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Africa
Health Service Delivery in Sierra Leone
Results of 2018 Service Delivery Indicator Survey

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GHNDR and GEDDR

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EXECUTIVE SUMMARY

The Service Delivery Indicators (SDI) provides a set of key indicators that benchmark service delivery performance in the health and education sectors in Sub-Saharan Africa. The overarching objective of the SDI is to ascertain the quality of service delivery in basic health services and primary education. This would in turn enable governments and service providers alike to identify gaps and bottlenecks, as well as track progress over time, and across countries. The broad availability, high public awareness, and a persistent focus on the indicators that SDI provide, will help mobilize policymakers, citizens, service providers, donors and other stakeholders to take the necessary steps to improve the quality of service delivery, and thereby improve development outcomes.

The first ever SDI survey in Sierra Leone visited a sample of 547 health facilities across the country between January and April 2018. The sample was composed of 501 public facilities and 46 private facilities. The survey team observed 1700 workers for absenteeism and assessed 818 health workers for competence using patient case simulation. The data collected are representative of the fourteen districts, of facility location i.e. urban/rural areas, facility ownership i.e. public/private, and level of facility i.e. hospital/health center/health post. The health workers were broken down into three categories: (i) doctors (specialist and general medical doctors), (ii) community health officers and assistants, and (iii) nurses/midwives.

This report presents the results from the implementation of the first SDI survey in the health sector in Sierra Leone. A unique feature of the SDI surveys is that it examines the production of health services at the frontline from the perspective of beneficiaries accessing services. The production of health services requires three dimensions of service delivery: (i) the availability of key inputs such as drugs, equipment and infrastructure; (ii) providers who are skilled; and (iii) providers who exert the necessary effort in applying their knowledge and skills. Successful service delivery requires that all these elements be present in the same facility at the same time. While many data sources provide information on the average availability of these elements across the health sector, the SDI surveys allow for the assessment of how these elements come together to produce quality health services in the same facility simultaneously.

What service providers know?

- Health providers in Sierra Leone could correctly diagnose less than half (44.6 percent) of the five tracer conditions.[1]
- Diagnostic accuracy rate varied across case conditions, ranging from 90 percent accuracy for pulmonary tuberculosis to 16 percent for malaria and anemia.
- Doctors correctly diagnosed two thirds (66.2 percent) of all the tracer conditions and CHO/CHA a little over than half (51.1 percent). Nurses correctly diagnosed only 39.1 percent.
- There were substantially large discrepancies between diagnosis and treatment across the board revealing a critical disconnect in provider knowledge and practice gap. With pulmonary tuberculosis, even though 90 percent got the diagnosis correct, only 4 percent provided the correct treatment.

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[1] Tracer conditions include malaria with anemia, diarrhea with severe dehydration, pneumonia, pulmonary tuberculosis and diabetes.

- Higher level facilities (hospitals) correctly diagnosed more of the tracer conditions with a score of 61 percent. This was followed by health centers (44.3 percent) and health posts (37.7 percent).

- Adherence to clinical guidelines in the management of the five tracer conditions was at 30.2 percent. The lowest was in health posts (25.3 percent), followed by health centers (30.1 percent) and hospitals (41.7 percent).
- Doctors adhered to more of the clinical guidelines (52 percent) followed by CHO/CHA (34.8 percent) and nurses/midwives (25.2 percent).

What service providers do?

- Outpatient caseload was 10 patients per health worker per day.
- Public facilities had a higher daily caseload at 10.3 patients per provider per day than private (6.8).
- Absence rate was 29.9 percent during an unannounced visit. The absence was particularly high in Freetown's hospital and health posts with 44.5 percent and 45.3 percent of staff absent, respectively.
- Among the districts, absenteeism rates were high in Western Rural (50.7 percent), Bombali (44.6 percent) and Kono (41.9 percent).
- CHO/CHA had the highest absenteeism rate of 32.3 percent followed by nurses/midwives (29.8 percent).

What service providers have to work with?

- 56 percent of priority drugs were available in Sierra Leonean facilities. Urban facilities had a slightly higher availability of priority drugs (60.9 percent) compared to rural facilities (53.9 percent).
- Facilities in Koinadugu had the highest availability of all priority drugs at 64.4 percent. Priority drugs for mothers were more available than drugs for children with average scores of 72.5 percent and 62.6 percent respectively.
- About 96 percent of health facilities provide immunization services, 60 percent stock vaccines of which 90 percent have a refrigerator in working condition. 96.3 percent of all vaccines were available in those health facilities.
- Less than a third (31.9 percent) of health facilities in Sierra Leone met the minimum medical equipment requirements. Health centers were typically better endowed in equipment (53.2 percent), followed by hospitals (34.5 percent), and then health posts (26.2 percent). The district of Bo had the worst score (19.4 percent) and Koinadugu scored highest at 55.8 percent.
- 51.1 percent of health facilities had at least one of the three forms of communication equipment (phone, radio or computer). Personal cell phones were the most widely available piece of equipment, followed by cell phones paid by the facility and computers. There was a large gap in the availability of computers in rural and urban facilities. Only 6.3 percent of rural facilities had computers compared to 36.7 percent of urban facilities.
- Less than half (47.7 percent) of the health facilities had access to all three types of basic infrastructure such as toilets, clean water and access to electricity. There was also a huge difference between health posts (38.2 percent) and hospitals (95.7 percent). The district of Kono scored lowest on the availability of all three types of infrastructure (18.3 percent).
- More than half (59 percent) of facility revenue comes from donors and NGOs, followed by user fees (21 percent); while local and central government together contribute 17 percent.

- Majority of facilities had a governing committee (94 percent) and received at least one supervisory visit from the DHMT in the previous year (91 percent).

What does this mean for Sierra Leone?

Sierra Leone continues to lag far behind in maternal, infant, and child mortality compared to its regional peers. While it had better indicators on caseload, management of maternal and neonatal complications, availability of drugs and infrastructure in the region; absence rate, diagnostic accuracy, adherence to clinical guidelines and equipment availability were worse off. **Equitable access to quality health services remains a key challenge**. While there has been some progress in Sierra Leone's health sector, more can be done to improve service delivery. Perception of quality at facilities is often a deciding factor in service utilization. Like many countries, Sierra Leone faces an inequitable geographic distribution of service quality. Quality and provider availability, which is still low is better in urban areas. The availability of medical equipment and level of diagnostic accuracy are also higher in urban areas than rural areas.

Inputs are important and the lack of medical equipment and infrastructure in facilities are concerning. Basic equipment as mandated by the Government, is not available at most primary health facilities. This is alarming given the fact that most of the population accesses care at a public primary health facility. There are also major challenges around infrastructure and drug availability. Less than half of the facilities in Sierra Leone have the required components for infrastructure. Drug availability, particularly for mothers and children is quite poor.

Availability of skilled human resources for health (HRH) remains a bottleneck to improving quality of care. In addition to increasing the volume of health workers to address the shortage of providers, improvements in management, supervision and training are critical to ensure quality health service delivery by a skilled HRH base. More importantly, mechanisms need to be designed to encourage performance among health workers. The survey found that provider knowledge and abilities are very low to deliver quality services. Training needs to be better focused with the main objective of capacitating health workers to accurately diagnose and treat the main causes of illness as well as to have the skills to refer complicated cases up to higher levels of care. There should also be a concerted emphasis on adhering to the national guidelines as far as managing critical health conditions is concerned. Secondly, the Government should ensure establishing systems for tracking staff availability during facility operation hours to reduce absenteeism.

Using data for decision making. SSL and the Ministry of Health and Sanitation played a critical role in implementing this first round of the SDI. There is strong capacity within SSL and the Ministry of Health and Sanitation to support data collection. Further capacity building efforts are needed in using this data for decision making through all levels of the health system. The next step would be to utilize annual health facility data along with other population-based surveys to target and support interventions especially in rural and vulnerable regions of the country. In addition, this first round of the SDI provided a good overview of the status of health service delivery and it also highlighted a number of nuances and intricacies of the Sierra Leonean health system.

An Important Opportunity. Sierra Leone emerged from a civil war (2002) and Ebola outbreak (2014) and since then, a bit progress has been made in the health sector, but much remains to be done. The opportunity to accelerate progress exists with the political will behind the Government's recently approved National Health Sector Strategic Plan that includes action points to improve maternal and child health as one of the key objectives. There is a need to put strong emphasis towards improving quality of care through legislation, regulation and supervision. Finally, the Government can make strides by implementing set of targeted and equitable reforms in the short, medium, and

long term that address the key challenges highlighted under the SDI and other recent analytic pieces to improve availability of quality public health services especially in rural primary health facilities.

Table 1: Sierra Leone SDI At-A-Glance

	Sierra Leone	Public	Private	Urban	Rural	Hospital	Health center	Health post
Caseload (per provider per day)	10.0	10.3	6.8	7.8	10.9	5.6	9	10.5
Absence from facility (% providers)	29.9	28.8	35.1	33.3	24.8	31.8	30.9	28.3
Diagnostic accuracy (% clinical cases)	44.5	44.1	48.4	50.9	37.3	61.0	44.3	37.7
Adherence to clinical guidelines (% clinical cases)	30.2	34.9	24.9	29.6	34.5	41.7	30.1	25.3
Management of maternal and neonatal complications (% clinical cases)	31.2	31.3	30.3	34.1	27.9	42.6	27.6	27.9
Drug availability (% drugs)	56.0	56.3	53.4	60.9	53.9	63.4	65.9	53.1
Equipment availability (% facilities)	31.9	32.9	20.6	40	28.3	34.5	53.2	26.2
Infrastructure Availability (% facilities)	47.7	45.2	74.3	73.0	36.5	95.7	75.4	38.2

Table 2. SDI Country Comparisons[2]

