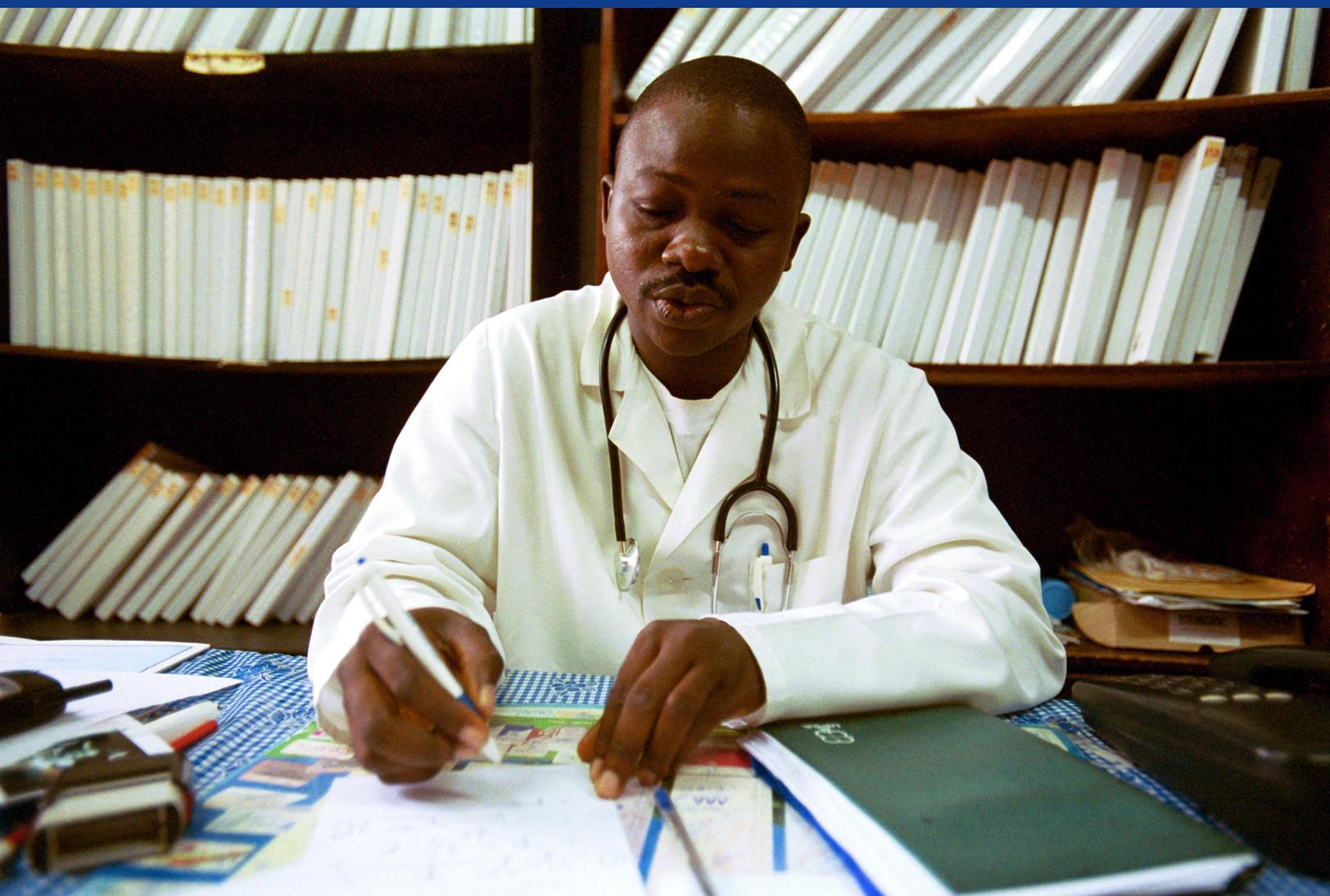


# A Case Study of the Integrated Patient Monitoring System in Cote d'Ivoire



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## Acronyms

3ILPMS	Three Interlinked Patient Monitoring Systems
ANC	Antenatal care
ART	Antiretroviral therapy
ARV	Antiretroviral
DIPE	Directorate for Information, Planning, and Evaluation
eMTCT	Global Plan Towards the Elimination of New HIV Infections Among Children by 2015 and Keeping Their Mothers Alive
HIS	Health information system
HMIS	Health management information system
IMAI	Integrated management of adult and adolescent illness
IPMS	Interlinked Patient Monitoring System
IPT	Intermittent preventive treatment
KII	Key informant interview
MCH	Maternal and child health
MIS	Management information system
MoH	Ministry of Health
M&E	Monitoring and evaluation
PEPFAR	The U.S. President's Emergency Plan for AIDS Relief
PMS	Patient Monitoring System
PMTCT	Prevention of mother-to-child transmission
PNPEC	National HIV Care and Treatment Program
SIGDEP	Management Tool for Electronic Patient Files
STI	Sexually transmitted infection
TB	Tuberculosis
VCT	Voluntary counseling and testing

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Cote d'Ivoire has a three percent adult HIV prevalence rate,<sup>1</sup> one of the highest in West Africa. In 2001 the country launched a national care and treatment program with the goal of improving the quality of life for people living with HIV and AIDS. The Ministry of Health (MoH) of Cote d'Ivoire has sought strategies to address the epidemic in a comprehensive way, in alignment with global guidance provided by the World Health Organization (WHO), other international agencies, and bilateral donors. As part of this effort, in 2008 the MoH adapted and implemented the WHO's system of standardized patient monitoring tools, known as the Patient Monitoring System (PMS) for the country's national HIV care and treatment program.

Beginning in 2010, to support and strengthen the integration of HIV services, the MoH worked with MEASURE Evaluation to revise the PMS, producing the Interlinked Patient Monitoring System (IPMS). The IPMS system includes a set of paper-based data collection forms for collecting and recording information from individual patient consultations, registers for recording information on clinical services rendered to all patients seen at the various service delivery points (i.e., the care and treatment clinic, antenatal care clinic, counseling and testing center, among others), and two types of summary documents that produce aggregate reports from the patient-level data. The objective of the IPMS is to set up a national system through which comprehensive, longitudinal patient data can be collected and used for decision-making by service providers at different service delivery units at the facility level, by program managers working at the regional and national levels; and for reporting data to external donors.

The MoH conducted a three-month pilot of the tools at eight facilities in three districts from November 2011 to February 2012. After the field test was completed, MEASURE Evaluation conducted a mixed-method case study to assess whether, and how, the interlinked tools support the delivery of integrated services.

Quantitative data were collected through a questionnaire administered to primary users (facility-based users who fill out the IPMS data collection tools and/or reports) and secondary users (users who do not directly fill out the tools but receive and use data from the tools, submitted to them in the form of routine reports). The responses of 42 IPMS tool users (comprised of 33 primary and nine secondary users) were compared to responses from 36 users of the old PMS tool.

Qualitative data were collected through key informant interviews (KIIs) conducted with 10 IPMS tool users (comprised of six primary users, two secondary users at the district level, and two secondary users at the national level).

The case study sought to answer the following research questions:

1. Does the IPMS improve service integration by facilitating coordination, communication, and referrals?
2. Does the IPMS improve program management by making available better metrics that can be used for evidence-based decision making?
3. Does the IPMS contribute to improved health information system (HIS) performance by generating high-quality data that can be collected, analyzed, and transformed for use in decision-making?

<sup>1</sup> UNAIDS website. See <http://www.unaids.org/en/regionscountries/countries/ctedivoire/>

4. What are system users' perceptions of the benefits and challenges of using the IPMS?
5. Does the IPMS improve patient monitoring by making information available to help clinicians improve patient management decisions?

Each of these overarching questions was examined through a series of questions to provide a detailed analysis of each aspect of the IPMS and its effectiveness.

## ***Quantitative Findings***

### **Service Integration**

All respondents were asked to answer a series of questions to assess whether tool users perceived that the tools contributed to improvements in service integration by facilitating coordination of patient care between service providers, communication of patient information between service providers, and referrals between service points. The quantitative analysis did not show that IPMS users were more likely than PMS users to believe that their tools improved service integration. Both IPMS and PMS users held similar, overall positive views about the ability of their respective tools to improve communication of patient information and referrals; IPMS users expressed a slightly more positive view about the ability of their tools to improve coordination of patient care.

### **Program Management**

All respondents were asked a series of questions to assess whether tool users perceived that the tools contributed to improvements in program management at the national, district, and facility levels. The quantitative analysis did not show that IPMS users were any more likely than PMS users to believe that their tools improved program management. Slightly fewer IPMS users than PMS users felt that their tools supported program management, especially at the district and national levels. Compared to primary IPMS users, secondary users were more likely to rate the IPMS favorably in this domain.

### **Health Information System (HIS) Performance**

All respondents were asked to answer a series of questions to assess whether tool users perceived that the tools contributed to improvements in HIS performance by generating high-quality data that can be collected, analyzed, and transformed into information for decision making. The quantitative analysis did not show that IPMS users were more likely than PMS users to believe that their tools improved HIS performance. In fact, IPMS users viewed their tools slightly less favorably than PMS users, and reported mixed impressions of their tools in terms of improving data management processes, data quality, and data demand and use. Again, secondary IPMS users were more likely to rate the IPMS more favorably in this domain than primary users.

### **Users' Perceptions**

This section examined tool users' general perceptions of the strengths and weaknesses of the IPMS tools and the challenges associated with using them. Only the primary users, i.e., facility-based users who are directly responsible for filling out the tools, were asked to respond to this section of the questionnaire. The quantitative analysis showed that in general, IPMS users had a more positive view of the tools than PMS users. However, both types of users reported that the tools are not user-friendly, that the time it takes to complete the tools is disruptive to their other duties, and that the guidelines for the tools do not adequately explain reporting requirements or how to address common reporting problems. Both IPMS and PMS users believed that their current organizational cultures do not support or promote the value of collecting and using information to manage patients and programs more effectively.

## **Patient Monitoring**

Only service providers, who are a subset of the primary users, were asked to answer a series of questions to assess whether they perceived that the tools contributed to improvements in patient monitoring, including improvements in:

1. monitoring general patient care,
2. monitoring patients in HIV care and treatment,
3. monitoring women, and
4. monitoring HIV-exposed infants.

The quantitative analysis showed that the IPMS users believe that the tools do improve monitoring the provision of specific services and health outcomes. IPMS users rated their tools significantly better than PMS users in tracking the nutritional status of HIV-positive patients and monitoring whether: HIV-positive patients are screened for STIs; HIV-positive pregnant women receive intermittent preventive treatment for malaria and are using insecticide-treated bed nets; HIV-positive women of reproductive age receive family planning counseling; and HIV-exposed infants are exclusively breastfed for the first six months of life. In four specific areas, a majority of both IPMS and PMS users either disagreed that the tools were helpful or expressed a “neutral” view. Those areas were monitoring whether: patients referred to other services actually receive the services; eligible patients are initiated on ART within a week; HIV-positive patients are screened for TB at every visit; and HIV-exposed infants receive a viral load test two months after birth.

## ***Additional Findings***

Further analysis and triangulation of the quantitative and qualitative data revealed several additional findings:

### **Neutral Responses**

In general, IPMS users were more likely to select a Neutral response category in the questionnaire compared to PMS users. This may have been because at the time the study was conducted, the IPMS tools had only been piloted for three months, whereas the PMS users had been using their tools for several years. Since IPMS users were still learning to use the relatively complex system, they most likely did not feel comfortable evaluating the tools and therefore tended to select Neutral responses.

### **Primary vs. Secondary IPMS Users**

There was also a clear difference in how primary and secondary IPMS users perceived and rated the tools. It is important to note that primary and secondary users interact with the tools very differently. Primary users are responsible for filling out the tools and reports on a daily basis. They interact with the tools directly and have firsthand experience using the tools. Secondary users deal with the final product, i.e., the reports that are generated with data collected by the system, and thus do not use the tools directly.

When responding to the questionnaire, primary users were also more likely to choose Neutral responses to questions, compared to secondary users. Again, this difference is most likely linked to the brevity of the pilot period. At the time of the study, primary users had only been using the IPMS tools for three months. Since they were probably still becoming familiar with the tools, they may not have felt comfortable drawing conclusions about them. By contrast, secondary users, who did not have to deal with the daily challenges of learning the new tools, did not exhibit the same kind of hesitation in evaluating the tools and stating their opinions, whether positive or negative.

### **Advantages of the IPMS Tools**

Primary IPMS users who participated in the KIIs cited as strengths the comprehensiveness and longitudinal organization of the tools, which they believe facilitates patient management and follow-up as well as generation of reports. However, they were critical of the format and layout of several of the tools, especially the antenatal care (ANC) register, and reported that many of the tools were difficult to read and follow. They also said that the tools require too much time to fill out, and detract from their time seeing patients. Secondary IPMS users said that they believed the tools were helping primary users to manage patients. They also reported that the tools helped them to monitor whether service providers were following clinical protocols.

### ***Recommendations***

The information gathered during the case study was used to formulate several recommendations to facilitate use of the IPMS tools:

1. Streamline and revise the IPMS tools to improve their user-friendliness and ease of use, especially the ANC register.
2. Strengthen the guidelines for using the tools, including clearly defining reporting requirements and how to address late, inaccurate, and missing reports.
3. Involve tool users, especially primary users, in the review and future redesign of the tools.
4. Develop a culture of information use, especially among service providers, to promote the sustainability of the system.
5. Address technical, behavioral, and organizational factors that affect IPMS use, to ensure the system's success. This includes providing training and support for system users, clarifying roles and responsibilities in terms of producing and managing data, and ensuring that the burden of reporting does not distract from users' other duties.
6. Improve linkages between patient monitoring systems and systems to monitor drugs and pharmaceutical supplies and commodities.
7. Repeat the study after the IPMS has been used for a longer period of time and users feel more comfortable evaluating the tools.

The findings from this case study were used to inform the national scale-up of the IPMS and improve implementation of the tools in Cote d'Ivoire. Furthermore, we hope that the documentation of this experience is helpful for other countries that are in the process of designing and rolling out integrated facility-based information systems, and integrating components of their health information system, and contributes to the global evidence base for strengthening integration activities.

## Integration of Services and Systems in the Context of HIV

At the beginning of the 21st century, the rapid scale-up of HIV care and treatment programs in many high-burden countries dramatically changed the nature of health care service delivery and by extension, of the health information systems (HIS) in countries affected by HIV and AIDS. In most cases, existing systems were designed primarily for episodic management of acute illnesses, not for long-term management of chronic conditions. HIV, along with other chronic conditions, requires life-long follow-up and care across a spectrum of disciplines and services. This, in turn, requires improvements in linkages and integration. Linkage describes the relationship between different points of care, either within the same facility or across different facilities, such as the linkage between a HIV treatment clinic and a TB clinic in a facility, or the linkage between a first-level health center and a district hospital. Integration describes the provision of multiple services or interventions to the same patient, either by a single health care provider or a team of providers in a coordinated manner. A health system that includes strong linkages between points of care, as well as integrated service delivery, is especially important when dealing with long-term and chronic health conditions, including the care for people living with HIV.

Equally important—to support the continuum of care—is the development of a strong HIS, which can be defined as a system that generates reliable and timely information that is used to guide health policy, planning, resource allocation, program management, and service delivery.

In this case study, we are concerned with a specific type of data that are generated by health information systems, specifically patient-level data from health facilities that are aggregated to generate programmatic indicators that can be monitored, reported, and used with the help of data collection and reporting tools—collectively known as patient monitoring tools or a patient monitoring system (see Box 1). As HIV services become more and more integrated, the systems that support service delivery, including these patient monitoring tools, are also becoming integrated.

### Box 1—HIV, the Continuum of Care, and Monitoring of Patients

Since patients with HIV/AIDS require life-long follow-up and care, the HIV epidemic has required countries to develop and scale up systems that enable long-term clinical management of patients via patient monitoring systems. In the context of global HIV/AIDS, patient monitoring is the routine collection, compilation, and analysis of standardized patient data over time (i.e., multiple visits), at multiple service delivery points, and across clinical disciplines. Patient monitoring data support both clinical patient monitoring and program management.

At each visit, the provider will record standardized information about the reason for the visit, the services provided, and the outcome of the visit on either paper-based or electronic tools such as files, registers, and forms. The patient's health information is updated at each visit; thus, the files and registers give the provider access to the patient's long-term medical history. This creates a longitudinal patient monitoring system, which is especially important for HIV/AIDS because it allows the provision of a continuum of care. Such a system also facilitates program management by generating important programmatic indicators, helps eliminate redundant or excessive record-keeping, and enables the generation of reports (WHO 2010a).

In this case study, we will take a close look at these patient monitoring tools, which are designed to gather data on the services provided to HIV-positive patients, and examine the interplay between the tools and service delivery. Specifically, the document examines the use of patient monitoring tools that were developed by the World Health Organization (WHO) and adapted for use in Cote d'Ivoire by the Ministry of Health (MoH).

Shortly after the WHO developed the original HIV care and treatment patient monitoring tools in 2006 (see Box 2), the MoH in Cote d'Ivoire went through a process to adapt the tools for the local context and implemented them nationally. When the revised (3ILPMS) guidelines and tools were released, the MoH adapted the revised tools and field-tested them for a three-month period. This study took place in 2012, after the MoH had completed the field test.

### Box 2—The WHO Patient Monitoring Guidelines and Tools

The patient monitoring tools that were implemented in Cote d'Ivoire as well as several other countries were originally developed by WHO and partners to support countries to shift from a model of service delivery focusing mainly on short-term care of acute conditions to long-term management of chronic conditions and the holistic management and care of patients. The WHO developed the Integrated Management of Adult and Adolescent Illness (IMAI) framework in 2006 to provide guidance to countries to help them reorient their health systems from a predominantly acute care model to a chronic care model. In 2006, WHO, with support from MEASURE Evaluation and other collaborators including the U.S. Agency for International Development (USAID) and the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), developed the Patient Monitoring Guidelines for HIV Care and Antiretroviral Therapy (ART) and started providing technical assistance to countries to support the implementation of national, longitudinal patient monitoring systems that would support the long term care of patients with HIV and AIDS.

