Saving One Million Lives Initiative

Strengthening Public Health Reporting from Private Facilities: The Case for Investing in Electronic Health Records

Insights from PMTCT Engagements in Akwa Ibom, Cross River

Executive Summary

Stakeholders in programmes that seek to harness the capacity of private providers for the delivery of priority health services in Nigeria will likely find, as we have in our recent work in the prevention of mother-to-child transmission of HIV (PMTCT), that unreliable reporting of service-utilization data is a major impediment to successful programme execution. To address this, governments, with the support of donors, have provided training and data-reporting tools to privately owned health facilities (PHFs), but significant challenges remain. This report makes the case that support to acquire targeted health information technology (HIT) upgrades, including hardware, can enable private providers that offer priority public-health services to remain engaged in, and accountable for, service delivery long after donor funding ebbs.

We arrive at this conclusion from our recent engagement exploring the key drivers of lower-than-anticipated uptake of PMTCT services delivered through PHFs in two states. Official data suggest that PHFs account for nearly 40% of facility-based obstetric services delivered in Nigeria, yet despite outreach to these facilities for service delivery by donors and government over the last two years, the uptake of PMTCT services in PHFs has remained well below expectations. We hypothesized that *underreporting of services* and *poor provider adoption* were the likely drivers of underperformance, and in late 2014 engaged with stakeholders in Akwa Ibom (AKS) and Cross River (CRS) to explore these hypotheses and design appropriate solutions to the challenges identified.

Our main findings are summarized in **Exhibit 1**. **There was significant underreporting in both states**, though the degree and nature of the reporting challenges differed by state. In CRS, the major challenge was getting the data recorded by PHFs onto the National Health Management Information System (NHMIS) web portal; in AKS, the entire data-reporting system was ineffective, beginning with poor facility-level use of official registers. In both states, the burden of manual data reporting from facilities with the highest client volumes was high. We also found major, but rare, inaccuracies in reporting: one facility underestimated its client volume by a factor of nine. **There was little evidence that poor provider adoption was a driver of underperformance**, as provider training appeared adequate, critical inputs for care were routinely available (except for early-infant diagnosis of HIV), and motivation to provide PMTCT services to clients seemed high.

Experienced stakeholders in PMTCT – indeed in most programmes that engage PHFs for service delivery – should not be surprised by these findings. The poor quality of programme data has been a stubborn problem even in the public sector, where top-down mandates make reporting easier than in the private health sector, where the incentives generally favour non-reporting. Yet unlike in the public sector, which has received significant investments in data-reporting infrastructure, many stakeholders have only explored more tentative options for PHFs – simplifying paper-based reporting; training and mentoring gatekeepers along the reporting cascade; addressing logistical challenges at bottlenecks along the cascade; or tying incentives to reporting. None of these options satisfying, as they sacrifice important information; present practical challenges that are difficult to surmount; rely on continued operational funding and are thus likely unsustainable; or do not adequately address the fundamental *motivational* challenge: that the drudgery of paper reporting relies, at both the facility and further upstream, on human effort exerted in an incentive system that favours noncompliance.

Health information technology (HIT) can overcome these shortcomings and build a platform for future programming. A basic

electronic health record (EHR) system deployed at facility-level that is minimally disruptive to current operations; substantially replaces paper; automates data aggregation and quality assurance in an NHMIS-compliant way; is integrated with the NHMIS portal;, and is not overly dependent on access to broadband and power supply will strengthen reporting of utilization data in general and HIV data in particular. We also hypothesize EHR could improve the quality of care. The high upfront capital expenditure required is the biggest barrier we see to adoption at scale but, if social investors were willing to defray the cost, the already existing IT skill base we found among records officers in PHFs and the experience with IT in other consumer-facing industries in Nigeria (retail, financial services) suggest uptake would be rapid and sustained.

Strengthening data reporting with EHRs is therefore the main focus of the next stage of our engagement. Work is ongoing to fix the gaps in the NHMIS web portal and train records staff in private facilities on the accurate use of registers and other reporting tools. We plan to augment this by demonstrating the feasibility of a basic EHR that meets the high-level specifications above. In doing so, we will prioritize facilities with the highest caseload because we found substantial variability in patient volume across PHFs, with a few facilities accounting for the vast majority of obstetric clients; because the burden of reporting seemed highest in these facilities; and because programme performance is most sensitive to data reported from these facilities. We expect to make investments in hardware for these high-volume facilities but we will also offer software and training to other facilities with IT equipment.

We expect resistance to investing in HIT on historical, philosophical, and practical grounds. Funding for "infrastructure" has traditionally been a tough sell with donors, especially if the proximate beneficiaries are for-profit. Similarly, government has not put in place fiscal incentives for health IT. That we found underreporting to be a more significant driver of private-provider PMTCT underperformance than provider adoption, the usual focus of programming, should prompt a rethinking of such reticence. Some would argue that the priority for limited programme funds be service delivery, not data infrastructure. We continue to reiterate the importance of evidence-driven performance management of health programmes, the very basis of the Federal Ministry of Health's Saving One Million Lives movement, which we are a part of. Others may insist, with some justification, that owners of the PHFs, not donors, make the needed investments. We would caution that poor access to capital is a well-known challenge in private health care in Nigeria, and that healthcare the world over has been slow to embrace HIT in the absence of powerful incentives.

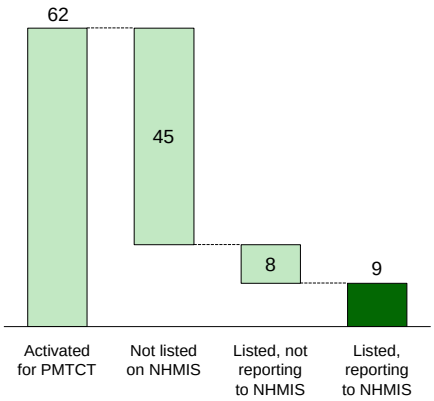
A more effective critique relates to timing: with funding for HIV (and many other programmes) likely to flat-line over the next few years, has our advocacy for HIT come a little too late? We think not. On the contrary, as the outlook for donor funding worsens, and governments and service providers assume a more central role, the time is ripe for stakeholders to put in place systems that guarantee priority interventions like PMTCT are sustainable over the long run. A HIT system that generates reliable and timely service-utilization data is one such system and, beyond the thousands of kids born free of HIV in Nigeria, could well be an enduring legacy of the years of hard work in PMTCT and serve as a platform for future engagements in public health.

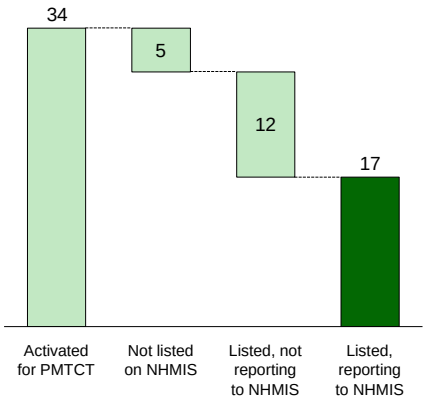
On the Structure of this Report

The rest of this report proceeds as follows. First, we explore the likely drivers of disappointing uptake of PMTCT in PHFs in AKS and CRS. Next, we discuss potential solutions we and others have considered for tackling the main challenge of unreliable reporting from PHFs. We then describe why EHRs offer a sustainable solution to that challenge, how the barriers to adoption might be overcome, and a pilot plan to deploy HIT in facilities with the greatest need.

