Addressing Data Systems Fragmentation in Mixed Public-Private Health Systems

Exploring a Case Study from Liberia

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This brief describes the challenge of data systems fragmentation in mixed public-private health systems – or contexts with a robust private sector – for the global health community. We illustrate this challenge and its implications through a case study of family planning data in Liberia, offering recommendations and considerations for the country and the global community about how to support a more cohesive, harmonized data landscape that supports data-driven decision-making.

Background

Essential health data is scattered across diverse sources, systems, sectors, and entities. This data fragmentation clouds our understanding of the health market landscape and the scale of challenges and potential solutions to address the most critical health priorities. As a result, policy effectiveness and program efficiency are compromised, leading to misaligned policies, inefficient resource allocation, and suboptimal health market performance.

Data is the cornerstone of actionable **market intelligence**, empowering actors to glean insights about the health market and guide interventions. As part of its overall objective to strengthen health markets, the United States Agency for International Development (USAID)-supported Frontier Health Markets (FHM) Engage project seeks to tackle market intelligence challenges that hinder data-driven decision-making for family planning and other priority health areas globally, including in Liberia.

Like many countries, Liberia faces barriers to understanding the family planning market, including difficulties accessing, organizing, harmonizing, and analyzing high-quality market data. These challenges are exacerbated by Liberia's diverse yet siloed private sector, which provides approximately 40 percent of the country's healthcare and was the source for family planning methods used by 37 percent of women in 2020.[1] This fragmented private sector results in a comparably fragmented data landscape,

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[1] Liberia Institute of Statistics and Geo-Information Services (LISGIS), Ministry of Health [Liberia], and ICF. 2021. *Liberia Demographic and Health Survey 2019-20. Monrovia,* Liberia and Rockville, Maryland, USA: Liberia Institute of Statistics and Geo-Information Services (LISGIS), Ministry of Health, and ICF.

complicating the coordination of family planning efforts across sectors and impairing decision-making related to resource allocation, investment coordination, contraceptive supply planning, and designing effective supply- and demand-side interventions, and more.

This brief explores the critical market intelligence challenge of fragmented data systems, using Liberia as a case study. It describes the various data systems containing family planning data across public and private sectors, highlighting their fragmentation and the resulting implications for expanding access to family planning. The brief also identifies strategic investment areas for reducing data silos and fostering a more cohesive data landscape across sectors. By improving the data landscape, decisions can be more evidence-based and grounded in facts rather than conjecture, ensuring a sounder approach to health and family planning. This will set the stage for more effective policies, programs, and market interventions. The brief concludes with suggested actions for Liberia and the global community to achieve these goals.
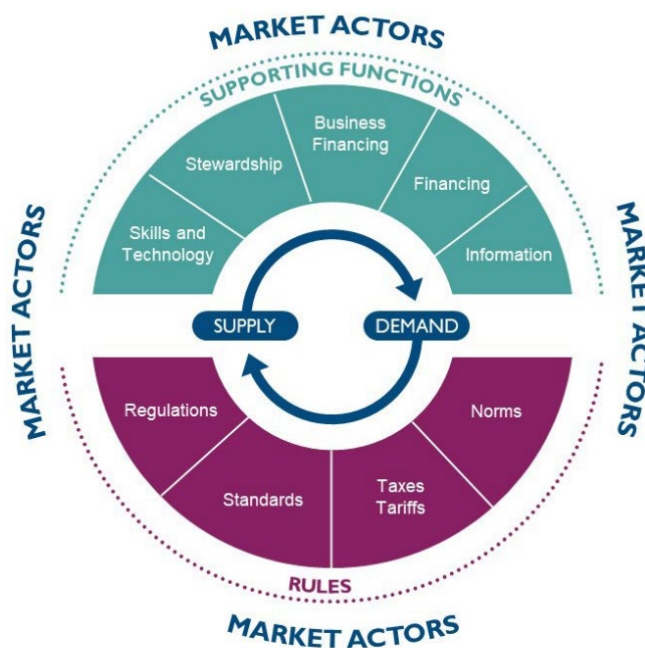
What is Market Intelligence?

Figure 1 illustrates a health market system, placing the essential supply and demand functions at its core. These functions represent the interactions between care providers and care seekers. Market intelligence serves as a supporting function within this system, aiding and influencing the dynamics of supply and demand for health services, products, and information.

Market intelligence refers to **data that has been organized, standardized, and analyzed for a specific purpose related to the health market**. It is a collection of information that actors can use to understand the market landscape for particular products or services, generate insights on market dynamics, and inform actions that effectively shape and guide the market.

Because market intelligence terms are often used interchangeably despite having different meanings, Box 1 offers definitions for the purpose of this brief. Each definition builds on the previous, illustrating the process by which data can be transformed into market intelligence.

FIGURE 1. MARKET SYSTEMS FRAMEWORK

> **Box 1. Market Intelligence Terms**[2]
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> **Market data:** A collection of observations or facts related to the supply and demand of healthcare products, services, and information. Market data can be qualitative or quantitative, structured or unstructured, fragmented or harmonized. Examples related to family planning include product price, volume, sales, and market share.
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> **Market information:** Quantitative or qualitative market data that is processed, organized, and/or structured to be in a format in which it can be analyzed.
>
> **Market insights:** Quantitative or qualitative market data that is analyzed or synthesized to generate a deeper understanding of market dynamics.
>
> **Market intelligence:** The interpretation of market insights to inform actions, recommendations, or decisions related to the market.