The HIV care/ART patient monitoring system was updated and expanded in 2009/10 to also support PMTCT and malaria prevention interventions integrated within routine maternal and newborn care, and TB-HIV interventions delivered within HIV care. The updated tools and guidelines are called the Three Interlinked Patient Monitoring Systems for HIV care/ART, MCH/PMTCT (including malaria prevention during pregnancy), and TB/HIV: Standardized Minimum Data Set and Illustrative Tools (3ILPMS). The tools were designed to help countries put in place standardized, national data collection and reporting tools and support the development of interlinked systems that facilitate integrated service delivery. Integration, in this context, refers to providing HIV related services along-side routine services such as antenatal and postpartum care, labor and delivery services, and newborn and under-five care, and strengthening linkages with other services such as tuberculosis (TB), sexual and reproductive health, maternal and child health (MCH) and other essential services needed for holistic patient management.

The 3ILPMS toolkit includes:

- An expanded minimum data set covering HIV care, ART, prevention for positives, maternal and newborn care, PMTCT, intermittent preventive treatment (ITP) in pregnancy for malaria, TB screening, isoniazid prophylaxis, and TB and ART co-treatment
- Facility-held individual patient cards for HIV care and ART, maternal health, child health, labor and postpartum records, TB treatment
- Patient-held cards for ART, maternal health, and management of children under five years of age
- Cross-linked registers for pre-antiretroviral therapy, ART, antenatal care, labor and delivery services, post-natal care, HIV-exposed infants, TB suspects, TB lab, TB basic management unit
- Two analytical reports –a cross-sectional report covering HIV care and ART, MCH including prevention of mother-to-child transmission (PMTCT), TB/HIV, malaria; and a cohort report to assess treatment outcomes
- Guidelines for using the tools.

Sources: WHO 2006; WHO 2010b; WHO 2013.

The study compares the older patient monitoring system (PMS) to the new system, known in Cote d'Ivoire as the Integrated Patient Monitoring System (IPMS), to answer a central question: whether integrated or “interlinked” data collection tools, such as the ones being used in Cote d'Ivoire, promote integrated service delivery. Findings from this study are meant to be used in the national scale-up and continuing use of the IPMS in Cote d'Ivoire, while contributing to the global evidence base on the case for providing and monitoring integrated services for responding to HIV.

This document describes Cote d'Ivoire's efforts to develop an interlinked system to monitor the delivery of integrated services within the HIV context; outlines the study's purpose and methodology; and presents the results of the quantitative and qualitative analysis, along with recommendations for improving the effectiveness of the IPMS tools.

## Cote d'Ivoire: Monitoring Integrated HIV Services

HIV prevalence remains relatively low in West and Central Africa compared to other parts of Africa. However, the HIV prevalence in Cote d'Ivoire (3%),<sup>2</sup> is one of the highest in the region. The National HIV Care and Treatment Program (known by its French acronym PNPEC) in the MoH is the department responsible for the clinical response to HIV/AIDS in Cote d'Ivoire. In 2001, PNPEC launched a national care and treatment program aimed at improving the quality of care for all people living with HIV.

The MoH's first national HIV annual report from 2005 highlighted the need for a longitudinal system to help track and manage the growing number of patients in the care and treatment program. The MoH used the 2006 WHO guidance, Patient Monitoring Guidelines for HIV Care and Antiretroviral Therapy, as a model for the design of a national patient monitoring system (PMS). The WHO tools were adapted to the Cote d'Ivoire context in March 2006, piloted, and rolled out nationally to institutionalize a standardized, national care and treatment monitoring system that would help with clinical management of HIV/AIDS patients and with the collection and reporting of data for program improvement.

The MoH's national service delivery guidelines state that antenatal care (ANC), voluntary counseling and testing (VCT), prevention of mother-to-child transmission (PMTCT), and HIV care and treatment should be integrated with other services to facilitate a move away from vertical, disease-specific systems and towards an integrated approach to service delivery. However, program reviews revealed barriers, including lack of coordination between maternal and child health (MCH) and HIV services, resulting in double-counting of some data and under-reporting of others, and insufficient data collected on HIV-exposed infants. To address these challenges, and also to meet donor requirements and global guidelines for service integration, the MoH decided to revise the existing patient monitoring system by incorporating the new interlinked tools that comprise the 3ILPMS.

The old patient monitoring tools were revised in late 2010 in a workshop attended by key actors involved in HIV data management. The changes made to the old PMS tools to develop the IPMS tools included:

- Revising the data collection tools for PMTCT and VCT
- Revising and aligning the HIV care and treatment data collection tools to the WHO 3ILPMS gold standard

<sup>2</sup> UNAIDS: See <http://www.unaids.org/en/regionscountries/countries/ctedivoire/>

- Developing new indicators for drug management and HIV care and support, and integrating these indicators into the HIV indicators data dictionary
- Creating a new tool to follow up of HIV-exposed infants
- Developing Users' Guides on how to use the tools.

In summary, whereas the old PMS tools were designed around vertical HIV care and treatment programs, the revised tools (henceforth referred to as the IPMS tools) were designed to reflect Cote d'Ivoire's ongoing transition towards a more integrated service delivery model. The IPMS changes the way services and service statistics are tracked. For example, in the old system, PMTCT services were provided within ANC and other MCH clinics, but PMTCT data were captured and tracked separately from other data collected in these clinics using PMTCT-specific registers. In the IPMS, PMTCT data elements have been integrated into the tools used in routine MCH, such as the ANC, post-natal, and delivery registers. Another difference between the old PMS and IPMS is in how routine reporting is managed. The old PMS used separate reports for each program area; in the IPMS, reporting has been streamlined so that most data are reported using a single reporting format – the monthly health management information system (HMIS) report form (see Box 3).

### Box 3—Cote D'Ivoire's IPMS

The IPMS consists of several paper-based data collection and reporting tools that are used by various clinics in a health facility. There are two types of data collection tools (individual patient files and clinic registers) and two types of reporting tools (a cross-sectional monthly report of service statistics and a cohort report).

#### Individual Patient Records

The individual patient files contain detailed information for each patient seen in the clinic. The specific tools include the Individual Patient File, Patient Follow-up Form, Exposed Child File, ANC Consultation Record, Delivery Consultation Record, and Post-Natal Consultation Record. The Individual Patient File and Follow-up forms capture patient socio-demographic data, HIV test results, history of antiretroviral (ARV) treatment and PMTCT, nutritional status of child and adult, physical exam data, tuberculosis screening results, WHO clinical status and CD4 count, and positive prevention measures. The Individual Patient File is subdivided into adult, child, adult and child, and family screening sheets.

#### Registers

The registers summarize key information for all patients who are seen in the clinic within a given period of time and are used to compile the cross-sectional monthly report. The IPMS includes registers for VCT, HIV screening by rapid test, lab services, pre-ART, ART, ANC, post-natal services, delivery, and curative consultations.

#### Reports

The IPMS includes an integrated cross-sectional monthly report; the Management Information System Monthly Report of Primary Health Facilities, which contains PMTCT and care/treatment; and the Cohort Analysis Report, which allows analysis and reporting of key outcomes for HIV-positive patients on ART.

After the field test, the MoH started rolling out the IPMS nationally, with the expectation that the interlinked tools will improve the country's ability to monitor the effectiveness of integrated health care delivery (i.e., the integration of VCT, PMTCT with focus on exposed infant follow-up, and HIV care and treatment with other care delivery service); increase the availability of quality information to facilitate evidence-based decisions on patient and program management; and fulfill reporting requirements for the Global Fund to Fight AIDS,

Tuberculosis and Malaria, the President's Emergency Plan for AIDS Relief (PEPFAR), and other donors. Furthermore, data from the field test of the IPMS and this case study will inform future refinements to the IPMS.

## **The IPMS field test and MEASURE Evaluation Case Study**

The MOH, with support from the MEASURE Evaluation project office in Cote d'Ivoire, field-tested the IPMS tools in eight facilities in three districts (Marcory, Port Bouet, and Treichville) from November 2011 to February 2012. The pilot facilities were selected based on accessibility to Abidjan and performance history with respect to the rate of data reporting and transmission (which was good for the district of Marcory, average for the District of Port Bouet, and low for Treichville).

The objectives of the field test were to assess the perceptions and utilization of the tools by facility staff and to coach health care workers to use the tools correctly. During supervision visits, supervisors assessed the availability of the tools and noted the challenges that tool users encountered when using the new tools.

Cote d'Ivoire was selected for the case study because it is one of the first countries to adapt and use the WHO's interlinked patient monitoring tool and therefore a logical choice for the study. In addition, the end of the field test and time-frame of the case study conveniently coincided making it a practical choice. And lastly, the presence of a MEASURE Evaluation country office in Cote d'Ivoire was a bonus because it greatly facilitated the logistics of organizing and conducting the study.

# Rationale, Goals and Objectives

The IPMS was developed in 2012 in an effort to improve patient management, program management, and integration of services in Cote d'Ivoire. Effective use of a new system depends not only on the technical quality of the system, but also on several other factors including the perception of system users and their views about the system, which in turn influences whether or not they use the system and the data that it generates. The IPMS field test in Cote d'Ivoire presented an opportunity to assess health care workers' perceptions of the new system prior to national scale-up. The information from the field test and case study have been used to address user concerns about the system and make improvements so that the final system is well received and the scale-up can be carried out effectively. In a broader sense, the case study also provided a valuable opportunity to explore the relationship between an integrated health information system (see Box 4) and integrated service delivery, and examine how one drives the other. These insights ultimately contribute to the global evidence base for strengthening integration activities. The lessons culled from Cote d'Ivoire can guide other countries that are in the process of integrating their health systems and health information systems. Specifically, it can help countries that are considering or in the process of rolling out integrated patient monitoring tools to plan an effective scale-up of the system.

## Box 4—Data Collection in Cote d'Ivoire

In Cote d'Ivoire, a majority of facilities initially collect data using the paper-based IPMS tools. The data are then entered into the national electronic HIV patient data management system, called SIGDEP (the Management Tool for Electronic Patient Files). In addition to the data entry interface, SIGDEP contains four other modules: a monthly cross-sectional report module, a cohort report module, a VCT module, and a pharmacy module to facilitate the management of ARV drugs. SIGDEP was revised after the field test of the IPMS tools to ensure compatibility with the revised tools and data elements. The adoption of electronic systems can make the management of large-scale patient monitoring datasets considerably more rapid, simpler, and more reliable—for example, by automating the compilation of monthly cross-sectional and cohort reports. However, since the quality of data in an electronic system is only as good as the data entered into it, ensuring reliable transcription of data from the paper-based tools to the electronic interface is critical. Measures should be put in place, and reinforced, to ensure that high-quality data are collected in the paper-based tools and then entered into the electronic system.

The goal of this study was to obtain information that can be used to help the MoH and the Directorate for Information, Planning, and Evaluation (DIPE) in Cote d'Ivoire improve the IPMS tools and strengthen the scale-up of the system. The study's objective was to examine users' perceptions of the tools with respect to the following research questions:

1. Does the IPMS improve **service integration** by facilitating coordination, linkages, and referrals?
2. Does the IPMS improve **program management** by making available better metrics that can be used for evidence-based decision making?
3. Does the IPMS contribute to improved **health information system performance** by generating high-quality data that can be collected, analyzed, and transformed for use in decision-making?
4. What are system **users' perceptions** of the benefits and challenges of using the IPMS?
5. Does the IPMS improve **patient monitoring** by making information available to help clinicians improve patient management decisions?

## Study Design

The case study methodology is a popular methodology for researchers who seek to understand complex social phenomena. It is helpful in understanding the “how” and the “why” questions as much as the “what” question. In this instance, we chose a case study approach because we were interested in finding out *how* and *why* an integrated information system affects service integration as much as we were interested in finding out *if* it affects integration of services. To explore this linkage we posed our questions to those who are most familiar with the system—the service providers and health care professionals who are the direct users of the system. Providers’ responses reflect their attitudes and behavior, and the assumption was that their attitudes and behaviors influence their patterns of tool use. Being informed about these perceptions, and using the information to strengthen the system and correct potential misunderstanding that users may harbor, is as important as ensuring the technical merit and quality of the tools in determining a tool’s effectiveness.

The case study used a mixed method approach consisting of a quantitative survey and key informant interviews (KII). The survey was administered to IPMS tool users from the facilities where the tools were piloted. To gain a deeper understanding of patient monitoring systems, the survey was also administered to users of the old PMS tools from “comparison” facilities, where the old PMS tools were still being used at the time of the study. The purpose of the survey was to assess if there were differences in how IPMS and PMS tool users perceived the tools influenced service integration, patient management and program monitoring.

Tool users were classified as either **primary** or **secondary** users. The primary users were defined as health facility personnel (e.g., service providers, data managers, HIS officers, etc.) who directly complete either the data collection tools or the reporting tools. The secondary users were defined as all other consumers of data generated by the tools but users who do not have a direct role in filling out either the data collection or reporting tools.

Data collection was carried out sequentially in two phases using quantitative and qualitative methods. First, the questionnaire was administered to 78 tool users in the IPMS and comparison sites (42 in the IPMS sites and 36 in the old PMS sites). A preliminary analysis of the quantitative data was used to develop the qualitative KII instrument, to further explore specific points of interests identified in the quantitative data. In contrast, the KIIs were administered only to IPMS tool users. A total of 10 interviews were conducted.

The quantitative and qualitative findings were analyzed separately and then synthesized and triangulated to gain a deeper understanding of the overall findings.

## District and Site Selection

The IPMS users came from the eight facilities where the IPMS tools were field tested. Seven other sites were chosen as comparison sites. These were facilities that continued to use the older patient monitoring system tools that were initially rolled out in 2008. To the extent possible, efforts were made to match the IPMS sites with the comparison sites with respect to

facility size, patient load, type of facility (i.e., referral hospital, district hospital, health center), geographical setting (i.e., urban, semi-urban, and rural), management structure (i.e., public, private, public-private partnership) The IPMS and comparison facilities and districts are listed in Table 1.

**Table 1—IPMS and Comparison Sites**

IPMS Sites			Comparison Sites (Old PMS)		
District	Facility	Facility Type	District	Facility	Facility Type
Treichville	USAC de Treichville	HIV Referral Center	Treichville	FSU COM Arras 3	Primary Care
	Hôpital Général de Treichville	Hospital		Dispensaire du Pont	Primary Care
	CAT de Treichville	TB Clinic			
Port Bouet-Vridi	Hôpital Général de Port Bouet	Hospital	Port Bouet-Vidri	FSU COM Vridi Canal	Primary Care
				FSU COM Vridi Cite	Primary Care
				FSU COM Gonzagueville	Primary Care
Marcory	Hôpital Général de Marcory	Hospital	Koumassi	FSU COM Divo	Primary Care
	CSU COM Aliodan	Primary Care		CSU COM Pangolin	Primary Care
	ASAPSU Marcory	Primary Care		Hospital General de Koumassi	Hospital
	FSU COM HKB Anoumanbo	Primary Care			

## Data Collection Instruments

All research instruments were first drafted in English, translated into French by a professional translating service, and then back-translated into English for verification that questions and content were accurately conveyed. Both the questionnaire and KII instrument were pretested in facilities around Abidjan before they were finalized.

### Quantitative

Table 2 shows how the questionnaire was structured. Except for the background information, all questions captured responses using a five-point scale:

- 5—agree
- 4—partially agree
- 3—neutral
- 2—partially disagree
- 1—disagree
- 0—not applicable

The questionnaire was administered to tool users from the district health offices and the central MoH office in a workshop format and was designed to be self-administered by all primary and secondary users from facilities.

**Table 2—Questionnaire Content**

Sections	Questions	Content	Respondent Type
Part 1	1.1–1.4	Background Information	All
Part 2	2.1–2.5 2.6–2.7 2.8–2.10 2.11–2.13 2.14–2.19	Service Integration Facility Level Program Management District Level Program Management National Level Program Management Health Information System Performance	All
Part 3	3.1–3.13	User Perception of the Tools	Facility Data Managers Service Providers
Part 4	4.1 4.2 4.3 4.4–4.5 4.6	General Patient Monitoring Monitoring Patients in HIV Care and ART Monitoring HIV-Positive Pregnant Women Monitoring HIV-Exposed Infants Monitoring–Other	Service Providers

### Qualitative

The final design and content of the qualitative instrument was informed by the preliminary analysis of the quantitative data. The KII guide was semi-structured and contained both categorical Yes/No questions and open-ended questions that examined various aspects of the IPMS tools and asked respondents about the strengths and weakness of the tools; obstacles to using the tools; whether users think that the tools improve data collection, reporting, data quality, and information use; how they use the data generated by the tools and what kind of decisions the tools help them make; whether or not users think the tools facilitate integration of services, patient monitoring and program management; and what other factors external to the tools users think affect these areas.

The KIIs were only administered to IPMS tool users.

## Data Collection

### Quantitative

The questionnaire was administered in two stages. First it was administered to all district- and national-level respondents, i.e., the secondary users, during a day-long workshop on March 15th, 2012. The workshop fulfilled two objectives. First, MEASURE Evaluation oriented all secondary tool users to the study objectives and administered the questionnaire to them. Next, MEASURE Evaluation trained the district-level participants to support and manage administration of the questionnaire in the study facilities in their respective catchment areas.

The second stage of data collection involved all facility-level tool users who participated in the study. The questionnaire was self-administered. A Study Coordinator was hired to work with the district health officers to coordinate data collection, troubleshoot, and ensure that facility-level users completed and returned the questionnaires within the designated timeframe.

### Qualitative

Ten key informant interviews were conducted by a team of two interviewers and two assistants. The interviews were conducted in French, tape recorded with informed consent, and subsequently transcribed. Later, all KIIs were professionally translated into English.

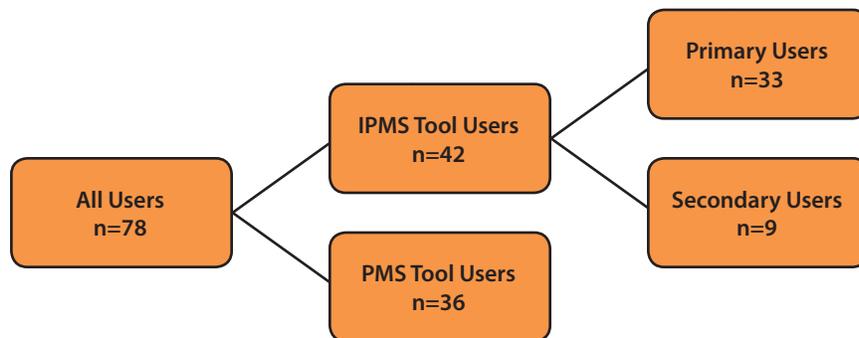
# Data Management, Cleaning, and Analysis

## Quantitative

Prior to data entry, the questionnaires were validated manually by a member of the study team to ensure adherence to skip patterns. The data were then entered into EpiData and cleaned electronically before being exported to Microsoft Excel. The final Excel dataset was then imported into Microsoft Access where it was accessed via Epi Info for analysis.