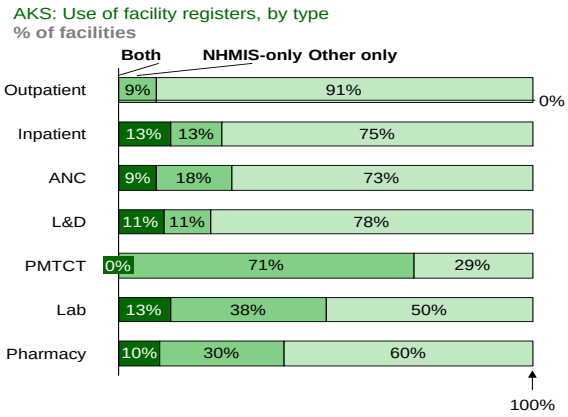
Exhibit 1: Our main findings

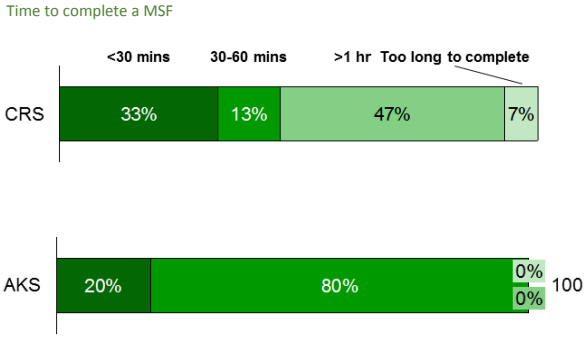
A. Data reporting: Only data from a minority of supported facilities reach the NHMIS portal





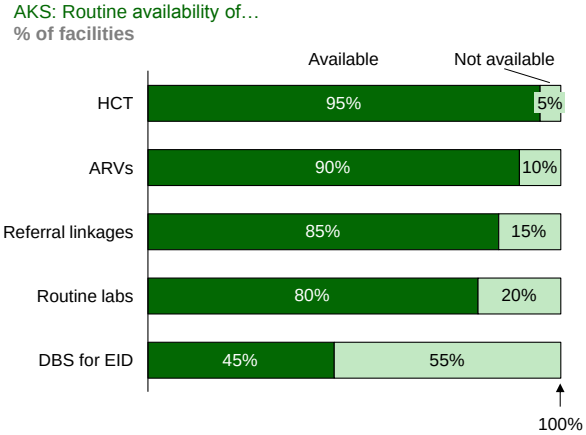
B. At facility-level, multiple registers and lengthy time to compile summary data likely contribute to underreporting

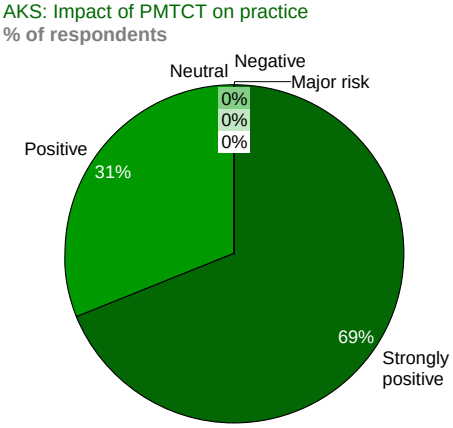




C. Provider adoption is not a significant issue: Key inputs are in place, and providers view PMTCT positively

(AKS; similar picture for CRS)





I. Why Is Private-Provider PMTCT Underperforming?

Background

The last two years have seen frenetic activity in PMTCT in Nigeria, including the in the private health services sector. During this period, the programme delivery unit of Saving One Million Lives (SOML) has played an important role in state-level planning for, and implementation of, PMTCT scale-up by embedding state-based consultants to support state ministries of health. In the eight states we are engaged with, the number of private health facilities (PHFs) supported for PMTCT has risen to 447 by the end of 2014 from just 70 by year-end 2013, a 538% increase in just one year.

Despite this progress in reaching more PHFs, we and other stakeholders have yet to see commensurate population impact. Most recent data from the Demographic and Health Survey suggest about 37% of women who deliver in a health facility do so in a privately owned one[1]. Yet despite the large-scale outreach to PHFs, the uptake of PMTCT services has been well below expectations. One priority state, for example, exceeded its target on number of PHFs in which PMTCT services are supported in 2013 by nearly 40% but with its current trajectory is on track to provide HIV counseling and testing to 60% fewer clients than projected by year-end 2014[2].

We recently engaged with state officials, PHF owners, and provider associations in Akwa Ibom (AKS) and Cross River (CRS) to:

a) Understand the drivers of lower-than-expected uptake of services,
b) Design appropriate solutions, and
c) Use the insights we gain to promote sustainable solutions in state-driven, private-sector PMTCT.

Engaging on Private-Provider PMTCT

We undertook a four-stage engagement with private-sector PMTCT stakeholders in in AKS and CRS. First, because of the poor quality of data on PMTCT performance in PHFs, **we developed a conceptual framework and secured consensus with our stakeholders** around the major hypotheses that could explain underperformance of PHF-targeted PMTCT (see **Box 1**). Two main hypotheses were agreed: Underreporting of services provided and poor provider adoption. Low demand for PMTCT was a secondary consideration.

Second, **we conducted facility visits with state government officials to test these hypotheses** in a sample of facilities in both states (see **Box 2**). We visited 15 and 20 facilities in CRS and AKS respectively. We used direct observation of facility records, structured interviews of PHF owners and key staff, process mapping, and follow-up discussions with local government personnel.

Next, **we analyzed the data and shared our findings with key state-level stakeholders**, including representatives of private-provider associations and NGO implementing partners and government. At these forums, we debated and agreed upon potential interventions with the stakeholders.

Finally, we worked with senior state government officials to convene meetings of private healthcare providers in both states where **we disseminated our findings and proposals, and agreed concrete interventions** to implement. We also took advantage of SOML's quarterly review meeting to share our findings with principals of the National AIDS/STI Control Program in attendance.

[1] National Population Commission and ICF International 2014. *Nigeria Demographic and Health Survey 2013*

[2] SOML, McKinsey analyses for Rivers State

Our Main Findings

We found significant under-reporting in both states, though the degree and nature of the reporting challenges differed by state. Because there are multiple reporting challenges and the sources of reported utilization data are sometimes impossible to verify, it is difficult to quantify the extent of underreporting; we focused instead on characterizing the nature and locus of the reporting challenges we identified. In general, CRS appeared to have much better reporting than AKS. By contrast, **our work suggests poor provider adoption is not a drag** on service delivery: in general, providers appeared to be have adequate training, capacity, and motivation to provide care. We also observed **wide variation in obstetric volumes in the PHFs we visited**, with a few facilities accounting for the vast majority of clients.

Reporting Gaps: Key Findings

The main reporting problems observed at facility-level were irregular completion of a monthly summary form (MSF) and inaccurate data reporting on the MSF. Some facilities had not completed an NHMIS MSF in the last three months. We also observed major, but rare, reporting errors that underestimated the caseload; for instance, one high-volume facility underreported its antenatal attendance by a factor of nine.

Completion rates of the MSF at the facility-level was remarkably different in both states; CRS was better. All the 15 facilities we visited in CRS had completed a MSF in each of the last three months – irrespective of practice type, caseload, and the availability of a trained records person on the staff (**Exhibit 2**). By contrast, only 45% of facilities in AKS submitted a MSF in the prior three months (see **Exhibit 3**.)

Facility adoption of NHMIS registers, not knowledge, appeared to explain the big difference between the states. We believe the key driver of better facility-level reporting in CRS is the relatively high adoption of the official NHMIS registers by facilities as their primary patient registries (**Exhibit 4**). By contrast, facilities in AKS were inundated with multiple registers, including theirs, likely causing confusion and non-adoption. There was no appreciable difference in knowledge of the NHMIS data process between the states. Our discussions with stakeholders suggest that the difference in facility reporting between the two states is the result of more active engagement of PHFs by the government and lead PEPFAR contractor in the area of NHMIS reporting.

The burden of reporting is significant, especially in high-volume facilities in both states, whose staff complained of a significant, uncompensated burden. We attempted to complete a MSF using data available to us in the facilities we visited (see **Exhibit 1B**.) Even with relatively well-completed official registers, it took us one hour or longer to complete the process in more than half of the facilities. The staff of facilities with the highest client volumes consistently complained of the uncompensated burden of reporting and how it competed with their clinical roles for time and effort.

In both states there were numerous challenges in getting data unto the DHIS-2, the web portal for the NHMIS. Across all facilities supported for PMTCT, just 15% in AKS (and 50% in CRS) had data on the NHMIS (see **Exhibit 5**). These gaps in NHMIS reporting mean that state governments are reliant on alternative, often poorly verified, sources of data for PMTCT.

The main reason for data not reaching the NHMIS platform was different for each state: For AKS, over 70% of facilities reached for PMTCT were not even listed on the platform, compared with under 15% for CRS. CRS' main challenge was in getting data for DHIS-listed facilities on the platform: data was not uploaded for as much as 35% of facilities reached for PMTCT (**Exhibit 5**).

