



AFRICA ROUTINE IMMUNIZATION SYSTEM ESSENTIALS

DRIVERS OF ROUTINE IMMUNIZATION SYSTEM PERFORMANCE AT THE DISTRICT LEVEL

ETHIOPIA CASE STUDY

ARISE Research Brief | Number 2

INTRODUCTION

The foundation of successful national immunization programs is routine immunization (RI)—the provision to all children of consistent, timely protection from common childhood diseases through vaccination. Effective RI systems increase coverage rates, sustain the gains that vaccination campaigns achieve, and facilitate the introduction of new vaccines.

The Africa Routine Immunization System Essentials (ARISE)¹ project was created in late 2009 to consolidate experience and learn about what drives improvement in RI coverage in Africa. Overall, the countries of sub-Saharan Africa² have achieved solid advances in immunization performance in the past decade. The proportion of infants vaccinated with a third dose of the vaccine for diphtheria-tetanus-pertussis (DTP3)³ grew from 55 percent in 2000 to 77 percent in 2010. However, in 2012 DTP3 coverage rates vary greatly among and within countries, and pockets of low vaccination coverage still exist. Some of Africa's most populous countries—Nigeria, South Africa, Democratic Republic of the Congo, and Uganda – have coverage rates well below the target of 80 percent, and many districts throughout Africa fall short of the 80 percent mark, as well.⁴ ARISE aims to learn from African experience with RI, particularly from countries whose RI systems are performing well. It seeks to explain why some RI systems achieve improvements in immunization performance and others do not, and then translate these findings into actions to improve African RI systems whose performance continues to falter.

- An effective national routine immunization (RI) system provides consistent, timely protection from common diseases to all children.
- Woredas in Ethiopia need the basic infrastructure of an RI system. Once these delivery systems are securely established, improving their performance will require extending services deep into the communities they serve by creating and strengthening partnerships between the health systems and community stakeholders and by improving accountability through regular review, use of data, and peer learning.

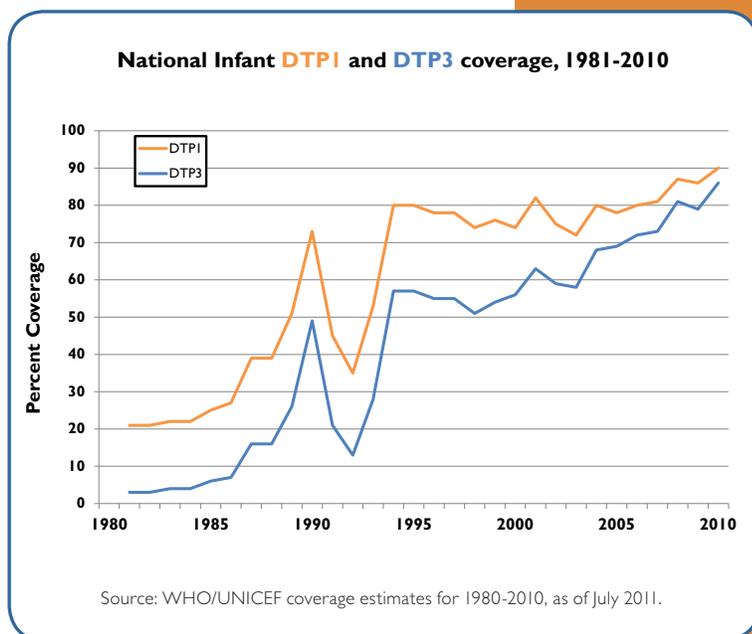
During the first stage of the project, in 2010, ARISE interviewed implementers and technical and development partners and completed a systematic review of published and grey literature on the drivers of RI system performance in Africa. (Performance is defined for the purpose of this study as DTP3/Penta 3 coverage).⁵ A preliminary set of policies, procedures, and investments driving RI system performance emerged.⁶ To investigate these and other possible drivers of coverage improvement in depth, and to better understand how they work in practice, ARISE conducted a study of the drivers of RI performance in four districts in Ethiopia. (Hereafter we will use a transcription of the Amharic word for “district”: woreda.) The research in Ethiopia is part of a larger study that extends to Cameroon and Ghana as well. This research brief reports the results of the Ethiopia case study.⁷

BACKGROUND

Ethiopia is a large, low-income country in the Horn of Africa, with the challenge of providing equitable health services across a highly dispersed population. The country is home to approximately 83 million people who occupy 1.1 million square kilometers of diverse topography.⁸ Ethiopia ranks 174th out of the 187 countries listed on the United Nations Development Programme's Human Development Index for 2011. Its score of 0.363 is lower than the 0.463 average score for sub-Saharan Africa.⁹

In 1980, Ethiopia launched the national Expanded Program on Immunization (EPI), which aimed to achieve 100 percent vaccination coverage of children under two years of age by 1990. In 1986, Ethiopia set a more conservative goal of 75 percent coverage of infants under one year of age. The country's immunization coverage rates have increased significantly over the past three decades. For example, national coverage of DTP3 in 2010 was estimated at 87 percent—up nearly 70 percentage points since 1981 (Figure 1).

Figure 1. National Infant DTP1 and DTP3 coverage, 1981-2010



Ethiopia updated its policy governing the national EPI in 2007. The program focuses on reaching children younger than one year of age with the following vaccines:

- Bacillus of Calmette and Guérin (BCG)
- measles
- pentavalent, which combines DTP3, hepatitis B, and hemophilus influenza type B (Hib)
- pneumococcal
- oral polio (OPV)

The program also aims to reach women of reproductive age (15 to 49 years old) with the tetanus toxoid vaccine.¹⁰

Hepatitis B and Hib vaccines were successfully added to the standard EPI schedule in 2007, the same year Ethiopia introduced pentavalent vaccine with support from the Global Alliance for Vaccines and Immunisation (GAVI). In October 2011, also with GAVI's support, Ethiopia became the fifteenth GAVI-eligible country to introduce pneumococcal vaccine—thereby meeting one of the goals of its comprehensive 2010-2014 Multi-Year Plan (cMYP). By adding this vaccine to the EPI schedule, the country hopes to reduce child deaths from pneumonia—the most common cause of death in children under five in Ethiopia and globally.

