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Model of a Community-Based Information System

Essential Components and Functions

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ABBREVIATIONS

CBIS	community-based information system(s)
CSO	civil society organization
CTV	community trace and verification
CW	community worker
HMIS	health management information system(s)
M&E	monitoring and evaluation
MIS	management information system(s)
USAID	United States Agency for International Development

PURPOSE

A community-based information system (CBIS) is a dynamic system that includes information on how data are collected, how they flow, how to assess and improve data quality, and how the information is used. A CBIS involves data collection, management, and analysis of health and related services provided to communities outside of facilities (de la Torre, 2014). The system should enable information sharing among community-based services (health and social services, in this case) and between community-based services as well as with health facilities and government offices. The CBIS should feed into the national health management information system(s) (HMIS) or other relevant national management information systems (MIS). CBIS have the potential to engage community members, provide them with an avenue to access health and social services, and hold service providers accountable, thereby contributing to the goals of sustainability (Jeremie, 2014; Sabitu, 2004).

To support the goals of the United States Agency for International Development (USAID) to combat infectious disease threats, the USAID-funded MEASURE Evaluation seeks to learn what works to improve health information systems and to address these systems holistically. MEASURE Evaluation's work on CBIS aligns with these goals, because these systems operate at the community level, where health services are closest to the people who need them.

The CBIS model presented here is a starting point for framing what is currently known from the literature and from MEASURE Evaluation's experience with community health and social service information systems in low- and middle-income countries. The model describes how a CBIS should function to help countries assess and strengthen their CBIS, by providing them with a reference for what should be included in a CBIS. The CBIS model has eight components that should be in place for a system that produces high-quality information for decision making. The components are leadership and governance; system design; system management; data sources; data management; information products and dissemination; data quality; and data use. The model also details the stakeholder groups who have a vested interest in the information generated by the CBIS and their roles in relation to the system.

The CBIS model aims to provide a sense of structure to an environment that has historically been disjointed, with each community-based health or social service program having its own information or reporting system, which inhibits having a holistic picture of community and population needs, the services provided, and potential gaps. The model also seeks to create linkages with other national information systems, such as the HMIS, which often do not include data from community-based programs, because of perceptions of poor data quality, lack of coordination, lack of uniform data element definitions, and lack of formal mechanisms to incorporate community data in national MIS.

The CBIS model is intended for use by CBIS technical experts, CBIS managers, community-based program monitoring and evaluation (M&E) staff, government staff developing and implementing a CBIS, and donors. It supports country-specific, regional, and global stakeholders as they assess, plan, design, implement, and monitor and evaluate their CBIS-related interventions.

OVERVIEW

National programs increasingly rely on community-based programs to expand coverage of health and social services, create linkages with the community and health facilities, reach the most vulnerable, and obtain a more accurate understanding of the population's needs and the services received. Community-based programs rely on paid and unpaid community workers (CWs), who are supported by projects or governments, and who have various levels of training. CWs provide services at the household level in communities and collect case management/care coordination information. CWs have evolved from serving primarily as a link between the community and the health and social service systems to that of a frontline care provider responsible for the delivery of a wide range of services and preventative care, including family planning, maternal and child care, childhood illness, malaria, nutrition, HIV/AIDS, and tuberculosis-directly observed treatment, short course (Sabitu, 2004; Mutale, 2013; Damtew, 2013; USAID, 2015). CWs—who are usually from the community they serve—have the advantage of being near the community and can reach out to community members, by conducting house-to-house visits, group meetings, and/or interacting with clients at static service sites. They are usually familiar with the community members and the specific health or social issues that require attention and follow-up. The information collected by CWs is a crucial part of a robust CBIS, because it allows programs and service providers to monitor service delivery, provide targeted supervision and support, and exchange information with the facility for improved case management.

A CBIS collects, analyzes, reports, and uses community-focused health and/or social welfare information. Information in the system can be used to inform programming and policy, target services to populations in need, monitor the continuum of care, and address equity, access, and accountability issues. The CBIS should enable the sharing of information between community-based service providers and health facilities and government to better serve the population in need. When community members have access to information in a CBIS, they have the potential to engage other community members around health and social welfare needs, and hold the larger health and social welfare system accountable for the services it is supposed to deliver, which ultimately contributes to the goals of sustainability (Jeremie, 2014; Sabitu, 2004). The model presented here focuses on the collection, analysis, and use of routine information. However, nonroutine information, such as surveys, evaluations, and research, are also part of a CBIS and can validate the routine information or be used to triangulate the information to answer specific programmatic or policy questions.

CBIS data are used by CWs, facility-based health workers, and social workers; government officials involved in planning services and making resource allocation decisions at various levels of government; and civil society organizations (CSOs) advocating services. A well-functioning CBIS can support civil registration and vital statistics, by providing information to the registry on births and deaths.

CBIS Functions

Information generated by a CBIS supports several community health or social welfare system functions. The following table presents the essential functions at each level of the system: national government, local government, and SDP (facility, civil society, and community).