Local government M&E staff complained of inadequate training and logistics for data upload. Some assistant M&E officers in local governments, to whom the task of data upload to the NHMIS often fall, have not been trained for that purpose, and often lack adequate access to broadband service. These challenges with uploading data explain most the underreporting in CRS, where facility-level reporting was strong.

We see opportunity for deploying information and communication technology to address some of these reporting challenges. About 50% of facilities in either state have internet-ready IT equipment in the facilities (**Exhibit 6**), and the majority of records staff have at least basic IT proficiency.

Reporting Gaps: Synthesis of Findings

In sum, despite the demonstrated burden of paper-based NHMIS reporting, sustained engagement of PHFs – through training, supply of tools, and mentorship – can make a difference in reporting, as it apparently did in CRS. However, as caseload increases, the reporting burden grows even more, and service delivery takes priority over data reporting, as we found in high-volume facilities. Regardless of the strength of facility-level reporting, though, data upload by LGA staff presents yet another challenging process in the reporting work flow, where infrastructure, lack of training, and poor motivation are the key problems. The installed IT skill base in the facilities provides an opportunity to address these challenges.

Exhibit 2: CRS had high facility-level MSF completion, regardless of practice characteristics

Facility	DHIS compliance	MSF completed monthly	MSF submitted monthly	Practice type	Antenatal, delivery volume	Trained records staff
1	Complier	Yes	Yes	Group	Medium	No
2	Complier	Yes	Yes	Solo	Medium	Yes
3	Complier	Yes	Yes	Solo	Low	No
4	Complier	Yes	Yes	Solo	Medium	Yes
5	Complier	Yes	Yes	Solo	Low	No
6	Partial complier	Yes	Yes	Solo	Medium	Yes
7	Partial complier	Yes	Yes	Solo	Medium	Yes
8	Partial complier	Yes	Yes	Solo	Low	No
9	Partial complier	Yes	Yes	Solo	Medium	Yes
10	Partial complier	Yes	Yes	Group	Medium	No
11	Non-complier	Yes	Yes	Group	High	Yes
12	Non-complier	Yes	Yes	Solo	Low	Yes
13	Non-complier	Yes	Yes	Solo	Medium	Yes
14	Non-complier	Yes	Yes	Solo	High	No
15	Non-complier	Yes	Yes	Solo	Low	No

Compliance status describes submission status on the NHMIS. Full=data in each of last 3 months; partial=1 or 2; non-complier = none.

Exhibit 3: AKS had low facility-level reporting, as a minority of facilities completed the MSF

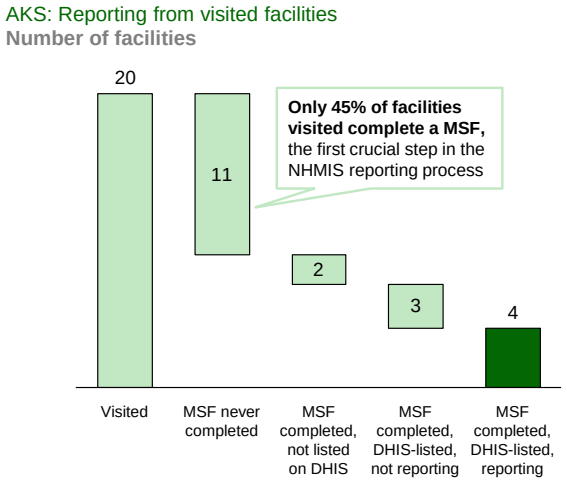
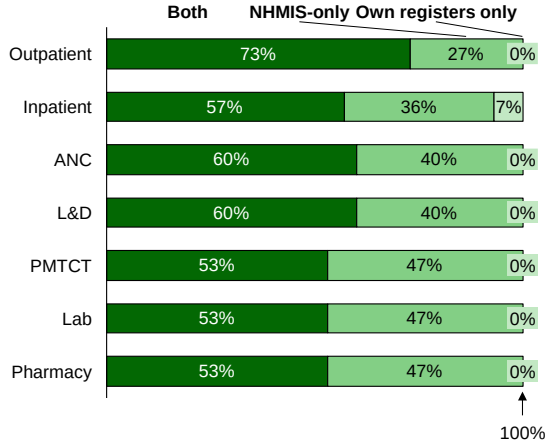


Exhibit 4: High adoption of NHMIS registers in CRS is likely a major driver of facility reporting

CRS: Use of facility registers, by type
% of facilities



AKS: Use of facility registers, by type
% of facilities

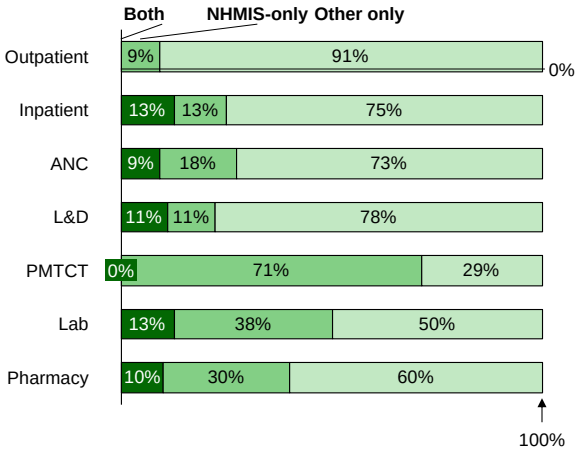
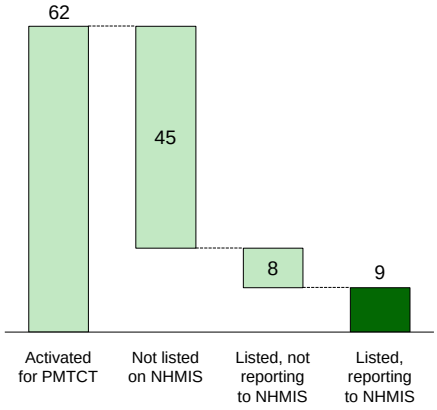


Exhibit 5: Data from only 15-50% of supported facilities reach the NHMIS platform

AKS NHMIS reporting, *all facilities*
Number of facilities



CRS NHMIS reporting, *all facilities*
Number of facilities

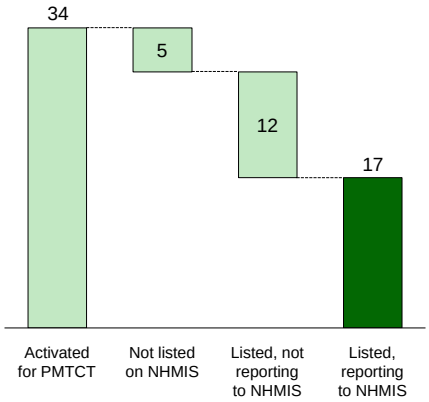
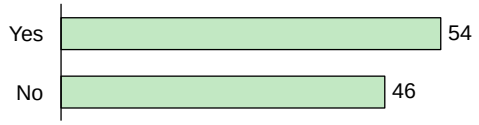
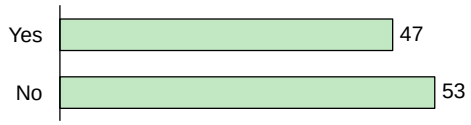


Exhibit 6: About half of all facilities in both states report access to internet-enabled IT on-site