Strategies introduced to stimulate improvements in coverage since 2003 include the Reaching Every District (RED) initiative and the Sustainable Outreach Services (SOS) approach.¹¹ The Health Extension Program (HEP), which began in 2003, also provides a framework for advancing primary health care at the community level. Currently, nearly all public health facilities provide immunization services, as do select private facilities. Immunization at public and nongovernmental organization (NGO) facilities is free of charge; private institutions, which function primarily in urban areas, levy charges for vaccination services.

Ethiopia is making progress towards more equitable geographical immunization coverage by building and staffing 15,000 new peripheral health facilities. Nevertheless, systemic barriers hinder the extension of EPI's successes in some areas of the country. To break through them, the government has been making special efforts to reach remote woredas. Examples are the Enhanced Outreach Strategy (EOS)¹² and the Enhanced Routine Immunization Activity (ERIA).¹³

The cMYP identifies the following challenges that Ethiopia must address in order to increase RI coverage:

- limited harmonization of health and nutrition outreach initiatives
- the need to cultivate an increased sense of responsibility for, and social mobilization around protecting the health of adults and children in communities
- the desire of peripheral health workers to receive more training
- limited use of immunization cards as a mobilizing strategy among community members to ensure that children stay on schedule
- the need to ensure that unit costs and service delivery mechanisms are the most cost-effective, given limited financial resources

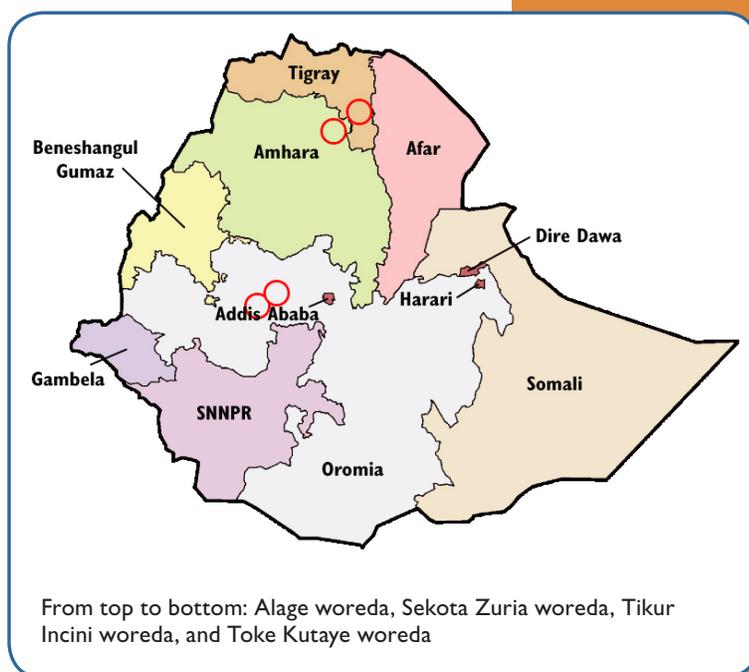
METHODS

The ARISE research in Ethiopia used a mixed-methods multiple-case-study design,^{14 15} enabling investigators to identify and explore:

- which drivers are critical to improving woreda-level RI system performance, as measured by coverage with the third dose of pentavalent vaccine (penta3)¹⁶
- how these drivers influence performance
- the contextual factors impeding or promoting a driver’s effectiveness
- the relationships among the drivers

Case selection was primarily based on trends in coverage from 2007 to 2009, as well as on geographic and other standard criteria. Three woredas where penta3 coverage had improved from 2007 to 2009 were selected. For purposes of comparison, a fourth woreda was selected that showed no significant improvement in coverage over the same period.¹⁷ Before case selection was finalized, immunization experts familiar with Ethiopia’s RI program reviewed the eligible woredas to ensure that the reported trends in coverage accurately reflected the performance of each woreda’s RI system. The woredas that were chosen for study are shown in Figure 2.

Figure 2. Location of ARISE study woredas



Woredas with improved coverage:

- Alage, Tigray Region
- Toke Kutaye, Oromia Region
- Sekota Zuria, Amhara Region

Woreda with steady coverage:

- Tikur Incini, Oromia Region

All of these woredas are in agrarian areas.¹⁸

Seven Ethiopian and international researchers with experience in case study methodology, expertise in qualitative research and RI programs, and knowledge of the local context implemented the study in February 2011. The research team conducted 104 interviews, collecting data in two stages at the national, regional/zonal, woreda, facility, and community levels, with greater emphasis on the latter three. They spent three to four days in each woreda, in order to reach respondents who worked at different levels of the immunization and health systems, as well as members of the communities served by the health system. Researchers also reviewed national and district documentation and administrative records, and conducted a woreda-level RI situation analysis to understand how the system was supplied, organized, and managed and how it delivered services.

Data analysis leading to the identification and exploration of performance drivers took place in stages. As the researchers progressed from woreda to woreda, they developed and then tested theories of driver-to-performance pathways through review of interview notes, team discussions, 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 woreda where coverage improved to find common or contrasting patterns related to resource management, partnering, and data use. The researchers then analyzed data from the woreda where coverage had not improved—the “steady” woreda—to determine whether patterns observed at the other woredas were present or absent.

Draft findings were presented at a stakeholder workshop in July 2011, where representatives of the four woredas reviewed results and constructed a chronology of contextual, policy, and program-level events or actions to map temporal relationships among context, proposed drivers, and performance. After the workshop, the researchers conducted another

round of interviews in the woredas to verify findings and fill data gaps. Then the research team constructed a conceptual map of the pathway linking the drivers of effective RI to improved rates of coverage in the three study woredas. Figure 3 illustrates the analysis process the researchers used to define performance drivers.