Frequencies and means were obtained for all variables before performing bivariate analyses. Variables were stratified by tool version (IPMS vs. PMS) and user type (primary users vs. secondary users) as shown in the figure below. Only the results for IPMS users were stratified by user type; these are included in the report because they revealed differences between types of IPMS users that were not observed in the PMS tool users. Due to the small sample size, a statistical level of  $p < 0.10$  was selected to detect relationships in all analyses.

Figure 1—Questionnaire Respondents by Type of Users



## Qualitative

To analyze the interview transcript data, a set of categories and sub-categories was developed based on the research questions and topics covered by the key informant interview guide. Each category and sub-category was assigned a code and transcript text was assigned these codes. Findings were sorted into three levels (national, district, and facility) identifying the level of the health system where the users worked, and then according to primary and secondary user classifications, so as to compare and contrast the perspectives of different types of users associated with working with the IPMS. Examples of category codes are data collection, reporting, data quality, data use, service integration, program management, patient monitoring, ways to help users, and ways to improve tools. Codes were then further sorted according to research question. Responses to questions in categories and sub-categories were tallied and are reported in the Qualitative Findings section.

## Background Information

Table 3—Survey Participant Profile

Variable	Value	n	Percent
<b>All Users (n=78)</b>			
Tool Version	New (IPMS)	42	53.8%
	Old (PMS)	36	46.2%
User Type	Primary	62	79.5%
	Secondary	16	20.5%
User Level	National	6	7.7%
	District	8	10.3%
	Facility	64	82.1%
<b>Facility Users (n=64)</b>			
Service Provider	Yes	58	90.6%
Tool Used for	Data Collection and Reporting	31	48.4%
	Data Collection Only	30	46.9%
	Reporting Only	1	1.6%
	Review Only	2	3.1%



## Research Question 1—Service Integration

The first research question examined whether users of the IPMS tools perceived improvements in service integration. All participants were asked to respond to this section of the questionnaire. Participants were asked a series of questions about service integration in terms of 1) improved **coordination** of patient care between service providers working in different service points; 2) improved **communication** of patient information between service providers working at different service points; and 3) increased **referrals** between service points within the same facility and between different facilities.

### IPMS vs. Old PMS

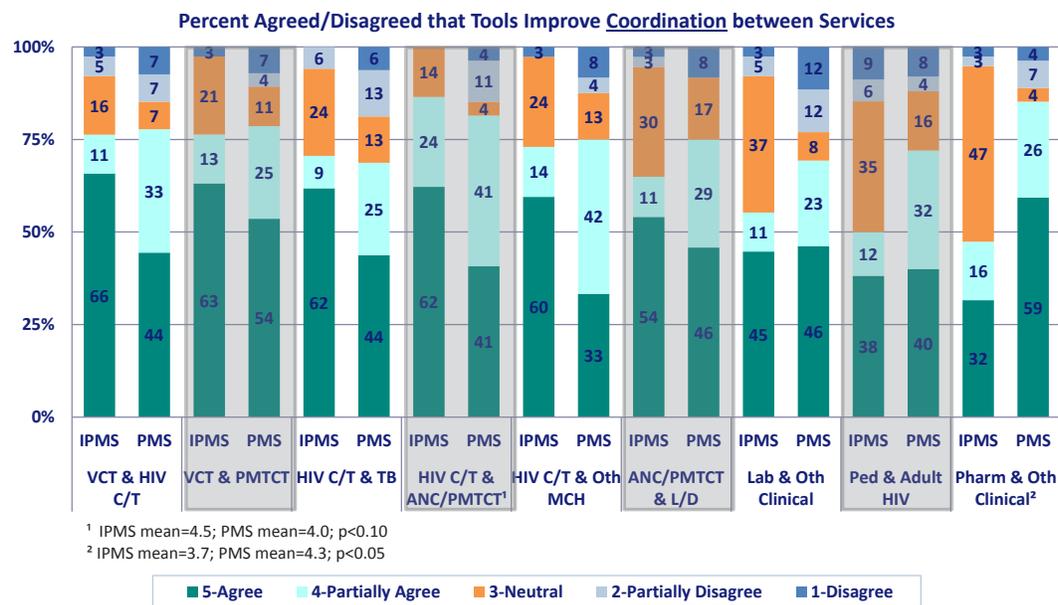
In general, respondents reported few significant improvements in service integration with the IPMS tools compared to the old PMS tools. Moreover, users of the IPMS tools had a greater propensity for choosing “neutral” responses to these questions than PMS users.

### Coordination between Services

More than half of IPMS users agreed that the tools improve coordination of patient care between service providers in most areas except in the following: laboratory and other clinical services (45%); pediatric and adult HIV services (38%); and pharmacy and other clinical services (32%) (see Graph 1).

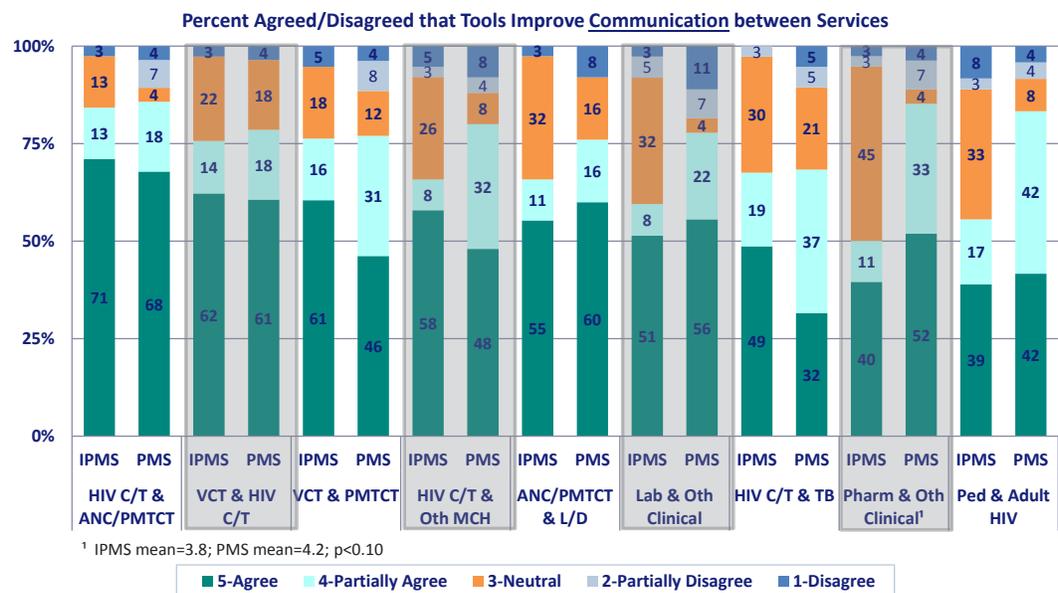
IPMS tool users' responses differed significantly from PMS tool users in response to only two questions in this section. First, IPMS tool users were more likely to agree that the tools improved coordination of patient care between HIV care/treatment and ANC/PMTCT services ( $p < 0.10$ ). Second, significantly more PMS tool users felt that their tools improved coordination of patient care between pharmacy and other clinical services ( $p < 0.05$ ) compared to IPMS users.

Graph 1—Improved Coordination between Services by Tool Version



Responses to the questions about improved **communication between services** (see Graph 2) were similar to the findings for coordination. Fewer than half of IPMS users reported improved communication between HIV care/treatment and TB services (49%), pharmacy and other clinical services (40%), and pediatric and adult HIV services (39%). In the case of pharmacy and other clinical services, significantly more old PMS tool users thought that their tools improve intra-service communication ( $p < 0.10$ ).

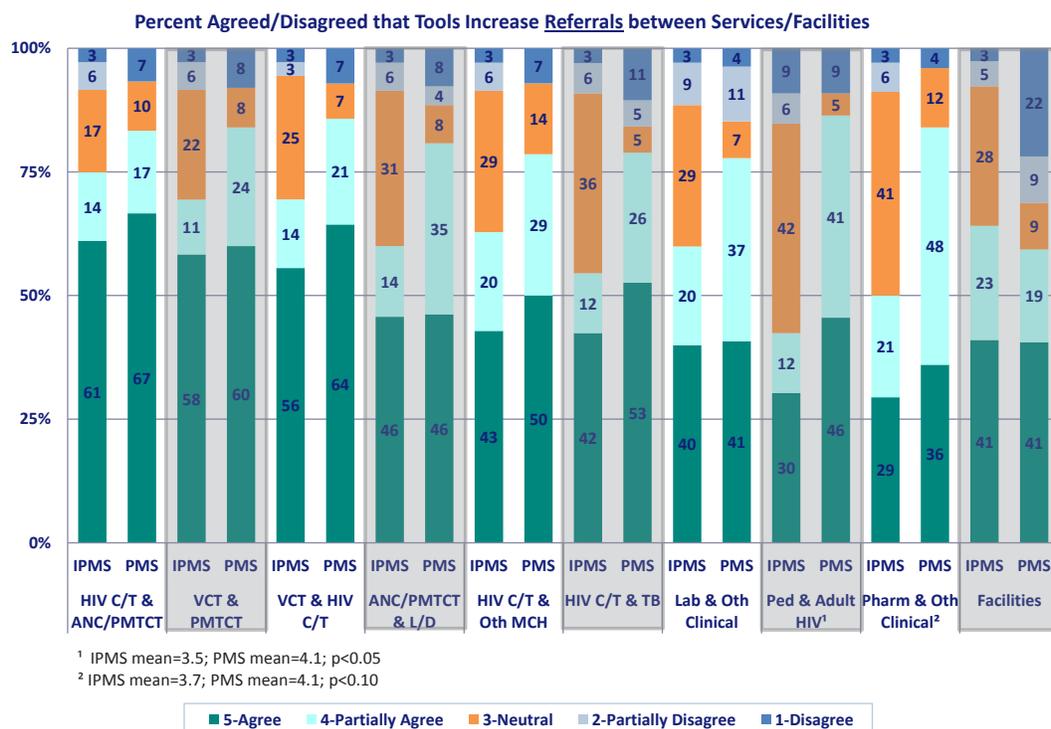
Graph 2—Improved Communication between Services by Tool Version



## Referrals between Services and Facilities

Fewer IPMS users reported improved referrals between services within the same facility compared to PMS tool users (see Graph 3). Moreover, the difference between IPMS users and old PMS users was significant for referrals between two specific sets of services: referrals between pediatric and adult HIV services ( $p < 0.05$ ); and referrals between pharmacy and other clinical services ( $p < 0.10$ ), where significantly more PMS users reported that the tools improved referrals compared to IPMS users.

Graph 3—Increased Referrals between Services/Facilities by Tool Version

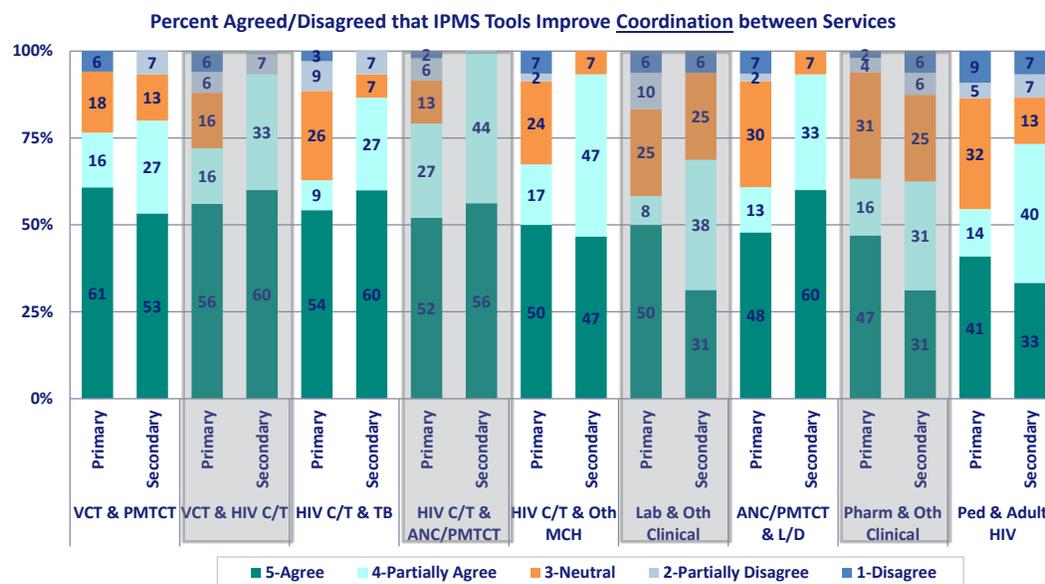


## Primary vs. Secondary Users

When we looked at only the users of the IPMS tools stratified by user type, it was clear that the neutrality in response choice seen in the IPMS users was largely due to the responses from primary users. In almost all cases, primary users of the IPMS tools selected more Neutral responses than secondary users.

With respect to improved *coordination* between services, there were no significant differences between primary and secondary IPMS users (see Graph 4). There were two areas where fewer than half of either primary or secondary IPMS users reported improvements in coordination of services: this was between pharmacy and other clinical services (primary 47%, secondary 31%) and between pediatric and adult HIV services (primary 41%, secondary 33%).

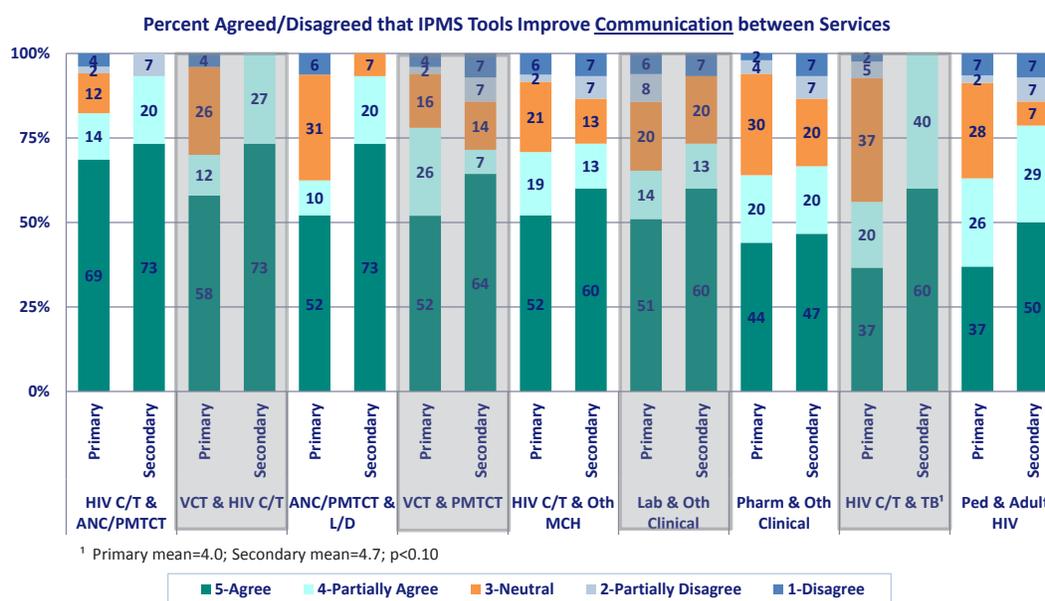
Graph 4—Improved Coordination between Services by User Type



When asked about improved **communication** between services, secondary IPMS users were more likely to find improved communication across all sets of services compared to primary users (see Graph 5 below), but the difference was only significant for communication between HIV care/treatment and TB services ( $p < 0.10$ ).

Fewer than half of either primary or secondary users agreed that IPMS tools improve communication between pharmacy and other clinical services (44% and 47%, respectively). Furthermore, only 37% of primary users agreed that the IPMS tools improve communication between HIV care/treatment and TB services, and pediatric and adult HIV services compared to 60% and 50% of secondary users respectively.

Graph 5—Improved Communication between Services by User Type



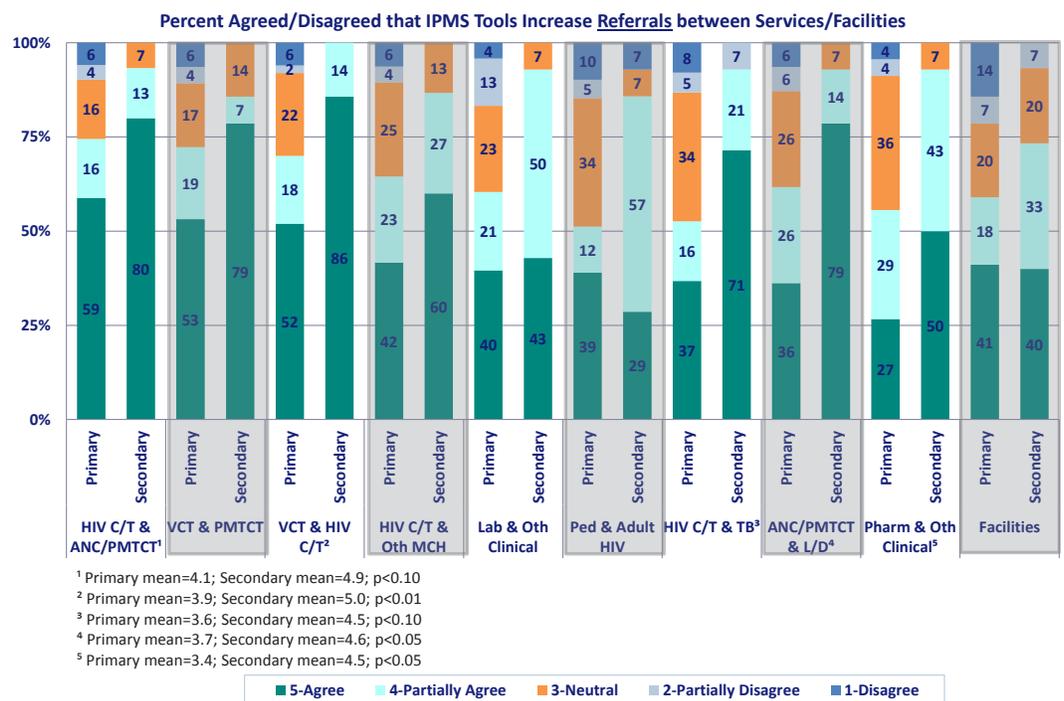
<sup>1</sup> Primary mean=4.0; Secondary mean=4.7;  $p < 0.10$

Primary and secondary IPMS users differed the most in their responses to the questions about *referrals* (see Graph 6). Secondary users were significantly more likely than primary users to agree that the new tools increased referrals, especially between the following services: VCT and HIV care and treatment services ( $p<0.01$ ); ANC/PMTCT and labor and delivery services ( $p<0.05$ ); pharmacy and other clinical services ( $p<0.05$ ); HIV care and treatment and ANC/PMTCT services ( $p<0.10$ ); and HIV care and treatment and TB services ( $p<0.10$ ).