AKS: Availability of internet-ready IT equipment
% of facilities



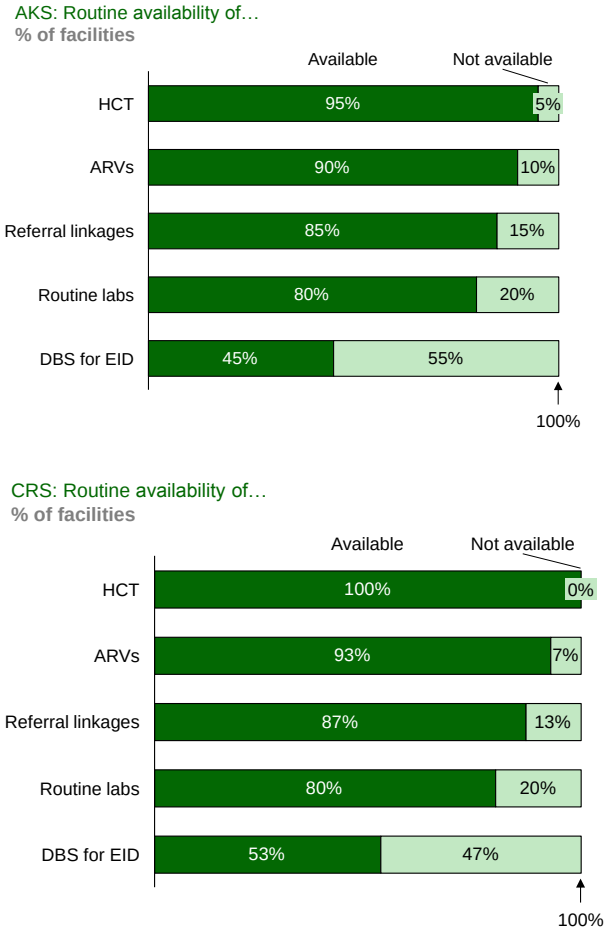
CRS: Availability of internet-ready IT equipment
% of facilities



Provider Adoption: Key Findings

Poor knowledge and/or high attrition of trained staff; low availability of the key inputs for PMTCT, and poor provider motivation (on account of HIV stigma, for instance) were presumed to be important drivers of poor provider adoption. **Our work suggests that poor adoption of PMTCT by private providers is not a major driver of low client uptake in CRS and AKS.** In both states, we found **a critical mass of healthcare workers had been trained on PMTCT service delivery**, and that staff turnover, except for nurses, was relatively low. Most of the **inputs of PMTCT – drugs, commodities, laboratory testing – were routinely available at the facilities** (although availability of dried blood sampling for early infant diagnosis of HIV was modest; **Exhibit 7**). Likewise, **most owner/heads of facilities were sufficiently motivated to deliver services: The vast majority see PMTCT as an important offering** to clients and a net positive to their practice (**Exhibit 8**).

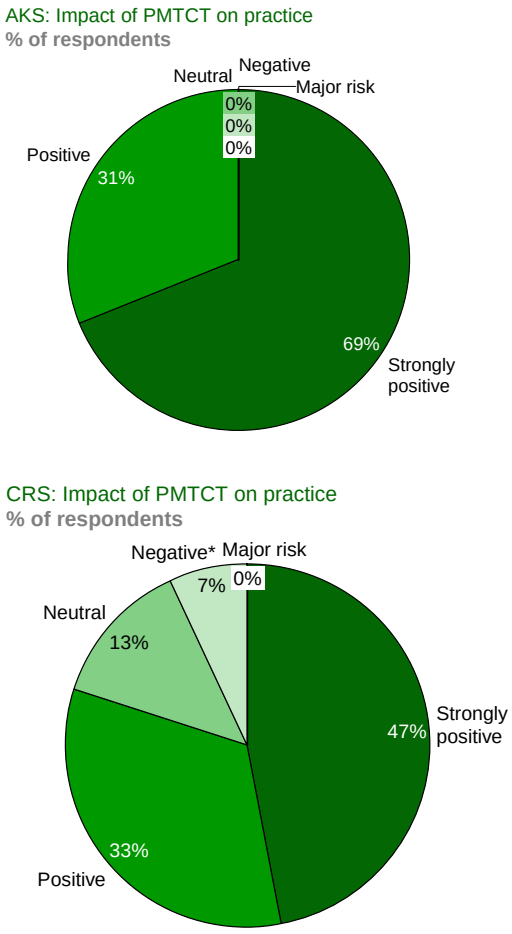
Exhibit 7: Except for EID, most facilities had key PMTCT inputs routinely available



Variable patient caseload

An important emerging issues was that although we had not set out specifically to measure client demand, we observed wide variation in obstetric client volumes across the PHFs visited. The median monthly antenatal and delivery volume in the PHFs we visited was 13 and 15 for CRS and AKS respectively.

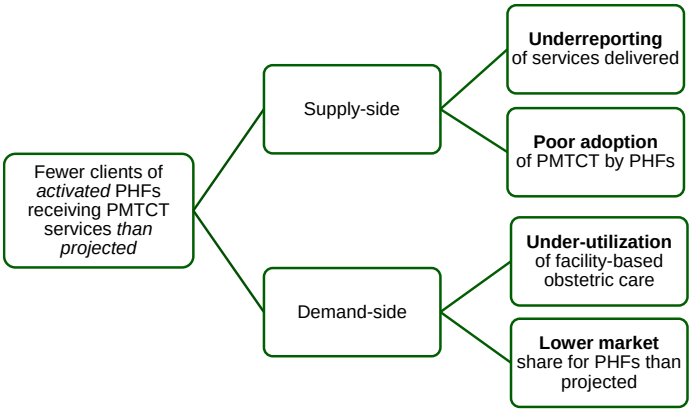
Exhibit 8: The vast majority of providers hold a positive view of PMTCT's impact on their practice



*Reason for negative impact: No financial benefit

Box 1: Why Private-Facility PMTCT Is Underperforming – Our Initial Working Hypotheses

Because good quality data was not available on the performance of private-facility PMTCT programmes, we developed *a priori* a conceptual framework (below) to explain the gap between effort and results. We then tested our hypotheses with state government officials and representatives of private health providers. From these consultations, we secured consensus on two major drivers of PMTCT underperformance: Underreporting of utilization data and poor provider adoption.



Underreporting

Underreporting of services delivered by PHFs is an intractable health-systems challenge in Nigeria. At the time of our engagement, routine reporting rates by state from PHFs to the NHMIS were in the high single digits, and the data were often incomplete, inaccurate, or untimely. There are three likely reasons for underreporting.

First, monthly **data reporting presents an undue administrative burden**. Virtually all providers maintain patient medical records in some form but the process of aggregating the data in the format required by the NHMIS is a manual and laborious one. In a survey of private doctors at a national conference, we found only 20% use electronic medical records in their practice (we suspect the real figure is lower), and half rated the task of generating a list of patients by diagnosis as difficult or impossible using their current records system (we think the real proportion is higher.)

Second, given the perceived burden of reporting, the **incentives for noncompliance are strong**. Routine data reporting is often regarded as a service to government (or donors) for which some providers insist deserves compensation. Health insurance penetration is low – at least 80% of clients of PHFs pay out-of-pocket, according to our survey – so only limited administrative data is reported for reimbursement purposes. At the same time, ineffectual regulation has meant that there is no credible threat of a penalty for PHFs that do not report data.

Finally, the current **infrastructure for data reporting from PHFs is weak**. Some providers tell us that they have not received the paper-based reporting tools and that their staff have not been trained in using the tools. In addition, we sense a general reticence by local M&E officials to expand their scope of work to include regular visits to PHFs for data collection without additional operational support and incentives.

Poor provider adoption

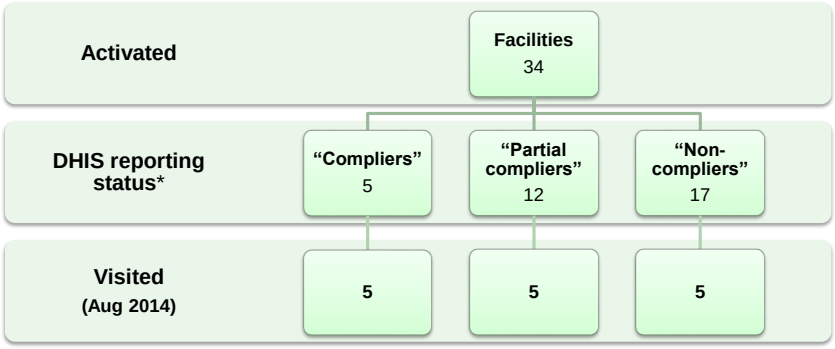
Poor adoption of PMTCT by providers was also of concern. Providers with low knowledge, capacity, and/or motivation were thought to be likely poor adopters of PMTCT. Provider knowledge was thought to be dependent on specific training for PMTCT. Capacity was thought to be driven by the availability of key inputs – prophylactic drugs and commodities. The major driver of low motivation was thought to be HIV-related stigma, which may dampen provider willingness to actively offer PMTCT services to their clients; some providers worried about their facilities gaining repute as "the HIV hospital".