FINDINGS

The following figure depicts changes in penta3 coverage from 2006 through 2010 in the four study woredas and nationally. Although the initial selection of study woredas was based on coverage data provided at the national level, Figure 4 depicts woreda coverage estimates based on data provided directly by the woreda health offices. In some cases, discrepancies were found between national and woreda level coverage reports, because some woredas used their own census data to calculate immunization program denominators (the number of children under one year of age) rather than the estimates derived from the last national census.¹⁹ In the three woredas where coverage improved, penta3 coverage rose from the low to mid-70s to 90 or above. However, in the steady woreda, the percentage of penta3 coverage stayed around the mid-60s between 2006 and 2009, only increasing in 2010 to 73. The identification and analysis of the drivers of coverage improvement reported below explain the difference between the woredas where coverage improved and the woreda where improvement was limited. Coverage estimates, in this instance, were a starting point for exploring the experience of performance improvement.

Figure 3. Analysis process to define and test drivers of routine immunization system performance

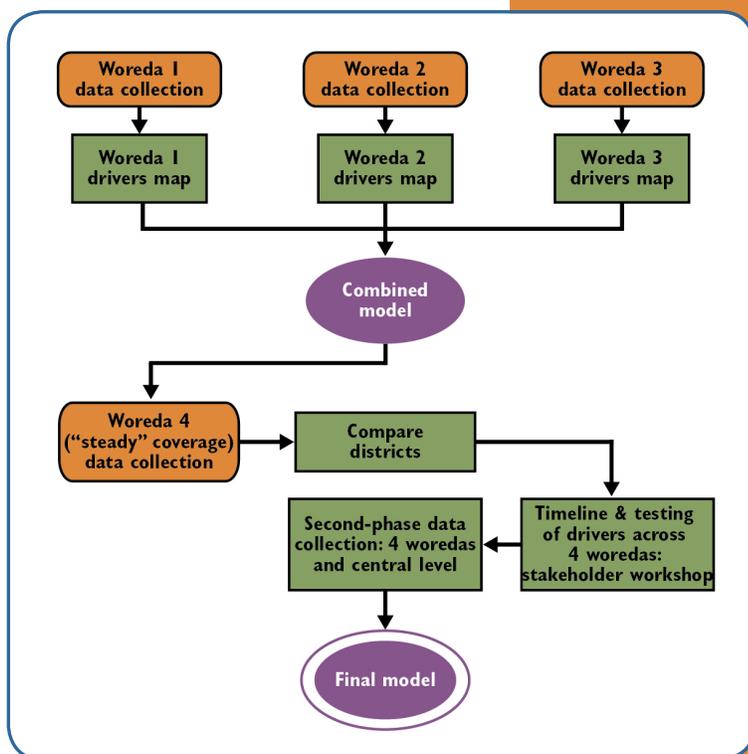
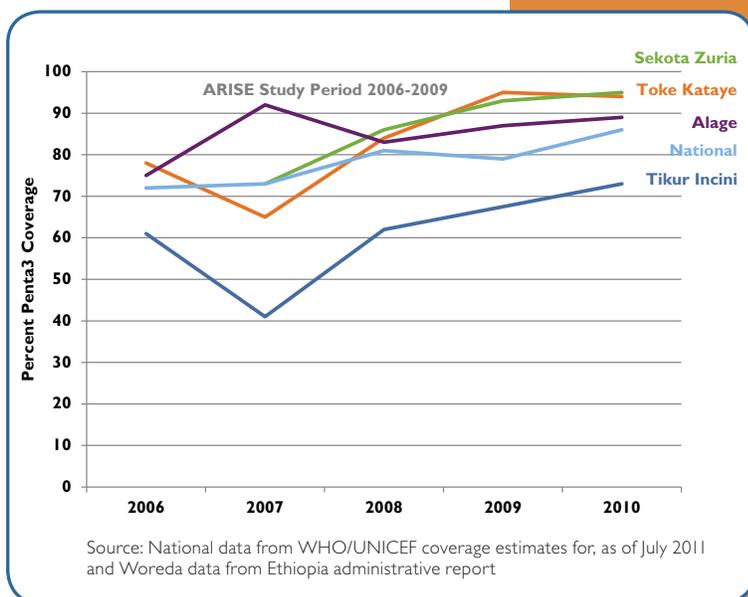


Figure 4. National and woreda level penta3 coverage, 2006-2010



FRAMING RI PERFORMANCE IMPROVEMENT

The anticipated outcome of a national or woreda-level routine immunization system—improved penta3 coverage, in the case of this study—is a product of the context in which routine immunization services are delivered, the availability of essential program inputs, and key performance improvement drivers. Figure 5 presents the performance improvement pathway. While these pathways, in practice, are rarely perfectly linear, this simple diagram shows broad steps on the way to improved coverage. It can guide policy makers and program managers to define areas where they can intervene to improve RI coverage including the introduction or scaling-up of key drivers of RI performance.

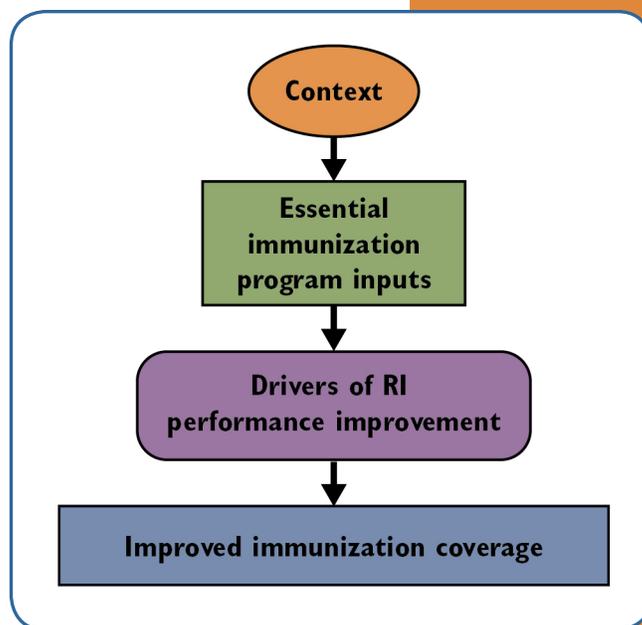
NATIONAL AND SUBNATIONAL CONTEXT OF RI PERFORMANCE IMPROVEMENT

The context of RI can influence the effectiveness of the service and may be as important as any strategy chosen to improve performance.²⁰ In Ethiopia, several aspects of the context of woreda-level RI created conditions that supported the introduction and effective implementation of performance drivers.