Generating market intelligence typically requires deep contextual knowledge, a clear grasp of the relevant market question(s) of interest, and specialized data-related skills, such as data organization and analysis. Digital tools and technologies often play a crucial role in structuring, harmonizing, visualizing, and analyzing data. Because market data often "sits" with different actors across public and private health sectors, governance frameworks, and structures; trust between these actors are essential for facilitating data sharing and access. Without the necessary skills, tools, and a supportive environment, the following market intelligence challenges can arise:

- **Data systems fragmentation**: Data is often scattered across diverse systems, sectors, and/or entities, often in different formats, leading to significant challenges in its integration and use.

- **Little to no data sharing**: There is often minimal data exchange between market actors, contributing to entrenched data silos. In many contexts, the expectation for private sector entities to report into public sector systems is often a one-way transaction that is costly and burdensome.

- **Insufficient data analysis capacity**: The development of robust, cross-sector market intelligence is hindered by a lack of sufficient data analysis skills and tools. This makes it challenging to interpret the data and extract meaningful insights.

- **Limited or fragmented data governance frameworks and processes**: Often data governance frameworks and processes are limited or fragmented, which leaves data susceptible to misuse and/or creates uncertainty about who has access, ownership, and responsibility for data quality and security.

- **Suboptimal collaboration and trust**: Often, relationships and collaboration among market actors are insufficient, which impacts the availability of market data and willingness to share it.

A Closer Look at Data Systems Fragmentation

The challenges outlined above are complex, deeply interconnected, and impair the ability to leverage market data for effective decision-making. This brief, however, primarily focuses on the issue of data systems fragmentation – a challenge that is especially pronounced in environments with a vibrant private sector, where fragmentation can significantly hinder market efficiency and public health impact.

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[2] Naraghi, Safa, Tanvi Pandit-Rajani, and Kristen Devlin. 2023. *Market Intelligence: FHM Engage Strategy Meeting.*

Data systems fragmentation typically arises from uncoordinated investments in several aspects: data collection methods, the specific type of data collected, data sources, and the variety of technologies used for collection, management, and analysis. When these investments do not align with national digital health strategic plans, they often lead to the proliferation of siloed data systems. These fragmented systems complicate and hinder effective and efficient data analysis and use. Consider a scenario where a new, community-based family planning program employs a mobile data collection technology to support community health workers in reporting service delivery data. If this tool collects different indicators in different formats than those used by the national health management information system, local stakeholders must separately access and manually combine family planning data from the community and facility levels each month.

USAID's Vision for Action in Digital Health describes several key challenges stemming from uncoordinated data systems, as well as strategies to foster a more coordinated approach to digital health – a direction many countries have started embarking on, summarized in Box 2.

While aligning publicly managed health management information systems is a priority area of investment for national governments and donors, data fragmentation also affects private sector entities – including commercial, nonprofit, and faith-based actors. These actors play a crucial role in delivering family planning information, products, and services to various population segments. However, accessing and effectively utilizing this data to generate cross-sector insights about the family planning market remains challenging. This difficulty largely stems from the private health sector's diversity and inherent fragmentation. Moreover, the types of data collected in the private sector often differ (e.g., sales data versus import data), private sector data is often proprietary, and it can be subject to varying data protection measures, complicating the collection, alignment, and harmonization of data across sectors.

Box 2. USAID's Digital Health Vision:
Challenges and Solutions for Better Health Outcomes[3]

Key Challenges of Uncoordinated Data Systems
→ Clients experience uncoordinated care because their health data is scattered across multiple systems.
→ Health workers face redundancies in data collection tasks.
→ System managers are burdened with maintaining duplicative systems.
→ Data privacy risks arise due to disorganized systems.
→ Resources are used inefficiently.
→ Decision-making is hindered, affecting the delivery of coordinated care and health outcomes.

Strategies to Foster Coordination and Efficiency
→ Strengthen leadership and governance capacity to ensure effective management.
→ Develop unified national digital health strategies for cohesive planning.
→ Create a common, interoperable digital health architecture to guide investments.
→ Leverage global digital goods, which are adaptable, open-source technologies and knowledge products.

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[3] USAID. 2019. *A Vision for Action in Digital Health 2020-2024.* USAID, Washington, DC:
https://www.usaid.gov/sites/default/files/2022-05/USAID-A-Digital-Health-Vision-for-Action-v10.28_FINAL_508.pdf

A critical remaining question is how to strategically include the private sector in efforts to streamline family planning data and its utilization.

Liberia Case Study

Purpose

In 2023, FHM Engage initiated an activity in Liberia aimed at understanding how to enhance family planning data availability, access, harmonization, and utilization across public and private sectors, through the lens of the challenge of data systems fragmentation.

Approach

FHM Engage's approach to understanding and addressing data systems fragmentation involved:

- **Review of existing resources**: Analyzed relevant policies, key documents, and data systems related to family planning market data, which provided a comprehensive description of the family planning market landscape.