Box 2: Facility Visits -- A Note on Methodology

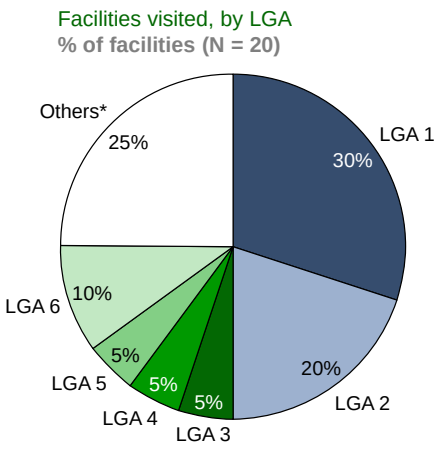
Our goal was to discover and document meaningful differences in provider capacity, record keeping, management practice, or attitude that influenced PMTCT uptake in PHFs.

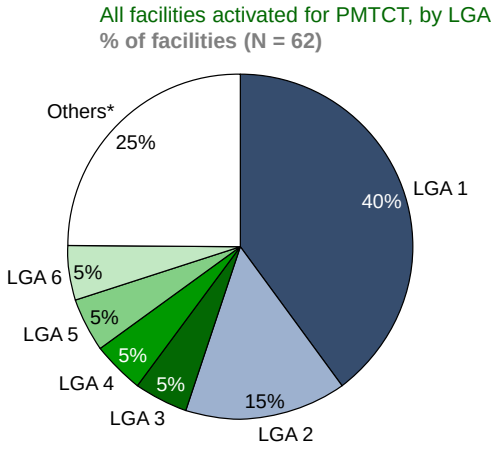
To do so, we sought to compare 3-5PHFs that regularly report PMTCT data ("compliers") on the NHMIS with an equivalent number of matched facilities that infrequently report data ("partial compliers") and those that do not report at all ("non-compliers"). The facility selection and matching was not intended to be scientifically rigorous; consultants attempted to match facilities using overt characteristics as patient volume, location (urban or rural), or facility type (clinic, hospital, or nursing home).

Only data for CRS afforded such matching, with 15 facilities selected (out of 34 activated for PMTCT) for site visits as shown.



The NHMIS data for AKS were too sparse to segment facilities by compliance status, so we selected a representative sample of 20 facilities at random (out of 62 activated; see below for distribution by local government area) using a random number generator.





Each selected facility was then visited by a team comprising at least one official from the State AIDS/STI Control Program, Department of Planning Research and Statistics, and SOML. At each site, we used direct observation and structured interviews to collect data on the medical records system; to review antenatal attendance records; to inquire about the process of aggregating data and submitting data to local government M&E officers (or development partners); to assess the availability of reporting tools; and to interview facility principals and staff about their attitudes towards data reporting and service delivery. Facilities were notified appropriately prior to such visits.

II. Current Reporting Solutions Offer Limited Impact

The main takeaway from the previous section is that underreporting of service utilization, not poor provider adoption, better explains the lower-than-expected level of PMTCT services in PHFs in AKS and CRS. Stakeholders in PMTCT, and indeed in many other health programmes, will be familiar with the challenge of getting good quality data for programme planning, execution, and evaluation. A number of different solutions have been considered or deployed, and in this section we review these options for improving reporting from PHFs. We start first by describing the utilization data flow through the National Health Information System (NHMIS).

The Gaps in the NHMIS Reporting System

Per national policy, health utilization data flows through the reporting chain depicted in **Exhibit 9**. In The process is similar regardless of the ownership status – public or private – of the facility. When clients access care at health facilities, the encounter is typically captured on the relevant register and then summarized on a monthly summary form (MSF). The MSF is then submitted to/collected by the monitoring and evaluation office at the local government area (LGA), whose staff validate the data and upload them unto the web portal of the National Health Management Information System (or NHMIS), the District Health Information System-2.

As shown in Exhibit 9, there are multiple points along this reporting chain where the data quality could be compromised.

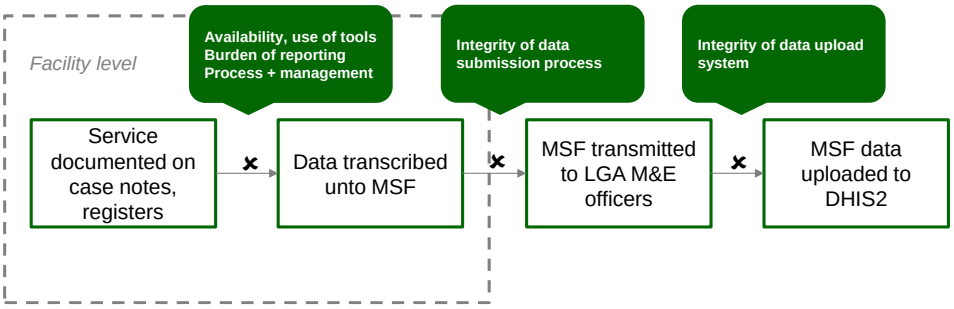
At facility-level, potential problems include:

- Non-availability of data tools (registers and MSFs)
- Non-use of the data tools because of their complexity, the effort to complete them, the weak incentives and management systems that influence compliance, and confusion caused by the availability of multiple types of data tools and various reporting platforms for the same data (NHMIS data under the purview of the Department of Planning, Research and Statistics of Federal Ministry of Health, or FMOH; Electronic Nigeria National Response Information Management System, or eNNRIMS under the National AIDS and STI Control Program of FMOH and the National Agency for Control of AIDS)
- Inaccuracies in reporting using the paper-based tools
- Lack of clarity about how to submit data to the LGA and about who will bear the effort/cost (Will the facility submit? Will the LGA arrange pick-up?)

If the data get reported to the LGA, other challenges arise:

- Limited staff capacity to validate and upload the data unto the DHIS
- Limited access to regular broadband and power supply means limited or no access to the platforms by key data management officers. The consequence is usually that data-quality issues are not easily detected and addressed
- Low staff motivation to drive the process of data validation and upload

Exhibit 9: Reporting challenges exist at multiple points along the NHMIS data reporting pathway



Potential Solutions to the Reporting Challenges

Stakeholders are already exploring, or have adopted, a number of potential strategies to address these challenges. As summarized in **Exhibit 10**, most strategies focus on enhancing competence, capacity, and motivation to report data at facility-level and in government. We find none of these options satisfying, as they either sacrifice important information; present practical challenges that are difficult to surmount; are over-reliant on continued operational funding and thus likely unsustainable; or do not sufficiently address the fundamental reporting challenges – the difficulty in extracting accurate NHMIS-relevant data from primary facility records, and seamlessly integrating facility-level reporting with the NHMIS portal.

Take, for instance, **simplifying primary reporting tools for PHFs**, a recent effort by some national-level stakeholders in HIV. The objective was laudable: to enhance facility utilization reporting by reducing the complexity of the tools and thus the burden of reporting. The shortcomings of this approach are that it does not solve the upstream, data upload challenges we have identified and has high execution risk. One risk was that oversimplification could narrow the scope of data collection, jeopardizing compliance with agreed reporting metrics, especially if simplification occurred across the multiple programme areas that the NHMIS tracks. Further, additional data tools would have to be printed, and funding for that is not guaranteed. Finally, tricky political minefields have to be navigated: the conflicting interests of multiple, independent government agencies and partners would have to be balanced. As far as we can tell, progress has stalled on that front.

Or consider the efforts at **training and mentoring facility records personnel** on the use of paper-based tools, a staple of many interventions to improve reporting. Many partners also couple that with supply of data tools. These efforts to improve competence (and capacity) for correct reporting and adoption of official reporting tools are a helpful first step. Still, as we found in CRS, where facility-level reporting was relatively strong, they do not on their own alter the prevailing incentives around reporting – high effort, low rewards/penalties – nor do they solve the upstream challenges with data validation and upload. Other efforts that target bottlenecks along the reporting chain, like LGA-level support for data-quality assurance and logistics meetings, present similar shortcomings. In addition, they are overly reliant on recurrent donor support and are inherently unsustainable.