Historically, and during the study period, leaders in the Ethiopian government demonstrated high level political commitment to improving RI services and immunization coverage. They expressed their commitment in terms of policies, funding streams for immunization and primary health care,²¹ and the adoption of specific strategies (for example, RED and ERIA) in response to reports of large numbers of unvaccinated children. In addition, the prime minister paid consistent attention to the national immunization program.

In 2003, prior to the study period, Ethiopia began a program that restated the importance of health to the nation's development: the Health Extension Program (HEP). Although the government had promoted childhood immunization for many years under the Health Sector Development Programs, HEP's introduction and rapid expansion marked a period of intense investment in basic health services that set the stage for the success of RI in the study woredas. The HEP's main intent has been to improve access to health services in rural areas, by expanding

Figure 5. Elements of the pathway to routine immunization performance



infrastructure (health centers and health posts) and introducing a cadre of government-paid, community-based, and community-focused health workers (health extension workers, or HEWs). The country's serious and sustained investment in HEP yielded remarkable progress in geographical as well as social access to health care (mainly preventive, though curative care is also part of the service package) which created positive conditions for immunization coverage improvement between 2006 and 2010 in the ARISE study woredas.²² In addition to the expansion in funding and access to care, HEP has focused on strengthening community structures such as networks of community volunteers and supporting their links to health service activity. As a result of HEP, local governments (the kebele administrations) and local volunteers are increasingly involved in health and development activities, including immunization.

One more aspect of the supportive context for improved coverage is the strong emphasis placed on measuring and openly reporting on progress in health care, including immunization. Nationally, the Ethiopian government's use of business process re-engineering²³ promoted the streamlining of performance measurement and encouraged administrative offices at all levels to pay closer attention to indicators relating to the United Nations Millennium Development Goals (MDGs) and to health. The government has also emphasized improving the public sector's accountability and performance. At the woreda level, health and local government institutions and community actors are held accountable for achieving health targets. Penta3 coverage by woreda, zone, and region is one of several indicators reported up the administrative chain of Ethiopia's political and health systems. It is used to stimulate competition and motivate health managers and government administrators. Respondents interviewed for ARISE reported having received feedback from as high as the prime minister's office when coverage levels fell below expectations. A "model family" initiative, which rewards families that have adopted all 16 services delivered under HEP and holds them up as examples for others, illustrates the use of accountability and incentives at the community level.

ESSENTIAL IMMUNIZATION INPUTS

To improve immunization coverage, a woreda-level immunization system requires an essential set of program inputs that enables the health team to deliver good quality and reliable immunization services. In Ethiopia, these inputs are mostly funded by national and regional entities, with support from development partners, and emanate from centrally-managed systems, such as the vaccine supply chain and workforce planning and deployment. Through the woreda RI situation analysis, the ARISE research

team assessed the basic capacity of each woreda to deliver immunization services from 2006 through 2010 in terms of the availability of these essential inputs, and explored the relationships among this basic delivery capacity, RI performance drivers, and improvement in coverage. Data were collected relating to the reliability and adequacy of cold chain equipment and management; vaccine supply; the health workforce for immunization; transportation assets, such as vehicles and motorbikes; and immunization service delivery sites. The availability of quantitative data for tracking these essential immunization inputs over time varied in each woreda. Thus, researchers augmented record review with interview responses and their observation of service delivery.²⁴

All four study woredas had a reliable supply of vaccines. Respondents reported that there were very few vaccine shortages or cold chain problems that had disrupted vaccination activities during the study period. When vaccine supply problems arose, the health team was able to address the problem by borrowing a vehicle to collect vaccines or by moving vaccines to adequate cold storage. Where refrigerators were available, cold chain management appeared adequate. Nevertheless, despite many cold chain improvements in the past six years, several fixed vaccination sites—chiefly health posts—lacked working refrigerators. Respondents at every level in the woredas identified transportation as a challenge, citing vehicle shortages and gaps in funding for maintenance and fuel. Distribution of vaccines from woreda to health center, health post, and outreach site was a challenge reported in all four woredas, which was attributed to periodic transport shortages and difficult road conditions. Vaccines are often transported to health posts by HEWs and volunteers, who walk long distances to collect vaccines for outreach immunization sessions.

With respect to human resources, key positions in the woreda health teams were filled. In addition, all four woredas experienced a marked increase in the community-level health workforce under HEP. From 2006 through 2010, in two of the three woredas where coverage improved, the number of HEWs increased tenfold. Alongside this boom in the health workforce, each woreda gained health posts (ranging from three to 28) and experienced large increases in the number of outreach vaccination sites. The increases in the number of health posts and outreach vaccination sites were less dramatic in the steady woreda than in the other three. However, in most cases, the availability of essential inputs for RI did not differ greatly among the four woredas. Table 1 compares several characteristics, including basic EPI capacity, of the woredas.