- **Stakeholder consultations**: Conducted consultations with 24 stakeholders including Ministry of Health representatives, county health teams, donors, family planning project implementers, and private health sector entities. Several overarching questions guided these discussions, articulated as headings in the following section.

- **Insights from ongoing FHM Engage activities**: Included key insights from the project's data systems capacity strengthening initiatives and a data solution co-creation workshop that identified strategies to improve cross-sector data collection, quality, and utilization.

The activity that informed this brief focused on specific types of family planning market data, such as supply-side data (e.g., importation, procurement, distribution, stock management, sales, service delivery) and demand-side data (e.g., preference, choice, behaviors) in both the public and private sectors.

Findings

What family planning data is collected?

In Liberia, family planning data is collected in a range of systems, some electronic and others in simpler formats, such as Excel. Diverse actors across the public and private sectors manage these at different levels of the health system. Table 1 outlines these systems, their owners, and the types of family planning data that each system collects. Six of these systems are distinct electronic platforms, while the last two encompass a variety of systems used by the commercial sector and non-government organizations (NGOs) (the scope of the activity did not include exploring those individual systems).

TABLE 1. FAMILY PLANNING DATA COLLECTED BY SYSTEM AND OWNER

System	Owner	Type of Family Planning Market Data Collected	Data Source
The country's primary health management information system (HMIS), which uses District Health Information Software 2 (DHIS2)	Ministry of Health	→ Service delivery data → **Examples**: number of Sayana Press injections administered; number of clients counseled for family planning	Public Private (select facilities)
Electronic community-based information system (eCBIS)	Ministry of Health	→ **Service delivery data,** primarily from the country's community health program. Some of this data is also entered into the DHIS2. → **Examples:** number of Sayana Press injections administered by a CHA; number of clients currently using modern family planning methods	Public Private (select facilities)
Electronic logistics management information system (eLMIS)	Ministry of Health	→ **Supply chain management data,** primarily at the subnational level → **Service delivery data,** which is also entered into the DHIS2 → **Examples:** number of implants available at the county depot; number of oral contraceptive pills received by county; number of condoms donated by x NGO partner to x county	Public Private (select facilities)
mSupply	Central medicine stores/supply chain partners	→ **Supply chain management data** related to contraceptives (and other commodities) upon arrival into the country and their distribution to counties → **Example:** number of (publicly procured) condoms received, by brand and manufacturer; number of male condoms distributed to health facilities	Public (Note that some publicly procured family planning products are distributed by select private facilities)
Excel database	Liberia Medicines and Health Products Regulatory Authority	→ **Import data** for social marketing and commercial sector family planning products	Private

System	Owner	Type of Family Planning Market Data Collected	Data Source
		→ **Example:** number of condoms received, by brand, importer, and manufacturer; commodities by production and expiration dates	
DHIS2 instance (owned and managed by a socially marketing organization)	Social marketing organization	→ **Point-of-sale data** from partner private sector facilities and pharmacies → **Social marketing programmatic data** → **Import and procurement data** (likely but unconfirmed) → **Examples**: number of socially marketed oral contraceptive pills distributed to partner facilities; number of socially marketed oral contraceptives sold; price per pill pack	Private
Various commercial sector data collection systems (e.g., QuickBooks, Excel, paper-based)	Commercial sector: wholesalers, distributors, private facilities, pharmacies, and medicine stores	→ Varied, but can include import data, distribution data, point-of-sale data (e.g., volume, price)	Private (commercial)
Various NGO-specific data collections systems (e.g., DHIS2)	NGO sector	→ Varied supply and demand-side data collected for a number of purposes (e.g., advocacy, research, project-specific monitoring, donor reporting)	Public and private

In which ways is family planning data fragmented? What are the resulting challenges?

The family planning data landscape is characterized in the following ways:

Fragmentation across public sector information systems hampers resource planning. The DHIS2, eLMIS, eCBIS, and mSupply contain family planning data from the public sector, as well as certain private facilities linked with the public health system. These systems were developed at different times for different purposes by various partners, resulting in a lack of a unified framework for data sharing and integration. Moreover, users across the public, NGO, and social marketing sectors have varying levels of access to these systems, complicating the ability to simultaneously view and synthesize data from multiple sources.

For example, supply chain managers use mSupply to track the national distribution of commodities and the eLMIS to manage subnational supply chain data. The lack of communication between mSupply and eLMIS makes it difficult for these managers to comprehensively track contraceptive products and other supplies. Another challenge supply managers face is that certain indicators, including for family planning, are reported into multiple systems (e.g., eLMIS and DHIS2), but updates in one system are not automatically synchronized with others, leading to data inconsistencies and quality issues.

These problems result in inefficiencies for supply chain managers, such as delayed responses to inventory needs, difficulties in predicting and responding to demand fluctuations, and overstock or stockout situations. These inefficiencies hinder the ability to ensure timely and equitable distribution of contraceptives. Further, this fragmented view of family planning data complicates the efforts of the Ministry of Health's Family Health Division and its partners to effectively allocate resources and implement its family planning initiatives. Enhancing the interoperability of these systems could significantly boost supply chain managers' efficiency. However, achieving this requires a coordinated effort and significant investment from donors and the government to support the necessary technological and governance frameworks.