For several services, fewer than half of primary users agreed that the IPMS tools increased referrals for: HIV care and treatment and other MCH services (42%); HIV care and treatment and TB services (37%); ANC/PMTCT and labor and delivery services (36%); and pharmacy and other clinical services (27%). There were two sets of services for which fewer than half of either primary or secondary users agreed that the tools increased referral: laboratory and other clinical services (primary 40%, secondary 43%); pediatric and adult HIV services (primary 39%, secondary 29%).

Fewer than half of primary and secondary users agreed that the IPMS tools increased referrals between facilities (41% and 40%, respectively).

Graph 6— Increased Referrals between Services/Facilities by User Type



## Research Question 2—Program Management

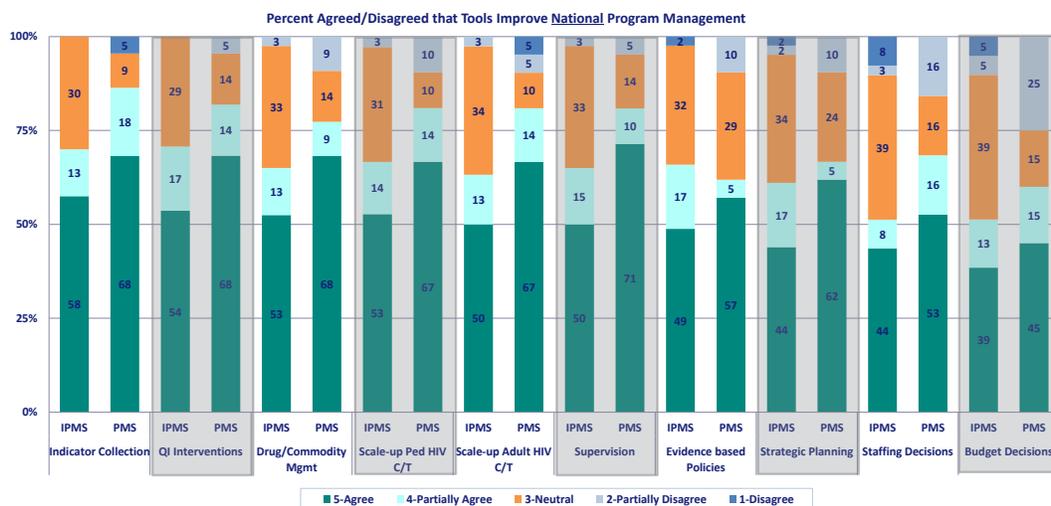
The second research question examined whether users of the IPMS tools perceived improvements in **program management** at national, district, and facility levels respectively. All participants were asked to respond to these questions.

### IPMS vs. old PMS

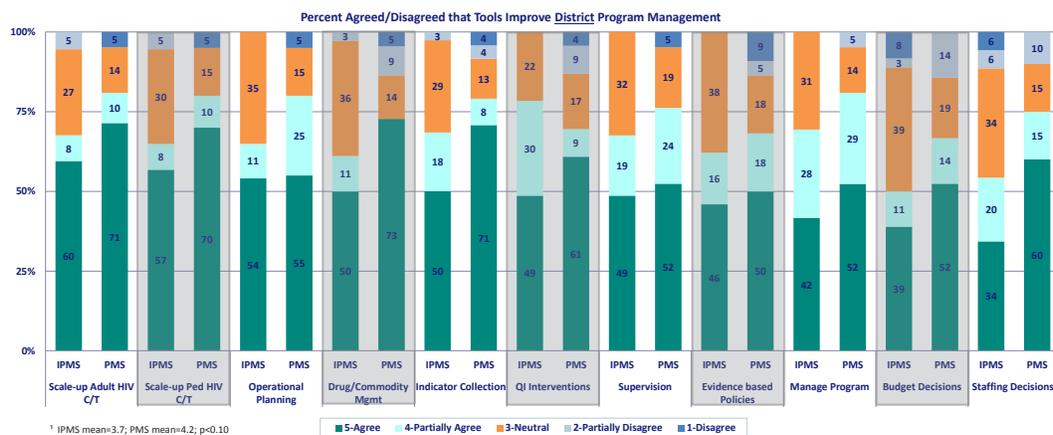
Only one significant difference emerged between the IPMS and old PMS tools in terms of program management: at the district level, respondents found the IPMS tools less helpful with staffing decisions compared to the old tool users ( $p<0.10$ , see Graph 8).

In general, respondents tended to view the IPMS tools less favorably than the old PMS tools in supporting program management, especially at the national and district levels (see Graphs 7 and 8). For question dealing with national-level program management, fewer than half of IPMS users noted improvements in: evidence-based policies by policy-makers (49%); strategic planning (44%); staffing related decisions (44%); and budgeting and resource allocation decisions (39%). For questions dealing with district-level program management, the findings were similar with fewer than half of IPMS users noting improvements in: evidence-based policies by policy-makers (46%); management of programs in the district (42%); budgeting and resource allocation decisions (39%); and staffing decisions (34%).

**Graph 7—Improved National Program Management by Tool Version**

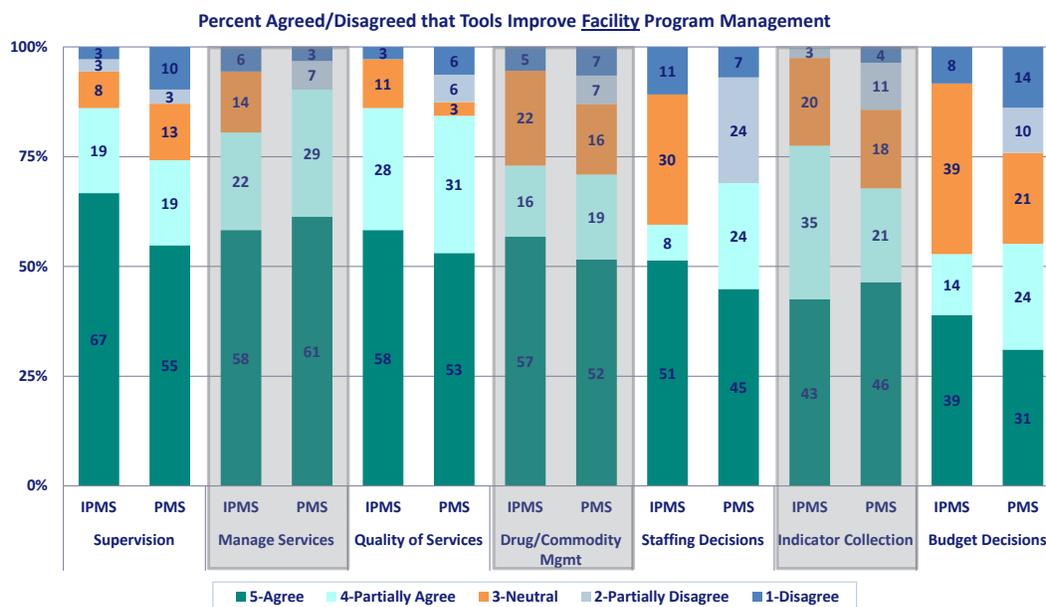


**Graph 8—Improved District Program Management by Tool Version**



At the facility level (see Graph 9), respondents generally agreed that data from the IPMS tools help facility managers improve supervision of staff (67%), the management and quality of services to patients (58% and 58% respectively), drug and commodity management (57%), and staffing decisions (51%). Fewer than half of respondents felt that the IPMS tools help collect data for programmatic indicators (43%) or help to make budget and resource allocation decisions (39%).

**Graph 9—Improved Facility Program Management by Tool Version**

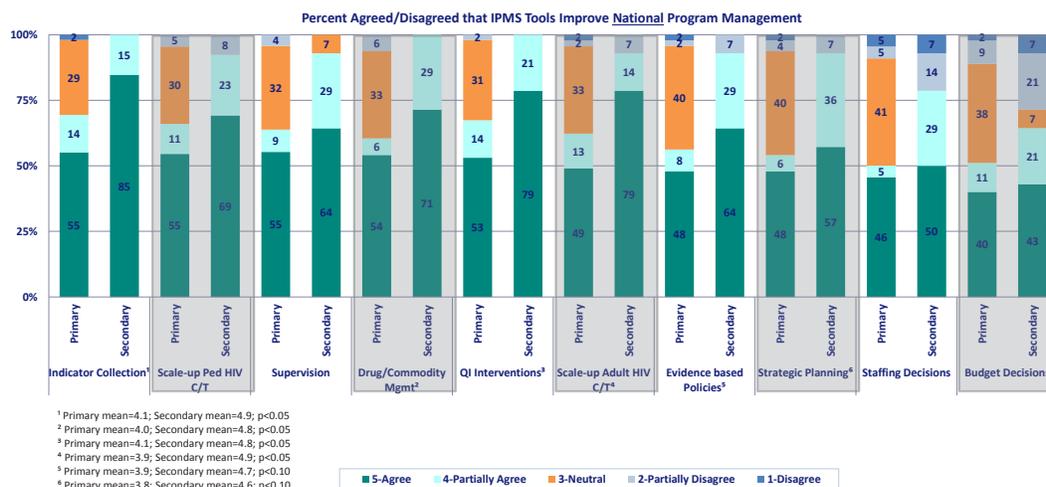


**Primary vs. Secondary Users**

In general, for questions on the effect of the IPMS tools on program management at all levels of the health system, primary IPMS users expressed more neutral responses than secondary users (see Graphs 10–12).

Secondary users viewed the IPMS tools more favorably than primary users for all aspects of national-level program management (see Graph 10) and the differences were significant for collection of core national indicators, drug and commodity management, quality improvement interventions, scale-up of adult HIV care and treatment program (all  $p < 0.05$ ), and evidence-based policies by policy-makers and strategic planning ( $p < 0.10$ ).

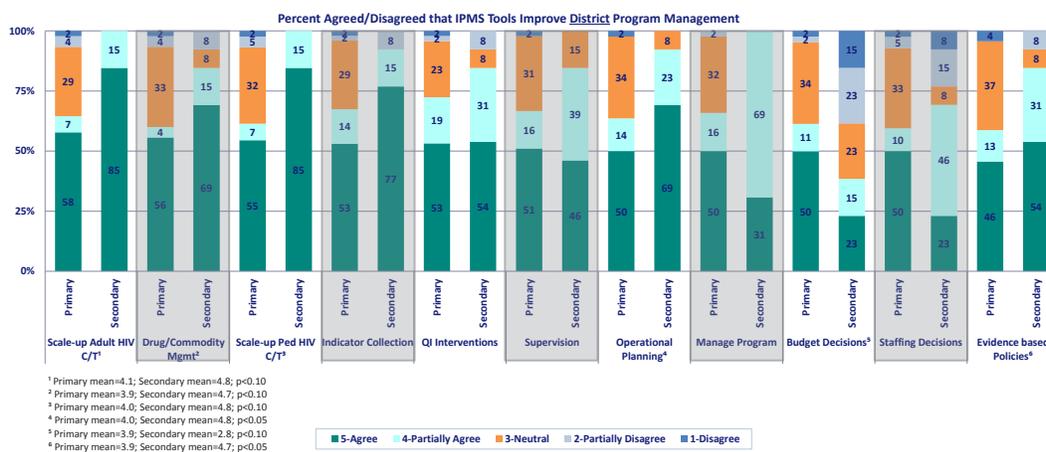
**Graph 10—Improved National Program Management by User Type**



For district program management, secondary users generally viewed the IPMS tools more favorably than primary users, except for the areas of supervision, program management, and staffing, where primary users reported more favorable responses than secondary users (see Graph 11). But these differences were only significant for decisions on budgeting and resource allocation ( $p < 0.10$ ).

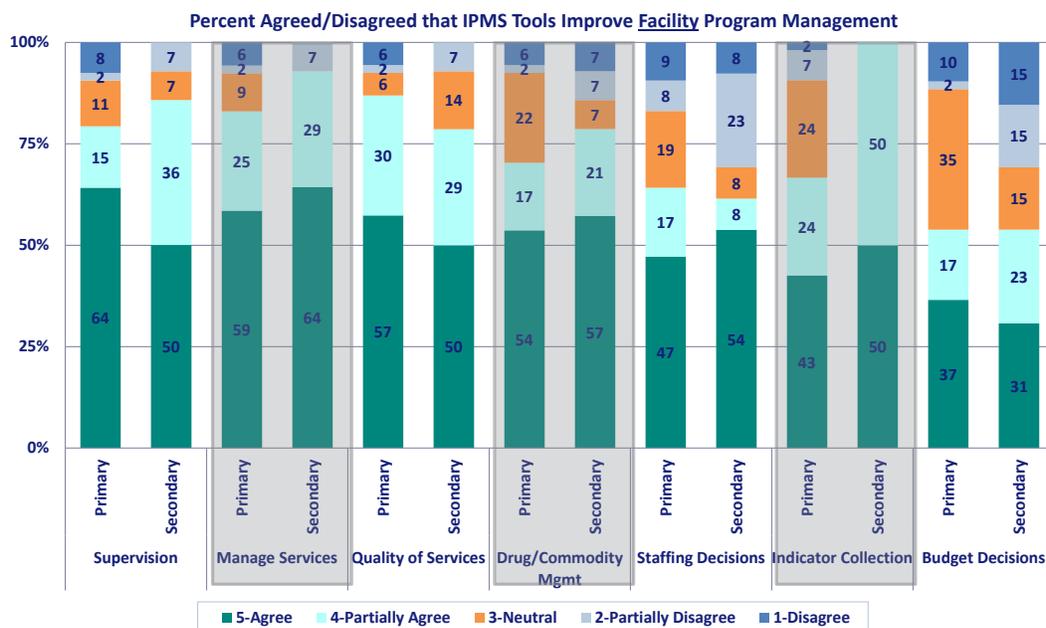
Secondary users agreed significantly more frequently than primary users on improvements in: operational planning ( $p < 0.05$ ); evidence-based policies by policy-makers ( $p < 0.05$ ); scale-up of adult and pediatric HIV care and treatment programs (both  $p < 0.10$ ); and drug and commodity management ( $p < 0.10$ ).

**Graph 11—Improved District Program Management by User Type**



At the facility level, there was a high level of consistency between the responses of primary and secondary users (see Graph 12). The majority of users felt that the IPMS tools had improved facility program management, except in: staffing decisions (primary 47%); collection of data for programmatic indicators (primary 43%); and budget and resource allocation decisions (primary 37%, secondary 31%).

**Graph 12—Improved Facility Program Management by User Type**



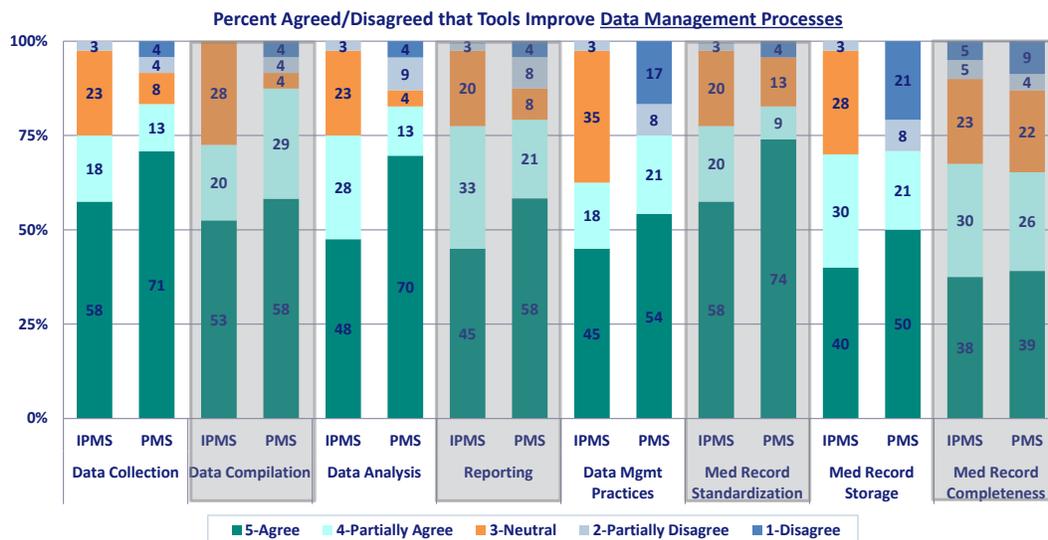
## Research Question 3—Health Information System Performance

The third research question examined whether users of the IPMS tools perceived improvements in health information system (HIS) performance as a result of the tools generating high quality data that can be collected, analyzed, and transformed into information for decision-making. We used the Performance of Routine Information System Management (PRISM) framework to define health information performance, which is defined as improvements in data quality and data use (Hotchkiss et al., 2010).<sup>3</sup> We also added data management procedures and data demand to the definition. All participants responded to these questions.

### IPMS vs. old PMS

IPMS and old PMS tool users did not differ significantly in their perception of HIS performance, though PMS users were somewhat more likely to have positive perceptions compared to IPMS users. Fewer than half of the IPMS tool users found that the IPMS tools improved data management in terms of data analysis (48%); reporting of data (45%); data management practices at the facility (45%); medical record storage (40%); and completeness of medical records (38%) (see Graph 13).