Table 1. Essential functions of a CBIS, at each level of the system

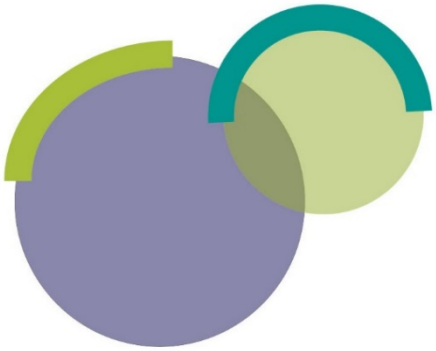
	Planning: design, implementation, resource allocation	Reporting	Accountability	Identifying people in need	Support case management	Planning for supervision	Identifying community needs
SDP							
Community			X	X	X		X
Civil Society	X	X	X	X	X	X	X
Facility	X	X	X		X	X	X
Local Government	X	X	X			X	
National Government	X	X	X			X	

Essential functions of a CBIS are:

1. Promoting community engagement in health
2. Identifying people in need of services
3. Supporting case management and care coordination
4. Ensuring accountability

A description of each of these functions appears below.

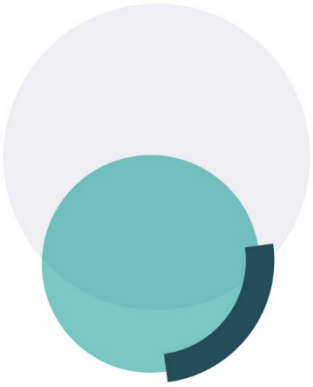
1. Promoting Community Engagement in Health and Social Welfare



Community engagement can lead to the improved use, availability, and quality of health and social services delivered. Information generated by a CBIS is an important resource for community members to engage in monitoring health and social welfare services, and to ensure that service delivery organizations are held accountable to those they serve (Kaseje, et al., 2010; Marston, et al., 2013). Access to data about services allows community health and social welfare committees or other community groups to define and prioritize the community's needs; set objectives and targets for meeting those needs; and participate in planning, implementing, and monitoring programs. During the Ebola outbreaks, it was found that community engagement can also support outbreak surveillance and containment (Stone, et al., 2016). It is important to include mechanisms for community involvement in defining data requirements, and in interpreting and using the data for programmatic decision making when designing a CBIS.

2. Identifying People in Need of Services

CWs can take a more proactive role in identifying and seeking out the people who need services in their catchment areas, by conducting household visits and using tools to track case management and cases lost to follow-up. A well-designed CBIS has tools that facilitate these processes for CWs and allow CSOs and facilities to monitor community-level activities. A CBIS can also include tools and mechanisms that allow facilities and the community to exchange data, such that clients' needs are more easily communicated across the levels of the health system.



3. Supporting Case Management and Care Coordination

"Case management" is the process of holistically gathering information about an individual's needs, and providing services and referrals to meet the needs. Case management has four subfunctions: (1) documenting individual-level needs to support individual care planning; (2) enabling bidirectional referrals; (3) tracking patients lost to follow-up; and (4) enabling the supervision of CWs (MEASURE Evaluation, 2012; Chewitha & Azim, 2013; Catholic Relief Services, 2017). CWs assess and document the clients' needs, so that they or other CWs can follow up efficiently and effectively. Information from case management can be entered in a CBIS and can fill the information gap between community- and facility-based health and social welfare services about the services provided to a specific client and his/her ongoing needs. By linking case management with a larger MIS, community- and facility-based staff can jointly track clients' health issues, referrals, and adherence to medication, and be alerted to those who fail to attend follow-up visits.

The information collected by case management tools lets CW supervisors see how well CWs are performing and identify where there may be a need for supportive supervision.

4. Ensuring Accountability

One of the primary functions of collecting and sharing information about activities conducted at the community level is to ensure accountability of government and donor funds. Ensuring accountability involves feeding back data to the community, including budget information for community-based programs and support to CWs, by using such mechanisms as public expenditure tracking and data-driven journalism, and providing information on services delivered to the community through community meetings and participatory M&E. By providing information to the community, community members can hold service providers accountable for the services they are supposed to deliver to the community and advocate for additional services they may need.

It is important to work with communities to document their health and social welfare needs and their perceptions of services. It is also essential to provide feedback to communities on the work that is being conducted on their behalf and the outcomes that are being achieved. For example, if a community project commits to improving access to economic strengthening services, the community should be informed about the type of economic strengthening services being provided and about progress and results.