Limited data sharing results in data silos across sectors and levels of the health system. While certain private health facilities report family planning data into public sector health management information systems, a significant amount of data from private sector providers, such as pharmacies and commercial distributors, remains siloed. This leads to limited family planning insights from these sectors, which comprise an estimated 40 percent of the overall family planning market.[4]

Furthermore, NGOs that provide family planning services collect extensive data on contraceptive supply- and demand-side interventions for donor and project reporting. This information often remains within individual organizations, not fully leveraged in strategic planning efforts to enhance family planning delivery across health systems.

National-level platforms exist for stakeholders to share activity updates, disseminate learnings, and coordinate with each other. However, stakeholders expressed that these engagements rarely include private/commercial sector entities. Thus, systematic processes, incentives, and governance frameworks for structured data exchange are limited. Additionally, stakeholders reported that family planning information-sharing across partners and sectors is particularly insufficient at the subnational level, complicating efforts to plan, coordinate, and measure the impact of activities.

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[4] Devlin, Kristen; Tanvi Pandit-Rajani, and Luke Krangar. 2023. *Liberia Family Planning Market Description (full).*
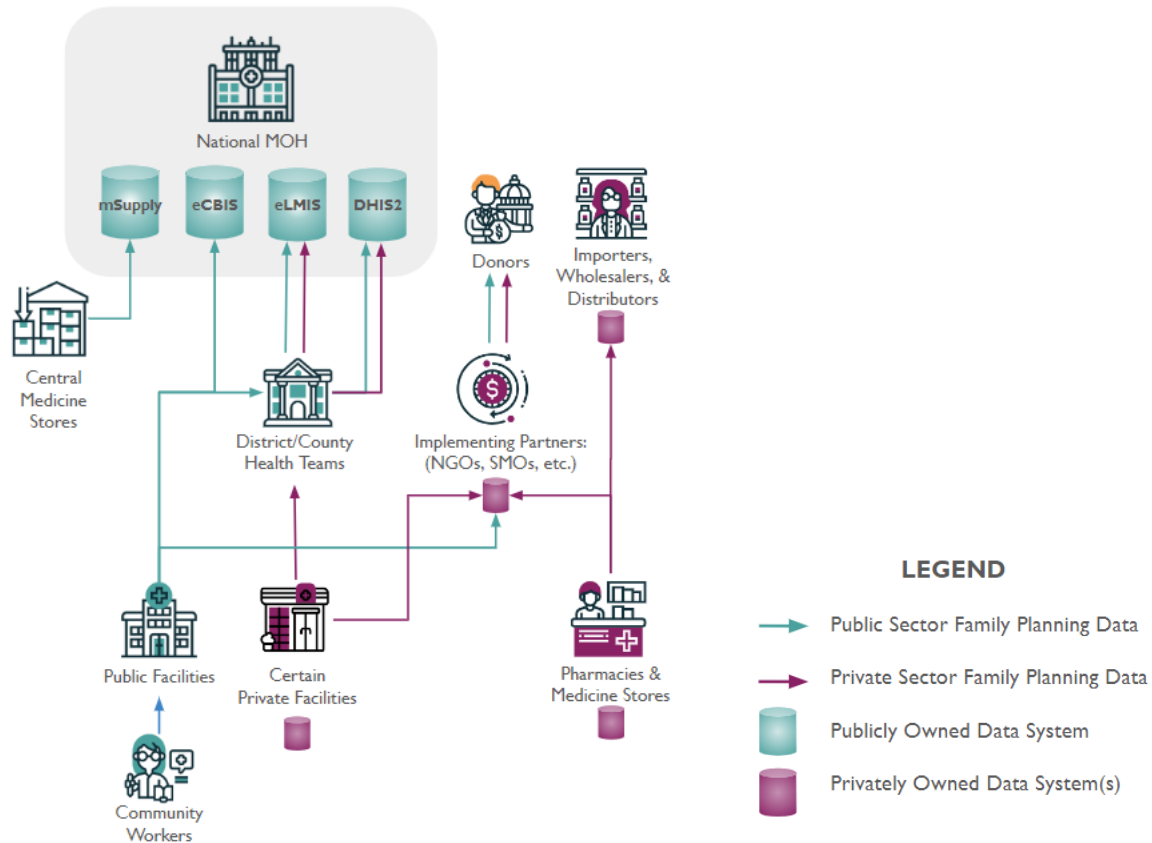
Diversity in indicators and data formats across systems inhibits data use. Family planning data is captured for different purposes, by diverse organizations and in various formats. For example, the Ministry of Health and certain NGOs use sophisticated, structured electronic data collection tools and databases, such as DHIS2 instances, whereas other entities rely on simpler tools such as Excel spreadsheets and paper-based systems. Improving data sharing among stakeholders requires overcoming the technical and logistical challenges associated with integrating these diverse systems and datasets. Only then can a comprehensive view of the family planning market be achieved to generate actionable insights to inform strategy and program planning.

Consider an example where a pharmacy uses a simple Excel document to track the volumes of condoms sold by brand by the box, while the Ministry of Health employs the DHIS2 to capture the total volumes of individual condom pieces distributed by public and certain private facilities participating in the national family planning program. Gaining a better understanding of the overall condom market would require standardizing how indicators are captured and correcting any quality issues across both systems. Additionally, these datasets may sit in different locations, exist in different formats, and may be updated at different cadences (e.g., monthly, quarterly). Addressing these issues is essential to effectively transform this data into actionable market intelligence.