	Countries' average	Sierra Leone (2018)	Madagascar (2016)	Niger (2015)	Mozambique (2014)	Tanzania (2014)	Nigeria (2013)	Togo (2013)	Uganda (2013)	Kenya (2013)	Senegal (2010)
Caseload (per provider per day)	9.03	10.0	5.2	9.8	17.4	7.3	5.2	5.2	6	15.2	-
Absence from facility (% providers)	30.2	29.9	27.4	33.1	23.9	14.3	31.7	37.6	46.7	27.5	20
Diagnostic accuracy (% clinical cases)	47.2	44.5	30.0	26.9	58.3	60.2	39.6	48.5	58.1	72.2	34
Adherence to clinical guidelines (% clinical guidelines)	33.4	30.2	31.0	17.4	37.4	43.8	31.9	35.6	41.4	43.7	22
Management of maternal and neonatal complications (% clinical guidelines)	23.5	31.2	21.9	12.0	29.9	30.4	19.8	26	19.3	44.6	-
Drug availability (% drugs)	53.5	56.0	48.0	50.4	42.7	60.3	49.2	49.2	47.2	54.2	78
Equipment availability (% facilities)	55.8	31.9	62.0	35.9	79.5	83.5	21.7	92.6	21.9	76.4	53
Infrastructure Availability (% facilities)	38.6	47.7	28.4	13.3	34.0	50	23.8	39.2	63.5	46.8	39

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[2] https://www.sdindicators.org/

I. INTRODUCTION[3]

In the 15 years since the end of the civil war in 2002, there has been notable progress in Sierra Leone. The return to peace and stability and the ample availability of fertile land facilitated recovery and growth in agriculture. Urban areas have become local trading and commercial centers, and the capital of Freetown has seen many sources of new wealth and development. Poverty significantly declined from 66 percent in 2003 to 53 percent in 2011, and access to basic services improved, particularly in education and health. Sierra Leone experienced a steady increase in income per capita from 2001 to 2014, its longest period since independence in 1961. Per capita GDP went from stagnating in the period from independence to the civil war and contracting 3.4 percent on average per year between 1991 and 2001 (civil war) to increasing 5.9 percent on average per year from 2002 to 2014 (post-civil war period). There was steady growth in the postwar period until 2014, after which there was a severe contraction due to the collapse of iron ore production and the impact of Ebola on Sierra Leone.

> **Box 1: Why focus on service Delivery?**
>
> Health service delivery—unlike other services such as water and sanitation or housing in which service delivery models are technology or infrastructure intensive—is fundamentally different. Specifically, health service delivery have human resource intensive service delivery models. SDI therefore focuses on frontline service delivery and provider behavior because of the unique aspects of service delivery in these sectors:
>
> - The labor intensive and transaction intensive nature of the health sector's service delivery model.
> - The highly discretionary nature of work effort determining whether a nurse presents for work 24/7, often in tough working conditions.
> - Nurses and doctors are intrinsically motivated, but that institutional incentives attenuate or undermine this motivation.
> - The asymmetry of information—between policymakers and providers, as well as between communities and providers—is particularly acute in the health sector.
> - A second order result of how planning takes place is the dominance of the "WHAT" rather than the "HOW" of service delivery.

Despite this progress, Sierra Leone's economic system remains vulnerable, with large imbalances in the distribution of resources, political power, and knowledge. Health outcomes are among the worst in the world despite high levels of private spending. The country has the lowest life expectancy at birth in the world (at 50 years) and the worst maternal and child mortality rates in the world. Poor health affects economic growth as well as the ability of households to increase their incomes. Insufficient access to contraception, along with lower levels of female education, job opportunities, and empowerment, results in high fertility, which leads to a vicious cycle, as it strains public service delivery, constrains women's time and empowerment, and limits the resources available to invest in individual children. Labor lost to poor health lowers farm productivity, particularly in labor-intensive agricultural activities, and poor access to health has been identified as one of the major reasons for the high prevalence of food and nutrition insecurity in Sierra

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[3] Sierra Leone Systematic Country Diagnostic, The World Bank Group (2018)

Leone. Health shocks also limit households' ability to save and invest, including in income-generating assets. In addition, Sierra Leone has extremely high out-of-pocket expenditures. This burden falls disproportionately on the poor, as out-of-pocket health payments are regressive and the poor are more likely to forgo health care.

Sierra Leone has the most serious maternal and child health issues in the world. It had the highest maternal mortality ratio in the world, with a ratio of 1,360 per 100,000 in 2015. The Under 5 Mortality Rate (U5MR) is estimated at 120 per 1000 live births, and the stillbirth rate (SBR) at 24.4 per 1000 live births. For neonates, the leading causes of death are preterm and intrapartum conditions and neonatal sepsis; these three account for 80% of all neonatal deaths in Sierra Leone. For children surviving beyond 28 days of life, the three leading causes of death are malaria (responsible for 20 % of all under 5 deaths), followed by pneumonia and diarrhea.

The Ebola Virus Disease (EVD) outbreak, led to a decrease in non-Ebola health service utilization and significantly weakened the health system. There was an observed drop in Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCAH) service utilization ranging from 15% to 25%. The outbreak led to an important loss of health-care workers, further diminishing the availability and access to health services.[4]

Organization of Health Sector in Sierra Leone
As shown in Figure 1 the basic package of essential health services (BPEHS) in the country is delivered through both primary and secondary levels of healthcare.

Primary healthcare
Primary healthcare services are provided at four levels i.e. at three types of facilities and at community level. Primary health care facilities are referred to as Peripheral Health Units (PHUs). There are three levels of PHUs with clearly defined functions: 1) Maternal and Child Health Post (MCHP); 2) Community Health Post (CHP); and 3) Community Health Center (CHC). While MCHPs and CHPs have beds only used for observation, patients requiring further supervised care are referred to the CHC or hospital. CHCs, where a wider range of more complex services are offered, admit cases referred from the lower levels. A limited range of preventive and basic curative services are also available directly at community level (outside of health facilities but with linkage to PHUs through supervision, reporting, and supply chain management) by community health workers (CHW).

Maternal and Child Health Post - MCPH is the most peripheral level of PHU, serving a population of 500 to 5,000 within a 5 km (3 miles) radius of the facility. Staffed by MCH Aides, MCHPs are often the first facility level of contact for patients and serve as a link between community and CHWs. MCHP typically focuses on antenatal care, safe and skilled deliveries (without complications), post-natal care, and child health services including EPI, nutrition, and IMNCI.

Community Health Post – CHPs are usually situated in a smaller town, and serve a population of 5,000 to 10,000 or more within 8 km (5 miles) radius of the facility. These posts have similar functions

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[4] "Sustainable and Efficient Health Financing and Service Delivery in Sierra Leone" ASA

to the MCHP with added curative functions. An SECHN or Community Health Assistant (CHA) typically serves as the in-charge in CHPs.

Community Health Center - CHCs are usually situated in the chiefdom headquarter town or in a well-populated area with a catchment population of 10,000 to 30,000 or more within 15 km (10 miles) radius of the facility. The CHC has preventive and curative functions. It offers the most complex and skilled services within the primary care level of the health system. The in-charge in a CHC is a Community Health Officer (CHO), supported by a team consisting of a CHA, SECHNs, Midwives, MCH Aides, and other clinical and support staff. The CHC supervises the lower levels of care, including CHWs, MCHPs, and CHPs within its catchment area.

Secondary care

Secondary care is delivered in district hospitals. District hospitals receive referrals from primary care facilities, and accept walk-in patients directly. Although these hospitals are intended for secondary care institutions, they also provide many primary care services to the population in their immediate surroundings, including ANC services and under-5's clinics. District hospitals are open 24 hours, and serve the whole district, with a catchment population of about 500,000.

Figure 1: Levels of service delivery in Sierra Leone
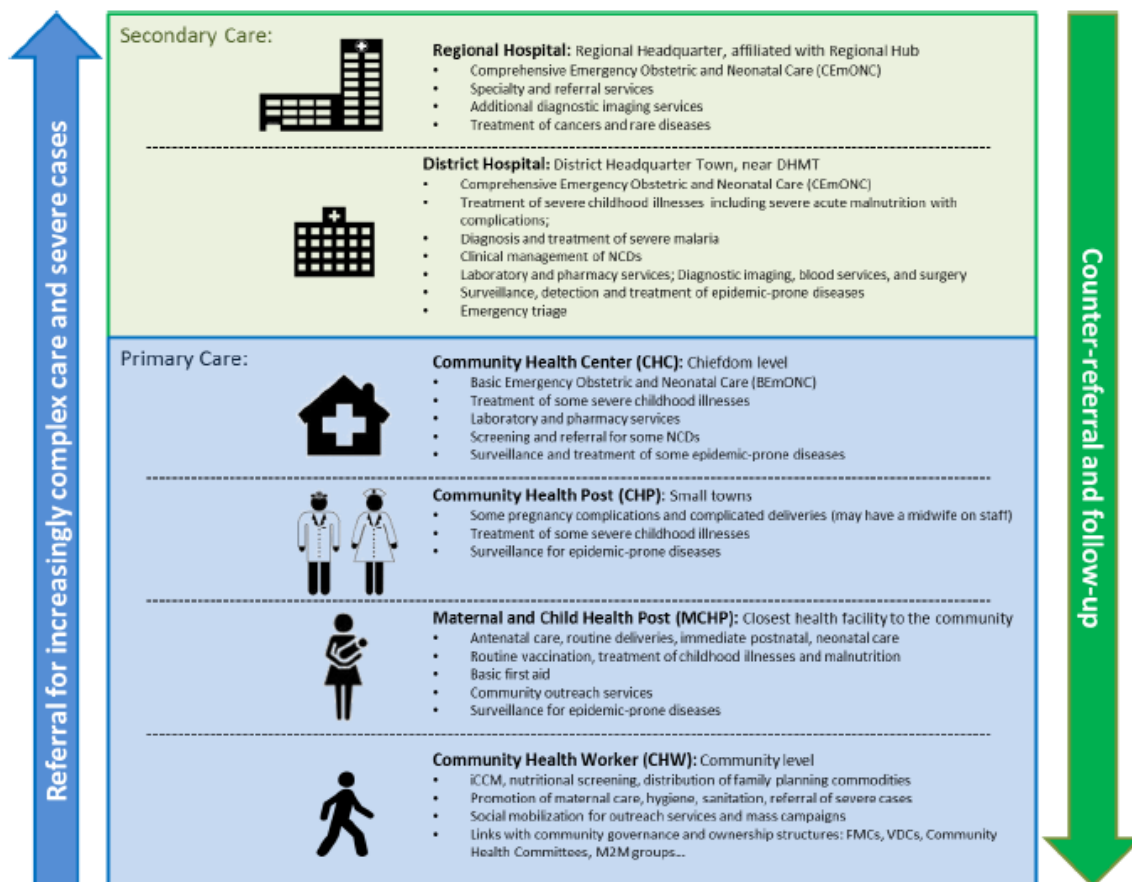
Source: Sierra Leone Basic Package of Essential Health Services, Report 2015

The foundation for delivering on health and healthcare goals depends on whether service delivery fundamentals are in place: Are health providers knowledgeable and skilled? Are they present at work? Are basic inputs available such as equipment and drugs? The SDI survey is essentially a return to the basics by shining light on these fundamentals.

