

BACKGROUND

Sub-Saharan African countries¹ 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)² grew from 55 percent in 2000 to 77 percent in 2010. Progress has been steady and sustained, but coverage rates vary among and within countries. Pockets of lower vaccination coverage still exist. Some of Africa's most populous countries—Nigeria, South Africa, Democratic Republic of the Congo, and Uganda—have coverage rates below 80 percent, and many districts throughout Africa fall short of the 80 percent mark, as well.³

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. Without an effective system to deliver RI, coverage rates cannot increase, gains from special vaccination campaigns cannot be sustained, and new vaccines cannot be introduced.

The **Africa Routine Immunization System Essentials (ARISE)**⁴ project was created in late 2009 to learn from countries whose RI systems are performing well. ARISE aims to explain why some RI systems achieve improvements in immunization performance and others do not.

In 2010, ARISE completed a systematic review of published and grey literature on the drivers of RI system performance in Africa and interviewed implementers and technical and development partners. A set of policies, procedures, and investments known to drive RI system performance

- An effective national routine immunization (RI) system provides consistent, timely protection from common diseases to all children.
- Districts need the essential components of an infrastructure for RI, but once those are in place, further improvement in RI system performance requires efforts to strengthen the health system overall.
- Improvements in RI system performance in the case study districts were driven by management practices that motivate the workforce, engage communities, and give local health teams the financial resources needed to deliver regular vaccination services.

emerged.⁵ To investigate these and other possible drivers and understand better how they work in practice, ARISE conducted an in-depth study of RI performance in four districts in Ghana. The research in Ghana is part of a larger study that extends to Cameroon and Ethiopia, as well. By comparing and contrasting the drivers of district RI systems in different settings, ARISE is building a body of evidence to inform programming and investment.

METHODS

The research in Ghana used a mixed-methods multiple-case-study design,⁶ enabling investigators to identify and explore which drivers are critical for improving district-level RI system performance, how drivers influence performance, the contextual factors impeding or promoting a driver's effectiveness, and the relationships among the drivers.

Three districts were selected because, from 2008 to 2010, the performance of their RI systems had improved, as measured by their coverage rates for administration of the third dose of pentavalent vaccine (penta3). The fourth district was selected for purposes of comparison, because its penta3 coverage rate in 2008 was basically the same as those of the other districts, but had remained steady, showing no significant improvement as of 2010.⁷ Technical experts familiar with Ghana's immunization program reviewed the eligible districts to ensure that the apparent trends in coverage accurately reflected the performance of the districts' RI systems.

The selected districts, whose locations are shown in Figure 1, are:

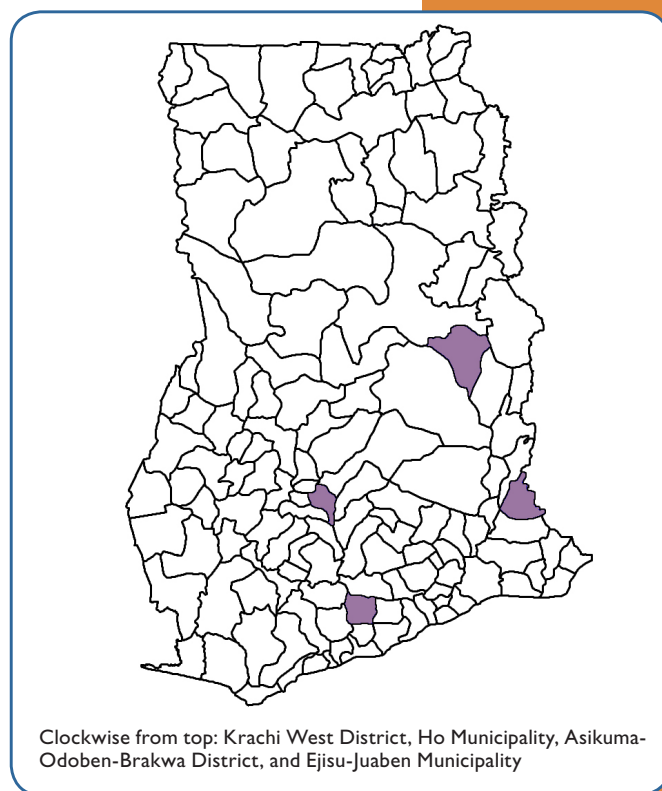
Districts with improved performance:

- Ejisu-Juaben Municipality, Ashanti Region
- Asikuma-Odoben-Brakwa District, Central Region
- Krachi West District, Volta Region

District with steady performance:

- Ho Municipality, Volta Region

Figure 1. Location of selected districts



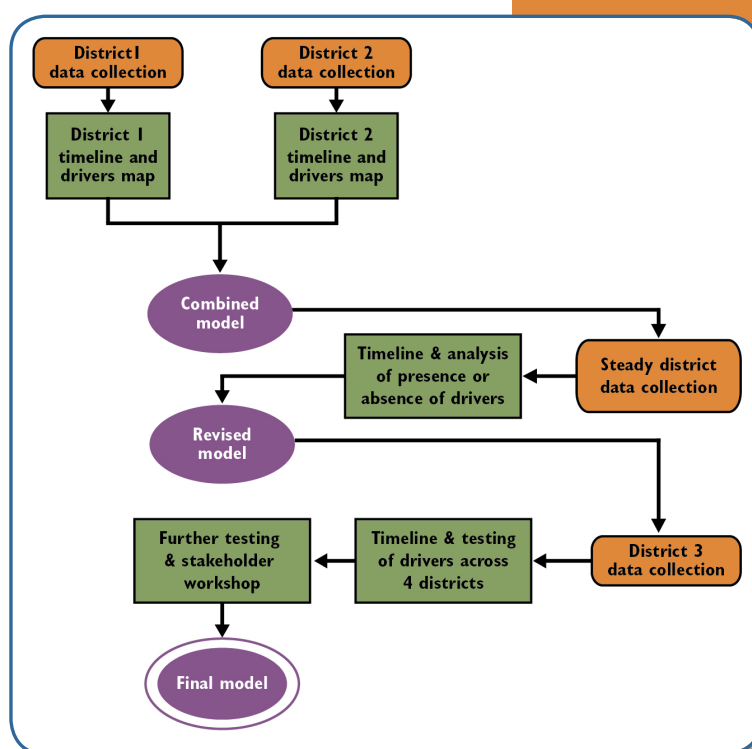
Clockwise from top: Krachi West District, Ho Municipality, Asikuma-Odoben-Brakwa District, and Ejisu-Juaben Municipality

Eight Ghanaian and international researchers with experience in immunization and health program management conducted the study. The team spent four days in each district and interviewed more than 100 national stakeholders, members of the district health management teams, health workers in subdistricts and at health facilities, district leaders, and community members. They also reviewed national and district documents and administrative records. Researchers adapted for use in Ghana qualitative and quantitative data collection instruments developed in the other two ARISE countries.

As in all case studies, the districts were not selected randomly. The analytical power of the case study method is derived from sequential development and testing of a grounded theory⁸ (see Figure 2). After collecting data in one district whose penta3 coverage had improved, the team constructed a timeline and conceptual map to explain the drivers of performance improvement, what gave rise to the drivers, and how the drivers influenced that district's RI system. The team then adapted this model in response to new information they gathered from other districts.

The rigor of the results came from replicating findings in the three improving districts and comparing the characteristics of the RI systems in those districts with the characteristics of the RI system in the district where penta3 coverage had been steady. A driver's presence in all three improving districts and its absence in the steady district were taken to be a compelling argument for the driver's importance as a source of improved performance.

Figure 2. ARISE Ghana grounded theory development process



FINDINGS

NATIONAL AND SUBNATIONAL CONTEXT OF RI PERFORMANCE

Ghana was the first sub-Saharan country to achieve independence and has enjoyed relative political stability. Ghana is rich in natural resources. Its economy has grown at about five percent a year for the past decade and is expected to grow faster as oil production increases.

Half of Ghana's 24 million people live in urban areas. Health is a government priority and the country is on track to meet the fourth of the United Nations' Millennium Development Goals: to reduce by two-thirds the under-five child mortality rate by 2015.

The Ghana Health Service (GHS) is responsible for the national immunization program, which, since the early 1980s, has vaccinated an increasing proportion of children (Figure 3). Penta3 coverage was 93 percent in 2010—the eleventh highest rate of all sub-Saharan African countries.³ A large part of this steady growth was driven by Ghana's strategic investments in providing routine immunization and strengthening district health services.