A FAMILY PLANNING SIGN IS ON DISPLAY IN SONIWEIN CLINIC IN MONROVIA, LIBERIA. PHOTO CREDIT: DONYA RAHIMI, FHM ENGAGE

Figure 2 illustrates a simplified version of Liberia's complex family planning data landscape. It summarizes the flow of family planning data from the point of collection.

FIGURE 2. PUBLIC AND PRIVATE FAMILY PLANNING DATA REMAIN MOSTLY SILOED

LEGEND

→ Public Sector Family Planning Data

→ Private Sector Family Planning Data

⬤ Publicly Owned Data System

⬤ Privately Owned Data System(s)

What are strategic investment areas for addressing data systems fragmentation? What are recommended actions?

The following section outlines strategies to address the complexities of fragmented data systems in Liberia and improve family planning coverage, organized under two "strategic areas." These areas aim to direct funding decisions toward creating a more aligned and efficient digital health ecosystem that includes both public and private health sectors. Recommended actions for each strategy are also detailed. Although these recommendations are specific to Liberia, many may be applicable in other contexts with mixed health systems.

STRATEGIC AREA 1: LEVERAGE FIT-FOR-PURPOSE DIGITAL HEALTH SOLUTIONS

Technological solutions offer significant potential to reduce data silos and foster an aligned digital health ecosystem. Addressing fragmentation in family planning data systems involves:

1. Resolving technological incompatibility by identifying and implementing digital health solutions that can facilitate comprehensive data analysis.

2. Standardizing data practices to ensure consistency in family planning indicators, data structures, and formats are used across systems, to allow for effective data harmonization.

3. Improving data quality by mitigating issues, such as duplicate data, allowing for consistent, reliable, and timely understanding of the progress toward family planning and related health objectives.

We suggest two strategies that Liberia – and other countries – might explore to meet this challenge.

STRATEGY 1.1: MOVE TOWARD SYSTEMS INTEROPERABILITY

Understanding the historical context is essential to appreciate how Liberia has approached data systems interoperability. Systems fragmentation became especially evident during the 2014 Ebola outbreak, when the country struggled to access the "right information at the right time" to rapidly and effectively respond to the emergency.[5] By 2016, the Ministry of Health developed a roadmap to achieve greater systems **interoperability**[6] across public sector information systems to begin to address fragmentation. This roadmap, akin to frameworks that many countries have developed over the past decade, guides a complex and collaborative process whereby stakeholders align on and adopt national **health information standards** for digital health systems, tools, and technologies. This facilitates interoperability for a more harmonized digital health landscape, involving realignment or overhaul of existing systems to conform to these standards. Liberia's roadmap articulates the priority to define and apply consistent health information standards, outlines the components of an interoperable health information ecosystem, and elaborates steps to guide the country over the subsequent six years. The Ministry of Health also developed a detailed national health information system (HIS) and information and communications technology strategic plan, which complements and reinforces the roadmap.[7]

However, as of 2022, the country has faced challenges in meeting its interoperability roadmap milestones. These challenges include coordination difficulties across health sector stakeholders and financial constraints, such as minimal government investment in HIS, misaligned funding commitments between Ministry of Health priorities and donors/implementing partners, and procedural delays in funding allocation. These delays resulted from the way funds are often channeled through various Ministry of Health programs before reaching the Ministry of Health's HIS Unit, which led the interoperability initiative. As a result, digital technologies continue to be developed without adherence to a common standard, further compounding data silos.

The current landscape presents a prime opportunity to revisit and revitalize discussions and action on interoperability strategies among the government, partners, and donors. Leveraging prior investments, such as the digital health frameworks, and drawing on recent successes from other countries can enhance efforts toward creating more interoperable digital ecosystems. Addressing overall health sector interoperability is crucial not only for broader system efficiency but also for improving individual health areas, such as family planning.

Recommendations for Enabling Greater Systems Interoperability

→ **Direct investments toward strengthening and harmonizing digital health infrastructure.** Donors might consider allocating dedicated funding for the foundational aspects of HIS can enhance the systematic collection, management, and utilization of family planning and other health data. Specifically, it is recommended that donors **earmark funds to update and initiate the implementation of Liberia's interoperability agenda**, a crucial first step toward creating a more integrated data ecosystem and reducing data silos.

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[5] Luke L. Bawo and Patrick Konwloh, Gaspar Mbita, and Antoine Legrand. 2022. *Data integration and interoperability - beyond the technical; Experience from Liberia Ministry of Health.* Presentation at the 2022 DHIS2 Symposium in Washington, DC.