Service delivery literature points towards the importance of functional health facilities, and more generally, the quality of service delivery.[5] Nurses and doctors are an invaluable resource in determining the quality of health services. The literature has not always drawn links between systems investments and the performance of providers, arguably the ultimate test of the effectiveness of investments in systems.[6] The literature is, however, clear that conditional on providers being appropriately skilled and exerting the necessary effort, increased resource flows for health can have beneficial health and education outcomes (see Box 1).[7]

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5 Spence and Lewis (2009).
6 Swanson et al. (2012).
7 Spence and Lewis (2009).

Box 2: The Service Delivery Indicators (SDI) Program

A significant share of public spending on health should contribute to good health outcomes. Understanding what takes place at these frontline service provision centers is the starting point in establishing where the relationship between public expenditure and outcomes is weak within the service delivery chain. Knowing whether spending is translating into inputs that teachers or health providers have to work with (e.g. basic equipment in health facilities, textbooks in schools), or how much work effort is exerted by health providers or teachers (e.g. how likely are they to come to work), and their competency would reveal the weak links in the service delivery chain. Reliable and complete information on these measures is lacking, in general.

To date, there is no robust, standardized set of indicators to measure the quality of services as experienced by the citizen in Africa. Existing indicators tend to be fragmented and focus either on final outcomes or inputs, rather than on the underlying systems that help generate the outcomes or make use of the inputs. In fact, no set of indicators is available for measuring constraints associated with service delivery and the behavior of frontline providers, both of which have a direct impact on the quality of services that citizens are able to access. Without consistent and accurate information on the quality of services, it is difficult for citizens or politicians (the principal) to assess how service providers (the agent) are performing and to take corrective action.

The SDI provides a set of metrics to benchmark the performance of health clinics and schools in Africa. The Indicators can be used to track progress within and across countries over time, and aim to enhance active monitoring of service delivery to increase public accountability and good governance. Ultimately, the goal of this effort is to help policymakers, citizens, service providers, donors, and other stakeholders enhance the quality of services and improve development outcomes.

The perspective adopted by the Indicators is that of citizens accessing a service. The indicators can thus be viewed as a service delivery report card on health care. However, instead of using citizens' perceptions to assess performance, the Indicators assemble objective and quantitative information from a survey of frontline service delivery units, using modules from the Public Expenditure Tracking Survey (PETS), Quantitative Service Delivery Survey (QSDS), and Staff Absence Survey (SAS).

The literature points to the importance of the functioning of health facilities and more generally, the quality of service delivery. The service delivery literature however is clear that, conditional on providers being appropriately skilled and exerting the necessary effort, increased resource flows for health can indeed have beneficial education outcomes.

The SDI initiative is a partnership of the World Bank, the African Economic Research Consortium (AERC), and the African Development Bank to develop and institutionalize the collection of a set of indicators that would gauge the quality of service delivery within and across countries and over time. The ultimate goal is to sharply increase accountability for service delivery across Africa, by offering important advocacy tools for citizens, governments, and donors alike; to work toward the end goal of achieving rapid improvements in the responsiveness and effectiveness of service delivery.

More information on the SDI survey instruments and data, and more generally on the SDI initiative can be found at: www.SDIndicators.org and www.worldbank.org/sdi, or by contacting sdi@worldbank.org.

II. METHODOLOGY AND IMPLEMENTATION

A. Implementation

The SDI survey interviewed 547 heath facilities across Sierra Leone between January 2018 and April 2018. 1700 workers were observed for absenteeism and 818 health workers were assessed with clinical cases. There were 32 hospitals, 99 health centers and 416 health posts. Within the sample, there were 501 public facilities and 46 private facilities across Sierra Leone. Further, there were 382 rural and 165 urban facilities. The data collected are also representative of the districts, urban and rural areas strata.

B. SDI survey instruments

SDI uses a set of instruments to collect data and compute indicators. The instrument consists of 4 modules each of which captures specific information and is directed to the person(s) in the facility who is best informed and able to provide the relevant information.

Table 3: SDI Health survey instrument description

Module of Instrument	Module Title	Main respondent	Description
Module 1	Facility information	Head of facility	Information about the facility's: functioning, infrastructure, equipment, materials, supplies, and tracer drugs.
Module 2A and 2B	Health Worker Roster	2A: Head of facility 2B: selected medical staff	2A: Administered to head of facility to obtain a list of all health workers. 2B: Administered to randomly selected health workers to measure absence rates and to collect information about worker characteristics.
Module 3	Clinical knowledge assessment	Medical staff	Administered to medical personnel who regularly treat patients to evaluate their competency in the diagnosis and treatment of routine pathologies. Done using vignettes.
Module 4	Facility finances and governance	Head of facility and accountant (where relevant)	Collection of information about revenues, expenditures, management, governance, and drug provision for the facility.

Module 1 captures general information about the facility such as the availability of equipment or infrastructure. The module is also the vehicle to check for the availability of commodities, check whether the cold chain is in place and working, among others. An important aspect to note is that the information collected is verified by the enumerator. For instance, the infant scale must be seen and tested, a specific drug must be seen and the expiration date verified. On the cold chain the team does not rely on the temperature shown on the fridge instead they carry their own thermometer to

measure the fridge temperature. Module 4 on the facility's financing, management, and governance follows the same principles.

To measure absence, the SDI uses an internationally accepted protocol of an unannounced second visit. During the first visit, which is announced, the team records the full staff roster for the health workers and the number of non-health workers in the facility. From the roster a maximum of 10 people are randomly sampled for follow up. Three days or more later the team visits the facility again but this time they come unannounced. The team then ascertains the whereabouts of the 10 people which were selected earlier. The team does not rely on the report of the head of facility or any other staff instead each person in the list of 10 must be seen ion the facility to record them as present. The current activity of each staff is also documented.

Module 3 provides the information on provider's knowledge which is measured through Patient Case Simulations (PCS, also called "vignettes"). With this methodology, one of the surveyors acts as a case study patient with some specific symptoms. The clinician who is informed of the simulation is asked to proceed as if the enumerator is a real patient, while another enumerator acts as an observer. High quality performance in outpatient consultations entails at least the following: (i) to systematically arrive at a correct diagnosis (or preliminary diagnosis); (ii) to provide an appropriate treatment (or referral); and (iii) to reveal important information to the patient about which actions to take (e.g., how to take the medicine, what to do if the patient does not get better, etc.). The methodology presents several advantages: (a) all clinicians are presented with the same case study patients, thus making it easier to compare performance across clinicians; (b) the method is quick to implement, and does not require waiting for patients with particular diagnoses; (c) it is not intrusive and eschews ethical issues that arise with real patients. The method also has its drawbacks. The most important one is that the situation is a not a real one and that this may bias the results.[8]

C. Sampling

The overall objective of the SDI is to produce accurate and representative indicators at the national, urban and rural levels. Indicators are representative at the district level for this Sierra Leone health SDI and for all 14 districts. The main units of analysis are health facilities as well as health workers. The SDI also aims to produce accurate information on providers at varying levels in the pyramid i.e. hospital, health center and health post as well as cadre (doctors, CHO/CHA and nurses), ownership (public versus private) and location status (urban versus rural).

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[8] Comparisons of Patient Case Simulations with Direct Observation of real patients in low income contexts have revealed that performance scores typically are higher with Patient Case Simulations, but that the correlation between the two measures is substantial (e.g., Das, Hammer, and Leonard, 2008). Some authors have interpreted the score of Patient Case Simulations as a measure of competence or ability rather than actual performance (Das and Hammer, 2005, Leonard et al., 2007). There is reason to believe that Patient Case Simulations measure a blend of competence and actual performance, and that the blend depends on the actual design and framing of the tool. The Patient Case Simulations used in SDI were framed to resemble actual performance as closely as possible. Nevertheless, one should be aware of a potential upward bias of the *absolute* performance levels. As a measure of *relative* performance, though, Patient Case Simulations have considerable merit.

The sampling for Sierra Leone SDI has been undertaken by Statistics Sierra Leone (SSL): the Sierra Leonean national statistical office. The sampling frame used for the Sierra Leone health SDI was the list of health facilities obtained from the MoHS before the start of the field work. The original sample frame contained 1300 health facilities with geographic identifier variables such as region, district, and chiefdom.

A multi-stage clustered sampling strategy is adopted. The first stage cluster selection is carried out independently within each stratum. The primary cluster considered is the district which is therefore the primary sampling unit (PSU). All 14 districts have been sampled. Except for the hospitals, other health facilities were randomly drawn with equal probability as a secondary sampling unit (SSU). As there was only one hospital in each district, the selection was automatic. However, all facilities were sampled for two districts (Kailahun and Koinadugu). At the third stage, health workers were selected.

Box 3: Analytical underpinnings

Service delivery outcomes are determined by the relationships of accountability between policymakers, service providers and citizens.[a] Human development outcomes are the result of the interaction between various actors in the multi-step service delivery system, and depend on the characteristics and behavior of individuals and households. The delivery of quality healthcare is contingent foremost on what happens in health facilities, where a combination of several basic elements have to be present in order for quality services to be accessible and produced at the frontline. This in turn depends on the overall service delivery system, and these institutions and governance structures provide incentives for the service providers to perform. (see Figure 2)

Figure 2: Relationships of accountability: citizens, services providers and policymakers
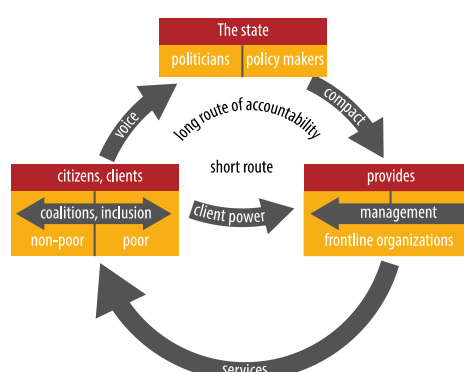
Source: a. World Development Report, 2004.