Table 1: Characteristics of the four study woredas and their routine immunization systems

WOREDA	ALAGE	TOKE KUTAYE	SEKOTA ZURIA	TIKUR INCINI
Region	Tigray	Oromia	Amhara	Oromia
Population size	116,263 (2009)	122,582 (2010)	142,728 (2010)	107,536 (2010)
Characteristics of settlement	Rural	Rural/ semi-urban	Rural	Rural
Penta3 coverage rates in 2006 and 2009	75%; 87%	78%; 95%	73%; 93%	61%; 66%
Dropout rates between pental and penta3 in 2006 and 2010	6%*; -1%	7%; 4%	15%**; 3%	9%; 6%
Number of health posts in 2006 and 2010	11; 14	10; 31	5; 33	3; 7
Ratio of health post to population, 2010	1: 8,304	1: 3,954	1: 4,325	1:15,360
Number of outreach sites for vaccination in 2006 and 2010	21; 72	38; 62	Unknown; 132	22; 55
Ratio of outreach sites to population, 2010	1:1,614	1: 1,977	1: 1,081	1:1,955
Estimated share of vaccines delivered by outreach, 2010	60%	70%	85%	80%
Number of 4-wheeled and 2-wheeled working vehicles, 2010	6	2	3	1
Number of health extension workers (HEWs) in 2006 and 2010	22; 35	6; 62	5; 64	7; 39
Ratio of HEW to population, 2010	1:3,321	1: 1,977	1: 2,230	1: 2,757
Number of working refrigerators at health care facilities, 2010	5	9	14	8

*2008 data; **2007 data

WOREDA-LEVEL DRIVERS OF RI PERFORMANCE IMPROVEMENT

Respondents at the national and woreda levels cited the availability of essential immunization inputs as an important contributor to improved coverage in Ethiopia. However, the presence or absence of resources and infrastructure only partly explains the differences in outcomes between the steady woreda and the woredas whose coverage rose an average of 16 percentage points in three to four years. By comparing and synthesizing the woredas' experiences, the research team identified five common practices or innovative steps that drove positive change in immunization coverage. These drivers of the performance of RI systems were:

- locally-recruited and supported HEWs
- active community participation in RI and health
- partnership between the woreda health team and the local government (woreda and kebele) administrations
- focus on accountability and performance monitoring
- support from development partners

Locally-recruited and supported health extension workers

Health extension workers were central to improvements in RI coverage. In the study woredas where coverage increased, respondents identified the HEWs more frequently than any other factor as the primary force of change. Several recent surveys also report a link between RI coverage improvement and the presence of HEWs at woreda level.²⁵ These workers contribute directly to improved immunization coverage, because they deliver immunization services and health messages in the community on a regular basis. Before the HEWs were placed at health posts, outreach for immunization was conducted less frequently in some woredas through fixed health centers by health assistants or nurses. The dramatic growth in the size and reach of the community-focused health workforce not only increased geographic access to immunization services; it also established HEWs as focal points in their communities for health generally and immunization specifically.

The HEWs provide immunization at newly-constructed health posts, through vaccination outreach, and by making house-to-house visits. During home visits and in myriad settings in the community, the HEWs were reported to educate and inspire mothers to seek out vaccination for their children. Through their work organizing vaccination sessions and raising awareness, HEWs in the three woredas where coverage improved,

“When the HEWs arrived they came with their job description about immunization and other activities and everything changed straight away. Immunization became their responsibility.”

Alage respondent

built trust and rapport, which encouraged the use of immunization and other primary health services. The workers also established partnerships with community leaders and volunteers, employing mechanisms such as registration of newborns and immunization defaulter tracing to increase the likelihood of mothers initiating immunization and completing it on schedule. The dropout rate between pentavalent 1 and 3, for example, declined considerably between 2006 and 2010 in two of the woredas where coverage improved.

Clearly, the presence of HEWs does not always guarantee success. In the woreda with steady coverage, the dropout trend shows a decline that started somewhat later than in the other woredas, and a large share of children (25 percent) remain unreached by immunization—even with one dose of pentavalent vaccine. The lack of parallel improvement in the steady woreda, despite HEW involvement, can be traced to three factors. First, in the steady woreda, many planned health posts and health centers had not yet been constructed by 2010. The HEWs therefore moved in and out of the community to provide outreach services, but, unlike their counterparts in the other three woredas, they had no base to live and work. Second, some HEWs were not recruited locally, and were therefore reported to be less effective. Toke Kutaye woreda learned this lesson early and in their second HEW recruitment drive, hired many local women. Finally, the relationships between the HEWs and the local administration were not as strong as those found in the other woredas. The experience of Tikur Incini woreda suggests that while HEWs are important for RI success, their effectiveness in driving improvement in coverage depends on several other factors. For example, the HEW's role was found to work best when she had support from the kebele administration, worked closely with the network of community volunteers, and was regularly supported and supervised by the health center or woreda health office. These complementary drivers are discussed below.

Active community participation in routine immunization and health

From the local government (woreda and kebele administrations) to local networks of volunteers, teachers, and religious leaders, the community's role in making immunization services effective and acceptable was undisputed in Alage, Sekota Zuria, and Toke Kutaye. In these woredas where coverage improved, the HEWs and the community formed a solid team that committed time and human and material resources to raising awareness of health needs and interventions, organizing outreach

“In a typical week, HEWs often walk several hours each day to visit families in the villages, in addition to providing services at the health post.”

Health worker

vaccination, and setting high expectations in the community for meeting health service targets. Volunteer networks, which are part of the official government structure in Ethiopia, assign—where possible—one female volunteer to a defined group of families. These volunteers, who are known in some communities as “the network,” work side-by-side with the HEWs to help them deliver immunization services and teach mothers about the value of immunization. As summarized by one respondent, “The presence of community health volunteers is another factor contributing to high immunization coverage.” Some community volunteers help by collecting vaccines for outreach clinics and kerosene to power refrigerators and others by tracking down those who fail to return for second and third doses of vaccine (“defaulters”). In the woreda where coverage remained steady, the overall number of volunteers was low throughout the study period, many volunteer roles were unclear, volunteers complained that incentives given during campaigns and by NGOs were not available for routine services, and few volunteers were involved in tracing defaulters.