[6] Ministry of Health, Republic of Liberia. 2016. *Liberia Standards based Health Information Exchange (HIE) Roadmap.*

[7] Ministry of Health, Republic of Liberia. 2016. *Liberian Health Information System & ICT Strategic Plan 2016-2021.* Monrovia: Republic of Liberia. https://drive.google.com/file/d/1tyt3SbXv1vczxsQjHPLsj_04r1bl2UjZ/view

→ **Foster collaborative, long-term planning, and resourcing for Liberia's interoperability roadmap.** The journey toward greater systems interoperability requires a commitment to collaborative long-term planning and resource allocation among all stakeholders, including the Ministry of Health, donors, implementing partners, and the private sector. A unified approach to updating and implementing the roadmap, ideally led by the Ministry of Health's HIS Unit, and working groups as appropriate, ensures the necessary time and resources are dedicated to successfully integrating health information systems and avoiding the fragmentation and funding challenges that previously impeded progress.

→ **Include private sector actors in interoperability planning.** The Ministry of Health should consider involving private health sector stakeholders – such as private hospitals, pharmacy networks, and social marketing organizations – in interoperability planning and discussions. Understand and address their specific motivations to foster buy-in and alignment with national health information standards. Facilitate targeted consultations to highlight the business benefits and operational value of standardization, ensuring robust support across all health sectors.

→ **Revitalize and fund the Integration and Interoperability Technical Working Group.** Several years ago, this group served as a vital platform for exchanging technical expertise on resolving data systems fragmentation. The group could focus on overseeing updates and the implementation of the interoperability agenda, providing targeted technical capacity strengthening in areas such as data governance and leadership, and leveraging global insights and best practices for addressing data systems fragmentation to accelerate Liberia's progress toward interoperability, streamline efforts, and prevent common pitfalls. Including stakeholders from the Ministry of Health, donors, implementing partners, and the private health sector in this group with diverse expertise – such as data specialists, programmatic experts, and technology professionals – ensures a wide range of perspectives and skills, facilitating innovative solutions and robust problem-solving strategies.

STRATEGY 1.2: EXPLORE COMPLEMENTARY DIGITAL HEALTH SOLUTIONS TO INCORPORATE PRIVATE SECTOR DATA SYSTEMS

Achieving greater systems interoperability must also address the complexity of meaningfully incorporating the private sector into these efforts, given their crucial role in Liberia's family planning and broader health landscape. While some private health facilities report their family planning data into public health information systems, a considerable amount of family planning data is held by pharmacies, commercial wholesalers, distributors, NGOs, and other private entities. These groups may be hesitant to share their data, including concerns about how their data is managed and used (see more in Box 3 on page 13). Even if they are willing to share certain data under the right conditions, aligning their systems with national health information standards would likely require significant time and resource investments.

Therefore, exploring context-appropriate digital health solutions that can more easily facilitate the integration of private sector data can significantly reduce fragmentation and support cross-sector analysis. For instance, **integrated data warehousing** harmonizes data from disparate systems irrespective of format into a central location. This enables a unified view of the data and the ability to perform advanced analytics.[8] Such solutions are particularly beneficial in mixed public-private health systems as they do not typically require data owners, such as social marketing organizations or pharmacies, to align their systems entirely with predefined health information standards. This approach reduces technological barriers to data sharing while still allowing entities to align with public health

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[8] More information on this technology solution can be found [here](#) and [here](#).

sector standards if they choose. Liberia's Ministry of Health recognizes the important role that integrated data warehousing can play in enhancing data analytics and has advocated for its development as part of its broader interoperability agenda.

When selecting digital health solutions to address systems fragmentation, it is important to consider specific challenges and needs of various market actors. Questions like "What challenges or knowledge gaps need to be addressed, and by whom?" and "What data and analyses are required to inform key decisions?" can guide selection of contextually appropriate technologies and frameworks.

STRATEGIC AREA 2: STRENGTHENING THE ENABLING ENVIRONMENT TO ENCOURAGE DATA SHARING, THEREBY REDUCING DATA SILOS

The second strategic area concentrates on enhancing the enabling environment to create conditions favorable for data sharing among market actors, especially given the sensitive nature of data (see Box 3). Strategies to achieve this include building trust, investing in robust data governance, and exploring incentives. These approaches can complement and amplify the effectiveness of technological solutions designed to address data systems fragmentation.

Box 3. Reflecting on the Sensitive Nature of Data

It is important to acknowledge that data provides a crucial insight into an organization's performance, whether public or private. Private sector data often includes proprietary information critical to business operations, and sensitive client information which must be safeguarded. Thus, requests for private sector data sharing can sometimes be met with skepticism or distrust. This is especially true when balancing the commercial entity's need to protect business interests and patient confidentiality against the public sector's mandate for transparency and accountability. (This is not to suggest that public health sector data is neither sensitive nor protected, but rather that expectations and standards for this may be different across entities.)

Recommendation: Explore technological solutions that facilitate the integration of private sector data into strategic market analyses

One effective approach that the Ministry of Health and partners might explore is integrated data warehousing, which harmonizes diverse data sources into a central system without necessitating modifications to the source systems. This solution, and/or other appropriate technologies, should be customized to meet the specific requirements of private sector entities (e.g., for data collection, access, management, and utilization), ensuring they align with operational protocols. Furthermore, these solutions should leverage global goods where possible, as they often offer proven, scalable, and easily customizable tools that can respond to data use needs while reducing costs and deployment times. Implementing these solutions should align with the country's interoperability agenda, integrating seamlessly into existing data frameworks without creating new data silos.