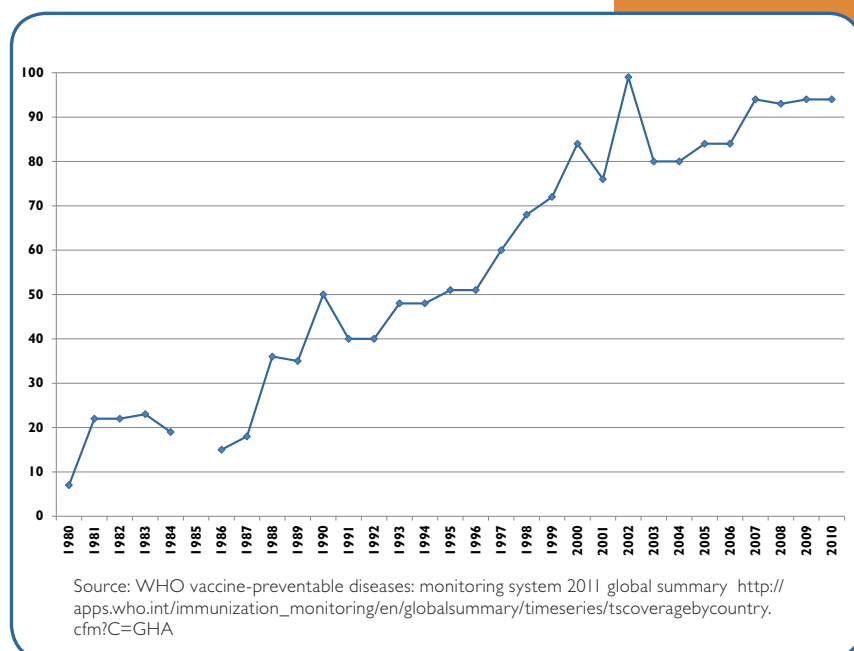
Ghana's multi-layered health service consists of the Ministry of Health, Ghana Health Service, 10 regional health services, and 170 district health services. Each district has a district director of health services (DDHS). District staff are appointed by the national and regional health services and district funds come directly from the national government. District assemblies are the political and administrative arm of Ghana's decentralized system. Although district assemblies do not control district health services, the DDHS provides the assemblies with regular reports.

Routine immunization is administered by community health nurses (CHNs), who have two years of pre-service training. Most vaccinations are given at monthly child welfare clinics, which are conducted at fixed locations or on an outreach basis. CHNs are also responsible for health and nutrition education, growth monitoring, school health, family planning, and some treatment of minor illnesses.

DISTRICT PERFORMANCE INDICATORS AND DRIVERS

By 2010 penta3 coverage in the three improving districts was between 85 and 95 percent—similar to the national rate. The penta3 coverage rate in Ho Municipality—the steady district—stayed below 70 percent between 2008 and 2010. Ho's coverage rate was one of the lowest in the

Figure 3. Three decades of DTP3/ penta3 coverage in Ghana



country. Moreover, the municipality's dropout rate between penta1 and penta3 was 14 percent; the highest dropout rate among the other three districts was 1.1 percent (Table 1).

Essential infrastructure in health facilities

All four study districts had reliable supplies of vaccines in the district cold rooms. Key positions on the district health management teams (DHMTs) were filled and the numbers of CHNs were adequate. The DDHS cadre was highly qualified, with master's degrees in public health and technical competence in the management and administration of vaccines. The benefits of childhood vaccines were widely known in the communities and every district had a schedule of monthly vaccination clinics at fixed and outreach sites that had been in place for many years.

However, districts varied in the size of their populations, settlement patterns, and essential immunization infrastructure, such as vehicles, cold chain equipment, and ratio of CHNs to population (Table 1). The steady district (Ho) was the largest. It had the most people, types of settlements, and health facilities. Ho also had a proportionally greater deficit of essential resources required for immunization service delivery. Ho was the only district with fixed vaccination sites that lacked a working refrigerator or vehicle. In Ejisu-Juaben, facilities without cold chain equipment were supported by nearby health centers, which sent CHNs with vaccines to conduct clinics at the facilities on a regular basis. Facilities in Ho without cold chain equipment were expected to collect vaccines and provide services without support from other health centers.