Service Delivery Production Function
Consider a service delivery production function, f, which maps physical inputs, x, the effort put in by the service provider, e, as well as his/her type (or knowledge), θ, to deliver quality services into individual level outcomes, *y*. The effort variable, *e,* could be thought of as multidimensional and, thus, include effort (broadly defined) of other actors in the service delivery system. We can think of this type as the characteristic (knowledge) of the individuals who are selected for a specific task. Of course, as noted above, outcomes of this production process are not just affected by the service delivery unit, but also by the actions and behaviors of households, which we denote by ε. We can therefore write: $y = f(x,e,θ) + ε$

To assess the quality of services provided, one should ideally measure $f(x,e,θ)$. Of course, it is notoriously difficult to measure all the arguments that enter the production, and would involve a huge data collection effort. A more feasible approach is, therefore, to focus instead on proxies of the arguments which, to a first-order approximation, have the largest effects.

Indicator Categories and the Selection Criteria
There are a host of data sets available in health. To a large extent, these data sets measure inputs and outcomes/outputs in the service delivery process.

Box 3. Analytical Underpinnings (cont'd)

The proposed choice of indicators takes its starting point from the recent literature on the economics of service delivery. Overall, this literature stresses the importance of provider behavior and competence in the delivery of health services (as opposed to water and sanitation services and housing that rely on very different service delivery models). Conditional on service providers exerting effort, there is also some evidence that the provision of physical resources and infrastructure has important effects on the quality of service delivery.

The somewhat weak relationship between resources and outcomes documented in the literature has been associated with deficiencies in the incentive structure of health systems. Indeed, most service delivery systems in developing countries present frontline providers with a set of incentives that negate the impact of pure resource-based policies. Therefore, while resources alone appear to have a limited impact on the quality of health in developing countries, it is possible inputs are complementary to changes in incentives, so coupling improvements in both may have large and significant impacts (Hanushek, 2006). While budgets have not kept up with the expansion in access in recent times, simply increasing the level of resources might not address the quality deficit in health without also taking providers' incentives into account.

SDI proposes three sets of indicators: (i) provider effort; (ii) competence of service providers and (iii) availability of key infrastructure and inputs at the frontline service provider level. Providing countries with detailed and comparable data on these important dimensions of service delivery is one of the main innovations of the Service Delivery Indicators. Additional considerations in the selection of indicators are (i) quantitative (to avoid problems of perception biases that limit both cross-country and longitudinal comparisons), (ii) ordinal in nature (to allow within and cross-country comparisons); (iii) robust (in the sense that the methodology used to construct the indicators can be verified and replicated); (iv) actionable; and (v) cost effective to collect.

Table 4: Health SDI Indicators

Provider Effort
Absence rate
Caseload per provider
Provider Competence
Diagnostic accuracy
Adherence to clinical guidelines
Management of maternal and neonatal complications
Availability of Inputs
Drug availability
Medical equipment availability
Infrastructure availability

Notes: a. The indicators listed here are not the only metrics collected in SDI surveys. For example, below are some example of management and governance data included the instrument. Examples: Roles and Responsibilities in Facilities, Government Supervision, Time Use, Leadership, People Management Practices, User Fees, Financial (cash) support to facilities by source, Community Involvement etc.

Table 5: Survey Sample

	Total	Share of total sample (Unweighted, %)	Share of total population (Weighted, %)
Facilities	547	100	100
Hospital	32	5.9	3.7
Health center	99	18.1	19.9
Health post	416	76	76.4
Ownership			
Public	501	91.6	91.6
Private	46	8.4	8.4
Location			
Freetown	21	3.8	5.1
Urban	165	30.2	30.6
Rural	382	69.8	69.4
Healthcare workers	3093	100	100
Doctors	64	2.1	1.5
CHO/CHA	267	8.6	10
Nurses /Midwives	2762	89.3	88.5

Table 6. Sample for indicators of absence and competence

Cadre	Absence rate[a]			Competence indicators[b]		
	Total	Percent[c] (%)	Percent[d] (%)	Total	Percent[c] (%)	Percent[d] (%)
Doctors	28	1.6	2.5	31	3.8	10.8
CHO/CHA	188	11.1	9.8	161	19.7	21.3
Nurses /Midwives	1484	87.29	87.7	626	76.5	67.9
Total	1700	100	100	818	100	100

Source: Author's calculations using Sierra Leone 2018 SDI data
Notes:
a. Absence rate is calculated using all health workers (i.e. whether clinician or not, e.g. pharmacist, laboratory technician).
b. The competence indicators (e.g. diagnostic accuracy, adherence to clinical guidelines and management of maternal and neonatal complications) are measured using only those health workers who interact with patients or users). Note also that the provider must be present during the first visit to be interviewed for competence.
c. Unweighted share i.e. share of the sample
d. Weighted share i.e. share of population (all facilities in the country or all health workers)

III. RESULTS

Context

Sierra Leone's population is young, diverse, urbanizing, and rapidly growing. According to the 2015 census, the population of Sierra Leone is approximately 7.1 million, with 45.8 percent of the population under the age of 15, and 74.8 percent below the age of 35. The share of the population living in urban areas almost doubled from 21 percent in 1967 to almost 40 percent in 2015, with a high concentration in the capital Freetown, which has grown to a population of more than 1 million.

The most recent household survey, the 2011 Sierra Leone Integrated Household Survey (SLIHS), estimated the incidence of poverty to be 53.8 percent. This represents a 12.6 percentage point decrease from 66.4 percent in 2003, the first statistic available following the end of the civil war. However, the number of poor remained nearly constant, at around 3.3 million, over this period due to high population growth. Despite a decrease from 79 percent in 2003 to 66 percent in 2011, poverty in Sierra Leone remains disproportionately rural, with more than three-quarters of the poor living in rural areas in 2011.[9]

D. Delivering Health Services

In rural areas, Peripheral Health Units (PHUs) are probably the only resource most households have, the number of days health facilities offer services and the number of hours per day they operate are amongst the most basic indicators for measuring health service delivery. In Sierra Leone, health facilities are open on average 6.9 days per week (Table 7). There is little but significant difference between the time public and private health facilities are open. The number of hours facilities are open for outpatient consultations is critical in understanding accessibility to health services. On average, facilities are open for 21.6 hours per day. Private health centers have the shortest hours of operations at 16.2 hours per day. Public facilities are open for longer time in a day than the private ones.

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[9] Sierra Leone Systematic Country Diagnostic, The World Bank Group (2018)

Table 7. Hours and days of service delivery

	Sierra Leone	Freetown	Urban	Rural	Percent difference (%)	Public	Private	Percent difference (%)
Number of days per week facility was open (days)								
All facilities	6.9	6.9	6.9	6.9	0	6.9	6.7	3***
Hospital	6.8	6.9	6.8	.	.	7.0	6.7	4*
Health center	6.9	7.0	6.9	.	.	6.9	6.3	8***
Health post	6.9	6.8	6.8	6.9	1	6.9	6.8	2**
Hours outpatient consultations offered per day (hours)								
All facilities	21.6	22.1	20.8	21.9	-5**	21.8	19.4	11***
Hospital	21.4	22.0	21.4	NA	.	24.0	19.9	17**
Health center	20.8	24.0	20.8	NA	.	21.2	16.2	23*
Health post	21.8	21.2	20.6	21.9	-7*	21.9	20.1	8

Source: Author's calculations using Sierra Leone 2018 SDI data
Note: Level of significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The percent difference is between public and private; urban and rural public facilities.

Sierra Leone's health workers are distributed inequitably with majority of the high-skilled workers concentrated in the Western Area, especially Freetown, while the rural districts remain seriously underserved. Freetown has 40 percent of all the country's midwives, or 1 midwife per a population of 9,200 compared with Tonkolili district which has 1 midwife for a population of 53,000. Overall, Sierra Leone which has 2 skilled healthcare workers per 10,000 inhabitants is far below the WHO recommended minimum of 23 per 10,000. Besides, the skill mix of the health workforce is skewed towards curative services. In addition, the country also has a high number of volunteer health workers (they are called unsalaried health workers who are not included in the government payroll) working in the sector.

Table 8 shows the distribution of health workers by public/private and location. Facilities on average were staffed 6.4 health workers.[10] Urban facilities have almost over four times more staff (13.2 providers) compared to rural facilities (3.4 providers). On average, public facilities are less than half the size (5.9) of private facilities (11.9) in terms of number of staff.

Approximately 98 percent of health personnel are either nurses/midwives (89.3 percent) or CHO/CHA (8.6 percent), and most health workers (83.5 percent) work in the public sector. Table 8 below shows that a disproportionate number of doctors (98.4 percent) work in urban areas whereas the majority of the population (63.6 percent) and 78.4 percent of the poor, live in rural areas.[11] Around a fourth of (27.4 percent) the country's health workforce and only a miniscule share of all doctors (1.6 percent) serve the rural population. This distribution between urban and rural population is likely to reinforce service delivery and income inequalities. As the overwhelming majority of health workers are in the public sector, a more efficient geographical allocation of doctors and nurses could be effected by the Government.

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[10] Administrative or other support personnel are not included.
[11] Sierra Leone Integrated Household Survey (2011)

Table 8. Distribution of health cadres by ownership and location

	Sierra Leone	Public	Private	Urban	Rural
All health staff (#)	6.4	5.9	11.9	13.2	3.4
Doctors (%)	2.1	60.9	39.1	98.4	1.6
CHO/CHA (%)	8.6	86.1	13.9	78.7	21.3
Nurses/midwives (%)	89.3	83.8	16.2	71.4	28.6
Total	100	83.5	16.5	72.6	27.4

The average number of health workers per facility in Freetown is 22.5 whereas the national estimate is only 6.4. Regionally, east (4.7) and north (4.6) regions have lower estimates than south (6.9) and west (16.9). The distribution of health cadres by regions shows that Freetown is disproportionately favored (see Table 9). Almost a fourth of all health workers (21.5 percent) are in Freetown but close to a third of the country's doctors (32.8 percent) serve in the capital which is home to only 15 percent of the population with 6 percent of the country's poor population. Except for the Western region where the health workers seem to be more concentrated, other regions have lower than the national averages.

