Decreasing the Data Burden at the Last Mile to Improve Data Management and Use for Stronger Pharmaceutical Systems

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OVERVIEW

In most low- and middle-income countries (LMICs), significant amounts of data are needed at all levels of the health system, with service delivery points (SDPs) generating and compiling the majority of these data. Furthermore, because health services and pharmaceutical management are so heavily dependent on data, the temptation is often to place emphasis on collecting as much information as possible.

Yet in most LMICs, where data are primarily managed through paper-based systems because of lack of infrastructure, resources, and capacity, the need to have the *right* amount of data to manage health delivery and pharmaceutical services has led to a proliferation of *too much* data to effectively manage the quality and quantity of the information available. In systems where infrastructure and resources are limited, the data often sits at the service delivery point, inaccessible to those up the chain, which reinforces an often incorrect perception that there is a lack of data.

Several initiatives have attempted to address this gap by designing and implementing information system solutions targeted at the lower levels of the health system. However, a number of these initiatives have resulted in a higher burden on health personnel as they have to capture, consolidate, and submit data on additional forms and reports while still maintaining the paper records. Analysis and feedback systems are often not optimal, with lower level workers unclear about why the information is collected and how it will be used.

Imagine a health worker, such as a nurse, at one of these service delivery points. Apart from attending to the patients under her or his care, the nurse also needs to maintain paper records on these individuals, their diagnoses, and treatments prescribed or administered. These data, often duplicated in multiple places, need to be summarized for different programmatic reports, which may involve

Data burden, as defined in this brief, is the time, human effort, and resources expended by an individual at any level of the health system to collect, aggregate, validate, and report health data beyond what is reasonable for running an efficient health system.

Data management is the process of collecting, aggregating, validating, and reporting data.

Impact of Data Burden:
- Reduces time and ability to complete other aspects of work not related to data entry and reporting
- Reduces individual motivation for timely or accurate completion of the data collection requirements
- Lack of timely and accurate information impacts ability to make effective policy and management decisions

reviewing multiple forms and registers to compile each report. Because of limited pharmacy staff, the nurse is likely also responsible for maintaining records regarding dispensing and commodity stock levels within the ward or rural health center. So the nurse is dealing with a heavy patient load, the accompanying patient records, and the need to aggregate and report on the patients and their treatment. So if there is an issue anywhere in this system and there will be when dealing with people's health care, what is the effect on the data she is collecting, aggregating, and reporting data?

While there have been studies conducted in the Unites States and the United Kingdom on "paperwork burden" on doctors and nurses due to regulatory compliance necessities[1] in both countries,[2] few studies exist that identify the causes of data burden at service delivery points in LMICs, or which try to distinguish

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[1] Kumar S, Henseler A, Haukaas D. "HIPAA's effects on US healthcare*." International Journal of Health Care Quality Assurance* 22 :2 (2009): 183-197.
[2] "Paperwork takes half of nurses' working week." September 2007. *Nursing Times: NT, 38,* pg. 5.

essential data requirements from the non-essential. There are also no common metrics to measure or quantify data burden at the service delivery point in LMICs.

BACKGROUND

Through its support of governments in low- and middle-income (LMIC) countries across the globe, the US Agency for International Development-funded Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program has helped many governments address the data management challenges facing their health systems. Governments and their partners are acutely aware of the need for innovative ways to reduce the data burden on health workers. To define and quantify the data burden facing health workers, SIAPS conducted a review of data management and use practices, particularly with respect to pharmaceuticals, in Malawi and Swaziland. Malawi was chosen because of the presence of a SIAPS partner working with the Ministry of Health to improve supply chain data management and pharmacovigilance; Swaziland was chosen because of a recently released study of the health management information system which, although comprehensive on information flow for patient-specific data, did not cover pharmaceutical information flows or individual data burden on health workers. The purpose of the in-country assessments was to gather specific examples and case studies to help quantify and illustrate the data management challenges facing LMIC health systems. During these assessments, the local teams identified the pharmaceutical and health service delivery data being collected at the service delivery points (health centers and hospitals), documented the tools and approaches being used to manage pharmaceutical and health service delivery data, and quantified the level and causes of data burden at the service delivery point. SIAPS staff and partners interviewed health workers such as nurses, their assistants, and pharmacy personnel as well as management at all levels of the health system, including health center management at regional/district level, and central level staff such as chief pharmacists, vertical disease-specific program managers, and health management information systems (HMIS) staff.[3] In addition to these individual interviews, the teams also observed data collection processes at the hospitals and health centers and examined the data contained in the forms and registers. Informed by these in-country assessments, as well as the collective years of experience of SIAPS and its partners in managing these issues, this brief provides both context for and an articulation of the data burden seen within health systems in LMICs. It also provides recommendations for ways that ministries of health, donors, and implementing partners can rethink their approach to data management to improve health service delivery

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[3] For further details on the two assessments please refer to Annex A for country backgrounds and survey methodology.

KEY THEMES BASED ON IN-COUNTRY ASSESSMENTS

Health workers who are charged with taking care of patients strive to keep up with the data requirements expected of them as part of their job. Some amount of data is needed by them for direct patient care and diagnosis, as well as for the individual facilities to manage staff and resources. But beyond this immediate data collection necessity, there exists a greater burden of data expected from the facilities that may or may not be needed by the central level managers. Separating this additional data collection and reporting from the patient care data needed to manage the health system is difficult.[4]

Across the two countries, a few key themes regarding data management were pervasive in the interviews with respondents regardless of health system level—community health worker, clinician, pharmacy personnel, or central level management. These themes are outlined below.