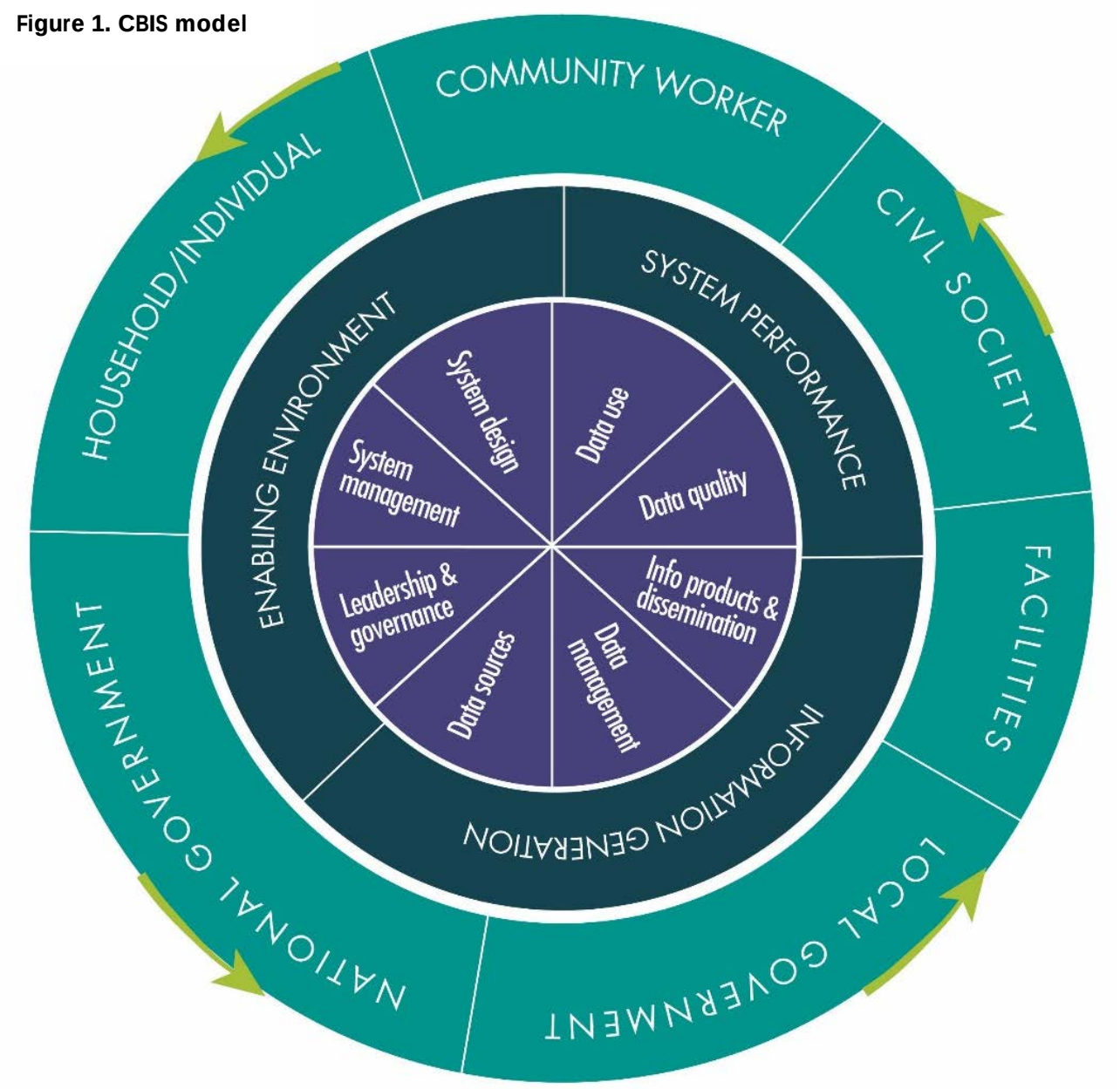
Government and donor funds need to be tracked to ensure accountability, to counter corruption, and to support resource allocation decisions. Programs collect and use routine information to track whether activities are occurring as planned, address any programming gaps, and scale up when there is evidence of success. Program monitoring data also help donors track their investments and can provide early indications of program shortfalls (e.g., failure to reach targets) and successes that can be replicated.

These accountability functions can be eased using mobile solutions for case management and reporting, because information can be relayed nearly in real time. Therefore, decision makers can detect issues quicker than they can with reports on paper, which can take a month or longer to reach them. Also, the information can be fed back to CWs and communities in a timelier manner, so they can take action with clients or local leaders and/or decision makers. With paper-based systems, it can take months—if ever—for information to be fed back to the CWs and community.

CBIS MODEL

The CBIS model below describes a structure for developing and implementing a national- or program-level CBIS. The components of the CBIS model are based on the seven components of the Health Information System Strengthening Model (https://www.measureevaluation.org/his-strengthening-resource-center/his-strengthening-model), with one additional component: system design. System design has been added, because careful consideration should be given to how data elements are defined, the type of platform to be used by the CBIS, what other systems the CBIS may link to, and how the systems will link, integrate (be included in a given system), or interoperate (be able to exchange data). The eight components are shown in the inner circle of the model. The middle circle categorizes the eight components in three broader dimensions: enabling environment, system performance, and information generation. The outer circle shows the stakeholders who interact with the CBIS and engage with each of the eight components in some way. The CBIS model is designed as a circle, because our experience has shown that the development or strengthening of a CBIS is not necessarily a linear process. All components are important and should be addressed during system development/system strengthening processes. The CBIS stakeholders encircle the CBIS components, because they have roles to play (some more significant than others) in the development, strengthening, and implementation of each component. A description of the eight components and the roles played by stakeholders in relation to each component follows.