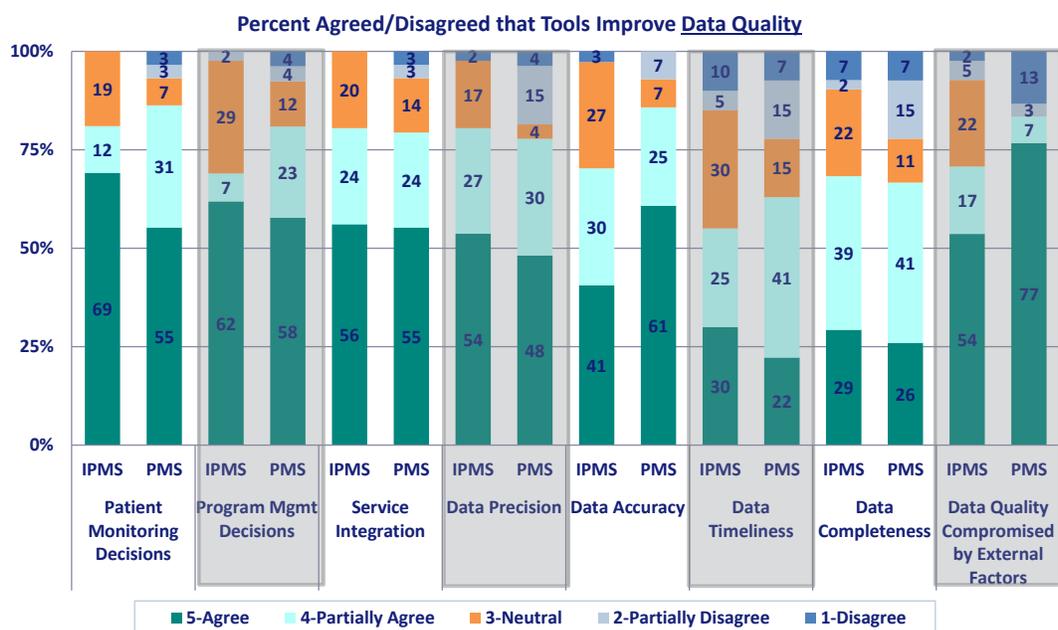
Graph 13—Improved Data Management Processes by Tool Version



The majority of IPMS tool users reported that the tools improved various aspects of data quality (see Graph 14). However, they rated the IPMS tools lower on improving accuracy (41%); timeliness (30%); and completeness (29%). Interestingly, most of the IPMS tool users reported that data quality is compromised by factors other than the tools (54%).

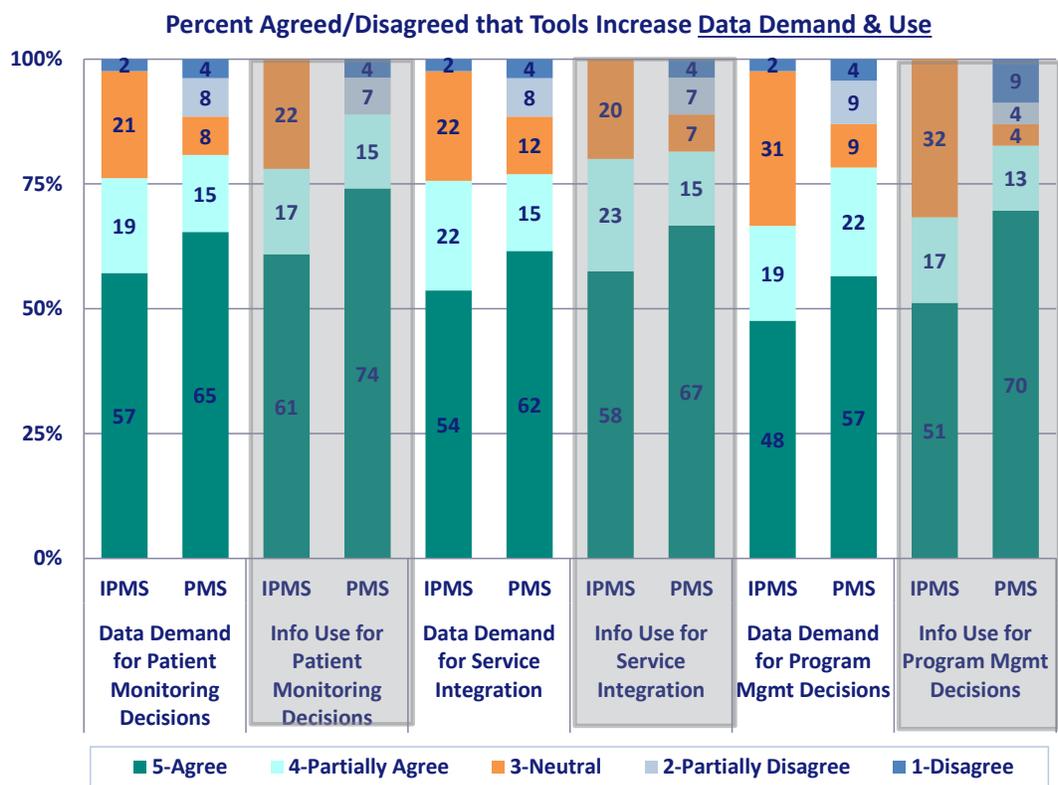
<sup>3</sup> The PRISM framework comprises tools to assess HIS performance, identify technical, behavioral, and organizational factors affecting performance, and help design interventions to improve HIS performance and enhance the quality and use of routinely collected health data.

Graph 14—Improved Data Quality by Tool Version



The majority of IPMS tool users reported that the tools improve data demand and information use. However, levels of agreement on these questions were consistently higher among PMS users, as shown in Graph 15.

Graph 15—Increased Data Demand and Use by Tool Version

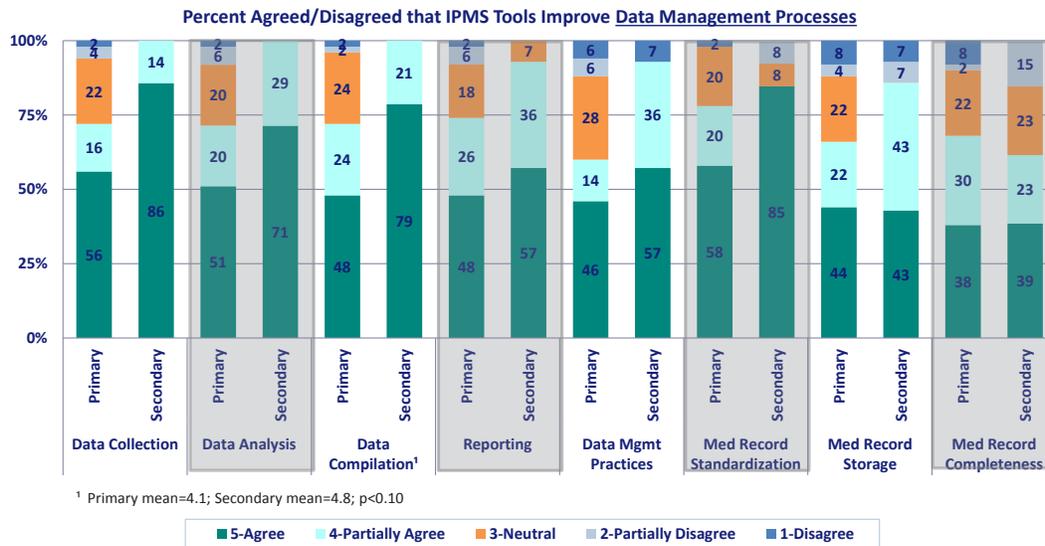


## Primary vs. Secondary Users

As with service integration and program management, primary users selected more Neutral responses about the IPMS tools compared to secondary users.

Although a higher proportion of secondary users than primary users viewed the IPMS tools favorably on data management processes (see Graph 16), the difference between primary and secondary users was significant in only one area: data compilation ( $p < 0.10$ ). Fewer than half of primary and secondary users agreed that the IPMS tools improve medical record storage (44% and 43%, respectively) or completeness of reports (38% and 39%, respectively).

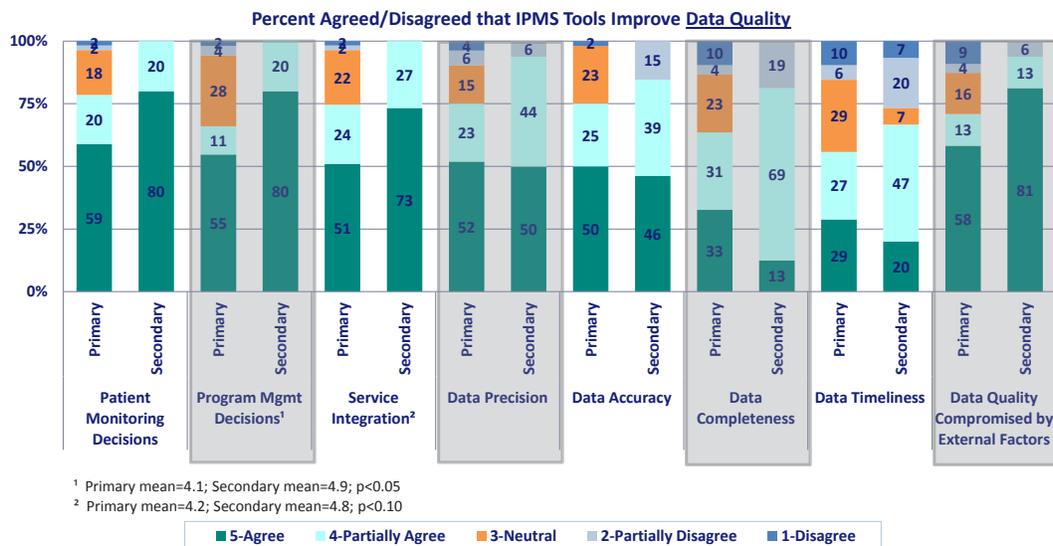
**Graph 16—Improved Data Management Processes by User Type**



Secondary users were more likely than primary users to agree that the tools increase the availability of high-quality data for patient monitoring, program management decisions, and service integration (see Graph 17). The differences were significant for both program management decisions ( $p < 0.05$ ) and service integration ( $p < 0.10$ ). Interestingly, a larger proportion of secondary users than primary users thought that data quality is compromised by factors other than the tools (81% versus 58%, respectively).

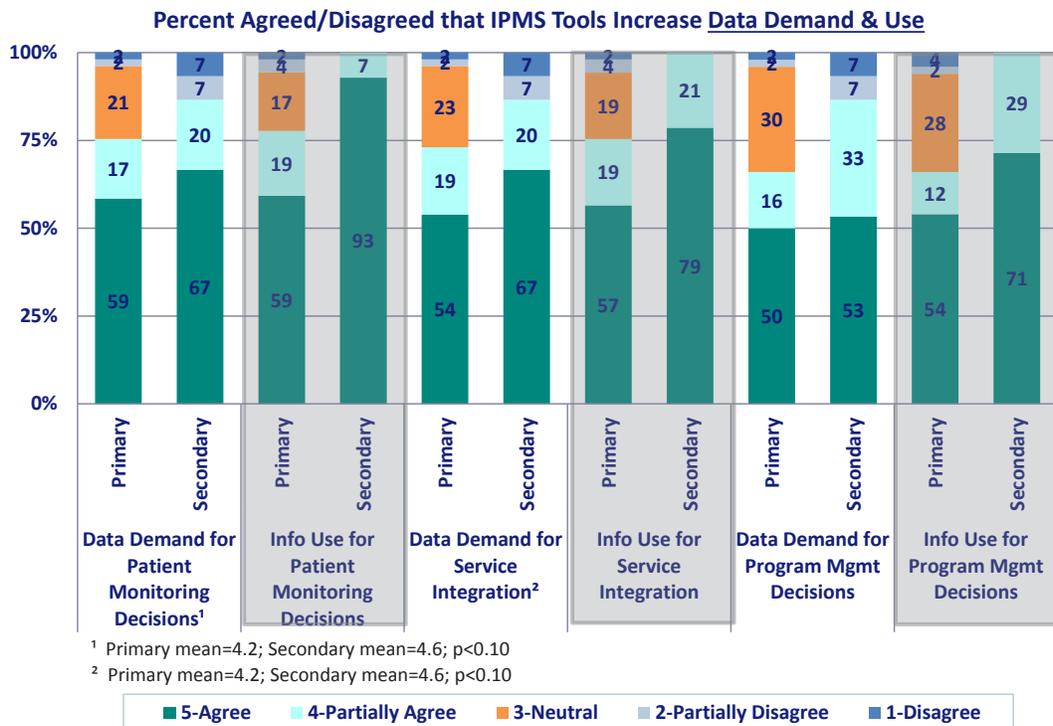
Conversely, primary users tended to view the tools slightly more favorably with respect to generating data that are precise, accurate, complete, and timely; however, none of these differences were significant. Both primary and secondary users rated the tools the lowest in terms of the ability of the tools to improve completeness (primary 33%, secondary 13%) and timeliness (primary 29%, secondary 20%) of data.

Graph 17—Improved Data Quality by User Type



Most users agreed that the IPMS tools increase demand for data and use of information (see Graph 18). As Graph 18 shows, secondary users expressed more positive responses than primary users for all questions in this section; the difference between the primary and secondary users was significant for data demand related to patient monitoring decisions and service integration (p<0.10).

Graph 18—Increased Data Demand and Use by Tool Version



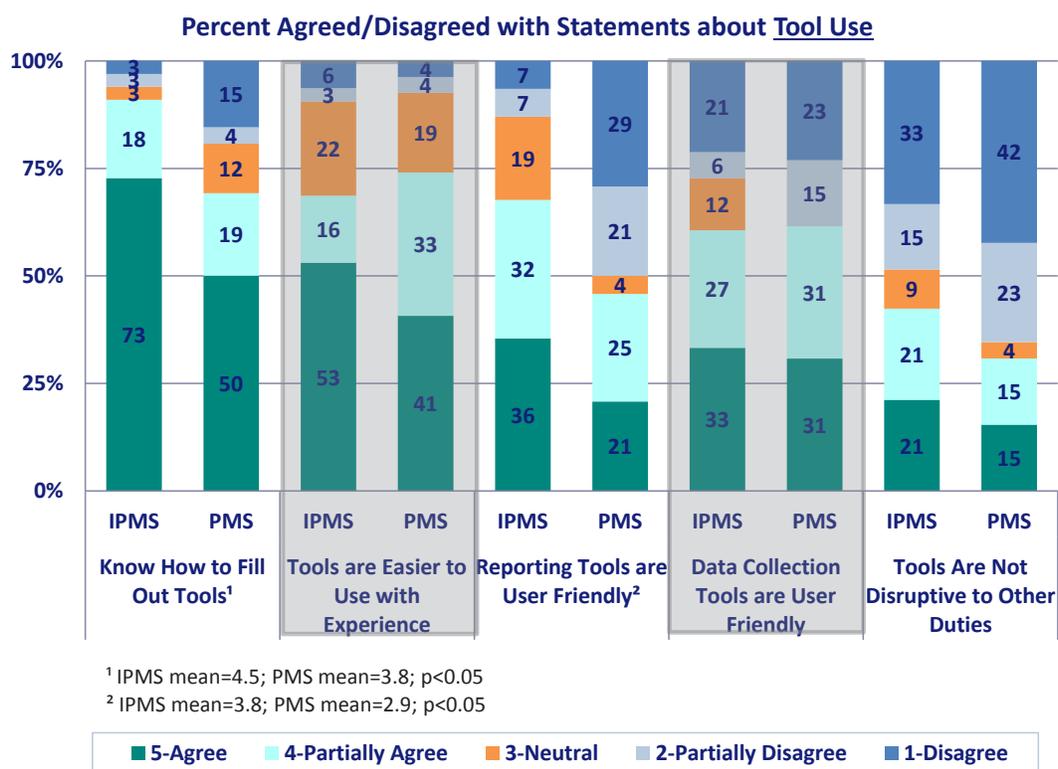
## Research Question 4—User Perceptions

The fourth research question examined users' perceptions of the IPMS tools, especially the perception of users who were directly responsible for filling out the tools. Therefore, only facility-based users were instructed to answer these questions. Questions focused on tool use, user support, and organizational factors.

### IPMS vs. old PMS

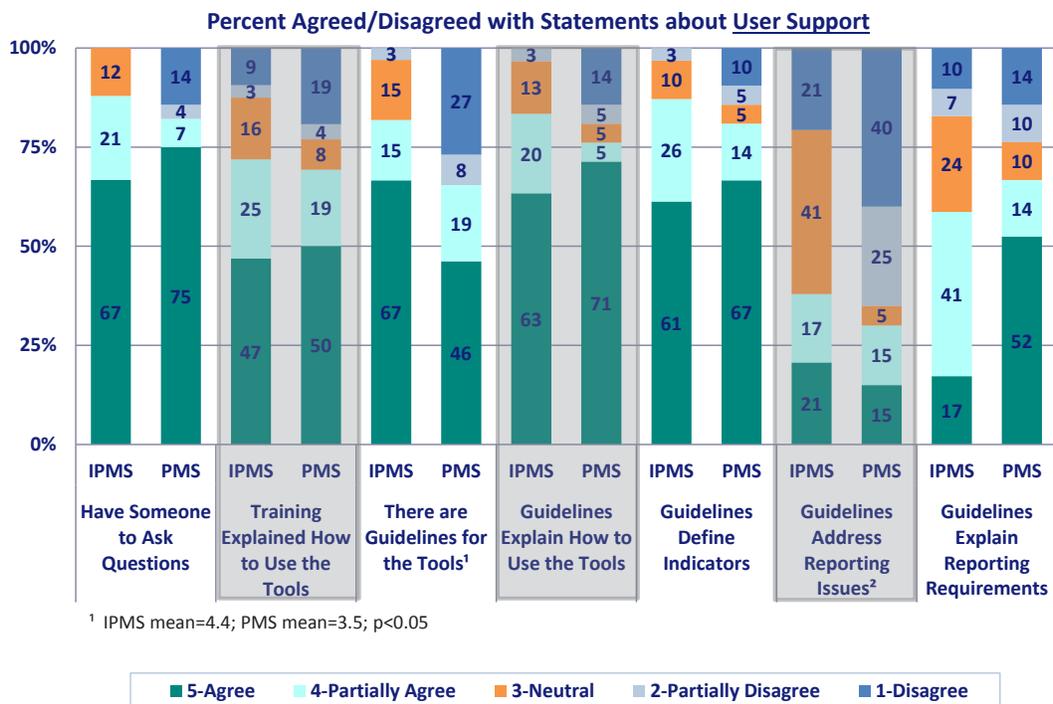
Overall, for this section users of the IPMS tools were more positive than users of the old PMS tools (see Graph 19). Compared to users of the old PMS tools, users of the IPMS tools were significantly more likely to find the IPMS reporting tools users-friendly ( $p < 0.05$ ) and to report feeling confident about how to fill out the tools ( $p < 0.05$ ). However, barely a third of either IPMS or PMS users agreed that the IPMS data collection tools are user-friendly (33% and 36%, respectively). A minority of both IPMS and PMS users (21% and 15% respectively) agreed that the time required to complete the tools is not disruptive to their other duties and responsibilities.