Proliferation of data points within a facility results in incomplete and inaccurate source record.

Duplicate data points are repeatedly collected across multiple forms, registers, and reports across departments and wards within service delivery points (SDPs) and even sometimes within a single department/ward.

In an example from Swaziland, each time a medicine gets issued to a nurse from the pharmacy, the transaction gets recorded in three different places: the in-patient register (signed by the nurse and pharmacist), the stock card (official inventory document), and a stock movement book (maintained by the pharmacist for internal record-keeping). Similarly in Malawi, each time an antimalarial is provided at a health facility, the patient

demographic information and dosing is recorded in the patient register, an additional out-patient register, and a dispensing register. Since these systems are paper-based, recording patient demographic information and dosing in each register takes 5-7 minutes per register. Multiple recordings of patient demographic details across registers have been observed in other countries as well, including Swaziland. In Malawi, community health workers (see box 1) are tasked with reporting information on their commodities such as the quantities received, consumed, and the stock on hand in at least three different reports; two paper and one short message service (SMS) based report (cStock). This is also seen in Swaziland: a maternity ward compiles three reports on the mortality and morbidity of maternities in the ward, each containing the same information, but instead of one report getting sent to the three entities asking for the statistics, the ward nurses complete three separate reports, with each report taking up three to five hours of time each month.

Although in some cases, this duplication may have been purposefully introduced for data validation, the reality is that these checks and balances add to the workload. There are limited human resources available to handle the normal health care tasks and the paperwork needed for data collection, When time is limited, the first priority will always be given to seeing patients—data completeness and quality will not receive the attention they require.

Lack of a definitive data source leads to more time spent on data aggregation for reporting.

Because of the multiple registers that exist within a ward or department, a health worker might find it difficult to identify the original and definitive source for a specific data point. Reports compiled from different data sources often result in different aggregate numbers,

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[4] For a complete list of all HMIS and LMIS forms and reports collected in each country, please refer to Appendix C (Malawi) and Appendix D (Swaziland).

Box 1. Health Surveillance Assistant, Malawi

Arthur belongs to a cadre of community health workers referred to as Health Surveillance Assistants (HSAs) in Malawi. He makes home visits to pregnant women, inspects small wells and latrines for hygiene and sanitation standards, conducts village clinics to provide community case management of non-complicated childhood illnesses, conducts well-child clinics for immunizations and growth monitoring, and holds regular community sensitization events as needed.

Every day, the HSA has slightly different duties. On days when he is running a village clinic for community-case management and doing home visits of pregnant women or women who have recently delivered, he uses two key registers (Integrated Management of Childhood Illness [IMCI]) Village Clinic Register and the Maternal and Newborn Health Register) to record his work. He spends about two hours each day for data collection, which is derived from his interactions with pregnant women (Maternal and Neonatal Register) and caregivers (Village Clinic Form). Because he manages medicines for the Village Clinic, he also keeps track of the medicines that he uses each time he runs a village clinic. About once or twice a week, he holds an immunization and growth monitoring clinic that requires an additional set of forms and a child health register.

The HSA sees compiling reports as an important responsibility, and he sees creating accurate reports as a key part of his job. He needs two days to complete the monthly reports at the end of the month, but is often interrupted by families coming to him with sick children and calling for his attention. He is especially burdened by the Expanded Program on Immunization (EPI) report, which requires to him make several calculations during reporting. He spends one morning, about four hours, to gather the necessary data on immunizations from his form and register to do the needed aggregation calculations. He then spends the rest of the day completing the report and validating that there are no calculation errors. He records the same information on medicines dispensed each month in three places–on the village clinic register, in paper-based monthly reports, and through an SMS tool called cStock.

His primary wish for improvement in information management is for the government to supply him with a regular stock of the paper-based data collection forms and tools, because he runs out of them frequently. When this happens, he either creates his own forms on a blank piece of paper or, if paper is not available, he does not record data until he receives a new set of forms.

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undermining confidence in available data and complicating efforts to spot check data quality and accuracy. When creating a report to send to the district, regional, or central level, health workers in both countries need to consult three to four different data sources for the compilation of one report. Going back to the example of the maternity ward in Swaziland mentioned above, the maternity statistics reports have three sources: the maternities register, the Prevention of Mother to Child Transmission (PMTCT)[5] register, the gynecology register, and admissions and discharge notes. Aggregating data from all these sources takes considerable time. Cross

referencing multiple data sources could allow health workers and their managers to identify erroneous data, but in reality there is not a clear sense of which data source can be trusted. Instead of clarifying and identifying problems, the multiple data sources cause confusion and uncertainty about the reliability of the data.

Perceived mistrust in the quality of the data and lack of connected systems leads to duplicative data recording and storage.

Doubts about the quality of data, and a misperception higher up in the system that there is no quality data available, leads to the proliferation of registers and tools that collect

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[5] Prevention of Mother To Child Transmission (PMTCT) of HIV.

the same data. In addition, the lack of data management systems that share common data points forces the health system to collect and record all the data being collected and submitted through all the reports. This leads to every health program collecting as much information as possible, instead of asking, "What are the minimum data needed for informed decision-making?" In addition, again due to lack of visibility and clear processes, individual health workers who are responsible for collecting and maintaining data do not trust the data that is available when it has been collected or maintained by others. In Swaziland, both nurses and pharmacy technicians recounted instances when the pharmacists did not trust the health workers' calculations of aggregates and ended up pouring over the registers themselves to verify data.