Figure 1. CBIS model



Enabling Environment

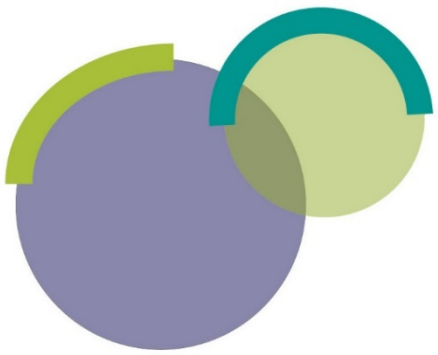
System Design

System design is essential to the development of a CBIS. Without a strong design, the system—whether it is paper-based, electronic, or a hybrid—will be deficient and will not produce the information required for reporting and decision-making purposes. System developers need to be clear about the following:

- The purpose of the CBIS and the data requirements, including what data are collected and not collected
- The different workflows in community health or social welfare programming, including the roles and responsibilities of various players, how the data flow through the system, and what information is needed by whom and when
- How frontline workers interact with clients and collect data during a client visit; their challenges and motivations; what they perceive as the strengths and weaknesses of the existing system; and what information they need from the system
- The technology that is currently available and that could feasibly be used for the CBIS
- Interoperability and integration potential with other MIS for health and social services

By understanding these elements, system designers can identify possible constraints and enablers, and construct a system that meets the needs of the program, CWs, communities, and other stakeholders to support decision making. The system design process should be informed by the results of systematic assessments conducted using well-tested tools. Examples of these tools are the Performance of Routine System Information Management (PRISM) tool (https://www.measureevaluation.org/resources/publications/ms-11-46-d), the 12 Components of a National M&E System (http://www.unaids.org/sites/default/files/sub_landing/files/1_MERG_Assessment_12_Components_ME_System.pdf), the Stages of Health Information Systems Improvement Toolkit (https://www.measureevaluation.org/resources/tools/stages-of-health-information-systems-improvement-toolkit/), and the DHIS 2 Community Health Information System Assessment Tool, (https://www.healthdatacollaborative.org/fileadmin/uploads/hdc/Documents/Working_Groups/CHISGuidelines_version_August29.pdf, pages 181ff). Assessments using such tools reveal a system's strengths and weaknesses and inform the development of plans for system improvement. Follow-on assessments can be conducted to show changes in the information system and identify areas still requiring strengthening.

Leaders planning the CBIS need to determine whether the system will link to the national HMIS or other social welfare MIS, and if so, how they will interact. For example, will paper reports be sent to health facilities or district offices? Will electronic systems be interoperable? Or will the program try to integrate with a certain MIS? When thinking through the linkages, system designers need also to ensure that the metadata elements in the systems are defined the same way. For example, will community data be aggregated with facility data (e.g., reporting all fever cases tested in the catchment area, regardless of whether the clients were seen at the facility or in the community)? Or will these data remain separate, to facilitate more detailed analysis?



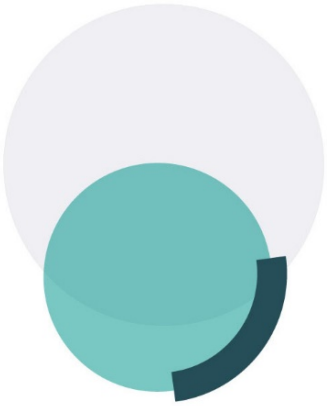
When designing the system, it is important to understand the end users' perceptions of the tools and their capacity to use the

tools. In the case of paper-based systems, CW literacy rates will determine their ability to use complex registers and forms, the time it will take them to collect the data, and their ability to aggregate large numbers. In terms of mobile data collection, some frontline workers may be more familiar with feature-enhanced phones or with smart phones, and some workers may not be comfortable carrying around tablets, for fear of being robbed. Such issues should be considered in a system's design, to avoid imposing an undue burden on CWs.

Whether the CBIS is digital or paper, its tools need to be tested, to ensure that the assumptions the designers made hold true and that the system produces the information it is intended to produce. The system design process also determines how information collected in CBIS will be managed. Will household folders be stored in a specific location? Will there be a database into which data are entered from paper records? Or will there be a full digital system, whereby data are entered in a mobile device at the community or household level? If there are digital components, infrastructure (power source and Internet) requirements to support the system need to be defined or developed.

Leadership and Governance

Low- and middle-income countries have been working on leadership and governance for the overall health sector and health information system, but have only recently started to focus on community health and social service systems and their information systems. By developing a strategic vision and governance structures for community health systems and their information systems, governments can work with partners to harmonize the fractured CBIS and develop a national system that is equitable and provides the information needed to make decisions at all levels.