Partnership between health and local government administration

An important positive force for improved RI performance in the three improving woredas was a strong working relationship between the health and the administrative arms of the government. Coordination and collaboration between administrative and health offices and workers distinguished the three woredas where coverage improved from the woreda where coverage was steady. Administrative and health offices worked closely together in annual planning. Kebele heads often supervised the HEWs and helped to raise the profile of health and health workers in the community. They met frequently with HEWs to review the workers’ short- and long-term work plans and assess performance as part of oversight and evaluation. In these woredas, local government also shared their resources to support health activities—for example, by lending vehicles for the transport of vaccines and supervisors. Moreover, every kebele member interviewed was well informed about immunization activities.

Respondents viewed the interpersonal relationships between the woreda administration and the woreda health office as crucial for the improved performance of the health system in general and, by extension, for immunization. A kebele manager noted: “We meet with HEWs every week and we raise different immunization and other

“We have a registration book. We check who hasn’t come, and then write a list of those names. We give the list of names to the 18 volunteers, so then they go to their respective households and tell the mothers to bring their children on the day of the next immunization session. If the mother refuses, the volunteer tells us, and then we personally visit the house to talk to the mother to convince her. After that they don’t refuse”

Health extension worker

“The community mobilization and the work with kebele administration have increased in the last two years and coverage has improved”

Woreda-level respondent

health-related issues, discuss them, and solve problems encountered as per our capacity.” HEWs confirmed the importance of kebele support: “The woreda health office and kebele leaders also urge the community to trust us and listen to our message. This increases our credibility within the community.”

A focus on accountability and performance

A sharp focus on accountability and improving the performance of the RI system was woven into the partnership between the HEWs and the local administration in all study woredas. At the woreda and community level, program performance review takes the form of quarterly meetings of woreda health and administrative staff and regular supervision. At the community level, HEWs, kebele representatives, and community members meet to review progress and trace defaulters, guided by reports of children who are behind in their vaccinations or who have not been vaccinated at all. Ranking health facilities and woredas based on coverage and other indicators is also common. In addition to ensuring accountability, these practices are used to recognize achievement, promote learning, and focus stakeholders on a common goal. Data on immunization coverage is deemed “data for action” that focuses volunteers, health workers, and local government representatives on areas where targets are being met and areas where progress is lacking.

What makes these simple management tasks effective are their regularity and the managers’ commitment to following up on reports with specific actions to rectify poor performance. Supervisors also collect examples of effective HEW practices and innovative community strategies and share them with fellow workers at team meetings and during regular rounds of supervision. The workers reported a direct benefit from this peer learning approach and from the public recognition of achievement, which they said motivated them and gave them credibility in their communities. The HEWs reported that supervisors encouraged the use of local data to guide immunization activities and strategies. Supervisors, through their work with HEWs, learned how HEWs met their targets and then shared this learning with others. An HEW reported that at health center review meetings, the “stronger HEWs help to give advice and share ideas with others.”

In addition to recognition and learning, respondents also reported an element of pressure to improve performance. A health manager explained:

We rank health providers and in the review meeting we let the higher-ranked providers discuss how they work and report some of their

“We get encouragement and advice [at review meetings] and continuous follow-up. The monthly review meetings help us to strengthen our skills.”

Health extension worker

best practices, so that the poorer- performing health posts can learn from them.

Another respondent said:

Three years ago the performance of the woreda was low. We questioned ourselves: What are the reasons for the low performance? We called the HEWs and supervisors for meetings and we discussed with them at that meeting. We also identified the problems and experience-sharing was made among meeting participants.

Official emphasis on meeting program goals for health also filters down to families, where “model families” who adopt immunization (by fully immunizing all their children) and other behaviors related to the community health package “graduate” and are celebrated as an example for others.

Support from development partners

Development partners contribute to improving RI performance at all levels of the system. However, researchers concluded that development partners acted more as enablers than direct drivers of improvement in RI system performance. Major international agencies, such as the World Health Organization (WHO), the United Nations Children’s Fund (UNICEF), and GAVI historically made substantial contributions to the National Immunization Program in Ethiopia and continued their assistance from 2006 to 2010. Examples of their support during that period are guidance on policy and technical issues, support for EPI posts, training, EPI surveys and rapid assessments, and the development of ERIA guidelines. From the woreda perspective, however, respondents were more likely to identify the contribution of NGOs to improvements in immunization coverage than to attribute the improvements to major funders or advisors. In the three woredas where coverage improved, NGOs provided equipment, training, fuel, vehicles, and technical assistance. They also helped to build capacity by providing training on all 16 HEP interventions to woreda health administrators, health care providers, and HEWs. In addition, to strengthening the supervision of HEWs, the NGOs introduced checklists, and mentored in supportive supervision. Several NGOs provided the primary support to community health volunteers through training for advocacy, creating awareness, and social mobilization in addition to capacity building. In contrast, there was no equivalent support from NGOs in the woreda with steady coverage, and health managers considered this an obstacle to improving RI system performance.

IMPLICATIONS

To improve and sustain RI coverage, woredas need a supportive political and policy context, as well as essential immunization infrastructure. The national Health Extension Program provided the impetus and the resources to bring about a dramatic improvement in geographic access to immunization (and other health interventions). Longstanding national commitment to RI and the support of development partners ensures the availability of vaccines and equipment. In the three woredas where coverage improved, the relatively consistent availability of these essential inputs provided the foundation on which the five routine immunization performance drivers were able to move penta3 coverage from around 75 percent to as high as 94 percent. Without these inputs from the national government and international development partners for the maintenance of an RI system's basic infrastructure, commodities, workforce skills, and operations, the performance drivers could not work effectively to bring about positive change in immunization coverage.

The ARISE exploration of district level RI reveals, however, that it is the way in which each improving woreda implemented RI that triggered coverage improvements, giving rise to the RI performance drivers discussed above. Comparing the woredas, there was not much difference in terms of health infrastructure. Rather, woreda experience differed in relation to the choices that woreda health teams made in managing their resources and the shared commitment of the health system, the local government, and the community to improving immunization coverage. Such positive relationships and enhanced coordination motivated a range of community members (for example, volunteers, religious leaders, and school personnel) as well as health workers to promote RI. In addition, in woredas where relationships between the woreda administration and health offices were strong, resource pooling—for example, the sharing of vehicles—was reported to be crucial to an effective immunization system, particularly for the distribution of vaccines to health posts and outreach clinics. In the steady coverage woreda, many of these performance drivers—performance review, HEWs' work in defaulter tracing, and raising community awareness—were either very recently instituted, present but not functioning as effectively as they were in the improving woredas, or missing altogether.