Similarly, distrust in the availability and quality of data leads donors and partners to create parallel data collection and reporting systems, thereby contributing to providing and collecting data related to pharmaceuticals and health service delivery. Instead of focusing on strengthening the quality of the existing systems for creating and maintaining good pharmaceutical data, efforts have instead led to new data collection tools and approaches that often duplicate the existing weak systems. Vertical programs focused on

specific diseases or interventions continue to operate in silos instead of integrating with the overall health information systems, as seen in figure 2 illustrating commodities ordering flow for Swaziland.

Data collection tools are created but not used, partially because of the current data burden

In an attempt to get more or better data, new tools are added by the central level to the existing data collection efforts. However, the purpose and use of these tools are not always clear to the individuals working at the SDPs so they are not used.

One example is the adverse drug reactions tool. In Malawi, no one is currently recording information on adverse drug reactions, despite the Malawi Pharmacy, Medicines, and Poisons Board introducing a handbook with guidance and forms to record this information nearly two years ago. Similarly, Swaziland has also introduced a form titled the "adverse reporting tool" which is to be used by SDPs in case of any adverse drug reactions and sent directly to the Central Medical Store (CMS). During the assessment, not a single department or ward within an SDP identified this tool as part of their data reporting.

Figure 2. Commodities ordering flow in Swaziland
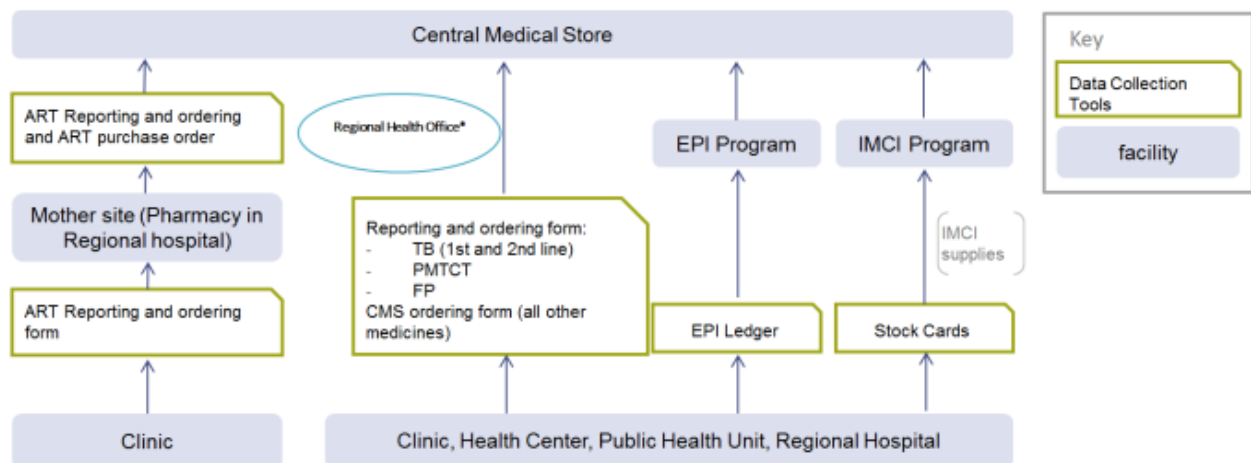
Acceptance of new tools is further discouraged when old tools are not phased out or old reporting templates not erased. In both Malawi and Swaziland, the assessment team found older, outdated versions of reports and forms in use alongside the new versions in several departments and wards. This leads to sparse data sets that move up the chain, and inconsistent information coming in month to month if the SDPs switch back and forth between new versions and old versions.

Lack of "protected time" for data collection and reporting makes balancing patient care with data management a challenge

A nursing assistant in Swaziland framed this issue in a direct manner: "Reporting needs its own time set aside, yet we also have to see patients in the same time allotted…. [There are] too many reports and too many people to see, hence maybe we don't do justice in filling the data properly."
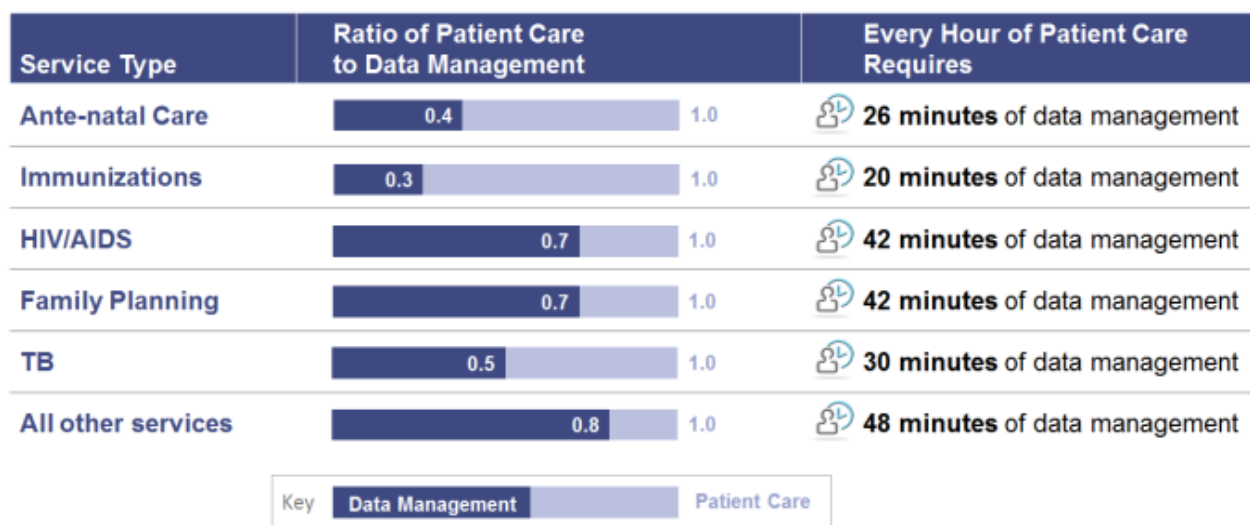
This burden becomes most noticeable when the time required for data management is illustrated in relation to every hour of patient care delivered. Figure 3 shows time estimates provided by Swaziland respondents at the SDPs for completing each form, register, and report needed to include all aspects of data management required as part of their position. If a Swaziland health worker had to accurately provide all the required data while also seeing patients, she or he would need to work beyond the allotted work hours each day just to finish that day's data management.