Graph 19—Tool Use by Tool Version



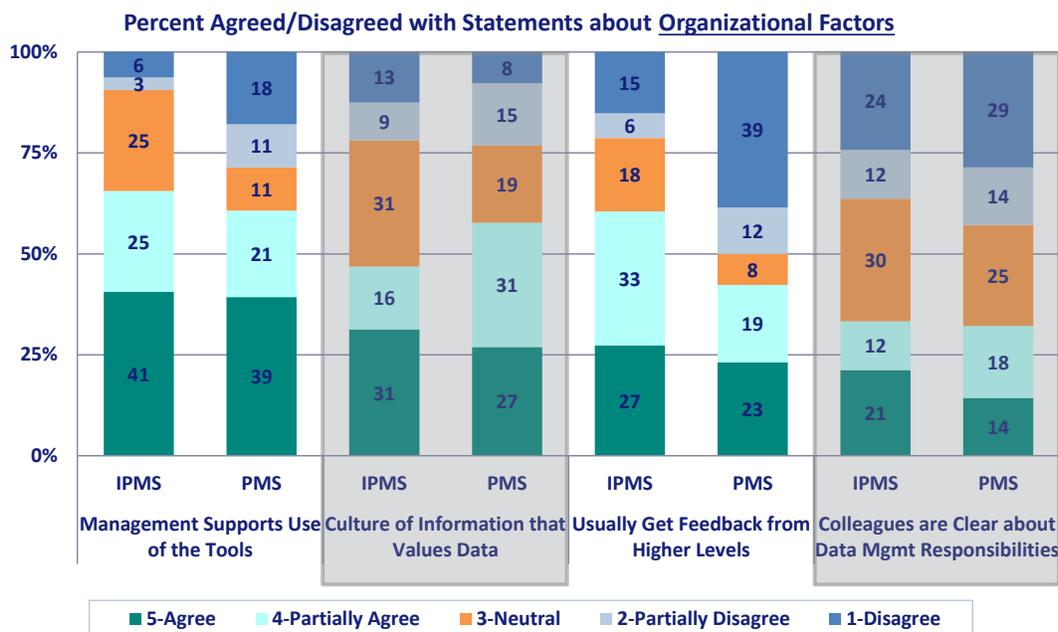
Generally, IPMS tool users expressed positive views about the tools for questions on user support, such as knowing whom to go to with questions on the tools (see Graph 20). The majority of IPMS tool users said that there are guidelines for the tools (67%), which was significantly more than PMS users ( $p < 0.05$ ). While most of the IPMS tool users agreed that the guidelines explain how to use the tools correctly and what information each indicator is meant to collect, only 17% felt that the guidelines adequately explained the reporting requirements. In addition, only 21% of IPMS tool users agreed that the guidelines describe how to address late, incomplete, inaccurate, and missing reports; however, their responses were still more positive than that of PMS users in this regard ( $p < 0.10$ ).

Graph 20—User Support by Tool Version



Finally, neither IPMS nor PMS users reported experiencing strong support from their organizations for information use (see Graph 21).

Graph 21—Organizational Factors by Tool Version



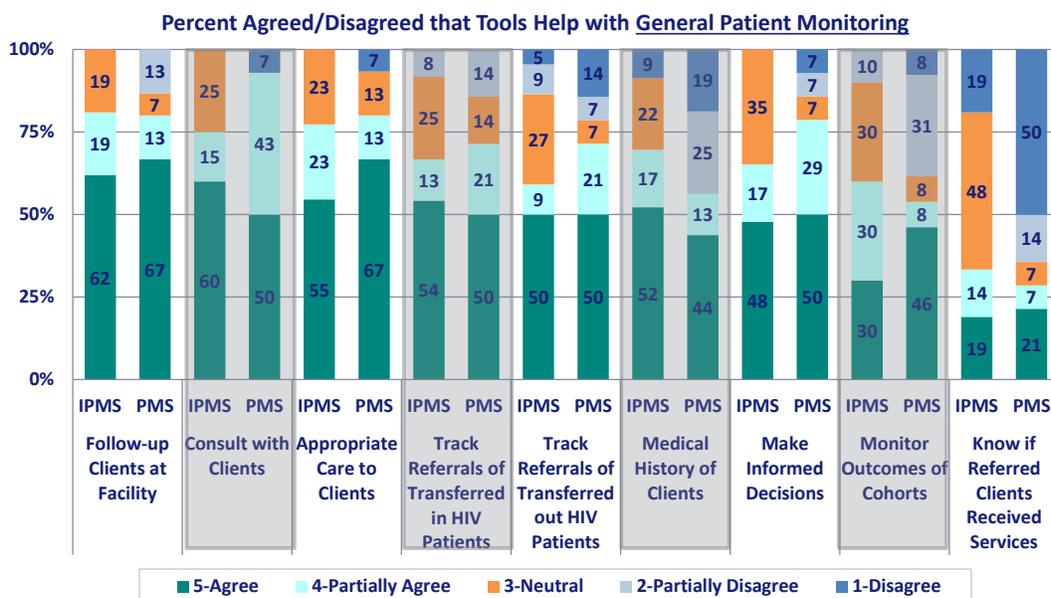
## Research Question 5—Patient Monitoring

The fifth research question examined whether users of the IPMS tools perceived improvements in **patient monitoring**, including improvements in monitoring: 1) general patient care; 2) patients in HIV care and treatment; 3) women; and 4) HIV-exposed infants. Only service providers, who manage patients and also directly use the tools, were asked to respond to these questions.

### IPMS vs. old PMS

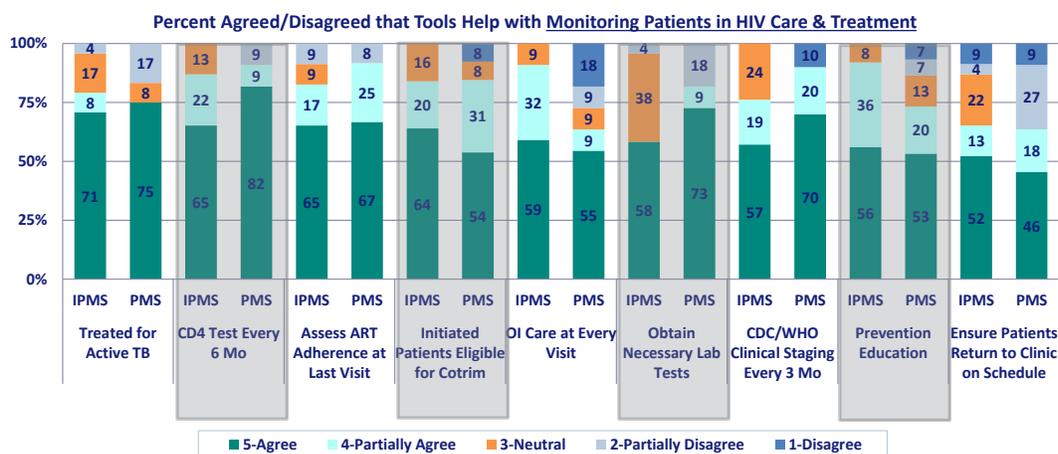
Most service providers who used the IPMS tools agreed that they help them with **general patient monitoring** in areas such as following up patients when they return to the facility (62%); conducting consults with patients more efficiently (60%); providing appropriate care to patients (55%); tracking transferred-out and transferred-in HIV patients (50% and 54%, respectively); and staying informed about their patients' medical histories (52%) (see Graph 22). The two exceptions were in monitoring the outcomes of cohorts (30%) and knowing whether patients referred to other services had actually received those services (19%). However, none of these responses differed significantly from the responses of users of the old PMS tools.

Graph 22—General Patient Monitoring by Tool Version



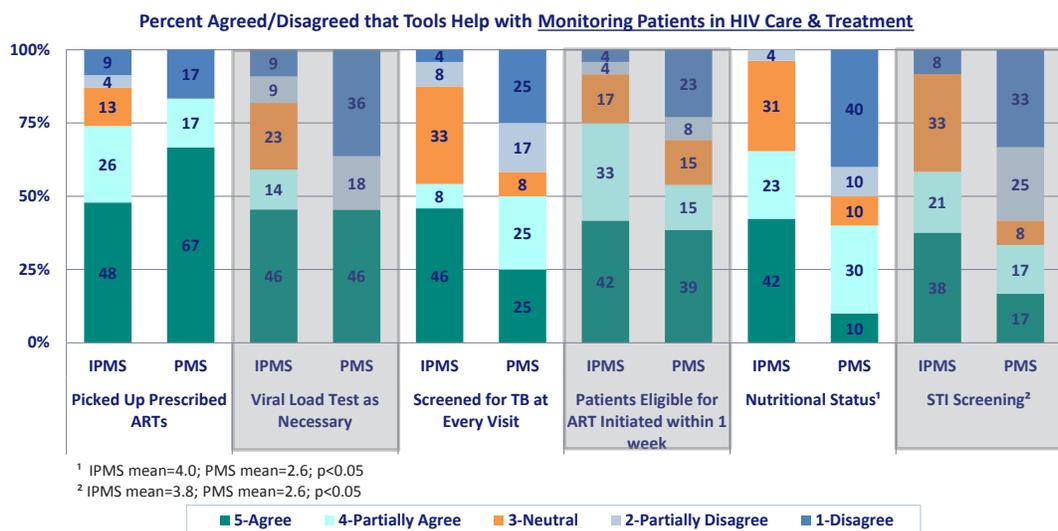
In several areas, a majority of IPMS tool users agreed that the new tools help with **monitoring patients in HIV care and treatment**, although their responses did not differ significantly from those of PMS users (see Graph 23a).

Graph 23a—Monitoring Patients in HIV Care and Treatment by Tool Version



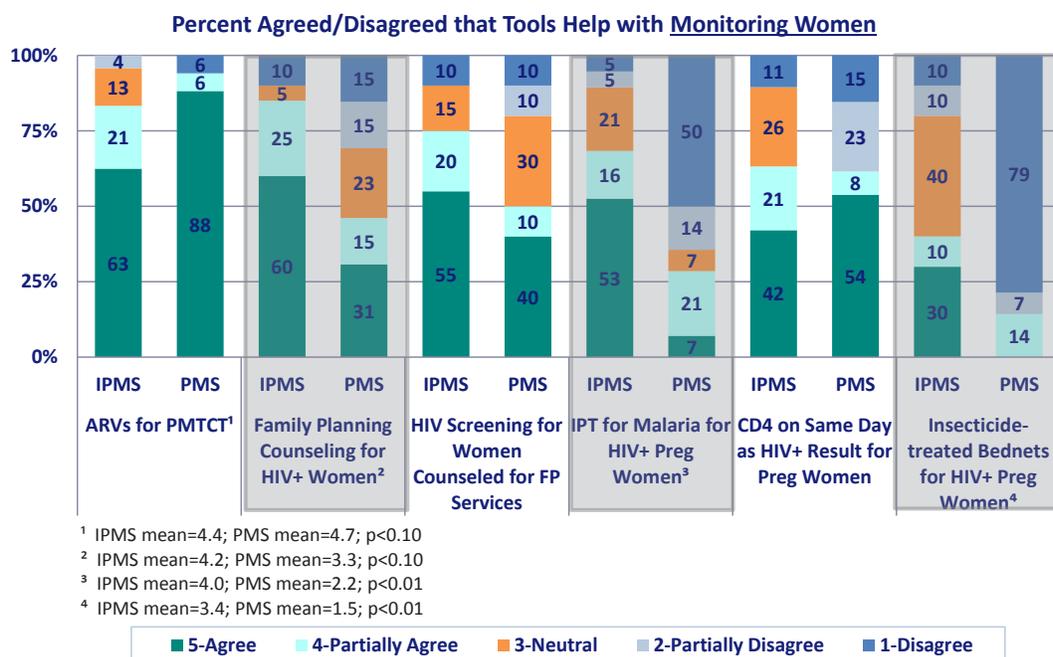
However, fewer than half of IPMS users found improvement in certain aspects of monitoring HIV care and treatment patients (see Graph 23b). Nonetheless, even in these cases, IPMS users' responses were more favorable than the responses of PMS tool users. For example, IPMS tool users were more likely to report that the tools helped them monitor nutritional status and STI screening among HIV-positive patients ( $p < 0.05$ ).

Graph 23b—Monitoring Patients in HIV Care and Treatment by Tool Version



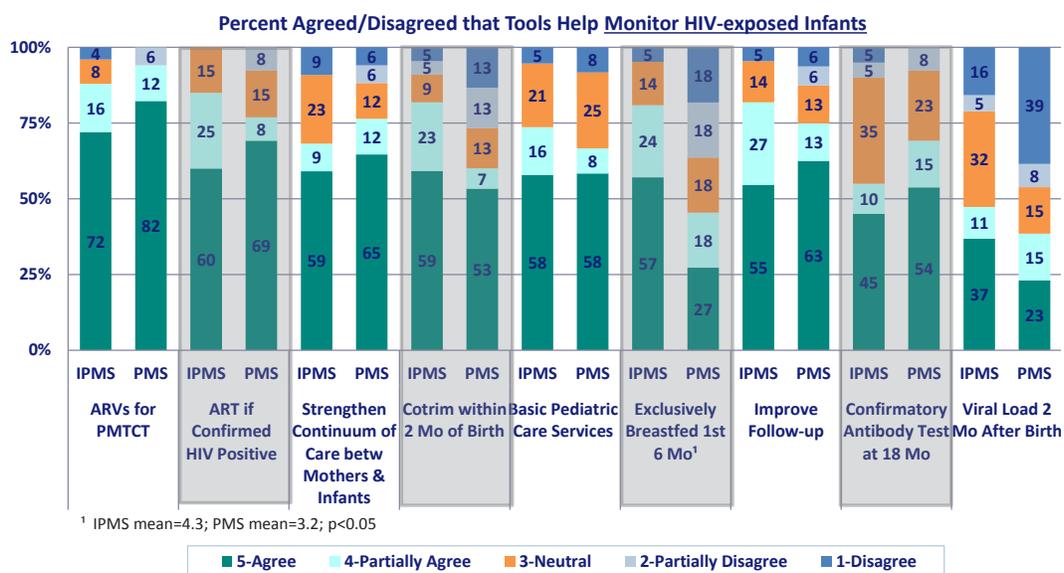
A few results favoring the IPMS tools over the old PMS tools were seen in **monitoring HIV-positive women** (see Graph 24). Of the two groups, IPMS users were more likely to report that the tools help monitor whether HIV-positive women of reproductive age receive family planning counseling ( $p < 0.10$ ). In addition, IPMS users were more likely to report that the tools help monitor whether HIV-positive pregnant women receive intermittent preventive treatment for malaria, and whether these women are using insecticide-treated bed nets ( $p < 0.01$ ). However, IPMS tools were seen as less helpful than PMS tools for monitoring HIV-positive pregnant women who were receiving antiretrovirals for PMTCT.

Graph 24—Monitoring Women by Tool Version



In general, most IPMS tool users thought the IPMS tools help **monitor HIV-exposed infants** (Graph 25). Users found that the IPMS tools significantly outperformed the old tools in monitoring whether HIV-exposed infants are exclusively breastfed for the first six months of life ( $p<0.05$ ). On the other hand, fewer than half of IPMS users agreed that the tools help monitor whether HIV-exposed infants receive a confirmatory antibody test at eighteen months (45%) or a viral load test two months after birth (37%).

Graph 25—Monitoring HIV-exposed Infants by Tool Version



## Background Information

Ten key informant interviews were conducted for the qualitative section with a subset of the IPMS tool users: six primary users (five service providers and one facility-level data manager) and four secondary users (two at the district and two at the national level; national-level participants included one official in HIV programming and one in HMIS). The narrative that follows describes the responses obtained from primary and secondary users.

## Research Question 1—Service Integration

### Primary Users

Facility-level informants agreed that the IPMS tools play a role in service integration. They described integration of different sets of services: TB care and HIV services; gynecology and pediatrics; lab and ANC services; and PMTCT and general medicine. It should be noted that in many cases, it was unclear whether they were saying that the IPMS facilitated the integration of these services or if they were listing examples of integrated services independent of the tools. One provider reported that the integration of ANC and lab saves women multiple trips to the facility. Facility-level informants also expressed the view that the tools facilitate integration of services across levels:

*“The tools help everyone participate, at their respective levels, to care for patients.”*

*“These tools play a role in facilitating the integration of services, for example: the transfer of a patient monitored for TB care to HIV care services. I see more integration of services at the level of care and treatment, because since the integration, all TB patients are tested for HIV, the same goes for PMTCT.”*

Informants also discussed factors aside from the tools that influence service integration, including how services are organized with a facility, how well-defined staff roles are, whether or not inter-service meetings and other types of review meetings are happening, and whether or not providers are being trained to provide integrated services.

### Secondary Users

Both national-level informants replied “yes” to the question, “Do you think the IPMS tools play a role in facilitating service integration?” and specifically gave the example of PMTCT. They found that the IPMS tools were good at capturing information from various adult services, but weak at capturing data on services provided to children at different service delivery points (e.g., pediatrics, immunization, and PMTCT) in a coordinated way that would improve long-term monitoring of children. They also expressed concern over high rates of missing reports, which they attributed to insufficient staffing for data management including the preparation of reports. National-level informants mentioned several factors that also contribute to service integration, including staff training and sensitization, supervision of providers, and technical and material support from partners.

At the district level, both informants replied “yes” to the question, “Do you think IPMS tools play a role in facilitating service integration?” One informant said,

*“The new tools integrate several spheres of activities (HIV, TB, etc.), so staff know that HIV activities are part of the minimum package of the activities from now on. We note a greater integration between ANC services and Maternity, and [between] Maternity services and curative consultation services.”*

However, the other district-level informant noted that the services were already integrated and the tools did not result in a significant change. These two informants mentioned coordination meetings and good cooperation among providers as important factors independent of the tools that contribute to integration.

## **Referrals**

### **Primary Users**

In response to the question, “Do the IPMS tools improve referrals?” five informants at the facility level replied “yes” and one declined to answer. They discussed referrals between services in the same facility, particularly between general medicine and gynecology and gynecology and pediatrics. They also mentioned that the tools improve referrals between facilities. An informant gave the example of how the tools are helping to monitor patients who are referred to other districts when their district is experiencing stock-outs of antiretrovirals (ARVs).

### **Secondary Users**

Both informants at the national level replied “yes” to the question, “Do the IPMS tools improve referrals?” However, they noted that the success of a referral system is also dependent on how the site is organized and is affected by patient mobility (i.e., when patients move from one facility to another without their patient records). They also mentioned that other “human factors” frequently create problems.