Strong leadership and governance are needed to:

- Bring stakeholders operating at the community level together to better coordinate service delivery and M&E
- Bring ministries together for larger budget discussions to ensure steady financing schemes
- Harmonize and standardize CBIS tools, indicators, and reporting systems, to avoid burdening CWs with excessive data collection and multiple parallel systems
- Create policies around the use of technology at the community level, including mobile applications, confidentiality, and security
- Ensure that CBIS data are used
- Institutionalize a training strategy
- Establish uniform CW incentives or employment standards

Policies, plans, and guidelines addressing these issues will lay the foundation for health and social welfare ministries to make the case to other ministries and to civil society and the private sector about the importance of a harmonized and responsive government-led community health and social welfare information system.

Strong leadership is needed to ensure that community health and social welfare information is presented at meetings where policy, programming, and financing decisions are made, both at national and local government levels. One way to encourage political will is by establishing a national-level steering committee that includes ministries with a stake in the CBIS, including the ministry of finance. The steering committee should ensure that decisions required for the proper operation of the CBIS are timely and that the decisions align with the program/country priorities. A national-level steering committee helps to strengthen the responsibilities of the stakeholders as well as collaboration across stakeholders to support the system's functioning. Political will needs to be present in the overall system, to ensure that information is used to move the community agenda forward, and to identify community information champions to help ensure that community data are part of high-level discussions. Leaders at all levels of the system need to ensure that the policies and plans developed at the national level are implemented with accountability and transparency at lower levels.

System Management

To have a well-functioning CBIS, management functions need to be in place. This entails the management of financial and human resources and oversight of the processes and functioning of the CBIS. Ensuring the availability of adequate financial resources and their proper use is essential for a CBIS to operate as planned. Many CBIS do not produce good-quality information, because they lack appropriate financing at each level of the system. Financial resources are needed at inception to develop, roll out, and train personnel on the system. Once the CBIS is operational, funding is needed to cover personnel, supervision, training/professional development, equipment, and operating costs. The costs include but are not limited to M&E/information and communication technology staff, training, printing, transport, technology, maintenance, and Internet. Financial resources will occasionally be necessary to replace equipment, train new staff, and update the system.

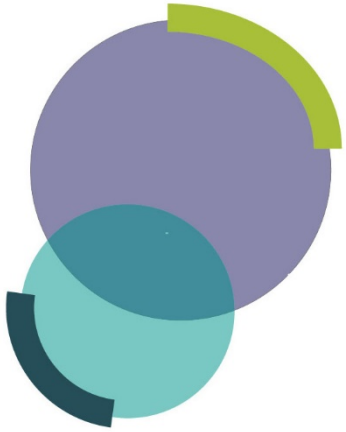
Human resources (program managers, M&E staff, digital programmers, and CWs) and training of those resources are other essential elements for a well-managed CBIS. Without the appropriate human resources for system design, development, training, and implementation, the CBIS could break down at different points. Staff who interface with the system need to have the skills and the capacity to work with the system, whether that be M&E skills, computer programming skills, or capacity to use the tools developed to collect, analyze, and use information.

Infrastructure to support the CBIS is also an important factor to consider when designing the system. For paper-based systems, CWs need to have access to transport and roads to transmit the information to the next reporting level. When digital tools are used, a power source to run computers and charge mobile devices is required. Where data are sent electronically to the next level, relatively stable access to the Internet is required, through landlines, Wi-Fi, or mobile data. CBIS developers can use assessment tools, such as the Integrated System Assessment Tool (http://iis.hpp-gt.org/index.php/Que-es), developed by the Proyecto Políticas en Salud y Educación, in Guatemala, to evaluate the infrastructure needed to support an electronic system and computing skills.

Information Generation

Data Sources

Data sources for a CBIS can range from nonroutine population-level information (e.g., household surveys, such as the multiple cluster indicator survey, http://mics.unicef.org), to routinely collected information (e.g., case management information and women and child health cards). The CBIS model focuses mainly on routine sources of information; however, there are often cases when nonroutine information should be triangulated with routine information to identify trends, assure the accuracy of routine data,



and make decisions. By triangulating data, government and programs can review program effectiveness, quality, and areas for improvement. The list of CBIS data sources (not exhaustive) follows.

Routine Data Sources

- **Basic health and social services:** Examples are household registration forms; case management/care coordination tools for antenatal and postnatal care, neonatal care, integrated community case management (malaria, diarrheal disease, and pneumonia), home-based care, and orphans and vulnerable children; immunization card; family planning register/tracker; referral forms; and HMIS
- **Specialized health or social services (HIV, orphans and vulnerable children, tuberculosis, Ebola, etc.):** Household vulnerability assessment; suspected case notification/community surveillance tools (health or child protection); case follow-up/outcome capture tools (referral completed, treatment completed, participation in household economic strengthening, and death registry); school enrollment and attendance records

Nonroutine Data Sources

- **Population-based surveys:** multiple cluster indicator survey; Demographic and Health Survey; population-based HIV impact assessments (PHIAs, knowledge, attitude, and practice surveys; census; civil registration and vital statistics; Expanded Programme on Immunization coverage survey; Standardized Monitoring and Assessment of Relief and Transitions (SMART) nutrition method