STRATEGY 2.I CULTIVATE TRUST AMONG MARKET ACTORS

Trust is the cornerstone of effective data sharing across market actors and is foundational to broader efforts to strengthen private sector engagement (PSE). In Liberia, entities like the PSE Unit within the Ministry of Health and the Healthcare Federation of Liberia (HFL) are instrumental in improving coordination across sectors. Activities that uphold principles of respect, mutual understanding, and transparency, as articulated in the country's PSE strategy, are crucial for collaboration, joint problem-solving, and even sharing data to guide collective action.

Recommendations for Cultivating Trust

→ **Organize cross-sector co-creation workshops and other forums** that bring together data providers and data users to build relationships and discuss common goals related to cross-sector data and decision-making related to family planning and other topics. The Ministry of Health PSE Unit, HFL, FHM Engage, and other private sector champions may be well-placed to convene and facilitate these engagements.

→ **Create or enhance an existing knowledge platform to enhance cross-sector family planning information sharing and collaboration**. Platforms such as the Maternal and Neonatal Death Surveillance and Response Technical Working Group foster a shared vision across stakeholders and build collective value. This alignment guides all actors toward achieving priority health outcomes (e.g., for family planning) and strengthens trusting relationships. The Ministry of Health Family Health Unit might consider strategies to actively engage private sector actors and representative groups, such as the HFL, given their important contributions to the family planning market landscape.

→ **Consider appointing a skilled, neutral facilitator to oversee the cross-sector information-sharing platform**, ensuring balanced power dynamics and equitable contributions from both public and private sectors. This neutrality helps to promote a balanced approach that values input from both sectors, adding to a collaborative and trusting environment. If the platform's scope includes data sharing and decision-making, the facilitator with fluency in data, expertise in navigating complex data landscapes, and fostering effective data-driven dialogue can support interpretation and insights. Furthermore, the facilitator may help to identify methods and technologies that ensure the privacy, security, and proper use of shared data. Such a role is crucial for maintaining trust, especially given the sensitive nature of health data.

STRATEGY 2.2: STRENGTHEN DATA GOVERNANCE

Effective data governance is crucial for ensuring the quality, integrity, security, and usability of data and a foundational practice for building trust and enabling data sharing. It involves establishing clear policies and procedures that govern how data is collected, organized, stored, accessed, and more. This includes everything from designing national data security guidelines to developing standardized data architecture that the Ministry of Health and partners must follow. Additionally, data governance can encompass smaller-scale data sharing agreements between individual entities that specify the nature of the data shared, the purpose, the duration, and other conditions under which it is shared. These agreements help create a structured, predictable environment for sharing data, reducing risk, and aligning stakeholder understanding around sensitive information.

Recommendations for Strengthening Data Governance

→ **Strengthen national data governance protocols.** The HIS Unit is well-placed to spearhead the enhancement of national data governance by developing and overseeing the implementation of comprehensive data security standards and protocols. Integrating data governance measures within broader interoperability efforts can strengthen the drive towards greater standardization and consistency across data systems. Additionally, considering the substantial involvement of the private sector in healthcare delivery, it is crucial to include private sector actors in this process. Their involvement will help ensure that the data governance frameworks adequately reflect private as well as public sector interests, leading to a more inclusive and effective data governance system.

→ **Enhance memoranda of understanding (MOU) templates with data management provisions.** Existing MOUs between the Ministry of Health and private health facilities establish a framework where certain private entities distribute government-supplied family planning products at no charge. By updating these MOUs to explicitly cover data management practices, such as data usage, storage, and privacy safeguards, the Ministry of Health can clarify how data from private health facilities is handled and utilized. This specificity reinforces trust and fosters deeper collaboration between private facilities and the Ministry of Health, ensuring data is managed responsibly and transparently.

→ **Enhance the capacity of the Ministry of Health and/or other local entities in data governance and leadership.** Civil society partners, NGOs, and data firms are well-positioned to strengthen essential data skills within Liberia's healthcare sector, crucial for the effective development and oversight of data governance initiatives. Focus areas could include developing skills that support the creation of robust multi-stakeholder governance frameworks, enhancing regulatory structures for data security, and facilitating technical working groups responsible for prioritizing and managing systems interoperability. Additionally, expanding data literacy among a broader range of stakeholders could enhance informed decision-making, increase transparency, and improve collaboration and intervention effectiveness across sectors. Capacity strengthening efforts should adhere to a structured process that includes identifying key priorities, enhancing relevant skills, and consistently measuring progress to ensure effective implementation and improvement.

→ **NGOs, private sector entities, and other market actors should consider creating data sharing agreements (DSAs)** to clearly define the purpose and parameters of data exchange. These agreements typically include critical elements such as the responsibilities of each party, privacy standards, incentives, usage limitations, and management of intellectual property rights. Establishing a well-defined DSA helps provide a structured framework that reinforces trust and cooperation among all partners involved. Incorporating provisions for data aggregation and anonymity within DSAs can also encourage private sector participation, as these measures help protect sensitive information while enabling broader data reporting and analysis.