Table 9: Distribution of health cadres by regions

	Sierra Leone	Freetown	East	West	North	South
All health staff (#)	6.4	22.5	4.7	16.9	4.6	6.9
Doctors (%)	2.1	32.8	7.8	32.8	35.9	23.4
CHO/CHA (%)	8.6	9.4	26.2	16.1	33.0	24.7
Nurses/midwives (%)	89.3	22.4	20.1	28.6	32.8	18.5
Total	100	21.5	20.4	27.6	32.8	19.1

Source: Author's calculations using Sierra Leone 2018 SDI data

Figure 3 shows the average health worker number per facility by district. Western Urban, which comprises of capital Freetown has 22.5 health workers per facility on average followed by Pujehun (18.2), and Western Rural (10.1). On the lower end, there are districts such as Bonthe (3.2), Moyamba (3.4), Kenema and Koinadugu (3.5 each) with health workers lower than the national average.

Figure 3: Average per facility health worker by district
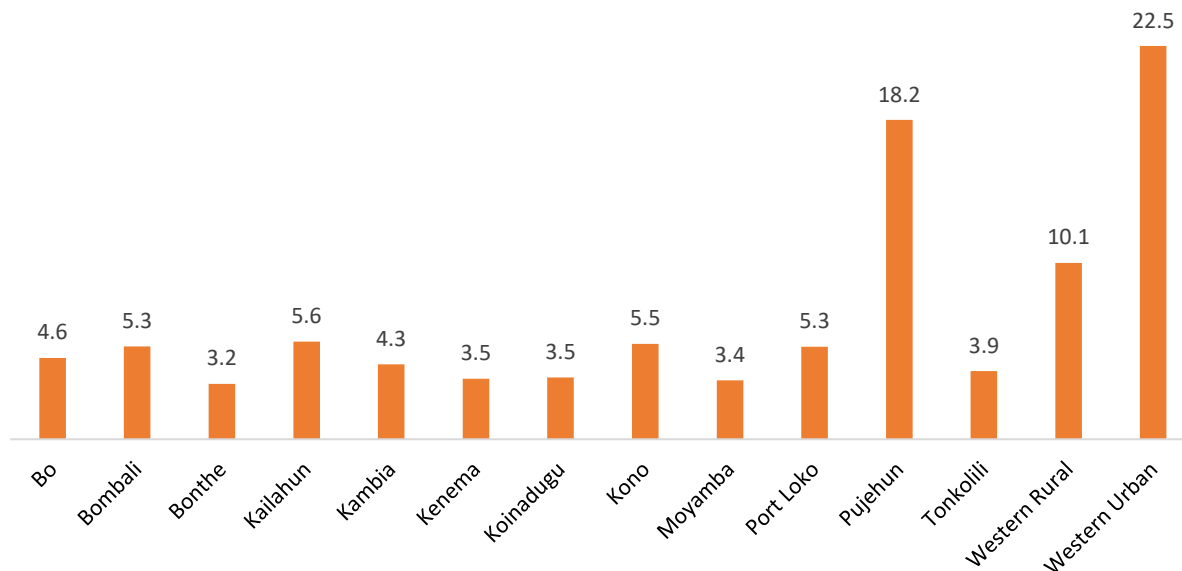
In high-fertility rate countries such as Sierra Leone, the provision of accessible and quality obstetric care (basic and comprehensive) is critical for the health system. However, access to quality health services for women is very limited in Sierra Leone leading to many complications during and after childbirth. This is clearly evidenced by Sierra Leone's extremely high maternal mortality ratio, estimated at 1,165 per 100,000 live births as of the latest population-based survey in 2013.[12]

A high proportion of facilities (96.7 percent) conduct deliveries (Table 10). More health centers (96.1 percent) and health posts (97.9 percent) reported to be providing birth services than hospitals (75 percent). A higher proportion of rural and public facilities reported to conducting births than their counterparts.

Table 10: Facilities where women give birth

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	96.7	98.5	92.0	98.8	98.6	75.5
Hospital	75.0	87.5	75.0	.	100.0	60.5
Health center	96.1	100.0	96.1	.	98.3	67.4
Health post	97.9	100.0	89.1	98.8	98.7	85.3
# Facilities	547	21	165	382	501	46

Even though almost all of health facilities conduct deliveries, most do not have the capacity to offer Basic Emergency Obstetric and Neonatal Care (BEmONC) as shown in Table 11 below. Only 4.8 percent of all facilities in Sierra Leone can provide basic emergency obstetric care services.

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12 Statistics Sierra Leone (SSL) and ICF International. 2014. Sierra Leone Demographic and Health Survey 2013. Freetown, Sierra Leone and Rockville, Maryland, USA: SSL and ICF International.

Significantly higher proportion of urban and private facilities provide BEmONC services than their counterparts. Less than half hospitals (42.7 percent) offer full Comprehensive Emergency Obstetric and Neonatal Care (CEmONC) coverage.

Table 11. Availability of basic and comprehensive emergency obstetric and neonatal care

% facilities	Sierra Leone	Freetown	Urban	Rural	Percent difference (%)a	Public	Private	Percent difference (%)a
Share of facilities offering full basic emergency obstetric care (%)								
All facilities	4.8	9.4	13.9	1.1	92***	3.9	4.8	-23***
Hospital	65.5	85.7	65.5	.	.	70.6	65.5	7
Health center	9.3	0.0	9.3	.	.	9.8	9.3	5
Health post	1.5	0.0	5.0	1.1	78**	1.1	1.5	-36***
Share of facilities offering full comprehensive emergency obstetric care (%)								
All facilities	1.6	4.7	5.5	0	100***	0.8	13.4	-1575***
Hospital	42.7	37.5	42.7	.	.	52.9	36.7	31

Source: Author's calculations using Sierra Leone 2018 SDI data
Notes: a. Level of significance: *** p<0.01, ** p<0.05, * p<0.1; b. In many countries CEmOC is only supposed to be offered at hospital level.

Out of all seven signal functions for BEmONC, almost all facilities had the provision of parenteral oxytocin, anticonvulsant and antibiotic, and neonatal resuscitation bag. Also, a larger share of facilities (> 70 percent) had manual extraction of placenta and retained products of conception. However, only 3 percent of health posts and 11 percent of health centers had the provision of assisted vaginal delivery. This particular signal function thus brings down the BEmONC values to below 5 percent for the whole country even though facilities have higher scores for all other signal functions. Assisted vaginal delivery is an important signal function that can save the lives of both the newborn and the mother. However, studies in Africa show lower rates of assisted vaginal delivery due to lack of skills and supplies.[13] There is a strong case to be made for improving the availability of assisted vaginal delivery for the health sector to upgrade its BEmONC indicator and most importantly potentially combat its high maternal mortality ratio.

Given the number of deliveries in public as well as rural facilities, it is important that they are have the right equipment and training to support safe deliveries in primary health facilities. Figure 4 shows the components of basic and Comprehensive Emergency Obstetric care (BEmONC and CEmONC) packages (CEmONC comprises caesarean sections and blood transfusions in addition to BEmONC).

Many of the elements needed to provide BEmONC are available at most primary health care facilities. The availability of assisted vaginal delivery is the main constraint to improving overall BEmONC provision. Only 3 percent of the health posts and 11 percent of health centers had the capacity to conduct assisted vaginal deliveries.

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[13] Ameh C, Msuya S, Hofman J, Raven J, Mathai M, et al. (2012) Status of Emergency Obstetric Care in Six Developing Countries Five Years before the MDG Targets for Maternal and Newborn Health. PLoS ONE 7(12): e49938. doi:10.1371/journal.pone.0049938

Figure 4: Availability of elements that comprise BEmONC and CEmONC

	Health Post	Health Center	Hospital
CEmONC package	0%	0%	57%
BEmONC package	1%	9%	66%
Cesarian section	0%	0%	89%
Blood transfusion	0%	2%	97%
Neonatal resuscitation bag	94%	100%	100%
Assisted vaginal delivery	3%	11%	66%
Manual extraction of products of conception	69%	75%	97%
Manual extraction of placenta	72%	84%	97%
Parenteral anticonvulsants	97%	99%	100%
Parenteral oxytocin	95%	98%	100%
Parenteral antibiotics	99%	100%	100%

E. Caseload

Methodological Note

The caseload indicator is defined as the number of outpatient visits (recorded in outpatient records) in the three months prior to the survey, divided by the number of days the facility was open during the 3-month period and the number of health workers who conduct patient consultations (i.e. paramedical health staff such as laboratory technicians or pharmacists assistants are excluded from the denominator). In hospitals, the caseload indicator was measured using outpatient consultation records; only providers doing outpatient consultations were included in the denominator. The term caseload rather than workload is used to acknowledge the fact that the full workload of a health provider includes work that is not captured in the numerator, notably administrative work and other non-clinical activities. From the perspective of a patient or a parent coming to a health facility, caseload—while not the only measure of workload—is arguably a critically important measure.

Caseload is usually of concern because a shortage of health workers may cause caseload to rise and potentially compromise service quality. Overall, the average caseload in Sierra Leone is at 10 outpatients per provider per day (Table 12). Public facilities had a higher daily caseload at 10.3 patients per provider per day than private (6.8). In general, the outpatient caseload was highest in the health post (10.5), which was almost double that of the hospitals (5.6).

Table 12. Outpatient caseload

Outpatient visits per provider per day	Sierra Leone	Freetown	Urban	Rural	Public	Private
All facilities	10.0	5.7	7.8	10.9	10.3	6.8
Hospital	5.6	6.7	5.6	.	3.6	6.8
Health center	9.0	10.2	9.0	.	8.6	16.1
Health post	10.5	3.4	5.6	10.9	10.9	4.3

Source: Author's calculations using Sierra Leone 2018 SDI data

Kailahun (27.5) and Koinadugu (24.6) districts have the highest outpatient caseloads, while at the lower spectrum there are districts such as Kambia (2.3) and Bonthe (3) with very few outpatients per day.