At the district level, one informant found that the IPMS tools improve referrals; the other did not. The first informant thought that the improved integration between services and the questions that are posed to patients in order to collect the information that is recorded in the IPMS tools, led to increased referrals.

*“The tools facilitate referral between services within the same health facility through the completeness of information contained in the patient record.”*

However, the second informant stated that referrals are facilitated by a system of referral and cross-referral sheets, implying that these are distinct from the IPMS.

## Research Question 2—Program Management

### Primary Users

Five out of six facility-level participants agreed that the IPMS tools improve program management. However, nearly all expressed the view that program management decisions are made at the central level, and thus the question was not relevant to their level.

*“We produce information and programs decisions are taken at central level.”*

### Secondary Users

All secondary users found that the IPMS tools improve program management. National-level informants said that programs direct actions based on indicators collected with the tools. They noted that the tools helped with monitoring the implementation of eMTCT<sup>4</sup> and with generation of national-level reports, including the report to the United Nations General Assembly Special Session, Cote d’Ivoire’s Rapport Annuel de la Situation Sanitaire (the National Health Annual Report), and the biannual Health Situation Assessment. District-level informants highlighted that information collected through the IPMS was being used to improve coordination among HIV, malaria, and TB services; tracking of HIV-positive pregnant women; tracking of the use of insecticide treated bed-nets by HIV-positive pregnant women; and decision-making on managing HIV-positive pregnant women.

## Research Question 3—Health Information System Performance

### Data Quality

#### Primary Users

At the facility level, all informants replied “yes” to the question, “Do the IPMS tools improve data quality?” They said that data from IPMS tools are comprehensive and readily available, improve cohort monitoring, and help address programmatic issues encountered in the treatment program.

#### Secondary Users

One national-level informant replied “yes” to the question, “Do the IPMS tools improve data quality?” This informant said that the introduction of data managers, the development of electronic platforms, i.e., the national electronic patient record system (SIGDEP) and the management information system for the electronic patient record system, known as MIS-DEP<sup>5</sup> and the completeness of reports compiled using IPMS tools have all enhanced data quality. The other national-level informant declined to answer either “yes” or “no,” stating that it was premature to make a comparison between the IPMS and old tools, and suggested making these types of comparisons at the time when a formal data quality audit is conducted.

<sup>4</sup> Ending Mother to Child Transmission of HIV (eMTCT), also known as the Global Plan Towards the Elimination of New HIV Infections Among Children by 2015 and Keeping Their Mothers Alive. See <http://www.unaidsrstea.org/region/regional-profile/ending-mother-child-transmission-hiv-emtct>

<sup>5</sup> French acronym for the system name, Information System for Electronic Patient Files.

## Data Use

### **Primary Users**

All informants at the facility level found that the IPMS tools have improved information use by enhancing the availability of comprehensive information about patients, such as data on nutrition and positive prevention, which had previously not been collected. “Data are always available,” one informant said.

### **Secondary Users**

All secondary users found that the IPMS tools improved information use. National-level informants reported that the IPMS has enhanced information use by enabling “the adoption of decisions in light of reality,” or in other words, evidence-based decision making. An informant from the district level said that since the tools have only been implemented for three months, certain data (i.e., nutrition) have not been collected long enough to be used. He also highlighted the need to update the electronic platforms to ensure that they are aligned with the IPMS tools.

Informants provided numerous other specific examples of how the data generated by the IPMS tools are being used at the facility, district, and national levels (see Box 5).

#### **Box 5. Uses of Data Generated by the IPMS Tools**

##### Facility level:

- Tracking loss-to-follow-up in patients
- Identifying patients who need to be transferred out to another clinic and monitoring transfer-ins
- Identifying patients who need to switch regimens
- Monitoring CD4 levels to determine if the patient is responding to the current regimen
- Monitoring the nutritional status of people living with HIV/AIDS
- Identifying active TB cases among HIV-positive patients
- Advocating to pregnant women to return to the facility for prenatal care during their pregnancy
- Identifying and tracking high-risk pregnancies
- Assessing anemia in pregnant women
- Tracking HIV-positive mothers who did not receive prophylaxis either for themselves or their children.

##### District level:

- Conducting facility visits every trimester to review patient monitoring data
- Ensuring an adequate supply of ART in facilities
- Providing recommendations for improving the quality of services.

##### National level:

- Quantifying ART and cotrimoxazole levels
- Monitoring performance in achieving targets and taking action if targets are not met
- Reviewing national protocols and adapting them based on what is happening on the ground
- Improving quality of care
- Conducting cohort studies
- Preparing the biannual Health Situation Assessment.

## Research Question 4—User Perceptions

### Data Collection—Benefits, Weaknesses, and Obstacles

#### **Primary Users**

Facility-level informants highlighted the comprehensive information collected for each patient by the tools, and the organization of this information in a single register, as the main benefits of the IPMS tools for data collection. They said that these features of the tools facilitate patient monitoring and referrals and save them time.

*“All of the information that we could get from a patient is already contained in one register. We therefore save time compared to the old tools.”*

Facility level-informants cited the bulkiness of some of the registers, the small print that is used in some of the registers, and the large number of data elements that need to be recorded, as the major weaknesses of the tools. They said that the small print makes it difficult for users to read what is written in the registers, while the large number of data element requires a lot of time to complete. They also noted design problems with the ANC and PMTCT registers, saying that the registers were “not user-friendly,” because they find it difficult to locate a patient’s information when they returned for a follow-up visit. Also, they said that the new PMTCT register contain fewer items compared to the old register, and is not aligned with the electronic reporting system. Additionally, they cited the lack of data elements capturing the psychosocial status of patients as an additional weakness of the tools.

Facility-based informants also mentioned the lack of confidentiality in the delivery room, which hinders sensitive conversations with HIV positive patients (and therefore also limits the recording of this information in the tools), the fact that the individual patient record does not include all types of adult care interventions, the lack of guidance on how to complete the tools comprehensively and correctly, insufficient provider training (especially midwives who are not formally included in the trainings on the tools but use the tools), and stock-outs of documents, as additional obstacles.

*“Too many items to inform and if there are many patients, it is difficult for the provider to complete all items. Obviously this poses no problem for one who has this as their main activity but this is not the case for the service provider.”*

#### **Secondary Users**

National-level informants discussed the advantages of the IPMS in terms of its usefulness in: tracking and monitoring patients from the point when the HIV status of the patient is known onwards into the management of their disease; aggregating data to generate indicators needed for national and international reporting; and improving patient monitoring. The weaknesses they mentioned included the large number of tools and providers’ lack of time to complete them, which result in incomplete record-keeping. National-level informants also cited challenges that they attributed to human factors, such as inadequate training, the need to develop an “information culture” among providers that values the collection and use of information, and staff mobility.

Key informants from the district level reported that the main benefits of the IPMS data collection tools were improved patient monitoring as a result of the availability of comprehensive information about patients. They echoed the concerns of other informants regarding the overly large size of the care register and the design of the ANC register, and cited incomplete record-keeping as the main obstacles to using the IPMS data. They attributed this to providers' workload and lack of time to enter all the required fields into the tools, as well as refusal of staff to complete the tools. A district-level informant said,

*“No obstacles except that certain categories of staff refuse to complete the collection tools.”*

## **Reporting—Benefits, Weaknesses, and Obstacles**

### **Primary Users**

Informants at the facility level said that the main benefit of the IPMS reporting tools is that they contain all the information needed for monthly reports, which facilitates the preparation of these reports. Weaknesses included stock-outs of tools, lack of coaching and training for tool users, and lack of time for staff to complete the tools. The main obstacle cited by facility-level informants was insufficient numbers of staff responsible for and able to complete tools.

*“The monthly report is now easy to develop unlike the old tools. For with the integrated tools, we find in a single register and more information for the preparation of reports. Before, I had to search for information for the monthly report in different data collection tools.”*

*“The problem raised at this level is the absence of a mentor who could help correctly complete the reporting tools but we are also very often facing stock-out of documents.”*

### **Secondary Users**

National-level informants said that the main benefit of using the IPMS reporting tools is that reports are more complete and information needs are being met. The main weaknesses were poor understanding of the indicators at the management level and the need for provider re-training, and a lack of information use at the district level. The main obstacles included the need for standard operational procedures that define the indicators, the fact that providers must complete the tools without the support of a mentor or supervisor, and compromised data quality resulting from providers' not understanding the importance of completing the tools properly.

*“The staff does not often perceive the relevance of completing tools resulting often in fanciful figures that do not always reflect reality.”*

District-level informants said that the main benefits of using the IPMS reporting tools consisted of easier generation of reports and the expanded quantity of patient information available. For weaknesses, they again mentioned the design of the ANC register. The greatest obstacle, they said, was providers' lack of time to complete the tools and, in some cases, refusal to do so.

## Ease of Tool Completion

### Primary Users

Four informants at the facility level replied “yes” to the question “Is it easy to complete the tools?” while two replied “no.” Some even noted a sense of “personal satisfaction” from completing the tools. Informants said that it was difficult to complete the tools at first, but became easier with experience. While discussing their confidence using the tools, several providers mentioned challenges they faced to completing them—such as the size of the tools which was also mentioned earlier as a drawback. The one data manager interviewed said that the only problem was with service providers not turning in reports in a timely manner.

*“Yes, I am confident I can complete the tools; because when the tools are properly completed, there is already a personal satisfaction and we are sure to have no problem in our report. I have no problem completing any tool. Everything hinges on the organization.”*

## Support for Tool Users

### Primary Users

Facility-level informants described the need for good coaching, regular supervision, continuing training, incentives, reduced workload, and staff motivation as measures that would help them in using the tools.

### Secondary Users

To help IPMS users be competent and comfortable using the IPMS, national-level informants recommended supportive supervision and supporting providers to do their own data analysis as two approaches that would support tool users. Suggestions from district-level informants included increasing the number of staff responsible for completing the tools as a way to distribute the workload more evenly among facility level staff; providing on-site coaching, supervision, and motivation of providers; integrating tool training into in-service training for providers; and teaching providers the significance of correctly completing the tools so that the practice becomes rooted in their work culture.

*“Increase the number of persons involved in the [completion and] management [of the tools] so the workload per person is reduced.”*

## Suggestions for Improving Tools

### Primary Users

Informants at the facility level recommended reducing the size of the tools, which they said creates storage problems. They also suggested integrating the care register and the patient record; adding items for psychosocial care in the patient record; redesigning the ANC register; reviewing the PMTCT register; training all service providers, including mid-wives, on the tools; and involving all programs in the future redesign of tools.

### Secondary Users

To improve the IPMS design and functionality, national-level informants discussed the need for increasing the involvement of providers, i.e., “collect their opinions and interact with them.”

A district-level informant noted the presence of several NGO reports at the sites and the need to standardize these reports to avoid extra work for providers, and called for dissemination of the electronic system (SIGDEP) to all sites to standardize the software used across facilities.

## ***Environmental Factors***

### **Primary Users**

Half of the key informants at the facility level replied “no” to the question “Is your working environment conducive to using the IPMS tools?” and half replied “yes.” Describing ways in which their work environments were not conducive to using the tools, participants mentioned the absence of archive rooms and closets for storage (resulting in a lack of confidentiality of sensitive patient information), inadequate computer equipment, stock-outs of paper tools, and stock-outs of ART.

## ***Improvements in Data Collection and Reporting***

### **Primary Users**

At the facility level, all informants replied “yes” to the question “Do you think the IPMS tools have improved the collection and reporting of data?” except for one, who declined to answer. Informants said that the tools enable production of aggregated data to monitor outcomes, improve patient monitoring and follow-up, contain new indicators on nutrition and positive prevention, facilitate monthly reporting, and facilitate daily tallying of service statistics (as opposed to having to wait until the end of the month as was the case with the old reporting forms). However, one participant stated that it was not possible to make conclusive statements until a formal evaluation of the tools has been done.

### **Secondary Users**

All secondary users felt that the IPMS tools improved data collection and reporting. Informants from the national level reported that the IPMS tools have improved data collection by streamlining data management, as evidenced by the integration of HIV reporting into the HMIS report, and through the user-friendliness of the tools. They also noted that the introduction of staff dedicated to data collection (i.e., the data managers) has also played a role. At the district level, key informants also agreed that the tools improve data collection and reporting, but one of the informants cautioned that enough time had not passed to be able to assess whether there have been real improvements that can be attributed to the tools.

## **Research Question 5—Patient Monitoring**

### ***Patient Monitoring and Case Management***

#### **Primary Users**

Facility-level informants all replied “yes” to the question “Do you think the IPMS tools help service providers improve the monitoring and management of patient care?” They cited as examples improvements in: screening for other diseases such as TB; management of treatment initiation; quality of care; and identification of patients lost to follow-up. Facility-based informants said the tools are useful in that they group all the services that are provided to patients together, making all information available to providers and giving them a holistic view of care. Providers said:

*“Information about the patient is quickly available with these tools and everything is so clear in our minds about this patient and this helps things move fast.”*

### **Secondary Users**

All secondary users also felt that the IPMS tools helped service providers improve patient monitoring and management. National-level key informants reported that the IPMS tools allowed providers to analyze data and make their own decisions based on data, and helped to reduce the number of patients lost to follow-up. At the national level, they said that the data help them ensure that providers at the service delivery level are adhering to national policies and protocols. They gave as an example the fact that the tools had revealed that a lower than expected percentage of HIV positive pregnant women were receiving ART, which prompted them to take action to increase providers' awareness of this shortfall and emphasize the national protocols for dealing with HIV-positive pregnant women.

We used a mixed method design for the case study to collect richer, more in-depth and more sensitive information than we could have collected using any single method alone. The quantitative component of the case study allowed for the identification of patterns in responses, as well as differences in the types of responses given by primary and secondary tool users. The qualitative component enabled a more nuanced examination of users' views on the research questions. In the analysis, when we looked at either the quantitative or qualitative results in isolation, we got incomplete and sometimes incongruous responses to the research questions that we had set out to answer. However, when we deepened the analysis by comparing and contrasting the quantitative findings with the qualitative findings, it added depth and multidimensionality to the analysis, and we were able to identify complexities, subtleties, and trends that we had not previously noted.

## Discussion by Research Question

The discussion addresses the major quantitative findings, and then summarizes general observations derived from a synthesis of both the qualitative and quantitative analyses.

### **Research Question 1—Does the IPMS improve integration of services by facilitating coordination, linkages, and referrals?**

*We do not have substantial evidence to show that IPMS tool users believe that the tools significantly improve service integration.* Both IPMS and PMS users had similar perceptions about the ability of their respective tools to improve communication of patient information and referrals. However, in terms of improving coordination of patient care, IPMS users had a more positive view than PMS users, especially with respect to coordination of care between HIV care and treatment services and ANC/PMTCT services.

In general, both IPMS and PMS users had a positive impression of the tools' ability to improve service integration with the exception of the integration of pharmacy services with other clinical services for which IPMS users rated their tools significantly worse than old PMS users in improving the integration. The exact reason for this finding is unclear, and warrants further investigation; but in general, systems for patient monitoring and pharmacy and drug supply management are kept separate and often operate in parallel even though they may be collecting the same or related data. Interlinking these systems allows for the cross-checking of information between the two systems, which can substantially help improve data quality. Creating a linkage between these two systems, or creating a process in which data from the two systems are triangulated on a routine basis, might be considered for a future revision of the IPMS.

### **Research Question 2—Does the IPMS improve program management by making available better metrics that can be used for evidence-based decision making?**

*We do not have substantial evidence to show that IPMS users believe that the tools significantly improve program management.* Overall, the quantitative findings showed that IPMS tool users viewed their tools slightly less favorably than users of the old PMS tools in terms of the ability of the tools' to support program management, particularly at the national and district levels.

The analysis by type of IPMS user showed that secondary users, who work at the national and district levels, viewed the tools more favorably than primary users on almost all aspects

of program management that were addressed in the questionnaire. A consideration, discussed further in the next section, is the finding that many of the facility-level users did not perceive program management as being within their scope of work, and therefore did not feel that they had any influence over, or even views to express, about program management. National-level IPMS users specifically highlighted the role of the tools in improving program management in two particular areas: 1) generating indicators for national and international reporting requirements and 2) simplifying the use of data at the facility level to make decisions about patient management.

### ***Research Question 3—Does the IPMS contribute to improved health information system performance by generating high-quality data that can be collected, analyzed, and transformed into information for decision making?***

*We do not have substantial evidence to show that IPMS users believe that the tools significantly improve health information system performance.* There were no significant differences between IPMS and PMS users, although PMS users were somewhat more likely to view their tools more favorably. Study participants reported mixed impressions about the contribution of the IPMS tools to improving data management processes, data quality, and data demand and use. The analysis by type of IPMS user showed that secondary users were more likely than primary users to express positive views about the role of the IPMS in improving data management, data quality, and demand for data.

Study participants' views about the quality of data obtained through the IPMS tools were particularly variable. Most respondents agreed that the tools increase the availability of high-quality data needed for program management, patient monitoring, and service integration. A majority of respondents reported that the tools generated precise data; however, they also expressed concerns about the accuracy, completeness, and timeliness of the data. Both primary and secondary users believed strongly that factors external to the data collection tools, some of which are human factors, play a significant role in compromising the quality of the data.

### ***Research Question 4—What are system users' perceptions of the benefits and challenges of using the IPMS?***

*In general, IPMS users viewed the tools positively when weighing the benefits and challenges of using the tools.* Significantly more IPMS users indicated having guidelines for the tools compared to PMS users. However, IPMS users expressed concern that the current guidelines fall short in several important aspects, such as explaining how to address late, incomplete, inaccurate, and missing reports, and explaining the reporting requirements adequately (i.e., explaining what is supposed to be reported, to whom the reports should be submitted, and when the reports are due). This finding shows that further work may need to be done on the IPMS guidelines to fully address all of the user concerns and questions about proper use of the tools.

Both IPMS and PMS users reported that the patient monitoring data collection tools were not very user-friendly. Although a significantly higher proportion of IPMS users compared to PMS users said that the reporting tools were user-friendly, their perception of the reporting tools was only slightly better than that of the data collection tools. This finding is most likely related to the efforts that have been made by the MoH and DIPE to streamline the reporting system under the IPMS. Users of both types of tools agreed that the time it takes to complete the tools is disruptive to their other duties and responsibilities, and that the training they received did not adequately explain how to use the tools.