There is too much emphasis on collection, and not enough on sharing

Multiple forms, reports, and registers exist throughout the system, but there are not similar structured tools for sharing, analyzing, and interpreting results. In Malawi, for instance, the Central Medical Stores Trust does not share current inventory levels of commodities with the health facilities, leaving a long delay between an order request from a facility and a notice of an unfilled order at the time of delivery, resulting in the facility unprepared for a longer stock-out period than anticipated. On the other hand, in Swaziland,

Figure 3. Time Estimates for Patient Care versus Data Management

Service Type	Ratio of Patient Care to Data Management	Every Hour of Patient Care Requires
Ante-natal Care	0.4 — 1.0	26 minutes of data management
Immunizations	0.3 — 1.0	20 minutes of data management
HIV/AIDS	0.7 — 1.0	42 minutes of data management
Family Planning	0.7 — 1.0	42 minutes of data management
TB	0.5 — 1.0	30 minutes of data management
All other services	0.8 — 1.0	48 minutes of data management

Key: Data Management — Patient Care

while the CMS does share stock status information with staff and senior medical officers at each facility on a weekly basis, it is still a work in progress to provide this information in a consistent way to decision makers higher up the system. Currently, it is an oral presentation when possible, highlighting stock-outs, stock availability, and reporting any challenges related to key program areas. None of these are official, standardized reports.

The lack of formal feedback loops is especially felt by individuals at the service delivery points, as demonstrated in the comment made by a district pharmacist in Malawi (see box 2). Health workers who are charged with collecting the data do not have a clear understanding of the point or value of all the data being tracked and collected. Very few respondents could say anything more

than, "it's needed to do my job," or "it explains what I do," since there is no feedback provided back to the health workers on their submitted reports. One of the nurses interviewed in Swaziland observed that, "[management needs to] improve feedback sessions on data we collect so we are encouraged to also see our efforts in what we do and why it is needed."

Delivery Data and Logistics Management Data Do not Inform and Support Each Other.

In most countries, the HMIS and LMIS are managed by different departments within the ministry and are not integrated at any level of the system. The two systems operate in parallel, both in terms of data flow and in terms of management personnel and data clerks overseeing them. As illustrated in the

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Box 2. Malawi District Pharmacist

Ruth works as a district pharmacist in one of the district hospitals in Malawi. A typical daily work schedule for her includes checking medicine quantities in wards, processing treatment sheets from the wards, dispensing to outpatients, collecting consumption data, ordering and receiving various commodities, and keeping the stock cards updated.

All of this work requires strong data management, usually taking three focused hours each day for data collection and upkeep of eight different forms or registers. She does not have a time set aside for this every day, and instead tries to catch up whenever free time from other work opens up. It is during reporting at the end of the month, that her time crunch becomes apparent— she needs at least 1.5 hours for two disease-specific reports, and at least five dedicated days to finish the LMIS report.

These time estimates for reporting don't include the one day needed to gather and find the source data and review documents for errors before starting the reporting.

She states right away that she is overworked and understaffed, while pointing out infrastructure constraints that make matters worse: for instance, stock-outs of paper forms and registers that sets data collection back for a few days or weeks until new ones arrive, or, the lack of internet access at the hospital which prevents her from submitting the LMIS report. For the latter, Ruth puts the report on a flash drive, and using her own time and funds, takes it down to an internet café to submit.

While she believes in the need for data for better systems performance and stock maintenance, she is unsure if the central level is paying the necessary attention to facility-specific data. If they indeed were paying attention to the LMIS reports she sends, then, "why are they sending items to the facility that is not needed when [her] report clearly showed that there was enough," she wonders. When asked to identify possible changes, she said that having a person whose sole task is gathering and reporting data would greatly benefit staff who simply don't have enough capacity to do it themselves and who don't have protected time set aside for data work within current responsibilities.

Malawi example in Figure 4, data collection at the SDP for both logistics and service delivery information is often handled by the same set of people. However, service delivery program managers at the central level often do not have access to aggregate logistics data and reports nor do central level logisticians have access to aggregate service delivery statistics and coverage information.

Stock cards were created to be as the single source of commodity inventory data their role is not reinforced

Stock cards are essential to managing supplies and the flow of commodities in and out of wards and departments within a facility;

their purpose, if maintained regularly, is to serve as the definitive source of real-time commodities inventory.