Figure 5: Outpatient caseload by district

Outpatient caseload by district (patients per provider per day):
- Bo: 6.0
- Bombali: 5.3
- Bonthe: 3.0
- Kailahun: 27.5
- Kambia: 2.3
- Kenema: 8.4
- Koinadugu: 24.6
- Kono: 7.6
- Moyamba: 18.8
- Port Loko: 5.4
- Pujehun: 7.5
- Tonkolili: 10.1
- Western Rural: 6.7
- Western Urban: 5.7
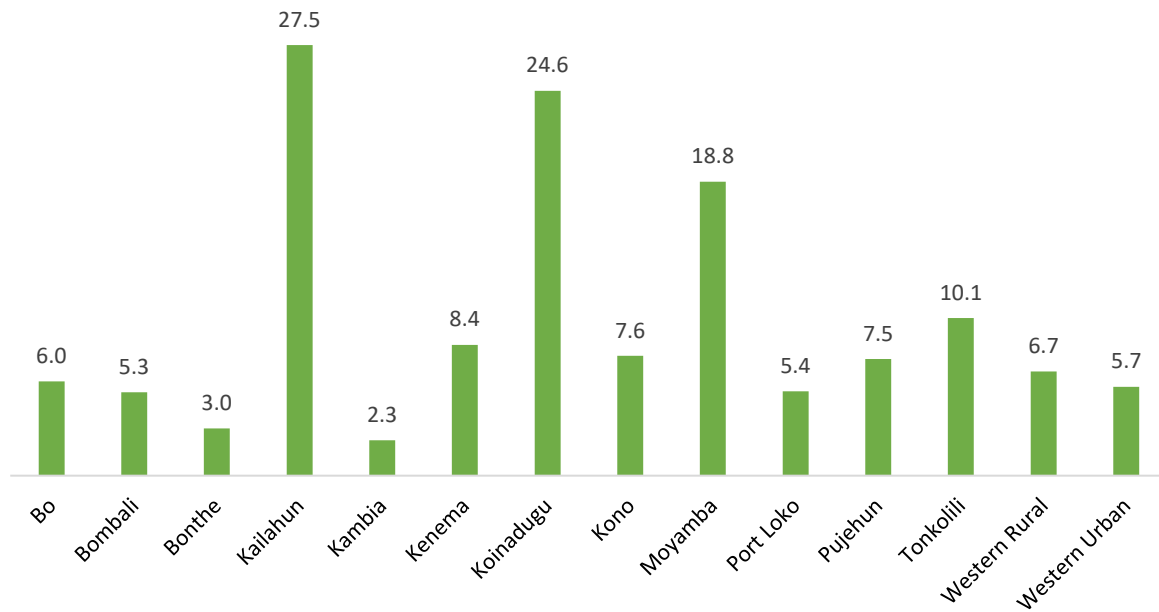
Figure 6 shows that large health facilities (11-20 staff) have very low caseload levels with fewer than 4 patients per provider per day. Small-sized facilities (6 to 10 staff), comprising mostly of health posts have the highest caseload (12.1 patients per day). These findings have implications on how health workers could be reallocated and be better utilized in primary health facilities with higher caseload.

Figure 6: Caseload by facility size

patients per health worker

health workers per facility:
- 11-20: 3.6
- 6-10: 4.2
- 3-5: 4.7
- 1-2: 12.1
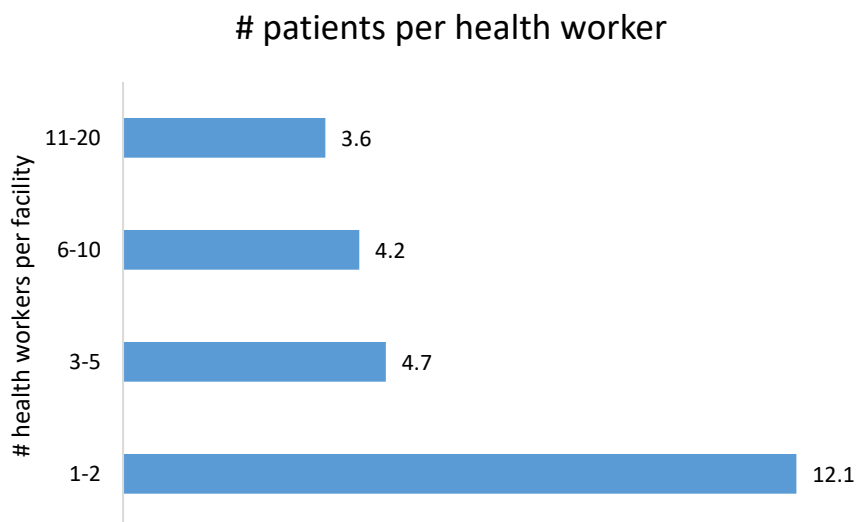
F. Absence Rate

Methodological Note

The average rate of absence at a facility is measured by assessing the presence of at most ten randomly selected clinical health staff at a facility during an unannounced visit. Only workers who are supposed to be on duty are considered in the denominator. Thus, workers on call and off duty were excluded from the analysis. The approach of using unannounced visits is regarded best practice in the service delivery literature. Health workers doing fieldwork (mainly community and public health workers) were counted as present.

The absence rate in Sierra Leone's health sector is 29.9 percent absent during an unannounced visit (Table 13). The absence rate was higher in Freetown where 33.2 percent of health providers were absent. Absence was particularly high in Freetown's hospital and health posts with 44.5 percent and 45.3 percent of staff absent, respectively. Among various levels of health facilities, hospitals (31.8 percent) had the highest absenteeism whereas health posts had the lowest (28.3 percent).

CHO/CHA have the highest absenteeism rate of 32.2 percent, followed by nurses/midwives (29.8 percent). CHO/CHA are more likely to be absent, as confirmed in a multivariate analysis (Annex C; Table 62). Table 13 shows that urban health providers are generally more likely to be absent than their rural counterparts. The regression results further show that facilities with less staffing and older providers have higher absence rates.

Table 13. Absence rate by cadre and facility type

	Sierra Leone	Freetown	Urban	Rural	Public	Private
All facilities	29.9	33.2	33.3	24.8	28.8	35.1
Facility type						
Hospital	31.8	44.5	31.8	.	33.2	29.6
Health center	30.9	8.9	30.9	.	31.1	28.5
Health post	28.3	45.3	46.4	24.8	26.1	46.9
Cadre						
Doctors	23.0	41.8	23.2	.	19.6	27.6
CHO/CHA	32.3	1.8	31.6	35.3	33.7	25.0
Nurses/ midwives	29.8	35.3	34.1	24.3	28.4	36.6

Among the districts, absenteeism rates are high in Western Rural (50.7 percent), Bombali (44.6 percent) and Kono (41.9 percent) (See Table 14). Among the levels of health facilities by district, Kono tops the list among hospitals (60 percent), whereas Moyamba for health centers (65.1 percent) and Western Rural (51.4 percent) for health posts with the highest absenteeism.

Among doctors – while most districts did not have any absenteeism – Kambia had all doctors absent. This district in fact had only one doctor sampled for absenteeism module. Kenema had the highest

absenteeism among CHO/CHA (65.2 percent) and Western Rural among nurses/midwives (50.8 percent).

Table 14: Absence rate by district

	All facilities	Hospital	Health Center	Health Post	Doctors	CHO/CHA	Nurses/ midwives
Bo	30.4	24.5	32.7	31.8	31.3	15.6	33.1
Bombali	44.6	43.7	49.1	42.8	45.0	47.5	44.2
Bonthe	37.1	51.8	22.0	36.9	74.0	38.5	35.7
Kailahun	12.7	5.9	14.4	16.8	0	9.8	13.2
Kambia	22.6	50.0	21.8	15.6	100	8.9	22.5
Kenema	33.5	19.7	48.1	28.3	0	65.2	28.3
Koinadugu	20.0	28.6	16.9	12.5	0	2.6	24.2
Kono	41.9	60.0	29.8	41.7	0	44.4	43.9
Moyamba	27.6	0	65.1	26.4	.	44.3	25.8
Port Loko	23.8	15.4	45.5	21.4	0	50.3	23.5
Pujehun	19.6	33.3	16.4	19.5	0	44.8	16.9
Tonkolili	19.1	12.5	26.0	19.0	0	27.2	18.8
Western Rural	50.7	.	50.2	51.4	.	49.4	50.8
Western Urban	33.2	44.5	8.9	45.3	41.8	1.8	35.3

Source: Author's calculations using Sierra Leone 2018 SDI data. N.A. indicates data is not available.

In any workplace setting, absence may be authorized or unauthorized. From a consumer's perspective, however, these providers are not available to deliver services at the health facility—whether authorized or not. Overall (Figure 7), most of the absences were authorized (25 percent) followed by non- authorized absence (20 percent) and other category (20 percent).

Most absences among doctors were work related-training (37 percent), authorized absence (28 percent) and official mission (15 percent). Majority of CHO/CHA were on unauthorized absence (26 percent) followed by authorized absence (24 percent) and official mission (20 percent). Most common reasons for nurses and midwives were authorized absence (25 percent), unauthorized absence (20 percent) and other category (21 percent).

There is a clear need for better organization and management of HRH to improve the availability of staff for service delivery especially as it relates to authorized absenteeism.

Figure 7: Reasons for absence by health worker cadre
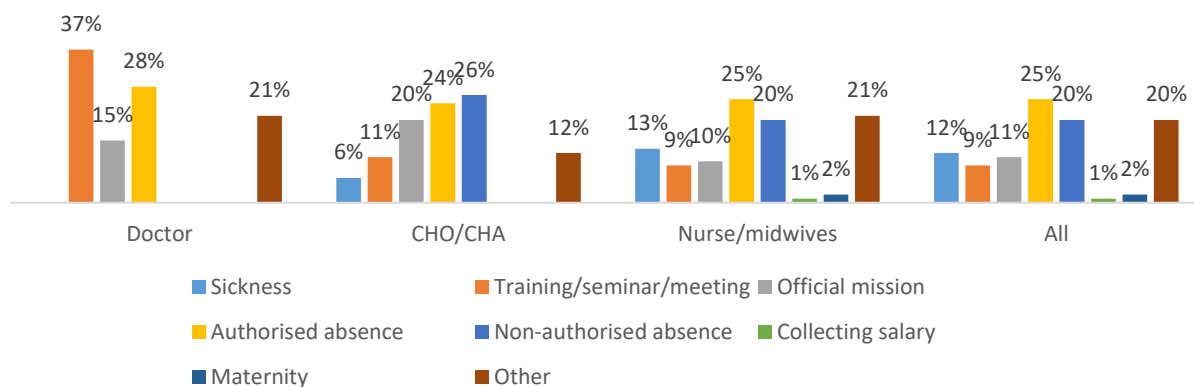
Comparing across locations (Figure 8), both urban areas had a higher share of authorized absence (30 percent), while rural areas had higher unauthorized absence (30 percent). Authorized absence (25 percent) followed by unauthorized absence (23 percent) were the leading reasons in public sector. The most common reason for absence in private sector was authorized absence (25 percent) similar to the public sector.