Mandating reporting through laws and regulatory action is a potentially more sustainable solution. The main appeal of mandates is in tilting the incentives for reporting more towards compliance, but it requires credible enforcement to be effective. Because of this, we do not see mandates as a real near- to medium-term solution. The 2014 National Health Bill, which recently secured presidential assent to become law, now requires PHFs to report data to

the NHMIS on pain of a fine, loss of licensure, or incarceration[3], but stakeholders expect real implementation of the ambitious provisions of the Act to drag out over several years, and actual enforcement to depend on the capacity of state governments to regulate the private healthcare market. Some states, like Lagos[4], are gaining traction on reporting through tough enforcement but most of the other states, including AKS and CRS, simply lack the commitment, funding, and institutional environment to do same.

Exhibit 10: Current fixes for reporting gaps are unsatisfying

Level	Increasing competence	Strengthening capacity	Enhancing motivation
Facility	Training/retraining records staff on correct use of data tools	Supplying reporting tools to facilities	Tying reporting to incentive payouts for service delivery
	Mentoring records staff on correct use of tools through facility visits by gov't staff	Using non-facility staff to extract data from facility records, submit data	Simplifying data tools for PHFs
			Mandating reporting with legislation or regulation
LGA/state gov't	Training/retraining gov't M&E staff on data validation, upload	Supporting data validation meetings	
	Mentoring gov't M&E staff on data validation, upload	Providing broadband access, computers for data upload	
		Supporting processes to drive reporting, e.g. "Control Room" [5]	

[3] The Act a) makes keeping a health information system the duty of PHFs; b) makes (a) a precondition for the grant or renewal of "certificates of standards"; c) punishes non-compliance with a six-month confinement, a fine of one hundred thousand naira, or both; and d) retains state government regulatory powers over PHFs.

[4] Lagos has a unique private healthcare market. Nearly 90% of health facilities are privately owned, and the government has set up an independent agency, the Health Facility Monitoring and Accreditation Agency (HEFAMAA) to regulate the operations of PHFs.

[5] Pioneered by SOML's performance-management team, the Control Room is a monthly rapid-response centre hosted by the state Department of Planning, Research and Statistics to drive data reporting and provide quick validation of submitted data.

III. HIT Offers Some Feasible Alternatives

Given that different solutions with paper-based reporting have limited value and questionable sustainability, we turn now to what role HIT could play in improving reporting and programme performance. A basic electronic health record system, or EHR, could overcome many of the shortcomings identified in the previous section, and holds the potential to improve clinical care as well[6]. Here we describe its basic features, examine cases of HIT implementation, and analyze potential barriers to adoption.

High-Level Specifications for a Basic EHR

No single definition of the must-have elements of an EHR exists but, in general, many EHRs have a number of the capabilities outlined in the comprehensive list in **Exhibit 11**. The key capabilities are for:

- Patient clinical and demographic information
- Order-entry management
- Results management
- Clinical decision support tools
- Population health management

The ability to manage patient health information and data and analyze the same for routine, public health reporting are of most interest to us. In addition, to be suitable for our context, the ideal EHR system must meet the following additional specifications. It is:

- Not overly dependent on reliable broadband access and power supply
- Minimally disruptive to current operations
- Capable of substantially replaces paper
- Capable of conducting advanced data-quality assurance checks automatically
- Integrated with the NHMIS

It would effectively address the downstream (facility-level) and upstream (submission, validation, upload) reporting challenges identified earlier.

Exhibit 11: Capabilities of an EHR

Health information and data
Patient demographics
Patient problem lists
Electronic lists of each patient's medications
Clinical notes
Order-entry management
Orders for prescriptions
Orders for laboratory tests
Orders for radiology tests
Electronic ordering for prescriptions and tests
Results management
Viewing lab results
Viewing imaging results
Electronic images returned
Clinical decision support
Warnings of drug interactions, contraindications
Out-of-range levels highlighted
Reminders for guideline-based screening and/or interventions
Population health management
Public health reporting
Notifiable diseases sent electronically

Source: Health information technology in the United States: Where we stand, 2008. Robert Wood Johnson Foundation.

HIT in Practice: Case Studies

While the use of health information technology has become a core part of primary care in the West, it is still largely an innovation in sub-Saharan Africa and in Nigeria. Our 2014 survey of private doctors and GPs attending the annual scientific conference of the Association of General and Private Medical Practitioners of Nigeria, a private-provider interest

[6] The evidence of the impact of EHR on the quality of care is inconclusive and is condition-specific

group, puts the penetration of electronic health records at 20% (we likely oversampled early adopters, and expect the real figure is significantly lower)[7]. As such, there are few cases of successful adoption of EHR that we can learn from, particularly those targeting independent private providers; most instances of HIT application in Nigeria have been in the public sector and involved the use of mobile health technologies. For instance:

Nigeria's National Primary Health Care Development Agency (NPHCDA) is piloting CliniPAK360, a mobile health application, in Anambra, Kano, and the Federal Capital Territory. CliniPAK360 wirelessly captures patient data and provides on-demand reporting of utilization of maternal and child care services, as well as of vital events. A health worker (typically a midwife) in a public primary health clinic electronically documents key patient information, (maternal vital signs, fetal heart rate, malaria and other comorbidities, infant birth weight, and maternal or infant death) using a pre-loaded application on an Android mobile device.

LAMIS, the Lafiya Management Information System, is a USAID-funded, open-source, web-based EHR for managing data on antiretroviral therapy (ART), tuberculosis treatment, cardiovascular monitoring, and screening for cervical cancer across 141 public health facilities in 13 states in Nigeria. Its capabilities include appointment scheduling and reminders, decision support, patient education and behavior change, resource management, and utilization data tracking and reporting. As of April 2011, more than 65,000 patients had been registered and over a million patient encounters documented.

Outside Nigeria, **BroadReach Healthcare's use of HIT to support a private GP down-referral model** for an ART project in South Africa is one relevant and interesting case study for which a formal evaluation is available (see **Box 3**). Uncomplicated HIV cases are referred from public hospitals to private GPs for routine ART follow-up. A critically important part of the project is the use of an EHR that monitors clinical outcomes and patient dropouts, and prompts action by programme managers. Clinical outcomes were superior but total and per-patient costs were an issue, driven by the investment in data infrastructure, although the project was found to be more cost-effective than the alternative.

Box 3: BroadReach Healthcare's Private GP Down-Referral Model, South Africa

Begun in 2005 to shift the delivery of routine antiretroviral therapy (ART) services from overcrowded hospitals to lower-level health facilities, the BRHC private GP down-referral model has demonstrated how private health sector engagement can complement and strengthen public-sector service delivery. Stable ART patients are referred from busy public hospitals to their preferred private GP for maintenance care. The project was PEPFAR-funded.

A key component of the model was the deployment of an EHR at private GP offices that closely tracks patient treatment progress and loss to follow up, supported by basic operational protocols and a programme management team to respond to the data. By 2012, more than 2000 patients were receiving care through a network of 35 GPs. Of note, the electronic HMIS deployed was specific to HIV and was criticized for not being integrated with the public information management system, the DHIS, despite similarities between both systems.

A recent review found that the project led to 47% lower patient loss to follow-up and a 31% greater viral suppression compared to down-referral to public primary-care facilities. Although it led to 38% higher total costs and 24% higher average per-patient costs, driven by HIT, it was also more cost-effective: the incremental cost of maintaining an additional patient with successful viral suppression was 30% lower than the public model over the study period.

[7] SOML survey, April 2014 (unpublished)

Potential Barriers to HIT Adoption

These case studies provide room for cautious optimism about the feasibility of using HIT to strengthen health information systems, including reporting, in PHFs in Nigeria. However, they also highlight a number of potential barriers to large-scale adoption. In mid-2014, stakeholders in information and communication technology for health got together under the ICT4SOML banner[8] to survey the landscape for ICT for health in the country and identify relevant barriers to adoption, including:

- Cost (and the availability of financial incentives)
- Capacity to use IT
- Resistance to change existing practice
- Supporting infrastructure, including power and internet connectivity
- The dearth of evidence of the feasibility of implementation and benefits of HIT.

We analyse some of these barriers to scale-up in AKS and CRS in **Exhibit 12** below.