Data Management

For the CBIS to produce information for decision making, it needs detailed, documented data management processes. Under data management, programs operationalize the M&E plans developed under the governance component. Standard operating procedures need to be developed that describe the processes for entering data in the system, whether on paper or electronically; how the data flow through the system; how they are cleaned and validated; and how they are compiled and analyzed. The standard operating procedures should be sufficiently detailed to serve as a job aid for those implementing the system. This component also includes documenting naming conventions for data elements; access rights for system users; and data protection and confidentiality. Examples of guidelines for establishing data security, privacy, and confidentiality can be found in MEASURE Evaluation's mhealth Data Security, Privacy, and Confidentiality Guidelines (https://www.measureevaluation.org/resources/publications/ms-17-125a). In addition, data management considers how data quality is assessed and addressed if issues are identified. Last, this component addresses how paper-based files and digital data are stored and accessed, how data are archived, and for how long they should be retained.

Information Products and Dissemination

Once the data have been cleaned and analyzed, a variety of information products can be developed, informed by stakeholders' information requirements. Examples of information products are facility service delivery reports, national community health and social service statistics reports, PowerPoint presentations, dashboards, scorecards, and project-specific fact sheets. Information products can be distributed through several channels, such as national and subnational community health or social service meetings, websites, social media, Short Message Service, and conferences. To develop information products, M&E and MIS teams need to understand the stakeholders' main programmatic questions, have the capacity to compile and analyze the information to answer those questions using multiple data sources, and be able to present the information in a way that stakeholders can use. For example, a community group may not find a 50-page, text-heavy report useful; it would rather have a brief document with vivid charts, graphs, and pictures showing how the community is doing in a specific area of

community health or social welfare. In contrast, the head of community health in the Ministry of Health may want a longer, more detailed document to understand the bigger picture of what is happening in community health throughout the country.

There are also information products used by civil society and CWs to make decisions about case management, care coordination, and supervision. For paper-based tools, supervisors can review case management forms that CWs submit, to see how care could be coordinated and whether there are CWs who need to be supervised, based on how well the forms are completed. Information from these tools can also be used to make wall charts to monitor trends in the catchment area. When case management data are electronic, dashboards can be developed to monitor indicators, and reminders can be sent to CWs regarding follow-up tasks and to help supervisors monitor CW performance.

System Performance

Data Quality

If all other CBIS components are functioning effectively, the quality of the data produced by the system should be high. If the system is not performing as planned, data quality could be jeopardized. For example, if the data elements are not defined well in community health and are not standardized, with the same data elements collected at the facility (e.g., number of confirmed malaria cases), then the data reported up the system may not reflect the reality on the ground, which could lead to inaccurate forecasts for supply orders.

Although CBIS share the characteristics and shortcomings of the broader routine MIS, of which they are a part (or should be a part), the complexity of the increasing number of CWs working at community level, the diversity of programs, and the geographic dispersion of service delivery points create unique challenges for data quality and data use (Guenther, et al., 2014). In addition to these factors, data quality could be affected by insufficient training of data collectors; low literacy rates among CWs who are tasked with collecting data; the sheer amount of data being collected; the complexity of the forms used to collect data; lack of data verification at the household level; and the overburdening of CWs. To address these challenges, procedures can be put in place to strengthen the quality of the data in the system, such as regular community trace and verifications (CTVs), coupled with supportive supervision visits and ongoing refresher training. Through CTVs and supervision, programs can identify areas where mistakes are being made and can develop training to address them. Through a CTV process, project managers can sample households that have been registered in the program and are listed as having received services during a certain period using lot quality assurance. Once a sample has been identified, program staff can visit those households and apply a short questionnaire, to verify that the community members received the services recorded (MEASURE Evaluation, 2013). Programs can also focus their data collection efforts, by having CWs collect only a key set of data that support case management and ensuring that the data collection forms are simple and easily understood by CWs.

Data Use

The goal of a well-functioning CBIS is to have stakeholders use the information it generates to inform decisions at all levels of the system. Data-informed decision making refers to the proactive and interactive process that considers data during program monitoring, review, planning, and improvement; advocacy; and policy development and review (Foreit, Moreland, & LaFond, 2006). This means that the health ministry and/or other ministries supporting social welfare have access to good-quality community health and social service data to inform policies and programs, and that community groups also have access to information to be able to hold the ministries and programs

accountable for the services they are supposed to offer. Data generated by the system can also be used to support performance management of CWs and their supervisors, and to plan for supervision visits. Several factors need to be considered when assessing the data use component: the system's ability to produce good-quality information in usable formats for the right audiences; skills to interpret the data; the level of integration in the decision-making process; and alignment of the information with stakeholders' needs.

