fixed and outreach sites, and transportation) must be in adequate supply and available on a consistent basis. Only then can the direct performance drivers take hold and improve the delivery of immunization services and increase community awareness and demand. The study districts where coverage improved had, for the most part, a



reliable and sustained supply of these basic RI resources, partly because of a strong, and long-standing national commitment to immunization and reliable support from development partners (the enabling drivers). Many respondents took this basic capacity and regular access to resources for granted, as they did not “drive” recent coverage improvement. However, they recognized them as a foundation for performance improvement.

The presence or absence of basic service capacity and the RI performance drivers only partly explains the differences between the “steady” coverage districts and those that succeeded in raising coverage. At the heart of this experience was the **district management team** in the districts where coverage improved. Each team possessed the strategic skills and determination to introduce or provide support for these drivers and use them as effective strategies of change. Higher-level units in the health system also granted these district teams sufficient autonomy to manage district resources as needed to achieve their goals.

Finally, it is noteworthy that most of the drivers that directly influenced immunization coverage were not unique to immunization, but were equally relevant to other primary health care interventions. Some of the drivers may have been introduced as part of an immunization program strategy, such as those found among the components of RED (e.g., use of data for monitoring and review, community engagement, and extending services via outreach to underserved areas). Others were part of a national effort to strengthen basic health care as a whole (e.g., the HEP in Ethiopia) or to strengthen the health workforce (e.g., training CHNs in Ghana). The use of review meetings, which was common in the early years of health sector decentralization in Ghana, reflects a long-standing emphasis on developing strong district-level management for health. Whatever the genesis or the intent of a strategy, the findings from the ARISE case studies suggest that for improving RI coverage, there is potential benefit from investing in both essential immunization service delivery and health system improvements simultaneously.

Although it is not possible to predict that introducing the same drivers in other districts in the study countries or elsewhere in Africa would improve immunization coverage in the same way, it is helpful to consider the relevance of these drivers to districts that have reached a similar stage of immunization program maturity as those represented by the nine districts where coverage improved. Each of these districts had reached Penta3 coverage levels of at least 70 percent by 2006–2007. In most cases, a basic set of RI program resources were in place and routine services were reliably available. In addition, it appears that a basic awareness of immunization and

its benefits had been established. In these types of settings, the combination of district-level practices that prioritized performance, partnership with local government and communities, and community-focused health care (by tailoring services and ensuring that health workers are accountable to the community) may be sufficient to move a district a long way toward achieving universal immunization coverage.

The findings of these district-level studies confirm that district immunization systems are complex and dynamic. They require a supportive national context, sound health systems, creative, adaptable strategies, and capable managers to channel resources effectively to reach women and children on a regular basis. Strong and routine engagement between health teams and the community also fosters mutual commitment to immunizing children and taps local resources for community-level health. Lessons from these and other successful districts should be shared among countries and with district teams, focusing on positive and effective strategies for coverage improvement, not only on obstacles and gaps that explain poor performance.

ENDNOTES

- 1 A child is considered fully immunized if he or she receives all vaccine doses in accordance with the national vaccination schedule. In many countries, RI also includes tetanus toxoid vaccination of women to protect women and newborns from tetanus.
- 2 In this report, the term Africa refers to the 46 countries in the World Health Organization Africa Region (WHO/AFRO).
- 3 ARISE is managed by the JSI Research & Training Institute, Inc. (JSI) and funded by the Bill & Melinda Gates Foundation. JSI's partners on the ARISE project are, in Uganda, the School of Public Health at Makerere University and, in the United States, the Dartmouth Institute at Dartmouth College and the School of Public Health at George Washington University.
- 4 The full case study reports and research briefs on ARISE results in Cameroon, Ethiopia and Ghana are available at <http://arise.jsi.com/>.
- 5 DTP3 or Penta3 relate to coverage with the third dose of vaccine. Pentavalent vaccine combines the DTP vaccine with vaccines for hepatitis B (HepB) and Haemophilus influenzae type b (Hib). These metrics are accepted indicators of routine immunization system performance. Pentavalent3 and DTP3 are used interchangeably in this brief.
- 6 Case study methodology has a number of advantages for this type of investigation. It permits a holistic, detailed description and analysis of what the drivers are and how they are working to improve RI system performance in a specific setting. Case studies are particularly appropriate for an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-world context, especially when the boundaries between the phenomenon and its context are not clear, as is the case with drivers of RI system performance. Yin, R (2009). *Case Study Research Design and Methods*, 4th edition. Thousand Oaks, CA: Sage Publications.
- 7 Health service research is often criticized for focusing on barriers that are not relevant to managers who want to identify evidence-based strategies that work (Bosch-Capblanch, Kelly & Garner, 2011). The ARISE design was informed by methodological approaches such as realistic evaluation and positive deviance that offer more nuanced understanding of how health systems work and provide more practical guidance for managers (B Marchal, M Dedzo & G Kagels, 2010a; B Marchal, M Dedzo & G Kagels, 2010b; Pawson, 2002; Pawson, Greenhalgh, Harvey & Walshe, 2005).
- 8 Data on DTP3 coverage were drawn from WHO/UNICEF estimates. http://apps.who.int/immunization_monitoring/en/globalsummary/timeseries/tswucoveredtp3.htm. Accessed July 2010.
- 9 A complete summary of district selection criteria and study methods is available on request.
- 10 QSR, 2011.
- 11 DTP3/Pentavalent3 is not one of the Millennium Development Goal (MDG) indicators, but immunization receives attention under MDG4 and with the reporting of measles coverage.
- 12 RED is an approach developed in 2002 to revitalize routine immunization and achieve equity and continuity of quality services focusing on five operational components.
- 13 Awoonor-Williams, J, Vaughan-Smith, M, Phillips, J. & Nyonator, F (2007). 'Chasing children': The impact of rural community-based health services on childhood immunization in Nkwanta District, Ghana. Paper presented at the Annual Meeting of the Population Association of America, New York City. https://apha.confex.com/apha/133am/techprogram/paper_102497.htm.
- 14 Ethiopia Federal Ministry of Health, Health Extension Program (HEP), "All Roads Lead to HEP" May 2009 (presentation).
- 15 Health Extension Workers in Ethiopia are mostly female (primarily young women) and are required to have a minimum of a tenth grade education. They are locally recruited and are required to have good health and fitness. The HEWs receive one year of training at technical and vocational training and education centers.



AFRICA ROUTINE IMMUNIZATION SYSTEM ESSENTIALS

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