Cost is the major barrier to large-scale adoption of HIT. The total costs involved include upfront capital expenditure, ongoing maintenance costs, and downtime costs. The availability of free, customizable, open-source solutions, like OpenMRS, reduces the upfront costs somewhat, as does the increasingly lower acquisition cost of more powerful hardware like tablets and smartphones. Many facilities already have or use IT: about half of the PHFs we visited in AKS and CRS had internet-ready IT equipment on site (although we did not assess compatibility with modern EHR). Still, for many PHFs in Nigeria, deployment of an EHR would be a significant financial undertaking, and many facilities lack either the access to financing or the business case to do so on their own.

Social investors and governments could help defray some or all of the costs involved but link that assistance to measurable programme goals. For instance, we propose as part of our next steps, to fully subsidize the upfront capital costs in exchange for facilities agreeing to attain a predefined set of "meaningful use" milestones, like comprehensive and timely monthly NHMIS reporting, or specific service-delivery targets. Benefiting facilities could also bear the costs of ongoing maintenance beyond the project timeline. Careful selection of facilities for implementation should also help to keep total costs down. We think an EHR makes the most sense for PHFs with the largest client volumes, although there is no empirical basis for defining what threshold volume to apply.

IT knowledge and skills of users has also been identified as a barrier to adoption, although a significant majority of the records staff we interviewed in PHFs in AKS and CRS claimed to possess basic to intermediate IT competence. As such, we do not expect a steep learning curve with a basic EHR. Still, some training of the users will be necessary.

Inertia to change is a challenge that could be overcome by carefully designed change management, including selecting a suitable facility-based IT champion; securing agreement on the goals of the HIT; training of users of the technology; designing a friendly interface between users and the technology; using minimally disruptive technology; and facilitating multiple touch points during rollout with competent IT support for mentorship and problem-solving. We will incorporate these elements in our next steps.

Unreliable access to power supply and broadband connectivity pose real challenges to EHR uptake. Fortunately most PHFs are located at or near urban centres with better infrastructure, but selecting suitable hardware (more energy-efficient smartphones and tablets over computers) and EHRs

[8] Assessing the Enabling Environment for ICTs for Health in Nigeria: A Landscape and Inventory. UN Foundation in support of ICT4SOML, Sept 2014

that work largely offline with minimal connectivity requirements could mitigate these challenges.

The paucity of convincing evidence about cost, benefits, and feasibility is another potential barrier that is worth highlighting. The more private providers, governments, implementing partners, and donors understand about HIT's potential and strategies to mitigate some of the above barriers to widespread adoption, the likelier it is that we will achieve scale in their adoption and use. Accordingly, we intend to use the next steps of our engagement, discussed in the coming section, to provide more insight into the implementation of HIT in PHFs.

Exhibit 12: It is possible to mitigate some of the known risks of HIT implementation

Risk	Impact	Probability of occurrence	Mitigation
Cost	3	3	Initial capital outlay can be borne by social investors; ongoing maintenance by private providers
Knowledge and capacity of users	2	1	There is basic IT competency, so the learning curve is not too steep.
Inertia of users	3	1	Proactive change management is planned, as is the application of a user-friendly interface
Unreliable power supply, broadband access	2	2	Use energy-efficient hardware, offline-enabled EHR, and back-up systems
3 = High, 2 = Medium, 1 = low			

IV. Next Steps

We found that underreporting more explains the lower-than-expected quantities of PMTCT services in PHFs in AKS and CRS than poor provider adoption. We also found wide variation in the volume of services delivered through PHFs, with only a few facilities accounting for the vast majority of clients. Current fixes of these longstanding reporting challenges are impractical or unsustainable, so a shift towards large-scale adoption of health information technology appears to be the only feasible option, though cost is the principal challenge. The next phase of our work takes these insights into account.

Strengthening Data Reporting

We propose to deploy an EHR as the main focus of the next stage of our engagement. Work is currently ongoing with SOML's Performance Management Team to fix the gaps in the NHMIS web portal and train records staff in private facilities on the accurate use of registers and other reporting tools. We plan to augment this by piloting a basic EHR system in partnership with ICT4SOML staff, who are currently engaged in a similar effort in Lagos state.

Our aim is to demonstrate the feasibility of deploying a basic EHR system in PHFs engaged in PMTCT service delivery in AKS and CRS. As far as we know, this will be the first such initiative testing the feasibility of EHRs in PHFs in Nigeria. Accordingly, we will carry key HIV/private-sector stakeholders including government, along in the process. We will also document the associated costs, short-run effect on utilization reporting and service delivery, and real-world implementation challenges.

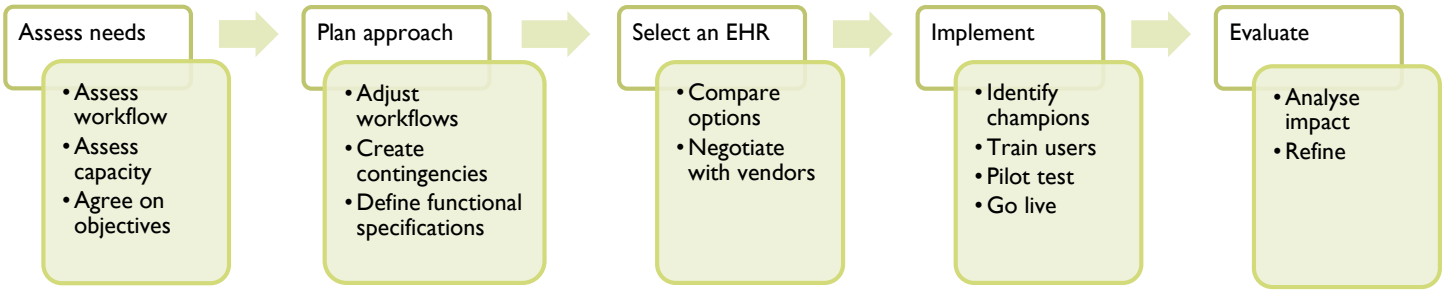
We will follow the implementation plan laid out in Exhibit 13, which incorporates principles of change management, from seeking alignment with owner-managers of PHFs to allowing for multiple engagements with end users of the EHR.

We plan to promote the use of an existing EHR over a simple data-capture tool (like mobile DHIS) because we believe that the latter only solves challenges with data upload, not collection and aggregation, and that the added benefits of an EHR – clinical decision support, for instance – not only improve adoption of the technology but could also enhance the quality of care delivered. The EHR must have offline capability, be able to capture and aggregate NHIS-compliant data, and be integrated with the DHIS-2. Final specifications on software and hardware will depend on a needs definition, objectives agreed with private providers, and negotiations with potential vendors.

We will target PHFs with the highest client volumes in the rollout of the EHR because we found a limited set of facilities accounting for the majority of clients; because the burden of reporting seemed highest in these facilities; because programme performance is most sensitive to data reported from these facilities; and because resources are limited. We expect to make some investments in hardware for these high-volume facilities but we will also offer software and training to other facilities with IT equipment. In exchange for our support, we will negotiate reporting targets. We estimate that about 30-40% of facilities in both states are high-volume, with a monthly obstetric volume exceeding 30 patients.

We will use the results we generate to advance the discussion on HIT among stakeholders at national and state levels as well as the organized private health sector of the need, benefits, and costs of scaling up HIT for PHFs.

Exhibit 13: A phased implementation is planned for the EHR rollout



Gantt chart for the Private Health Sector Engagement							
		2015					
	Activities/Tasks	April	May	June	July	Aug	Sep.
1	Implementation: NHMIS reporting (paper-based)	On-going					
2	Adjust workflows; Create contingencies Define functional specifications						
3	Compare options Negotiate with vendors						
4	Identify champions Train users Pilot test Go live						
5	Analyse impact Refine						
6	Dissemination of outcome and progress to key state-level stakeholders						
7	Closeout						
	Submit final report						

Other Ancillary Work

Cross River is working on a proposal to seek funding from the World Bank[9] to update their inventory of non-formal private maternity care providers – faith-based organizations and traditional birth attendants – as a precursor to state-led outreach to these providers for PMTCT. The rationale was the relatively low client volumes observed in some of the formal PHFs we visited in the state. SOML will also support this state-led outreach to informal private health sector.