Yet, out of 14 individual interviews conducted in Swaziland, only two nurses referred to the stock card along with a physical count for validation as their data source for completing order forms. All other respondents, especially at the mid-level larger service delivery points, mentioned using the stock card, in addition to two to three patient registers, to complete a single inventory report or order form. This is not unique to Swaziland either, with SIAPS and partners encountering incomplete and inaccurate stock cards in other countries as well.

Figure 4. Flow of information (HMIS and LMIS) and medical commodities
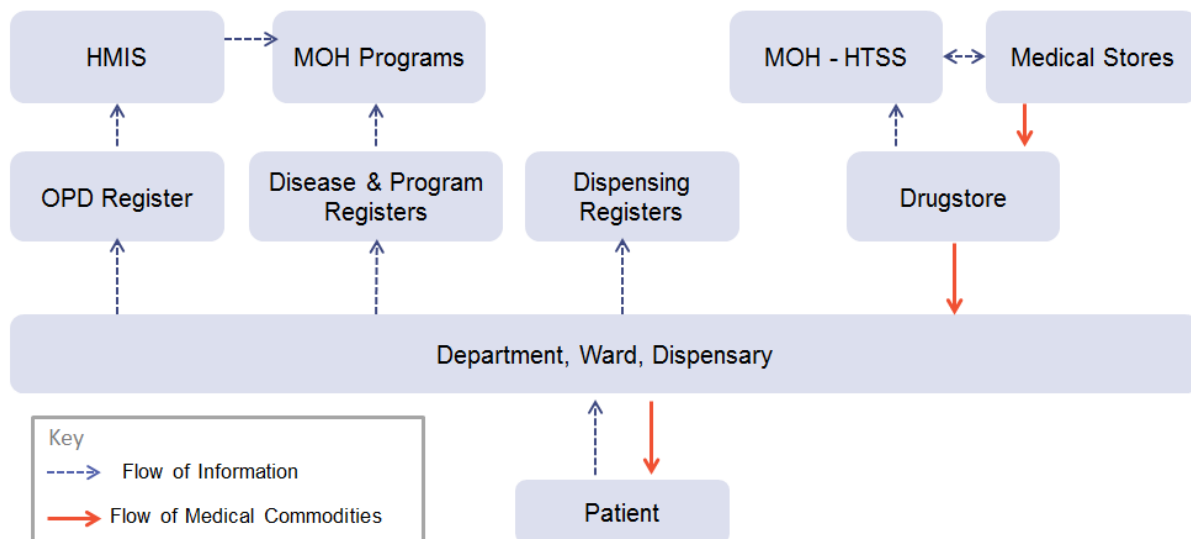
RECOMMENDATIONS

The themes above illustrate a perpetual cycle that both creates and reinforces the current data burden felt at the SDP. Health workers are required to collect, aggregate, and maintain data but are not provided with the context of or the feedback on the purpose of the data collection and therefore do not see value in the data. This is then compounded by the fact that health workers simply do not have time to focus on data management, thus leading to possibly poor quality data being transmitted up the chain. Decision makers on the receiving end in turn doubt the veracity of the data, which then leads to unused data or requests for yet more data to be collected. All of the people who were interviewed as part of this project agreed on the following fundamental principle: data collection and reporting should be limited to those data that have the greatest potential impact on the system for the least burden on the individual.

With this principle in mind, we recommend ministries of health and their donors and partners consider the following recommendations to decrease the current data burden and improve overall data quality. The recommendations start with changes that all countries, regardless of infrastructure capacity, can make within their health systems, followed by specific recommendations dependent on information systems capacity and telecommunications network stability and use.

Recommendations for All Countries

Leaders and Managers Have Major Role in Improving Accuracy of Data Reporting

There is a lack of understanding and absence of belief on the part of the respondents that the data they collect is integral to the operations of the whole health system. Strong leadership at the facility or district level is critical to

addressing this issue. Facility managers or clinic directors or district information systems officers should help health workers understand the costs and benefits of accurate data reporting by regularly emphasizing that the time used for record-keeping is time well spent. Patients also need to be given the message and understanding that the time used for records management helps ensure that the service they get is continuously improving. Leadership at these levels can be provided with trainings on how to engage with staff and patients on this issue, as well as provided with job aids to show good leadership and management practices related to data systems.

Support the Critical Role of Health Workers in Data Management to Improve Quality.

Requiring health workers to do a better job at collecting and reporting data requires a significant time investment on their part, so the health system needs to do more to motivate and support the human resources within it to see improvements. Specific interventions around human resources at the service delivery points can be technical, organizational, or behavioral in nature[6]:

Technical interventions include:
- Defining and prioritizing key data points so that the health worker is aware of which ones to pay particular attention to for accuracy, especially when time is limited
- Defining expected values (or ranges) for data entries and asking the user to confirm suspect or unusual entries

Organizational interventions include:

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[6] For more details: Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program. 2014. *Promising Practices: Data Management*. Arlington, VA: Management Sciences for Health.