The ability to use data for decision making is influenced by governance structures, human capacity, and commitment (Nutley, T., 2012). Data use is often impacted by the availability of funds to implement activities to support evidence-informed decision making, such as data review meetings; the political will to advocate the decision; and the complexity of the decision-making process and structure.

CBIS STAKEHOLDERS

CBIS stakeholders have different roles and responsibilities in relation to each component of the system. A description of the ways in which stakeholders engage in activities under the CBIS component follows.

National Government

Ministries for health, social welfare, finance, local government, and community development play a major role in the development and implementation of the CBIS, especially in relation to the components of leadership/governance and system management and in the coordination of stakeholders as part of the development of the CBIS. Policies, plans, and guidelines are developed for a CBIS and financing is secured at the national government level. National-level stakeholders develop the M&E plans for community health and social services, which lay out the information needs for the national program, along with data collection processes, tools, and deadlines. National governments also establish the digital health policies and confidentiality/security standards. Although the national government may have the mandate and resources to develop plans, strategies, and guidelines, other actors from subnational government and community-based program (nongovernmental organization/community-based organization) counterparts should participate in development of the CBIS. As a result, the national government also plays a coordination and facilitation role.

The national government plays several roles in relation to system management. It needs to have the political will to ensure that CBIS positions are allocated, resourced, and staffed at national and subnational levels, and that the system has budgetary support to function as detailed by national plans. Data standards across facility and community-based programs should be set at the national level. The national-level stakeholders need to ensure the availability of standard materials to train staff on community-based service delivery and data collection.

In terms of information generation, the national government needs to be engaged in developing standard community health and social welfare tools for reporting, and in letting those who generate the data know how it would like the information presented and by when.

The national government is a key consumer of information. It should use the information generated by the CBIS to make decisions about community health and social welfare policies and programs; inform proposals and develop budgetary allocations; produce national health statistics; and ensure tracking of progress in the achievements of the United Nations Sustainable Development Goals. Should the system have data quality issues, the national government should have the mandate to authorize a data quality audit, to determine where problems are arising in the system.

Local Government

Local government plays an important role in relation to the leadership/governance and system management components. Local government officials should be included in national-level meetings, to provide input on the plans, strategies, guidelines, and data standards that are being developed for the CBIS. It is also the responsibility of local government to operationalize guidance documents issued by the national government for their region/district/ward and ensure that prescribed standards are met at the local level. Local government actions could consist of facilitating meetings with stakeholders, to determine the best way to implement the plans (e.g., developing roadmaps/workplans) and conducting training on new tools and policies. In addition, local government needs to advocate to the national level for community health and social service CBIS positions in its offices, and for community health

worker/parasocial worker positions at lower levels. Local government needs also to advocate for subnational-level CBIS budget allocations at the national level for. In its own budget development processes, it needs to ensure that what is allocated by the national government for CBIS is programmed at the local level. Local government's role is also to ensure that CWs have appropriate pre-service and in-service training to carry out their responsibilities, and make sure that CWs, along with CSOs, are trained on the tools, forms, and updates to indicators and data elements.

In terms of system design, local government needs to map the data requirements and workflow for the system between the community, civil society, facilities, and local government. This mapping should address how data are collected and compiled at each level for the health and social programs; when data are entered in an electronic system; and how data should be analyzed and reported up. Because local government knows the infrastructure and skill level of its staff, it should recommend to national government the appropriate system design—whether the CBIS should be paper-based, digital, or a hybrid, and if a hybrid, where the information on paper should be transferred to digital platforms. It should also work with the national government to determine how community-based data will link with the larger HMIS or social welfare MIS, including having interoperable electronic systems or submitting paper-based reports to facilities and district offices.

Local government's role in data management depends on the type of system (paper-based or digital) and what the national government has defined. If a paper-based system is in place, local government should be responsible for aggregating data from the lower levels and submitting paper-based reports to the national level. For a hybrid system, where a database exists at the local government level, government staff should collect the paper forms from lower levels, and review and input the data in the database. For a digital system, local government should enter any relevant service delivery information from their level and verify data from lower levels.

In terms of the data sources component, local government needs to participate in the groups organized at the national level that are developing the CBIS tools, including registers, surveillance forms, case management tools, and reporting forms. Local government inform the other stakeholders the minimum data it requires to implement programs and make decisions. It plays a lead role in disseminating tools and training the staff of community-based organizations to use the tools properly, and it monitors the system once it is in place.

Local government staff are both data producers (service provision) and data consumers, so they have two roles in relation to the information products and dissemination component. Local government decision makers should inform data producers about their key questions and information needs; how they would like the information packaged for ease in decision making; and when they need the information. Data producers at the local government level need to analyze the data and present the information in a way that addresses the information needs of the decision makers.

In terms of data quality, local government ensures that data entered in the CBIS at the district level are good quality, by making sure that electronic systems have built-in data quality checks and that paper-based systems undergo regular data quality assessments. Local government staff should also conduct routine quality validations of data that either are entered in the CBIS directly or submitted to local government for entry.