Districts need essential immunization infrastructure to sustain and improve the performance of RI systems, but the presence or absence of this infrastructure only partly explains the differences between the steady district and the districts whose RI systems improved. The other important drivers of improvement in the performance of RI systems were good district health management practices, which motivated health workers and increased the capacity of community-based services to reach every child. The three improving districts achieved these outcomes by:

- Clarifying roles and responsibilities for immunization activities
- Holding regular review meetings on immunization and other health activities with subdistrict or facility teams
- Increasing subdistrict or facility autonomy and accountability
- Engaging with community leaders and community health volunteers

Table I: Characteristics of the district health services in the ARISE case study

	KRACHI WEST	ASIKUMA-ODOBEN-BRAKWA	EJISU-JUABEN	Ho
Region	Volta	Central	Ashanti	Volta
Population size (2010 estimate)	101,856	110,045	179,376	225,000
Characteristics of settlement	Rural & small urban	Rural & peri-urban	Peri-urban & urban	Rural & urban
Penta3 coverage 2008 - 2010 (from national data)	85/97	86/98	83/87	62/64
Number of fixed sites providing vaccinations	14	11	9	39
Number of outreach sites for immunization clinics	9	94	91	142
Number of working vehicles (four-wheeled and two-wheeled)	>30	>20	>8	25
Number of community health nurses (CHN)	40	39	43	89
Number of working refrigerators at health care facilities	26	23	6	30
Penta3 coverage ranking out of 141 districts in 2008	102	96	111	140
Penta3 coverage ranking out of 170 districts in 2010	38	36	93	166
Dropout rate from penta1 to penta3 (2010)	0%	-0.5%	1.1%	-14%
Ratio of people to CHNs	2,546:1	2,822:1	4,172:1	2,528:1
Ratio of people to vaccination clinics at fixed sites	7,275:1	10,004:1	19,931:1	5,769:1
Ratio of people to vaccination clinics at outreach sites	11,317:1	1,171:1	1,971:1	1,585:1

Clear roles and responsibilities

Clarity about the roles of teams and individuals is essential for creating and maintaining well-functioning health systems. In two of the improving districts, subdistrict teams had an officer responsible for immunization as well as other programs. This clear delineation of roles improved the quality of the supply chain and ensured the delivery of regular immunization services. Krachi West and Asikuma-Odoben-Brakwa districts started their reform processes by analyzing and redefining the roles of management and frontline staff in the delivery of immunization. Although the numbers of CHNs increased in all four districts, in the improving districts the additional staff made it possible to add more outreach sites or conduct regular home visits. In the steady district new staff were not given new duties but instead worked with the existing staff. The number of clinics held and vaccine doses administered did not increase.

Supervision helps frontline staff to gain skills and use these skills to fulfill their roles. Managers in the three improving districts conducted formal supervisory visits every quarter and had regular informal contact with staff between visits. Community health nurses and officers in charge of facilities reported that these visits were appreciated and motivated them to work to achieve their goals. Managers in the steady district also expressed commitment to improving the regularity of supervision, but in 2010 most facilities received only one visit. The district was too big for the DHMT to supervise every facility and subdistrict management teams were not created to take up that function. As a result, staff in the steady district believed managers were not interested in their performance.

Regular review meetings

The three improving districts instituted or strengthened a practice of monthly or quarterly meetings with people responsible for delivering community health services. The participants in the meetings varied across the three districts. If a district did not convene all-staff meetings, the subdistricts or facilities held team meetings to prepare reports for submission to district staff. In interviews, meetings to review performance were mentioned most frequently as a driver of RI system improvement.

Regular review meetings addressed all community health activities, but they emphasized routine immunization, because of the importance that the Ghana Health Service places on it. At the meetings each health team presented the number of vaccine doses they administered in the preceding period relative to the estimated number of infants under one year old. If the number of doses was lower than it was for the previous reporting

period, staff were expected to explain why and to propose strategies for improvement. Respondents reported that these meetings inspired them to work hard, because they wanted the praise and recognition and because they learned practical solutions from their peers.

The steady district held review meetings twice a year but lack of follow-up meant that decisions were not sustained. For example, following a review meeting at the district, the Ho township facilities' teams decided to meet monthly to compile a collective report of their immunization activity. Attendance dwindled when the meetings were not used as an opportunity for collaborative problem-solving.