- Establishing review teams to discuss data reported by individuals and its perceived accuracy
- Developing guidelines on how to use information, along with clear roles and responsibilities for individuals
- Performing periodic, unannounced, audits of submitted data

Behavioral interventions include:
- Training staff in skills and habits that encourage improved data quality, both collection and utilization
- Providing feedback mechanisms, particularly from routine supportive supervision, to encourage use of information
- Making documentation and guidelines readily available
- Providing periodic refresher training

Institute Regular and Standardized Feedback Loops to the Service Delivery Points

The Chief Pharmacist of Swaziland (see box 3) identified the need for sensitizing health workers on the importance and need for the data they collect as crucial to keeping the health system running smoothly. This was a recurring comment made by other respondents as well, particularly at the service delivery points. The person in the equivalent role in Malawi noted that frequently, stock-out data is reported from facilities but further investigation has revealed these were data entry and aggregation errors, and stock is in fact quite sufficient at the facilities.

As noted earlier, this is the cyclical nature of data mismanagement leading to poor decision-making that affects all levels of a health system. When problems are identified with reported data, it is important to communicate this back to the relevant facilities to address them and re-enforce the message that this data that has been sent back is most essential to decision making. In Swaziland, the central-level Supply Chain Working Group meets each month to look at inventory and consumption data reported by each facility; this data is used by the group to make quantification and procurement recommendations for the future. Yet, several of the respondents at the facilities

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Box 3. Chief Pharmacist, CMS, Swaziland

The role of the chief pharmacist in Swaziland involves giving policy direction for pharmaceutical services, developing guidelines and standard operating procedures related to the use and practice and regulation of medicines. The chief pharmacist is also responsible for the overall logistics and stock management of medical commodities undertaken by CMS staff. Access to quality, real-time data is thus crucial to this job.

The chief pharmacist listed several problems seen in the reports sent to CMS by the facilities: the data is missing from the system, or the report is incomplete, or is simply wrong, or is delivered late due to transport issues. The chief pharmacist accepted that the problem is part of a larger cycle of people not being aware of the importance of data, and wondered if improvements in data quality can take place once the central level takes time to re-sensitize people at the facility level on the need for this information and instituting regular feedback session back to them.

CMS receives seven monthly reporting and ordering forms from all the facilities in the country, and in turn, develops three reports shared with the Ministry of Health and management at all the facilities. The information in these reports from CMS are all internally produced—CMS staff record warehouse stock levels and stock received on a weekly basis and share this information with facilities. The seven reports from the facilities are used to gauge the stock needs for each facility and the subsequent delivery quantity that CMS would make. The chief pharmacist would like to use the data from the facilities far more than CMS currently can when making reports to the government or vertical disease programs, and has ideas for how this can be done, but currently does not have the manpower or the means to comb through all that information for the high-level data that is needed in the reports to the ministry and vertical programs.

did not seem aware of this fact—that the data they collected and reported was used for making such crucial procurement and distribution decisions. There is also a need for knowledge transfer of such quantification and forecasting exercises at the facility level—a member of the Swaziland Supply Chain Working Group noted that the facilities should be using their own data to make internal decisions on how much to order, paying particular attention to consumption patterns over seasons and years. The knowledge on how to do this can be passed along to the facilities through the feedback loops to show how the information is used and how the facilities in turn can use the data.

A successful example of this is the Supply Chain Information Portal used in Bangladesh. The portal allows local, facilities-specific stock data to be visible alongside procurement information at the national level, highlighting a cyclical feedback loop where all levels of the health system are privy to the data and how it is used for procurement or other decision making. Not only is Bangladesh paving the way by showing that countries can be transparent with their data and procurement decisions by making it available to anyone who is interested in the system, but it is also helpful to the facilities to see how the data they're collecting and reporting is widely accessed, looked at, and used by several different stakeholders.

Hire One-Time or Roving Data Clerks to Assist With Record Keeping at the Service Delivery Points

The primary training, and sometimes the only training, that doctors, nurses, and nursing assistants receive is in clinical care. This is their primary duty at the service delivery point, and it is critical that they document case notes on the care provided to patients. All other paperwork required tends to be more administrative in nature. Given the severe shortage of skilled health workers in LMICs, their time can be freed up

for patient care if some of the daily data collection, monthly summaries, data aggregation and reporting is task-shifted to a data clerk. This role could be shared across a few smaller facilities in order to decrease the financial cost. In addition, the data clerk role can help create the feedback loop between the service delivery point and health systems managers by bringing reports from regional or central levels back to the service delivery point, discussing areas for data management improvement with the facility staff, and helping staff create reports from the data available.

Recommendations for Countries with Limited Infrastructure

Stock cards are simple tools that can be maintained with minimal training and effort. Malawi is an ideal example using only stock cards, as they are the sole data source for completing any LMIS report at a health center or hospital, with no registers consulted for additional information or missing gaps. While there are challenges with keeping the stock card up to date, it is dealt with at the end of the month when regular physical inventory is done and when commodities are received.
It is important to have reasonable, unambiguous, written rules for use of stock cards that are widely understood and accepted and applied consistently. Stock cards that are regularly updated each time commodities move from storage to other departments within the health facility or directly dispensed to patients, even if it takes a few minutes away from direct patient service, can decrease overall time spent on data reporting and management. Exploring electronic stock cards —where resources and infrastructure allow— can also help to automate this process.

Outside of data points used within facilities for patient care and management, ministries of health and their partners can have an impact on the data burden on health workers by comprehensively cataloging,

Box 4. Staff Nurse, Swaziland

Patricia (PHU) in Swaziland. On a busy day, she sees between 30 and 40 patients, on other days, about 10 to 20. In addition to the time spent on direct health service to the patient, she needs about 12 minutes for completing the antenatal care register and stock card. Similarly, if an infant makes an immunization visit, she spends 20 minutes doing relevant data collection and entry for that immunization session. For patients seeking family planning counselling, she needs 22 minutes per patient for form and register completion. There is not enough time in her work day to keep up with all the paperwork, so on busy days her first focus is always the people waiting for care.