If the CBIS is functioning well, local government should be using the information it generates to make decisions for its region/district/ward, including but not limited to programming, budgetary, and staffing decisions. Local government should host regular data review meetings with key program stakeholders to

assess what the data are saying, to identify areas for improvement and program gaps, and to monitor activities. Data review meetings can also highlight any needs for additional resources (budgetary or human) for the administrative area and any shortfalls in commodities that can then be escalated to the next level of the system.

Facility

Facility staff's role in a CBIS is dependent on how linked the community- and facility-based information systems are, and whether CWs report directly to the facility (as opposed to a community-based organization). If they are linked or are in the process of being linked, the facility staff can play a significant role in ensuring that data submitted by CWs are compiled appropriately with the facility data. They also have a role in verifying the data submitted by the CWs, and possibly entering community-level data in a database. Facility staff can work with CWs to use information from the system to track clients who are lost to follow-up; to identify disease cases, such as malaria; and track referrals. In addition, facility staff can use the information from a CBIS to determine the need for community services; identify outbreaks; monitor clients' health through case management information; and support CWs to coordinate the care offered to clients.

Civil Society

Because civil society often supports local government to implement community-based programs, it plays a significant role in the development and implementation of a CBIS. Civil society should provide input on the development of plans and guidelines through participation in stakeholder meetings, and ensure that the plans, guidelines, and policies reflect the needs at the community level and what can realistically be implemented based on community structures and infrastructure. Civil society should also advocate to local and national governments to ensure that the CBIS is on the agenda for budget allocations, and that the money allocated is used to develop, strengthen, and implement a national CBIS.

Civil society members should be at the forefront of the CBIS design, because they have a good understanding of the information needs of community-based programs and the communities themselves. They understand how things function at the community level, who the stakeholders are, what their roles in relation to the CBIS are, and where possible bottlenecks in the system may lie.

Regarding the system management component, CSOs play a role in training CWs on the case management tools and other data collection tools that are part of the CBIS. If CSOs support CWs, they may store paper-based files and/or enter information in databases. They should ensure that those resources are managed and funded/staffed in such a way that they can compile any reports required by other stakeholders, e.g., government for reporting to donors.

Because CSOs often implement parts of community health or social welfare programs, they contribute significantly to information generation. CSOs should therefore participate in technical working groups that design tools for information/data collection (e.g., case management tools), because they understand the needs of their communities and can help design tools that reflect those needs. They often play a role in the training and supervision of CWs, which include supporting data collection and ensuring that the data collected are of good quality. CSOs also implement the standard operating procedures developed by the government for collecting, consolidating, cleaning, and reporting data. CSO staff develop information products for stakeholders based on the information they generate, and use information products to make their own programmatic decisions. Senior managers and technical leads in CSOs should work with their M&E teams to ensure that the information products being developed address their key programmatic and management questions.

As with other stakeholders, if the CBIS is performing well, CSOs should be able to use the information being generated to inform program implementation, management, and advocacy work. One aspect of civil society's role in ensuring the system's effective performance is to make sure that the data that it is responsible for entering in the CBIS are of good quality, by conducting validation exercises and supportive supervision of CWs.

Community Worker

CWs are often the primary data collectors of routine community-based data. As such, they have a significant impact on the CBIS in terms of the completeness, accuracy, timeliness, etc., of the data collected. Since CWs have such an important role, they are integral to the design of the system. System designers should therefore consult them, to understand their work flows and how they interact with clients. It is important to design the system so that not only do the national and subnational governments and civil society receive information to make decisions, but also so that the CWs have access to data, so they can work better—knowing which households to visit based on illness; with whom to follow up, based on referrals; and who has been lost to follow-up. Through digital health systems, CWs can receive reminders about following up with clients who have been referred or are due for services, and they can receive messages from health facility staff about clients who have missed appointments, so they can follow up with them (Walker & Nerad, 2018).

Household/Individual

Although households and individuals may not have a direct role in all components of a CBIS, they have a stake in making sure that the CBIS is producing good-quality information, thereby ensuring that they receive the services they need. They also have a role in making sure that government and/or civil society are providing them with information on the services being offered in their community, as well as health statistics, so that they can know that their needs are being met, or can use the information to advocate, if their needs are not being met.

THE WAY FORWARD

The description of the CBIS components and stakeholders in this model is based on accepted standards and on the opinions of experts obtained by MEASURE Evaluation. In the coming year, MEASURE Evaluation will continue to build consensus and make updates, where necessary, informed by experiences in the field. The project will also compile an indicator list and develop new indicators where needed to monitor the CBIS components, drawing from existing indicators and developing new ones, as needed. A webpage is planned that will house information on the CBIS model, along with tools that support its components, cases of actual and suggested CBIS model applications, and case studies that illustrate a well-functioning CBIS.

As we move the CBIS space forward, and work to link CBIS with other social service information systems, we will gather more documentation on best practices and evaluations of systems performance from which to learn. By learning from one another, we can start to create dynamic, integrated CBIS, with good-quality data that are used by stakeholders to inform decisions at all levels of the health and social service system.

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