The ARISE study in Ethiopia explored the pathways to RI system performance to understand how and why performance improves in different settings. Table 2 summarizes the pathway of these RI performance drivers, key contextual elements, and the role of basic immunization infrastructure.

Table 2: How context, essential immunization infrastructure, and performance drivers work together to improve coverage of routine immunization (ARISE case studies of four Ethiopian woredas)

FOUNDATION AND DRIVERS	MECHANISMS	PATHWAYS TO RI SYSTEM PERFORMANCE IMPROVEMENT
<p>CONTEXT:</p> <p>Political commitment to RI</p> <p>Supportive policies</p>	<ul style="list-style-type: none"> • Policies and funding that: <ul style="list-style-type: none"> – focus on increasing access to care – focus on community-based health – focus on performance measurement and improvement • Regular supply of vaccines and basic inputs for immunization 	<ul style="list-style-type: none"> • Services move closer to the community • Maintain vaccine supply chain • Increase community-focused health workforce • Motivate staff and promote accountability
<p>FOUNDATION:</p> <p>Essential immunization infrastructure in health facilities</p>	<ul style="list-style-type: none"> • National political commitment through HEP & well-functioning immunization program • Cold chain equipment and basic transport at every health facility offering fixed services • Increase in the size of community-focused health workforce 	<ul style="list-style-type: none"> • Maintain the vaccine supply chain • Maintain an adequate number of vaccination providers • Increase opportunities for fixed-site and outreach vaccination
<p>DRIVER:</p> <p>Locally-recruited and supported health extension workers (HEWs)</p>	<ul style="list-style-type: none"> • HEW characteristics: female, from the community, living in the community • HEW partners with kebele administration • HEW teams with extensive volunteer network • Community-based vaccination, defaulter tracing, awareness raising 	<ul style="list-style-type: none"> • Establish personal links between health workers and community • Provide regular vaccination clinics, defaulter tracing, and health education • Increase community and health partnership • Support the credibility of vaccination and HEWs
<p>DRIVER:</p> <p>Active community participation in RI and health</p>	<ul style="list-style-type: none"> • Regular interaction of community health volunteers with RI program • Strong partnership of HEW and kebele administration • Involvement of communities in decisions about service delivery 	<ul style="list-style-type: none"> • Increase capacity to mobilize community support, trace defaulters, and educate communities about health • Increase resources for health service delivery
<p>DRIVER:</p> <p>Partnership between health and government administration</p>	<ul style="list-style-type: none"> • Joint planning and implementation of RI • Regular supervision by woreda, HC, and kebele • HEW sits on kebele cabinet • Joint review of RI performance 	<ul style="list-style-type: none"> • Motivate health workers and community • Increase community involvement • Improve access to resources for immunization
<p>DRIVER:</p> <p>Focus on accountability and performance</p>	<ul style="list-style-type: none"> • Clear performance targets • Monthly or quarterly meetings with health teams to review performance • Praise for and correction of performance • Peer exchange of service delivery solutions • Supervision using data and peer learning 	<ul style="list-style-type: none"> • Motivate staff • Use data to inform decision making • Increase skills to improve community-level service delivery • Emphasize problem solving
<p>DRIVER/ENABLER:</p> <p>Development partner support for health and immunization</p>	<ul style="list-style-type: none"> • Capacity building • Resources to support immunization services • Technical tools and guidance 	<ul style="list-style-type: none"> • Improve service quality • Improve service consistency • Motivate health workers

INVESTING IN IMPROVED RI PERFORMANCE

The results of the study of drivers of improvements in RI system performance in four woredas in Ethiopia may have a number of practical policy implications for other sub-Saharan African districts.

First, Ethiopia's success with taking vaccination into the hearts of communities through Health Extension Workers suggests that a community-focused, community-based health workforce may catalyze immunization service uptake and completion of vaccination schedules. Closer physical proximity to services and the trust built from regular interaction with HEWs worked together to increase the availability of RI and the commitment of community members to take their children for vaccination.

Second, historic investment in establishing functional RI systems imbued with basic technical capacity to deliver services has clearly been effective in some woredas in Ethiopia and in other African countries. Yet, few study respondents even considered that vaccines, the cold chain, or trained health workers served as drivers of coverage improvement. Clearly, without continued attention and investment to sustain the supply of essential EPI elements, no RI program can deliver potent vaccines effectively and build the credibility for RI within a community that is required to sustain acceptance and use of vaccination. As countries gradually introduce new vaccines into the routine system, maintaining these basic service inputs is critically important.

Third, respondents may have placed less weight on the role of essential RI program inputs in driving coverage improvement, because the study woredas had become competent in maintaining those inputs. From 2006 onwards, no major changes—positive or negative—in service supply were reported. Respondents instead traced coverage improvement to decisions and actions related to management and the motivation of staff, to the coalitions formed between health and community actors, to the regular use of data, and to learning to focus workers on reaching targets. Many of the performance drivers were not specific to immunization programs but could be generalized to the basic practices and functions of a health system as a whole. Effective woreda-level RI services benefit from health systems that channel resources and services as close to the community as possible. These health systems engage ordinary citizens, leaders, and influential people in the management of community health services and through shared work build commitment to a common goal. Finally, effective health systems use data to hold health and community workers accountable for the system's performance and use of program review techniques to

motivate workers to stay focused on performance goals. All of these drivers are potentially as important to other basic health services as they are to immunization.

Fourth, in the woredas where coverage improved, no single driver could account for coverage improvement. Rather, drivers tended to work in concert to influence RI system performance. Managers and policy makers are therefore cautioned about looking for one key driver of coverage improvement. In complex systems with limited resources, the use of multiple strategies for achieving better immunization service delivery and increased use of vaccination is needed.