Once a month, she is also responsible for data entry onto a PMTCT summary report and two sets of ordering forms for PMTCT and family planning commodities. She estimates it takes her three hours in total for these documents, largely because of the multiple data sources: the PMTCT summary report, consisting of 90 indicators, requires her to consult four different patient registers. The two ordering forms rely on the stock card and four patient registers for their information.

She says the single greatest challenge she faces in completing these reports is "incomplete information;" she has to track down the information from other nurses within the ward and jog her own memory because the source data registers and stock cards are often incomplete. When asked how can she be better supported in this area, she responded, "Simplify the registers, it is too cumbersome to go back to all the registers for a single report; provide more training on how to maintain the registers so we understand what data is really needed by others."

analyzing, and then clarifying the role of each form, register, and report currently in use at hospitals and health centers. As shown in the profile of the Swaziland Staff Nurse (box 4), this clarification and simplification would receive the backing of the facilities as well. This includes thinking through how essential the data on each register, form or report really is to decision-making at a higher level. Collecting minimal data creates a streamlined process that requires less training and less staff effort. If there is no immediate response to the question, "What is this data point used for?" or "What decision does it help make," it should then be considered for elimination from the data collection and reporting tools.

A basic example of simplification of registers would be the information asked within patient registers. As noted earlier, in most LMIC health facilities, each ward, whether for out-patient or in-patient service, has a set of registers that all ask for full patient details, including repeated demographic information, whereas one central register for demographics would be

enough for tracking and follow-up of patients.

cStock, an SMS-based stock reporting system used by community health workers in Malawi, is an example of a system that only collects minimal data points due to the character constraints of SMS messaging and the small number of commodities managed by community health workers. Yet cStock has shown that many of the critical decisions about restocking, quantification, and positioning of stock could be calculated based on a single data point—stock on hand—as long as it is tracked regularly and stored in an electronic system that can retrieve the data to understand and track patterns over time. This streamlining and simplifying of data collection for supply chain purposes could be replicated beyond community health workers.

However, it is important to note that simplification should go hand in hand with clear guidelines that they replace the older, more cumbersome tools instead of in addition to the other processes already in place. This has not necessarily been the

case with cStock, since it has not replaced the two paper-based stock reports still required of community health workers.

Recommendations for Countries with improving telecommunications infrastructure

Deploy Appropriate Electronic Information Systems to Support Data Management, Improve Data Quality, and Increase Data Accessibility

The redundancy of data reporting can be reduced by the establishment of a single data repository, such that a single data submission from a department or ward at a service delivery point meets the requirements of multiple entities at the regional and central level. Depending on internet connectivity and infrastructure, the possibility of implementing an electronic system should be considered. This could even take the form of a single repository that is a stand-alone website or portal that receives data from multiple sources. This is also beneficial in combining HMIS and LMIS data used by central level management that operate separately, but helps the health worker at the service delivery point that collects and reports both sets of information.

Direct to digital technologies (such as the use of tablets for data collection) can help ease repetitive data collection by decreasing duplicative data points and making it more visible and usable. Other technologies that use scanning technologies to digitize paper forms, like ODK Scan or Captricity, can also make paper-based data more accessible by digitizing existing paper forms and registers, though they do not necessarily help with decreasing duplication unless the paper form redundancies in the system have already been fixed.

CONCLUSION

Although many ministries of health, health workers, implementing partners, and donors recognize that the current data management burden is untenable, there is currently a lack of a common understanding of how to define, measure, and reduce the data burden on frontline health workers. For instance, Malawi has undertaken efforts in the past to revise LMIS reports, but which resulted in more data points being added as opposed to removed, with each stakeholder wanting to ensure their data point was included. A systematic way to assess the impact of a poorly designed form, register, or report, is needed to avoid such problems. As the examples and themes identified in this brief highlight, it is vital to carry future work through by developing standard definitions to describe data burden as well as create indicators to quantify it, and to share this information widely.

ANNEX A. ASSESSMENTS BACKGROUND AND METHODOLOGY

Purpose and Objectives of In-Country Assessments

Purpose
Given the lack of research on health worker data burden reduction as identified above, and in order to identify and implement innovative ways to reduce this burden on the health worker, the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) conducted a systematic review of the data management and use practices of supply chain management and pharmaceutical services at the last mile. Thus, this policy brief is the result of the review of existing data capture tools (including e-health and m-health tools) and approaches used in two country programs (Malawi and Swaziland) to support data management, particularly related to pharmaceutical services, and to find out how (much) the data being collected is in reality being used for decision-making.

Objectives
    a. To identify the data being collected at the service delivery points (health centers and hospitals) and the use of this data for decision-making at all levels of the system;
    b. To identify the tools and approaches health workers are currently using to manage health services and pharmaceutical data; and
    c. To determine the level and causes of data burden at the last mile.