Primary IPMS users strongly valued the tools' comprehensiveness, which they said helps them take a holistic view of each patient's health status and needs. They appreciated that the tools help

them compile a single monthly report, rather than having to complete several separate reports at the end of each month. However, they also said that the tools contain too many data elements, that they do not have sufficient time to complete the forms thoroughly, and that this is one of the contributing factors to poor data quality. Paradoxically, however, they also stated that they wanted the tools to collect additional data elements including psychosocial status of patients.

There was a consensus among IPMS users (both primary and secondary) and PMS tool users that organizational factors pose significant barriers to optimal use of the tools and data generated by the tools (see “Tool use and data-gathering” in the general discussion).

### ***Research Question 5—Does the IPMS improve patient monitoring by making information available to help clinicians make better patient management decisions?***

*We have evidence to show that IPMS users believe that the tools improve patient monitoring, particularly the monitoring of specific health services and health outcomes.* In fact, it was for this research question where we observed the highest number of significant differences between how the IPMS and old PMS users perceived the tools.

Specifically, significantly more IPMS users than PMS users agreed that the tools were helpful in monitoring:

- The nutritional status of HIV-positive patients
- Whether HIV-positive patients are screened for STIs
- Whether HIV-positive pregnant women receive intermittent preventive treatment (IPT) for malaria
- Whether HIV-positive pregnant women are using insecticide-treated bed-nets
- Whether HIV-positive women of reproductive age receive family planning counseling (i.e., prevention positive)
- Whether HIV-exposed infants are exclusively breastfed for the first six months of life.

In four areas, a majority of IPMS and PMS users were either neutral or disagreed that the tools were helpful for monitoring patients. These areas are in monitoring if:

- Patients referred to other services actually receive the services
- Eligible patients are initiated on ART within one week
- HIV patients are screened for TB at every visit
- HIV-exposed infants receive a viral load test two months after birth.

A significantly greater proportion of PMS users, compared to IPMS users, perceived their tools to be helpful for monitoring whether HIV-positive pregnant women receive ARVs for PMTCT. This may be related to the information from the KIIs that some of the interviewees believed that the new PMTCT registers were less comprehensive than the old registers because they collected fewer data elements.

In the KIIs, primary IPMS users said that the IPMS tools were useful for patient monitoring and case management and helped them provide patients with a continuum of care. Secondary users believed that service providers who were using the tools in facilities used the IPMS data to manage patients, and that the data were also helpful to district and national level staff for assessing whether or not service providers were adhering to clinical protocols.

It is noteworthy that the six areas where we observed a significant difference between IPMS and PMS tools are related to the provision of a continuum of care to HIV-positive patients with a wide spectrum of HIV and non-HIV services, as opposed to the provision of only HIV-related services. In fact, for several of the HIV-related services (e.g., CD4 monitoring, assessing ART

adherence at each visit, monitoring whether patients undergo WHO clinical staging), we did not observe a significant difference between the two sets of tools. This could be because the old PMS tools were already effective at monitoring HIV-related services provided to HIV-positive patients—which is what they were designed to do. The added value of the IPMS tools is that they are designed to monitor the complete package of interventions recommended for people with HIV, thereby ensuring a continuum of care, which includes care that should be provided even before HIV-positive patients are put on treatment (e.g., adherence support and nutrition assessment and support), services that HIV-positive patients should be provided while on treatment (e.g., the management of common infections, comorbidities, and toxicities), and routine health services that should be provided to all patients regardless of their sero-status.

## General Observations

### *Factors that Support Service Integration*

Both primary and secondary IPMS users discussed and described several factors, separate from the tools, which influence service integration. These included the organization of services within a facility; training and support of service providers to provide integrated services; the clarity of staff roles and responsibilities; the existence of a collegial and collaborative attitude among different stakeholders in the facility; and the regular occurrence of data review meetings and inter-service meetings that encourage service providers from different service delivery points to talk to each other and share information. Tool users believed that there are several organizational and management-related functions that need to be addressed within a facility, and that should happen at the same time that new service delivery protocols or information systems are introduced, in order for services to be successfully integrated.

### *Differences Between Primary and Secondary IPMS Users*

When IPMS users were stratified by user type, analysis showed a greater propensity for primary users to choose a neutral response to questions on the survey compared to secondary users. We believe this is related to the short time-frame that primary users had to experience using the tools. At the time of the study, they were still learning to use the IPMS tools and getting accustomed to changes in the tools and in processes from the old system to the new system. It is important to keep in mind that the IPMS tools were piloted for only three months; thus, tool users had a relatively short time-frame to become familiar with the tools. The IPMS is a complex system consisting of multiple tools that are used at multiple service points. Achieving proficiency with the tools and understanding how they work together as a system requires training, practice and time. Three months may not have been a sufficient time period for IPMS users to feel confident about their capabilities to effectively use the tools. This in turn may have influenced them to feel reluctant about drawing conclusions about the tools or attributing improvements in performance to the tools, leading them to select neutral responses to many of the questions.

By contrast, the PMS tools have been in use since 2009. Because of their longer history with the tools, PMS users may have felt more confident about their ability to evaluate the tools, and were therefore less likely to select Neutral responses. The short amount of time that IPMS users were exposed to the tools may also explain some of the seemingly conflicting views that users expressed about the tools.

Secondary users, who are primarily MOH staff based at the district health office or the national program office, were more likely to express stronger views about the ability of the tools to bring about performance improvements. The finding is unexpected because compared to

primary users, secondary users interact less closely with the tools, since they do not complete the tools themselves, and do not experience the challenges of filling in the large quantities of data required, but mainly review reports submitted to them by primary users. This absence of direct experience with the tools may have influenced the propensity to express more positive views. Alternatively, it could also be that the IPMS tools confer a clear advantage over the PMS tools in various respects, including data aggregation and reporting, and that this advantage is easier to perceive at the secondary rather than the primary level.

Secondary users were also more likely to mention that they value the IPMS tools for their role in facilitating reporting. They believe that another major benefit of the tools is that they help collect information that is needed at each level of the health care system and make data readily available for the various types of decisions that need to be made at the national, district, and facility levels.

### ***Perceived Strengths of the IPMS Tools***

Generally speaking, the IPMS tools collect a greater depth of information by collecting more data elements than the old PMS tools. A desk review of the individual tools that comprise the IPMS and PMS systems revealed more variables on nutrition, ITP, and exclusive breastfeeding in the IPMS tool set. For example, for nutrition, the IPMS tools not only record whether or not a patient's nutritional status was assessed during the visit, but also the results of the assessment and the type of nutrition care that is provided. Since more data are being collected, service providers have a greater amount of information to make more informed patient management decisions.

In facilities that have multiple service delivery points, some of the same services may be offered through multiple points and likewise, the same health outcomes may be assessed at several service points and tracked in multiple data collection tools. The IPMS harmonized these indicators and health outcomes and the codes that are used to record information across different data collection tools. The standardization of indicators and data coding conventions helps ensure consistency in how information is recorded and helps improve data quality.

Respondents to the in-depth interviews partially attributed the ability of the IPMS tools to improve patient monitoring to the way information is recorded and organized within the tools. Health care workers said that the IPMS tools help them organize key features of the patient's medical history in one place (or just a few places) rather than having the information captured in multiple files and registers that are scattered across different service points in the facility. Thus, when a patient returns for a follow-up visit, the provider is able to quickly and easily access the patient's longitudinal medical history; this in turn enables the provider to make well-informed decisions about the patient's immediate medical needs, and enhances the provider's ability to provide appropriate follow-up care to the patient in the future. In summary, the information gleaned from the KIIs corroborated the notion that the IPMS tools help clinicians make better patient management decisions by making patient information more readily available. The longitudinal design of the tools also makes it a relatively easy process to extract information from one source (or a couple of sources), instead of multiple sources, when compiling the monthly reports.

### ***Perceived Weaknesses of the IPMS Tools***

According to the in-depth interviews, primary users found some of the IPMS registers to be excessively bulky and cumbersome, and the font size too small to be legible. These factors likely contributed to IPMS users' reports that the tools were not user-friendly. Interestingly, the comprehensiveness of the tools, which was noted as one of its strengths, was also seen as a

weakness. Primary users felt that the tools contain too many data elements. They reported that in a busy facility, they do not have time to complete all the data elements required in the IPMS, saying that this leads them to fill out the information incompletely, which negatively affects data quality. Yet users also said that there are several important data elements that the tools are currently not collecting, such as information on partner testing, additional PMTCT data elements, and information on a patient's psychosocial health status—implying that they would like the tools to collect additional information. On the whole, secondary users agreed with primary users on the weaknesses of the tools but also mentioned the lack of clarity about indicator definitions, and a specific design weakness of the ANC register as additional weaknesses.

### **Obstacles to Using the IPMS Tools**

In the quantitative survey, both IPMS and PMS users reported that the data culture in their organizations was weak. Findings from the KIIs echoed this perception, indicating that both primary and secondary IPMS users perceived the lack of a data culture as an obstacle that limited them from optimally using the IPMS and its data.

Primary users discussed several other obstacles that they believe impede them from fully using and benefitting from the IPMS tools:

- **Staffing:** Primary users felt that insufficient staff are given the responsibility to record and report data in most facilities, which creates an imbalanced workload for the few staff who are assigned the responsibility.
- **Training:** Facility-level users felt that the training, mentoring, and coaching on data management offered to service providers was not sufficient.
- **Confidentiality:** Since some of the IPMS tools contain confidential patient information, primary users believed that it was important to have a private space to collect this information from patients, and a secure place to store the tools when they are not being used. They felt that in certain situations, for example in the delivery room, it was often difficult to maintain confidentiality while discussing and collecting sensitive information from patients.
- **Supplies:** Providers mentioned stock-out of tools as a recurrent barrier to use.

Secondary users also listed several obstacles that they believe impede the optimal use of the IPMS tools:

- **Staffing:** Secondary users agreed with primary users that the number of facility staff assigned data management responsibilities was usually insufficient given the volume of work that is required.
- **Clarification of terms:** Secondary users echoed the concern of primary users that several indicators generated through the IPMS needed to be more clearly defined and operationalized in official guidelines.
- **Additional data elements:** Secondary users believed that adding data elements to collect information on partner testing and a patients' psychosocial health status would improve the tools.
- **Standardized procedures:** Secondary users felt that the guidelines need to include standard operating procedures for data management that articulate reporting requirements, an explanation of the reporting process, and staff responsibilities for data management.
- **Organization-wide support of a data-friendly environment:** Secondary users said that because there is no culture of information that values data at the facility level, staff do not understand the importance of the data they collect and do not see data reporting as their primary responsibility, which sometimes even leads them to refuse to complete the tools.

## Study Limitations

The case study was set up with two types of tool users: a group of users from IPMS sites, where the new tools were field tested, and a group of users from comparison sites that had continued using the old PMS tools at the time of the study. The study was designed in this way to try to identify changes or improvements in performance that could potentially be linked to the IPMS tools. However, there were several weaknesses in this design that affect the interpretation of the study results.

### *Limited Time Frame*

As discussed earlier, the three-month time frame for the pilot test of the IPMS tools may not have been sufficient for tool users to feel prepared to evaluate the tools. They may not have felt that they had mastered the tools within the short timeframe and likewise, may not have been ready to publicly voice opinions about the system. As mentioned above, this may explain why a large numbers of primary users tended to select a neutral response in the quantitative section of the study.

The IPMS is a complex system that requires an adequate amount of time for users to understand how to properly complete the tools and use the information collected to make decisions. It takes even longer for users to understand how the various tools interact together to form a system and influence service integration, program management, health system performance, and patient monitoring. Our findings seem to show that primary users, given their limited exposure to the tools, may not have had enough time to appreciate the benefits of the tools on performance improvement. This does not mean that the benefits do not exist, but that it was too early in the process, at the time the case study was done, to expect the users to be aware of these benefits.

### *Small Sample Size*

The IPMS tools were piloted in only eight facilities. This limited the sample size for the study to a total of 78 questionnaire respondents. The small sample size does not allow the findings to be generalizable.

In addition, even though we attempted to gather the perspectives of both primary and secondary tool users from all levels of the system (facility, district and national), the number of respondents from the national and district levels was small and may have been too small to adequately represent the views of users at these levels.

### *Data Collection Method*

Questionnaire respondents from the district and national levels were called to attend a workshop in Abidjan, where they were administered the questionnaire under the instruction and supervision of the study administrators. However, for facility level respondents, who comprise the majority of respondents, the questionnaire was self-administered with limited support from the District Health Officers who attended the national workshop and were trained to provide guidance to facility level respondents. This data collection approach was chosen primarily to reduce costs, since self-administered questionnaires are less expensive than questionnaires administered by hired enumerators. Although the data collection methodology reduced the study costs, it was at the expense of ensuring a more controlled study environment, which could have had repercussions on the quality of data that was collected.

The findings from the case study revealed several improvements that can be made to the design of the IPMS tools and to the data management system as a whole:

- **Streamline the tools.** Tool users voiced their perception that the IPMS tools are cumbersome and bulky because they attempt to collect too much information. The next time the tools are reviewed and there is an opportunity for revision, it is recommended that the MoH engage tool users, as well as other stakeholders, to closely examine the data elements that are being collected and critically assess how much of that information is actually being used. Using this type of participatory, evidence-based approach, the MoH can decide which data elements are being used and therefore should be retained, and which are being collected but not used. If it is found that data are being collected but not used, the question should be raised as to why they are not being used and if it is because the information is not useful. If so, it should not be collected. Data that are deemed useful but do not need to be collected and reported through the routine information system should also be dropped and collected through special studies or other non-routine means.

This review process can also be used to assess and address problems with the user-friendliness of the tools. This case study has already identified several areas where improvements can be made, such as using a bigger font size for some registers, improving the design of the ANC register so that service providers can easily find patients in the register when they return for a follow-up visit, and improving the clarity and comprehensiveness of the tool guidelines.

- **Involve tool users, especially primary users, in future review and redesign of the tools.** How users perceive a system, especially at the beginning when a new system is first launched, is an important determinant of the success or failure of the system. Therefore, in this case, it was very important to have a good understanding of how users perceived the system during the pilot phase, and to use that information to make revisions before the system was finalized and rolled out. The case study demonstrated clearly that primary and secondary users of the IPMS engage with the tools in different ways, and had distinct views about the tools. This underscores the importance of assessing the perspectives of all types of users. Since primary users are the direct users of the tools, it is especially important that their views be heard and factored into future plans.
- **To develop a sustainable system, develop a culture of information use.** To a large extent, service providers (i.e., doctors, midwives, counselors) are the primary users of facility-based tools such as the IPMS. Although there is a tendency among service providers to view patient care as their primary responsibility, they are also responsible for collecting patient information in these tools and for compiling and submitting monthly or quarterly reports by aggregating the data collected in these tools. Since the importance of data management is usually not the focus of their professional training, they often do not perceive data collection as a valuable activity and do not appreciate how data can enhance their own decision-making abilities, tending instead to view data management as an added responsibility imposed by those above them in the health system. There is a strong need to shift this mind-set and cultivate a stronger culture of information that cultivates the idea that data are a resource and a powerful decision making and management tool, at all levels of the health system but especially at the service delivery level, where that information can be used to provide better care to patients.

- **Take into account all three determinants of HIS performance when introducing a new system.** As described earlier, the PRISM framework categorizes the determinants of HIS performance into three broad categories: technical, organizational, and behavioral factors. According to the framework, to bring about positive changes in HIS performance, all three types of determinants need to be considered and addressed when designing and implementing HIS strengthening activities. The same framework can be used to study the performance of a patient monitoring system, such as the IPMS. From the PRISM perspective, the technical soundness and merit of the tools is not enough to ensure that the tools succeed in improving performance. It is equally important to address organizational and behavioral factors, such as the steady supply of tools, adequate training and mentoring to staff using the tools, designation of clear staff roles and responsibilities relative to the tools, and management of staff workload, to name a few. This framework is especially helpful when a new system is being introduced because it can help in the design of a complete set of interventions that will support the new system from all three angles to increase its likelihood of success.
- **Improve linkages between patient monitoring systems and systems for pharmacy and drug management.** At the time this report was written, the patient monitoring system was not linked with the pharmacy and drug management system, and IPMS users cited this disconnection as a weakness in the tools' contribution to service integration. Creating a linkage between these two systems, or creating a process in which data from the two systems are triangulated on a routine basis, could lead to substantial improvements in data quality and should be considered when the next version of the systems are developed.
- **Repeat the case study when IPMS users have gained familiarity with the tools.** A major limitation of this study was that the pilot period for the IPMS tools was too short to enable tool users to understand the tools and make confident and informed judgments about them. It would be informative to conduct the case study again once IPMS users have had at least a year of experience using the tools, at which time they would presumably feel more confident about assessing them.

In this mixed method case study, we used quantitative and qualitative methods to examine how primary and secondary users of the IPMS tools perceive the tools, with regard to the ability of this updated system to improve service integration, program management, health system performance, and patient monitoring. The case study compared the perception of IPMS users with those of PMS users. The research had two goals. The first was to collect information that would help the Cote d'Ivoire's MoH and DIPE improve the IPMS system and help plan the national scale-up of the system. Second, we wanted to contribute to the global evidence base for strengthening integration activities and document this experience, which we hope will be useful to other countries that are in the process of integrating components of their health system including the health information system.

As a whole, the case study revealed that tool users viewed the IPMS tools in a favorable light, which is a good indicator for the long-term viability of the system. We also identified some areas of significant improvement between the IPMS and old PMS tools, particularly the ability of the IPMS tools to improve patient monitoring with respect to the provision of specific services, including those that contribute to service integration. IPMS users expressed positive views about the comprehensiveness of the tools, and about the ease of compiling reports using the IPMS system. However, on the whole, we did not find that users made a remarkable distinction between the performance of the IPMS and that of the old PMS tools.

Deeper analysis of the data revealed that the majority of tool users felt that organizational support for data collection was weak, and that IPMS users perceived a need for much greater clarity about how to use the tools and about staff roles and responsibilities in terms of data collection and management. The analysis also revealed that IPMS users, particularly primary users, thought that it was too soon for them to form judgments about whether the tools have made substantive improvements in the study's four focal areas, mainly because they had just recently started using the tools and had not fully become proficient with them. Therefore, we recommend repeating the quantitative component of the study when users have been using the tools for at least a year to more effectively evaluate the effect of the tools on performance improvement.

The information that we gathered in this case study highlighted the fact that the IPMS is a complex system. Successful roll-out requires investments not only in the technical soundness of the tools, but also in addressing organizational and behavioral factors that create an enabling environment for data collection, management and data use. This will allow IPMS users to feel supported and confident as they use both the tools and the information that they generate.

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