Autonomous local health teams

The previous example shows that reviewing data and making decisions is meaningless without the authority and capacity to act. The three improving districts put mechanisms in place to shift authority and resources to subdistricts and facilities.

Asikuma-Odoben-Brakwa had the most radical approach. The DDHS assigned a team of “community directors of health services” headed by a CHN, to be responsible for each community. Instead of services being delivered by anyone who happened to be available, the community directors were responsible for all clinics, home visits, and other activities. Interviews with CHNs and community members confirmed that the new structure increased accountability and job satisfaction and improved relations between the health service and the community.

Krachi West and Ejisu-Juaben increased autonomy and accountability by allowing staff to assume greater financial responsibility. Subdistricts in Krachi West were given imprest accounts to buy fuel, pay for public transportation, and arrange for minor maintenance. In Ejisu-Juaben subdistricts were required to use funds generated from their curative services to support outreach programs. These initiatives made it possible for health teams to deliver regular services to communities and intensify efforts when necessary without having to rely on the district to approve payments or release vehicles.

In the steady district the ARISE Ghana team observed examples of local initiative, but these were not encouraged systematically. The district headquarters retained control over all of the four-wheeled vehicles and dispersed funds to pay for public transportation. More often than in the other districts, staff in the steady district complained that they were not given the resources needed to improve coverage and management complained about the lack of initiative of frontline health workers.

Community engagement

Districts whose RI systems improved made efforts to support community health volunteers and interact regularly with community leaders. Krachi West and Asikuma-Odoben-Brakwa held workshops and training for community health volunteers and community leaders while the management teams worked to re-invigorate community service delivery and strengthen local health teams. Ejisu-Juaben continued to support its strong community health volunteer program despite declining external funding, because district leaders recognized that volunteers were critical to any intensification of effort to improve RI coverage. Community health nurses from these districts frequently named community support—and particularly the assistance given by volunteers—as drivers of RI system improvement. Volunteers played a vital role in promoting the immunization services to community members. They also helped CHNs by reporting on recent births, tracing defaulters, assisting with home visits, and, in some cases, preparing the outreach clinic site and helping to weigh babies or record their weights.

The improving districts also fostered partnerships. As a result, district assemblies, private health care providers, and chiefs promoted vaccinations and supplied buildings and other resources for immunization services.

Increasing engagement with communities and partners was not a priority in the steady district. Training new community health volunteers had been postponed several times, because funds were short and volunteers in urban communities were few. In some parts of the district, relations with community leaders were strained, because health workers refused to live in the poor-quality housing that the community provided.

IMPLICATIONS

This study explored the reasons why routine immunization systems succeed. Table 2 presents these drivers and synthesizes them into five broad groups.

Observing the steady district, the ARISE research team concluded that having vehicles, cold chain equipment, and adequate staff appropriately deployed—infrastructure designated essential by the Expanded Programme on Immunization (EPI)—are essential drivers of performance. Once the basics are met, however, further improvement requires management practices that foster a competent, motivated health workforce with the autonomy and resources to adapt services to the needs of an engaged community.

Table 2: How performance drivers improve routine immunization systems (ARISE case studies of four Ghana districts)

FOUNDATION AND DRIVERS	MECHANISMS	PATHWAYS TO RI SYSTEM PERFORMANCE IMPROVEMENT
ESSENTIAL INFRASTRUCTURE IN HEALTH FACILITIES	<ul style="list-style-type: none"> • National political commitment and well-functioning immunization program • Cold chain equipment and adequate transport at every health facility offering fixed services • Adequate number of vaccination providers on staff 	<ul style="list-style-type: none"> • Maintain the supply chain • Support the capacity to expand or intensify services to the community
CLEAR ROLES AND RESPONSIBILITIES	<ul style="list-style-type: none"> • Well-functioning district and subdistrict management structures with clear RI roles and responsibilities • Supportive supervision to ensure that individuals are capable and motivated to perform their responsibilities 	<ul style="list-style-type: none"> • Motivate staff • Maintain the supply chain • Provide regular vaccination clinics, defaulter tracing, and health education
REGULAR REVIEW MEETINGS	<ul style="list-style-type: none"> • Clear performance targets • Monthly or quarterly meetings with subdistrict or facilities teams to review performance • Praise for and correction of performance • Peer exchange of service delivery solutions 	<ul style="list-style-type: none"> • Motivate staff • Use data to inform decision making • Increase skills to improve community-level service delivery
AUTONOMOUS LOCAL HEALTH TEAMS	<ul style="list-style-type: none"> • Transparent allocation of financial and other resources to subdistricts and health facilities • System of accountability 	<ul style="list-style-type: none"> • Motivate staff • Support the capacity to adapt services as appropriate for communities
COMMUNITY ENGAGEMENT	<ul style="list-style-type: none"> • Regular interaction with community health volunteers • Good communication with traditional and political leadership • Involvement of communities in decisions about service delivery 	<ul style="list-style-type: none"> • Improve uptake of services • Increase the capacity to mobilize community support, trace defaulters, and educate communities about health • Increase resources for health service delivery