Figure 8: Reasons for absence by location and sector
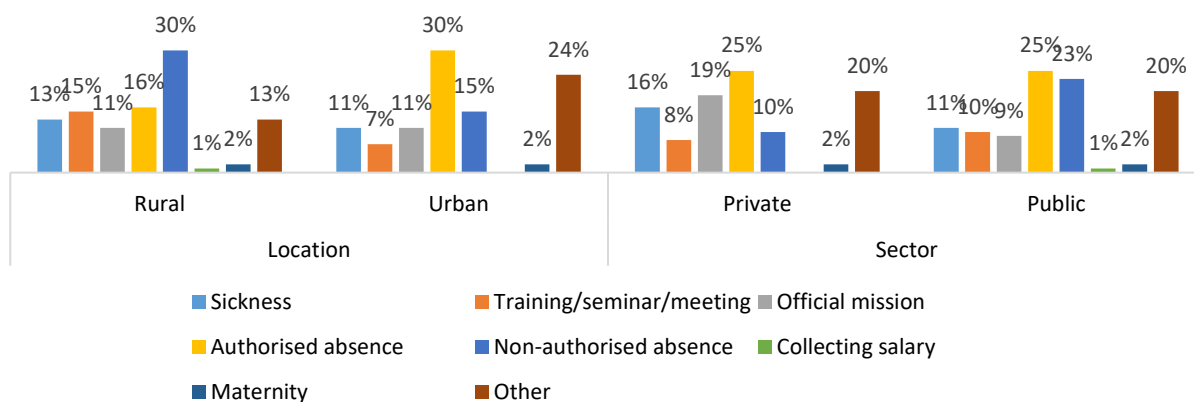
G. Diagnostic Accuracy

Methodological Note

The choice of tracer conditions was guided by the burden of disease among children and adults, and whether the condition is amenable to use with a simulation tool, i.e., the condition has a presentation of symptoms that makes it suitable for assessing provider ability to reach correct diagnosis with the simulation tool. Three of the conditions were childhood conditions (malaria with anemia; diarrhea with severe dehydration, and pneumonia), and two conditions were adult conditions (pulmonary tuberculosis and diabetes). Two other conditions were included: post-partum hemorrhage and neonatal asphyxia. The former is the most common cause of maternal death during birth, and neonatal asphyxia is the most common cause of neonatal death during birth. The successful diagnosis and management of these seven conditions can avert a large share of child an adult morbidity and mortality.

These indicators were measured using the patient case simulation methodology, also called clinical cases. Clinical cases are a widely used teaching method used primarily to measure clinicians (or trainee clinicians) knowledge and clinical reasoning. A vignette can be designed to measure knowledge about a specific diagnosis or clinical situation at the same time gaining insight as to the skills in performing the tasks necessary to diagnose and care for a patient. According to this methodology, one of the fieldworkers acts as a case study patient and he/she presents to the clinician specific symptoms from a carefully constructed script while another acts as an enumerator. The clinician, who is informed of the case simulation, is asked to proceed as if the fieldworker is a real patient. For each facility, the case simulations are presented to up to ten randomly selected health workers who conduct outpatient consultations. If there are fewer than ten health workers who provide clinical care, all the providers are interviewed.

There are two other commonly used methods to measure provider knowledge and ability, and each has pros and cons. The most important drawback in the patient case simulations is that the situation is a not a real one and that this may bias the results. The direction of this potential bias makes this issue less of a concern—the literature suggests that the direction of the bias is likely to be upward, suggesting that our estimates can be regarded as upper bound estimates of true clinical ability. The patient case simulation approach offers key advantages given the scope and scale of the Service Delivery Indicators methodology: (i) a relatively simple ethical approval process is required given that no patients are observed; (ii) there is standardization of the case mix and the severity of the conditions presented to the clinician; and (iii) the choice of tracer conditions is not constrained by the fact that a dummy patient cannot mimic some symptoms.

The SDI survey assessed provider ability and knowledge using two process quality indicators (the adherence to clinical guidelines in five tracer conditions, and the management of two maternal and newborn (MN) complications), and an outcome quality indicator (diagnostic accuracy in five tracer conditions).

Results from the SDI survey reveal that provider ability and knowledge is quite low. Providers only correctly diagnosed 44.5 percent of the tracer conditions (Table 15).[14] There were only slight

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[14] Figure 28-34 in Appendix C show the history taking and examination questions asked.

variations from the mean score across the private-public spheres. However, accuracy was higher for urban (50.9 percent) than rural (37.3 percent). Doctors correctly diagnosed more of the tracer conditions (66.2 percent) than CHO/CHA (51.1 percent) and nurses (39.1 percent). Similarly, higher level facilities correctly diagnosed (hospitals – 61 percent) more of the tracer conditions than lower levels (health center – 44.3 percent and health post – 37.7 percent). Multivariate analysis (Table 63) shows doctors are most likely to have a better diagnostic accuracy than CHO/CHA and nurses.

Table 15. Diagnostic accuracy by cadre

% clinical cases	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	44.5	54.6	50.9	37.3	44.1	48.4
			Cadre			
Doctors	66.2	61.8	66.2	0.0	68.2	56.7
CHO/CHA	51.1	62.2	53.7	39.5	51.0	51.5
Nurses/midwives	39.1	44.5	42.4	37.2	38.3	45.3
			Facilities			
Hospital	61.0	62.0	61.0	.	63.3	52.3
Health Center	44.3	51.7	44.3	.	43.9	49.7
Health Post	37.7	37.4	39.7	37.3	37.1	43.8

Source: Author's calculations using Sierra Leone 2018 SDI data

Table 16 shows that only one percent of the health providers correctly diagnosed all five tracer conditions. Most, 31.5 percent, could only diagnose two of the five cases.

Table 16. Number of cases correctly diagnosed

# cases	All	Doctors	CHO/CHA	Nurses/midwives
5 cases	1.1	0.0	2.8	0.7
4 cases	12.7	48.9	13.4	6.7
3 cases	26.9	36.7	38.7	21.7
2 cases	31.5	10.9	28.6	35.6
1 case	22.9	3.5	14.7	28.6
No case	5.0	0.0	1.9	6.7

Source: Author's calculations using Sierra Leone 2018 SDI data

Diagnostic accuracy rate varied across case conditions, ranging from 90 percent accuracy for pulmonary tuberculosis to 16 percent for malaria and anemia (see Figure 9).

An accurate diagnosis, however, is unfortunately not a guarantee for providing the correct treatment. There were substantially large discrepancies between diagnosis and treatment across the board revealing a critical disconnect in provider knowledge and follow-up. Among conditions excluding pulmonary tuberculosis, PPH, and neonatal asphyxia, interestingly more providers offered correct treatment actions even though they had lower diagnostic accuracy. With pulmonary tuberculosis, even though 90 percent got the diagnosis correct, only 4 percent provided the correct treatment.

Only 18 percent of health providers got the diagnosis of acute diarrhea with severe dehydration correct. Among those who correctly diagnosed the condition 72 percent got the correct treatment. Overall, only 10 percent of all health got both diagnosis and treatment correct. The results of the other conditions equally show a knowledge gap in clinical diagnosis as well as patient management.

Figure 9: Diagnostic accuracy and correct treatment by clinical case
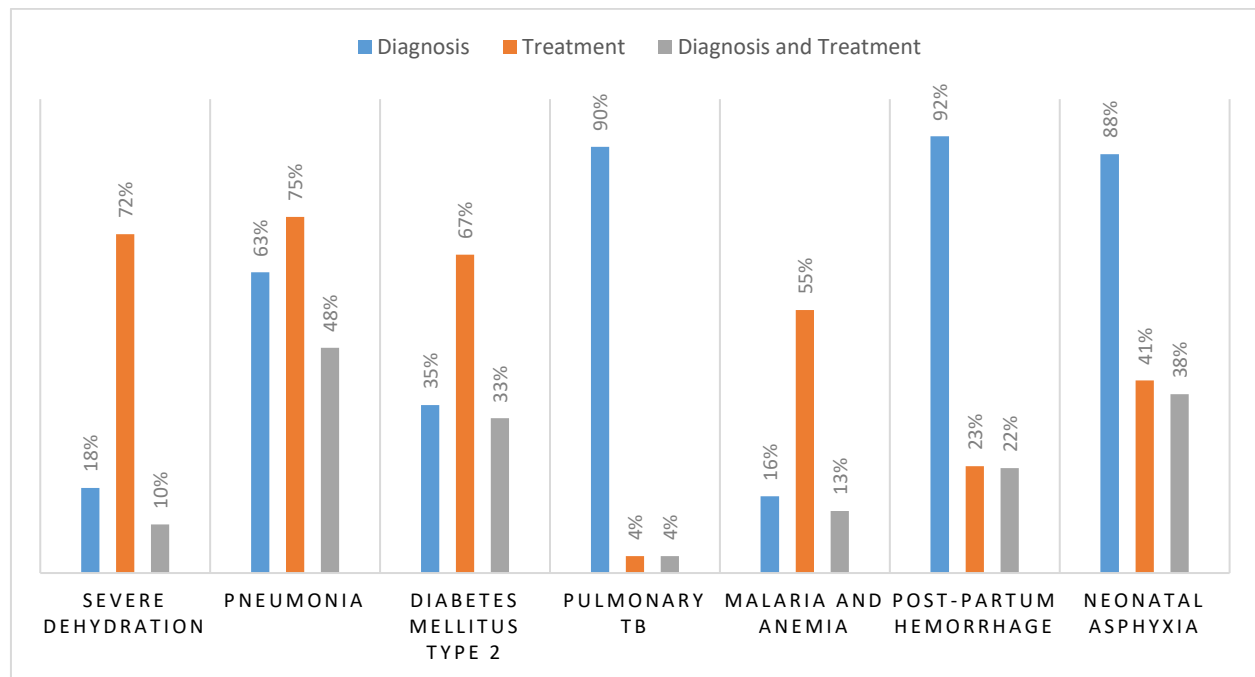
It must be noted that several clinicians gave partial diagnosis for certain conditions (see Diagnostic accuracy rate varied across case conditions, ranging from 90 percent accuracy for pulmonary tuberculosis to 16 percent for malaria and anemia (see Figure 9).

An accurate diagnosis, however, is unfortunately not a guarantee for providing the correct treatment. There were substantially large discrepancies between diagnosis and treatment across the board revealing a critical disconnect in provider knowledge and follow-up. Among conditions excluding pulmonary tuberculosis, PPH, and neonatal asphyxia, interestingly more providers offered correct treatment actions even though they had lower diagnostic accuracy. With pulmonary tuberculosis, even though 90 percent got the diagnosis correct, only 4 percent provided the correct treatment.