Finally, the responsibility for determining which performance drivers are effective in a particular woreda, and managing resources to apply and adapt performance drivers rests mainly with woreda (or district) level health teams. These teams were effective advocates for strategies that worked, and channeled resources toward effective actions such as use of data for regular performance review and motivation of HEWs. Local health managers in Africa must work strategically to improve health service capacity and effectiveness and increase the use of health services such as they did with respect to immunization in Ethiopia. To do so they require resources, skills, and the authority to use different strategies and adapt them as needed to the local context to optimize resources and improve the chances of program success.

ENDNOTES

- 1 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.
- 2 In this report, the term Africa refers to the 46 countries in the World Health Organization Africa Region (WHO/AFRO).
- 3 DTP3 refers to the third dose of any vaccine containing DTP, such as quadravalent and pentavalent vaccines.
- 4 World Health Organization/United Nations Children's Fund (WHO/UNICEF) coverage estimates for 1980 to 2010, as of July 2011 Available at: http://apps.who.int/immunization_monitoring/en/globalsummary/countryprofileselect.cfm
- 5 DTP3 or Penta3 are accepted indicators of routine immunization system performance.
- 6 Landscape Analysis Synopsis: An Initial Investigation of the Drivers of Routine Immunization System Performance in Africa (May 2011). Arlington, VA: John Snow, Inc./ ARISE Project for the Bill & Melinda Gates Foundation. Available at: <http://arise.jsi.com/landscape-analysis-2/>
- 7 The full Ethiopia case study report, reports and briefs on ARISE research in Cameroon and Ghana, and synthesized findings of the ARISE project are available at <http://arise.jsi.com/>.
- 8 Country population data from the World Bank was accessed at: <http://data.worldbank.org/country/ethiopia>
- 9 Human development index trends, 1980-2011. Human Development Report (2011). New York, NY: United Nations Development Programme. Available at http://hdr.undp.org/en/media/HDR_2011_EN_Table2.pdf
- 10 Ethiopia Ministry of Health (2010). Comprehensive Multi Year Plan, Ethiopia, 2010-2014.
- 11 RED is an approach developed in 2002 to revitalize routine immunization and achieve equity and continuity of quality services focusing on 5 operational components. SOS is a strategy for periodically reaching those segments of the unreached population that are too physically remote to be effectively reached by the present infrastructure of immunization services.
- 12 The Enhanced Outreach Strategy covers 7 million children with high-impact child survival interventions including vitamin A supplementation, deworming, nutritional screening, and targeted supplementary feeding. (Fiedler and Chuko (2008). The cost of child health days: a case study of Ethiopia's Enhanced Outreach Strategy (EOS). *Health Policy and Planning*, 23(4):222-33. Available at <http://www.ncbi.nlm.nih.gov/pubmed/18562457>.)
- 13 The Enhanced Routine Immunization Activity is a strategy to strengthen the existing routine immunization program in the four emerging regions with low immunization coverage and to reduce the number of unvaccinated children in zones with large numbers of unvaccinated children. Emerging regions include Afar, Benishangul –Gumuz, Gambella and Somali. These are frontier areas, mostly arid lands with pastoralists and/or shifting agriculture. (Fiedler and Chuko (2008). The cost of child health days: a case study of Ethiopia's Enhanced Outreach Strategy (EOS). *Health Policy and Planning*, 23(4):222-33. Available at <http://www.ncbi.nlm.nih.gov/pubmed/18562457>.)
- 14 Yin R (2009). Case Study Research Design and Methods, 4th edition. Thousand Oaks, CA: Sage Publications.
- 15 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 than other approaches (B Marchal,

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- M Dedzo & G Kagels, 2010a; B Marchal, M Dedzo & G Kagels, 2010b; Pawson, 2002; Pawson, Greenhalgh, Harvey & Walshe, 2005).
- 16 Pentavalent3 and DTP3 are used interchangeably in this brief.
- 17 ARISE (2011). In-depth case study research protocol, April 2011. JSI Research & Training Institute, Inc.
- 18 ARISE (2011). In-depth case study research protocol, April 2011. JSI Research & Training Institute, Inc.
- 19 EPI data quality is acknowledged to be a continuing concern in Ethiopia and according to the cMYP 2010-2014 is an important focus of future system strengthening activities.
- 20 Sovoronos T, Mate K (2011). Evaluating large-scale health programmes at a district level in resource-limited countries. Geneva, Switzerland: Bulletin of the World Health Organization, 89:831–837.
- 21 Ethiopia Federal Ministry of Health (2005). Health Sector Development Program III Report. Government of Ethiopia.
- 22 The Health Extension Program (HEP) is a consistent and focused push by Ethiopia's government to increase community access to health services. It has increased the numbers and skills of the health care workforce, particularly at the community level; introduced positions for coordination and supervision of health extension workers; introduced a package of 16 essential health services; and made resources available to expand the health infrastructure alongside the health workforce. The majority of ARISE respondents viewed HEP as a positive influence on coverage improvement, because it channeled support for immunization from the national level to lower levels and gave prominence to immunization as part of the HEP package at the community level.
- 23 Debelo, T (2009), "Business Process Reengineering in Ethiopian Public Organizations: the relationship between theory and practice, *The Journal of Business and Administrative Studies*. Vol 1. No 2.
- 24 The situation analysis was not intended to provide a comprehensive picture of RI technical capacity. Rather, it aimed to obtain sufficient information about how a woreda's RI system was organized and managed, and how it delivered services (with reference to the national context). This information allowed researchers to pursue meaningful inquiry about drivers of RI system performance.
- 25 Karim, AM (2011). "Enhancing interactions between households, communities and health workers for improving maternal and newborn health: the Last Ten Kilometers project." Presentation on June 22, 2011. Bill & Melinda Gates Foundation.



AFRICA ROUTINE IMMUNIZATION SYSTEM ESSENTIALS

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