Implications for the Future

We anticipate resistance to investing in HIT on historical, philosophical, and practical grounds. The conflict in public health and development over whether scarce resources should be devoted to systems strengthening versus direct relief or service delivery is an unending one (even though invariably in practice proponents of the latter tend to come out ahead.) Donors have traditionally been hesitant to support spending on "infrastructure" especially if the proximate beneficiaries are in business for profit. We suggest a rethinking of such reticence given that we found underreporting to be a more significant driver of private-provider PMTCT underperformance than provider adoption, the usual focus of programming.

Some would argue that the priority for limited programme funds be service delivery, not data infrastructure. We reiterate the importance of evidence-driven performance management of health programmes, the very basis of the Federal Ministry of Health's Saving One Million Lives movement, which we are a part of. We think the debate instead should be on how best to encourage PHFs to strengthen reporting – how social investors can help accelerate the adoption of HIT, and what incentives governments can put in place.

[9] The World Bank's Second Nigeria HIV/AIDS Programme Development Project provides funding for state-driven HIV priorities, including scaling up prevention interventions and increasing access to services.

A more effective critique relates to timing: with funding for PMTCT likely to flat-line over the next few years, and many programmes winding down, has our advocacy for HIT come a little too late? We think not. On the contrary, as the funding outlook becomes less favourable, and governments and service providers assume a more central role, the time is ripe for stakeholders to put in place systems that guarantee priority interventions like PMTCT are sustainable over the long run. A HIT system that generates reliable and timely service-utilization data is one such system and, beyond the thousands of kids born free of HIV in Nigeria, could well be an enduring legacy of the years of hard work in PMTCT, and serve as a platform for future engagements of private providers in public health.

				Implement Agreed Strategies					
Activity 6	**Implemention: NHMIS reporting (paper-based)**								
Tasks	6.1	CRS: Complete revalidation of facilities lists in NHMIS portal	SMoH/SOML	0	NGN 0.00	0	0	NGN 0.00	$0.00
	6.2	CRS: Tag PHFs in NHMIS - SMOH/SOML	SMoH/SOML	0	NGN 0.00	0	0	NGN 0.00	$0.00
							Sub-total	**NGN 0.00**	**$0.00**
Activity 7	**Implemention: NHMIS reporting (IT support) - AKS and CRS**								
Tasks	7.1	7.1.1 Assessment of ICT status & requirements of high-volume facilities through review of initial findings, limited site visits	SOML/PHFs	0	NGN 0.00	0	0	NGN 0.00	$0.00
		7.1.2 Identify champion	SOML/PHFs	0	NGN 0.00	0	0	NGN 0.00	$0.00
		7.1.3 Develop questionnaire	SOML	Desk work	NGN 0.00	0	0	NGN 0.00	$0.00
		7.1.4 Select facilities (by volume & infrastructure)	SOML/SMoH	Communication	NGN 3,000.00	2	2	NGN 12,000.00	$63.16
	7.2	7.2.1 Draft implementation/deployment plan	SOML/SMoH	Desk work	NGN 0.00	0	0	NGN 0.00	$0.00
		7.2.2 Customise open-source electronic health record	SOML	Desk work	NGN 2,850,000.00	1	1	NGN 2,850,000.00	$15,000.00
				Transport for participants	NGN 5,961.77	45	2	NGN 536,559.30	$2,824.00
	7.3	Conduct workshop to share plans;get consensus and buy-in	SOML/PHFs	Venues	NGN 50,000.00	1	2	NGN 100,000.00	$526.32
				Lunch (Group)	NGN 2,384.71	45	2	NGN 214,623.90	$1,129.60
	7.4	Develop/customize training materials (curriculum etc) - work with SMoH	SOML/SMoH	Desk work	NGN 0.00	0	0	NGN 0.00	$0.00
	7.5			Transport for participants	NGN 5,961.77	125	3	NGN 2,235,663.75	$11,766.65
		7.5.1 Training of users (Step down - facilities) Step down: (class ≤ 20) - 6 sessions of 2 - 3 days	SOML/SMoH	Venues	NGN 50,000.00	9	1	NGN 450,000.00	$2,368.42
				Lunch (Group)	NGN 2,384.71	135	3	NGN 965,807.55	$5,083.20
		7.5.2 Monitoring & Supervisory Visits	SOML/SMoH	0	NGN 0.00	0	0	NGN 0.00	$0.00
		7.5.3 IT support visits to facilities	Consultant/SOML	Consultancy fees	NGN 60,000.00	1	40	NGN 2,400,000.00	$12,631.58
				Transport for participants	NGN 5,961.77	45	2	NGN 536,559.30	$2,824.00
		7.5.4 Review meetings - e.g. in LGA clusters	SOML/SMoH	Venues	NGN 50,000.00	1	2	NGN 100,000.00	$526.32
				Lunch (Group)	NGN 2,384.71	55	2	NGN 262,318.10	$1,380.62
		7.5.5 Monthly support for communication - phone calls	SOML/SMoH	Communication	NGN 3,000.00	2	2	NGN 12,000.00	$63.16
		7.5.6 Monthly support for communication - mobile data on devices	SOML/SMoH	Communication	NGN 3,000.00	2	2	NGN 12,000.00	$63.16
								NGN 10,687,531.90	**$56,250.17**
		Infrastructure Costs (Laptop Option)		**Item**	**Cost Per Unit**	**Units Required Per Facility**	**Number of facilities**	**Total Cost (N)**	**Total ($)**
	7.6		SOML	Tablets	NGN 70,000.00	2	40	NGN 5,600,000.00	$29,473.68
				Lap Top computers/back up	NGN 150,000.00	1	40	NGN 6,000,000.00	$31,578.95
				Solar charger	NGN 60,000.00	1	40	NGN 2,400,000.00	$12,631.58
				Data Modems	NGN 5,000.00	1	40	NGN 200,000.00	$1,052.63
				Power Extension Units	NGN 2,500.00	1	40	NGN 100,000.00	$526.32
				Mouse	NGN 3,000.00	1	40	NGN 120,000.00	$631.58
								NGN 14,420,000.00	**$75,894.74**
							Sub-total	**NGN 25,107,531.90**	**$132,144.90**

Activity 8	**Implemention: Outreach to informal private sector**								
Tasks	8.1	CRS: Draft proposal for revalidation of directory of informal private providers	SMoH/SOML		NGN 0.00	0	0	NGN 0.00	$0.00
	8.2	CRS: Support field work on inventory of informal private providers	SMoH/SOML	Transportation (Group)	NGN 50,000.00	2	2	NGN 200,000.00	$1,052.63
				Refreshment/snacks	NGN 1,788.53	10	1	NGN 17,885.30	$94.13
	8.3	CRS: Support outreach by selected public facilities to informal private providers for PMTCT	SMoH/SOML	Transportation (Group)	NGN 50,000.00	2	2	NGN 200,000.00	$1,052.63
				Refreshment/snacks	NGN 1,788.53	10	1	NGN 17,885.30	$94.13
	8.4	Support monitoring visits to ensure progress	SMoH/SOML		NGN 0.00	0	0	NGN 0.00	$0.00
							Sub-total	**NGN 435,770.60**	**$2,293.53**
Activity 9	**Dissemination of outcome and progress to key state-level stakeholders**								
Tasks	9.1	Conduct bi-monthly debriefing to the Honourable Commissioner for Health, and Permanent Secretary	SMoH/SOML		NGN 0.00	0	0	NGN 0.00	$0.00
	9.2	Conduct stakeholders' forum	SMoH/SOML	Venue/Meeting room	NGN 50,000.00	1	2	NGN 100,000.00	$526.32
				Lunch (Group)	NGN 2,384.71	52	2	NGN 248,009.84	$1,305.31
				Transportation for participants	NGN 5,961.77	48	2	NGN 572,329.92	$3,012.26
							Sub-total	**NGN 920,339.76**	**$4,843.89**
Activity 10	**Closeout**								
	10.1	Submit final report	SOML		NGN 0.00	0	0	NGN 0.00	$0.00
							Sub-total	**NGN 0.00**	**$0.00**
							Total	**NGN 26,463,642.26**	**$139,282.33**
							Miscellaneous (5% of Total)	**NGN 1,323,182.11**	**$6,964.12**
							Grand Total	**NGN 27,786,824.37**	**$146,246.44**