STRATEGY 2.3: EXPLORE INCENTIVES

Incentives serve to motivate stakeholders to share their data. Effective incentive structures align the goals of data sharing (e.g., developing insights about a market challenge) with the organizational objectives of each stakeholder (e.g., profit, service performance, better market intelligence), thus making the process mutually beneficial. They can include financial remuneration, in-kind compensation, and improved access to market data for better data use. For example, an initiative in Southeast Asia has successfully implemented tailored financial and non-financial incentives to encourage pharmacies and

private facilities to participate in malaria reporting within the national HMIS.[9] In order for incentives to be successful, they must be thoughtfully integrated within the broader framework of data governance and trust-building measures, ensuring that they encourage participation and reinforce the security and value of the shared data.

Recommendations for Implementing Incentives

→ **Identify *individual* private sector actor motivations and sensitivities around data sharing.** Stakeholders seeking data from private entities (e.g., NGOs) should consider initiating conversations to uncover the specific types of data they are comfortable sharing and what, if any, data sharing conditions (e.g., financial incentives) they might be amenable to. Acknowledge that while many organizations may be reluctant to share extensive, sensitive, or proprietary data, they might be willing to provide aggregated or less sensitive data. Therefore, requesting only the data essential for addressing specific questions or challenges can be helpful. During these dialogues, actively listen to the concerns, motivations, and preferences of private sector actors to foster a constructive exchange. Clearly articulate the objectives of data requests and invite these organizations, suggest formalizing the partnership in a DSA, and invite them to participate in the data use process. This transparency not only clarifies the purpose and mutual benefits of data sharing but also builds trust and shared value.

→ **Leverage incentive-based strategies that motivate private health facilities to report data into government systems.** Implementing partners with expertise in PSE and data are encouraged to explore and adapt successful incentive models that encourage private facilities to share service delivery data to the Ministry of Health.

Conclusion and Global Considerations

Liberia's experience has illustrated how siloed, technologically incompatible data systems result in isolated snapshots of family planning information rather than a holistic picture. This challenge complicates efforts to synthesize relevant data across market actors and derive insights to guide the family planning market. A significant blind spot in the family planning landscape is a lack of contributions from the commercial sector, in part because commercial actors currently have little incentive to engage with the public sector and share business data related to family planning products.

Fortunately, several opportunities exist to address the fragmentation challenge. First, previous steps towards a national interoperability framework provide a foundation to build upon in future years. Another promising element is that the Ministry of Health has a dedicated HIS unit to spearhead this effort, as well as a PSE unit to help ensure that private sector actors are strategically included in HIS strengthening initiatives. Exploring additional strategies that respond to private sector needs is crucial. These include digital health solutions such as integrated data warehousing in combination with non-technological solutions like building trust, improving data governance practices, and identifying private sector motivations and incentives to facilitate an environment more conducive to cross-sector data sharing.

So, what can global stakeholders take away from Liberia's experience? While many of the recommendations for Liberia are also globally applicable, several additional reflections may be relevant

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[9] Population Services International (PSI). 2023. *GEMS+ Health Systems Strengthening through Private Sector Engagement: Lessons Learned from Malaria Elimination*. Washington, DC: PSI. https://www.psi.org/wp-content/uploads/2023/09/GEMS-Legacy-Book-2023.pdf

for national governments, their implementing partners, and donors seeking to support more cohesive data ecosystems:

→ **Commit to long-term investment and coordination to achieve a more interoperable digital health ecosystem.** Solving data systems fragmentation is an enduring commitment that can require substantial and sustained investments in digital health tools, data expertise, capacity strengthening, and collaboration. In many places, the process merits strategic involvement of private sector actors, ideally through a process that emphasizes trust-building, creating shared value, and fostering mutual understanding. Liberia's first experience developing and implementing an interoperability roadmap showcases the necessity of continued effort and support. This demonstrates that initial investments must be followed by persistent commitment, advocacy, and collaboration.

The good news is that many countries are currently forging ahead toward a more interoperable digital health ecosystem, providing the global health community with a wealth of examples and lessons to learn from. Utilizing tools and guidance from entities like the World Health Organization and USAID can help countries navigate this complex undertaking.

→ **Use case-driven approaches can help strategically address data silos across sectors.** While aligning private sector data systems with national health information standards is ideal for reducing technological barriers to cross-sector data sharing, a huge challenge lies in the feasibility and willingness of private actors to engage. Therefore, crafting specific use cases – a focused framework to answer the questions "what data do we need, for what purpose, and for whom?" – can greatly assist in defining and seeking only the necessary data to make key market decisions, which private sector actors might be more inclined to share under the right conditions. Furthermore, each defined use case should carefully consider the technological and privacy aspects required to effectively merge and analyze the data, ensuring that the solutions are purpose-driven, technologically sound, and do not create additional data silos.

→ **Take stock of the competencies necessary to plan and implement strategies for addressing data systems fragmentation.** Successfully unifying siloed systems across sectors can necessitate substantial technical expertise in diverse areas, such as digital health, data, PSE, and programmatic health areas (e.g., family planning). It can also require interpersonal skills (e.g., stakeholder engagement, facilitation, consensus-building) and strategic planning capacities (e.g., budgeting, resource allocation, coordination). When selecting solutions to reduce fragmentation and generate market intelligence, it is vital to map out these capabilities among stakeholders to strategically leverage the right expertise at the appropriate times. This mapping can also help identify where investments are needed to strengthen local capacities to develop and sustain a more unified health information ecosystem.