The strength of the ARISE methodology is that district RI performance was viewed through a wide lens encompassing communities' socioeconomic contexts and histories of health service delivery. Unlike most investigations of RI performance drivers, the Ghana study observed service delivery first-hand and interviewed mothers, community health volunteers, and opinion leaders as well as management and health workers. This intensive data gathering yielded an in-depth understanding of district RI systems. Replicating fieldwork in three districts whose coverage improved and

in a fourth district without positive change allowed researchers to test rigorously their hypotheses about the drivers of change.

This study's results cannot be directly generalized to other districts in Ghana and sub-Saharan Africa. It is not possible to predict that introducing the same drivers elsewhere would improve RI system performance. However, similar findings have emerged from research by others on Ghana's health system performance and also from ARISE case studies conducted in Cameroon and Ethiopia. This body of work is evidence of the potential of investing in health system improvements to strengthen RI coverage, as discussed below.

INVESTING IN IMPROVED PERFORMANCE

The drivers of improvement in the performance of RI systems derived from four district-level case studies in Ghana have a number of practical policy implications for other sub-Saharan African districts.

First, it is not sufficient to have essential EPI equipment and staff at the district level. These resources must be deployed strategically and consistently to the health facilities responsible for administering vaccinations. National governments should allocate resources in accord with a minimum standard that addresses maintenance and replacement, to ensure sustained service delivery capacity.

Second, further improvements in RI performance depend on increased and strategic investment to strengthen district health services and to build and support functioning community-based health services. Interventions should move beyond a simple checklist of good district management practices to foster sustained change. Mentoring, peer-learning, and recognition for introducing innovative practices are effective ways to build the skills of managers and motivate community-level workers to achieve immunization targets. Managers and health workers also require access to financial and other resources and the power to use resources in ways that are appropriate locally.

Third, community engagement is vital if district health services are to be able to maintain high vaccination coverage and introduce new vaccines. In the next year or two Ghana will embark on a new phase of decentralization, which will cede greater control of resources to district assemblies. Increasingly, district health directors will need advocacy and negotiation skills to secure financial and political support for routine immunization.

ENDNOTES

- 1 In this report, the term Africa refers to the 46 countries in the World Health Organization Africa region (WHO/AFRO).
- 2 DTP3 refers to the third dose of any vaccine containing DTP, such as quadravalent and pentavalent vaccines.
- 3 World Health Organization/United Nations Children's Fund (WHO/UNICEF) coverage estimates for 1980 to 2010, as of July 2011. Available at: http://www.who.int/immunization_monitoring/data/en/
- 4 ARISE is managed by the JSI Research & Training Institute, Inc. (JSI) and funded by the Bill & Melinda Gates Foundation. JSI's partners on ARISE are the School of Public Health at Makerere University (Uganda) and the Dartmouth Institute at Dartmouth College (United States).
- 5 *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://www.jsi.com/JSIInternet/Resources/Publications/childsurvival.cfm#immunization>
- 6 Yin R.K. (2009). *Case Study Research Design and Methods*, 4th edition. Thousand Oaks, CA: Sage Publications.
- 7 Only three districts experienced steady penta3 coverage from 2008 to 2010. Only one of these districts—Ho—met all the criteria for district selection.
- 8 Bernard, H.R. (2000). *Social Research Methods: Qualitative and Quantitative Approaches*. Thousand Oaks, CA: Sage Publications.



AFRICA ROUTINE IMMUNIZATION SYSTEM ESSENTIALS

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