Background: Health system structures in Malawi and Swaziland

Malawi
Nearly all formal health care services in Malawi are provided by three agencies: the Ministry of Health (MOH) provides about 60%, the Christian Health Association of Malawi (CHAM) provides 37%, and the Ministry of Local Government provides 1%. Other providers, such as private practitioners and commercial companies, provide the remaining 2%.[7] Public sector health services in Malawi are provided at three levels: primary, secondary, and tertiary. Primary-level services are delivered by rural hospitals, health centers, health posts, and outreach clinics, as well as individuals such as Health Surveillance Assistants (HSA) and Community Based Distribution Agents (CBDA). The secondary level, consisting of district hospitals and CHAM hospitals, mainly supports the primary level by providing surgical backup services, mostly for obstetric emergencies, and general medical and pediatric inpatient care for common acute conditions, with some hospitals also providing some specialized health care. Tertiary hospitals provide services similar to those at the secondary level, along with a small range of surgical and medical interventions. The Central Medical Stores Trust (CMST), a government entity independent of the MOH, is the main source of pharmaceutical commodities in Malawi, with all MOH facilities mandated to procure from CMST.

Swaziland
The Ministry of Health (MoH), also referred to as the National Health Office is the government body responsible for all health and hygiene related activities within Swaziland. Directly reporting

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[7] Ministry of Health 2007. Malawi National Health Accounts (NHA) 2002-2004, Department of Health Planning & Policy Development, Lilongwe, Malawi.

to the MOH are the national health programs (vertical programs focused on specific diseases such as TB, HIV/AIDS; IMCI; EPI; etc.), the Central Medical Store (CMS), and regional health offices (4 in total, representing each region within the country). The regional health offices coordinate and manage the hospitals and all other SDPs within it.

Each region has one regional hospital, health centers, public health units, and health clinics. Public health units (PHU) are either located within the same vicinity of a health center (HC) or a hospital; their functioning is guided by the entity they're located within. For instance, PHUs within the HCs are considered as part of the HC for administrative purposes, and as such, the clinical and commodities data they generate is consolidated in the HC's reports. But, PHUs within the regional hospitals are considered a separate, independent administrative entity and the data reporting flows are separate.

Only the regional hospitals and health centers have a pharmacy and qualified pharmacy personnel.

Previously, each region had a regional pharmacist (one per region) located at the regional health office; their positions were made possible through The Global Fund to fight AIDS, Tuberculosis, and Malaria (GFATM). All requisitions from SDPS in a region were sent to the regional pharmacist who then sent the necessary data to the CMS. Funding from GFATM ended in December 2013, and these positions were made redundant. All stock requisition forms from each SDP in the country is now sent directly to CMS; however, sometimes the facilities send the forms to the RHO due to habit, leading to lost or delayed stock requests. The CMS has a Chief Pharmacist supported by a Reproductive Health Commodities Coordinator, and some data clerks.

Assessment Methodology

Malawi
A combination of six district hospitals and two health centers were chosen to help articulate the variable data collection processes that exist within them. At each facility, the in-charges and any individuals involved in the collection and recording of pharmaceutical data were interviewed and the various forms, registers, and reports used at the facility were documented. In addition, two people from the central level were interviewed.

The in-country data collection team found it challenging to have a list of questions and ask the in-charge of the pharmacy. As the staff do not typically have a mental tally of the forms, data sources, or reports captured or used in their work, it was more helpful to identify a few different commodities and track those through various processes. For instance, LA, an antimalarial, was followed from the time ordered to the time dispensed or administered to a patient. In addition, it was necessary to observe the pharmacy over time as new forms, registers, and reports would surface throughout the work day that were not reported during the initial enumeration of these items.

No distinct questionnaires were used in this effort since the data collection activities in Malawi were a precursor to the efforts undertaken in Swaziland. The detailed assessment tools piloted by the Swaziland team were developed based on the experiences and feedback of the Malawi data collection team.

Swaziland
Of the four regions in Swaziland, Hhohho was selected because it was the most easily accessible. The in-country SIAPS data collection team aimed the site selection to be representative of the health system structure identified above. At the service delivery points, data was collected from the regional hospital, the health center, a health clinic, and two public health units (one located within the health center and one within the regional hospital). At the central and regional levels, the national health office (the Ministry of Health) the Central Medical Store (CMS), the Regional Health Office (RHO), and selected national health programs were targeted.

Participants were selected purposively from each of the selected sites targeted for the assessment:
- At the SDPs, interviews were conducted with those who were in charge of the department or ward and responsible for completing and submitting reports, forms, and registers, particularly related to pharmaceutical commodities.
- At the regional level, those who were in charge of LMIS and HMIS data were interviewed as well as those overseeing the facilities at the lower levels and submission of reports from the lower levels.
- At the central level, program managers were interviewed from selected health programs. Particularly, within CMS, those responsible for the medicines within the different health programs were interviewed along with the chief pharmacist.

Limitations of Assessments

A number of donors and partners working within Malawi and Swaziland contribute to the provision and collection of data related to pharmaceutical commodities and health service delivery. Many of these partners have separate reporting processes that health workers are asked to complete. These assessments, however, only sought to document the flow of information and commodities within official ministry of health channels and requirements in the two respective countries.

This brief contains data collected from both hospitals and health centers within the two countries. While it is intended to be representative of the general process and burden of data collection and reporting, it is not, however, a random selection of sites based on a rigorous selection mechanism. In Swaziland, the sites were selected based on accessibility (time taken to travel to sites and human resource personnel available to conduct assessment). In Malawi, the site interviews were conducted in conjunction with supervision visits of pharmacy assistants by a VillageReach supervision team.

Lastly, as mentioned earlier, the interview responses in Malawi were recorded in a less structured manner than the Swaziland assessment because there were no pre-determined questionnaires. As such, it has been harder to quantify and record the data burden in-country on a level similar to that of Swaziland.