Only 18 percent of health providers got the diagnosis of acute diarrhea with severe dehydration correct. Among those who correctly diagnosed the condition 72 percent got the correct treatment. Overall, only 10 percent of all health got both diagnosis and treatment correct. The results of the other conditions equally show a knowledge gap in clinical diagnosis as well as patient management.

10). For example, 94 percent diagnosed malaria only, 19 percent diagnosed anemia only and only 16 percent diagnosed malaria and anemia. Finally, only 16 percent of providers got the full diagnosis and

treatment for malaria and anemia (Diagnostic accuracy rate varied across case conditions, ranging from 90 percent accuracy for pulmonary tuberculosis to 16 percent for malaria and anemia (see Figure 9).

An accurate diagnosis, however, is unfortunately not a guarantee for providing the correct treatment. There were substantially large discrepancies between diagnosis and treatment across the board revealing a critical disconnect in provider knowledge and follow-up. Among conditions excluding pulmonary tuberculosis, PPH, and neonatal asphyxia, interestingly more providers offered correct treatment actions even though they had lower diagnostic accuracy. With pulmonary tuberculosis, even though 90 percent got the diagnosis correct, only 4 percent provided the correct treatment.

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Figure 10: Partial and complete diagnosis for co-morbid conditions
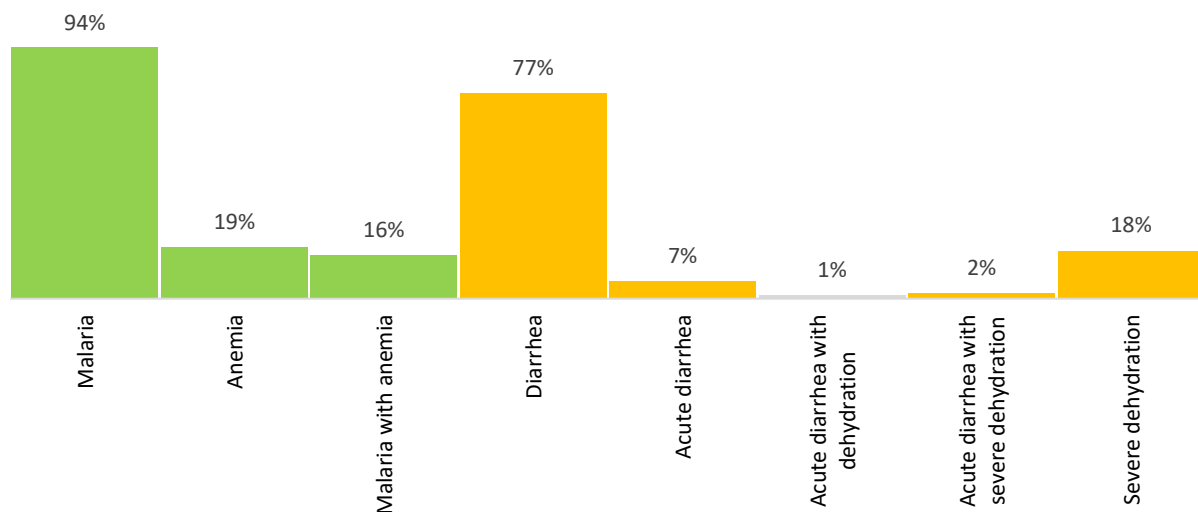
Similarly, not all conditions were fully treated. Figure 11 below shows the discrepancies in treatment of co-morbidities in malaria. In both scenarios, the fever was treated less by those that diagnosed malaria and pneumonia. In both cases the "patient" had a high temperature.

Three-quarters (75 percent) treated for pneumonia, only 61 percent managed both pneumonia and fever. While 90 percent treated malaria, a slightly over half (55 percent) treated both malaria and anemia. Clearly, there is a knowledge gap on treatment for co-existing conditions. This is also against the backdrop of availability of drugs in stock (See Annex Table 62). At the time of the study,

Paracetamol and Ferrous sulphate /folic acid was available in about two thirds of facilities (66 and 71 percent, respectively).

Figure 11: Partial and complete treatment of disease conditions
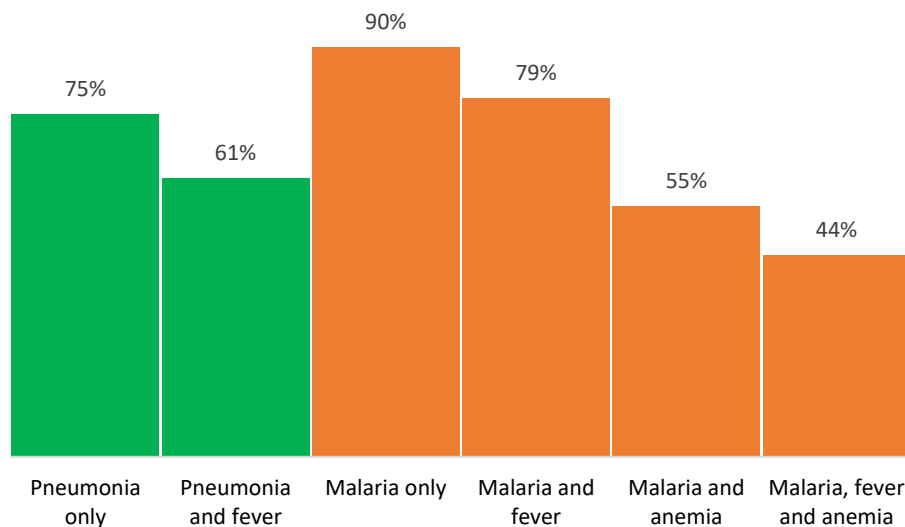
The challenge of partial treatment is real and has both short and long-term effects. For the case of fever, if the child is not tepid-sponged, their fever could reach higher levels and the child could easily have a febrile convulsion, which may cause aspiration of food or fluids, biting of the tongue, among others. If the convulsion is not well understood, it could also lead to further mismanagement of the condition.

The case of malaria and anemia is even more troubling. Malaria is the primary cause of anemia in children in sub-Saharan Africa, and presents an additional burden to the already existing nutritional challenges children face in Sierra Leone. Currently Sierra Leone has a stunting rate of 31.1 percent[15] and 76.3 percent of children under five years have anemia[16]. The failure to diagnose anemia under such a disease burden presents several problems. Undernourished children are more likely to die from illness than well-nourished ones. An anemic child has a greater potential to become severely anemic with a malaria episode as the parasite hemolysis the already few red blood cells. There is the additional challenge of drug absorption in an undernourished child. The long-term effect of untreated anemia is poor growth and development, susceptibility to illnesses among others.

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[15] Sierra Leone National Nutrition Survey (SLNNS) 2017
[16] Wirth JP, Rohner F, Woodruff BA, Chiwile F, Yankson H, Koroma AS, et al. (2016) Anemia, Micronutrient Deficiencies, and Malaria in Children and Women in Sierra Leone Prior to the Ebola Outbreak - Findings of a Cross-Sectional Study. PLoS ONE 11(5): e0155031. doi:10.1371/journal. pone.0155031

H. Adherence to Clinical Guidelines

Methodological Note

The assessment of process quality is based on two indicators: (i) clinicians' adherence to clinical guidelines in five tracer conditions and (ii) clinicians' management of maternal and neonatal complications. The former indicator is an unweighted average of the share of relevant history taking questions, and the share of relevant examinations performed for the five tracer conditions. The set of questions is restricted to core or important questions as expressed in the Integrated Management of Childhood Illnesses (IMCI).

The second process quality indicator is clinicians' ability to manage maternal and neonatal complications, i.e. post-partum hemorrhage and neonatal asphyxia. This indicator reflects the unweighted share of relevant treatment actions proposed by the clinician. The set of questions is restricted to core or important questions as expressed in the Integrated Management of Childhood Illnesses (IMCI) Guidelines for the tracer conditions.

Sierra Leonean health providers adhered to 30.2 percent of the clinical guidelines in the management of the five tracer conditions (Table 17). Overall, public sector and rural providers were more adherent to the guidelines. Doctors adhered to more of the clinical guidelines (52 percent) followed by CHO/CHA (34.8 percent) and nurses/midwives (25.2 percent). Adherence to clinical guidelines was lowest in health posts (25.3 percent) followed by health centers (30.1 percent) and hospitals (41.7 percent). For the most part, clinical guidelines are not followed in primary care health facilities, which is usually the first point of entry for most beneficiaries.

Table 17. Adherence to clinical guidelines by health provider type

% clinical cases	Sierra Leone	Freetown	Public	Private	Urban	Rural
All	30.2	31.9	34.9	24.9	29.6	34.5
			Cadre			
Doctors	52.0	43.7	52.0	0.0	53.5	44.8
CHO/CHA	34.8	35.6	36.0	29.7	34.2	41.4
Nurses/midwives	25.2	21.7	26.6	24.4	24.7	29.8
			Facilities			
Hospital	41.7	34.1	41.7	.	42.2	39.7
Health Center	30.1	34.2	30.1	.	30.2	28.4
Health Post	25.3	25.2	28.1	24.9	24.8	31.0

Source: Author's calculations using Sierra Leone 2018 SDI data

The survey assessed the availability of Standard Treatment Guidelines (STG) in facilities. As shown in Table 18, around half (52.5 percent) of the facilities had STG on the premises. STG were less likely to be available in the hospitals (32.3 percent). Private facilities were less likely to be available STG (35 percent) comparable to public facilities (54.1 percent).

Table 18: Availability of Standard Treatment Guidelines

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	52.5	50.8	50.5	53.4	54.1	35.0
Hospital	32.3	37.5	32.3	NA	47.1	23.8
Health Center	56.4	50.0	56.4	NA	56.8	50.6
Health Post	52.5	53.8	43.5	53.4	53.6	36.0
# Facilities	547	21	165	382	501	46

Source: Author's calculations using Sierra Leone 2018 SDI data

IMCI general danger signs and referral for sick children

According to the IMCI guidelines, there are four general danger signs that a provider must always ask or identify when presented with a sick child: (i) unable to drink or breastfeed; (ii) lethargic or unconscious; (iii) vomiting; and (iv) having or had convulsions.[17] Overall, about one of the four danger signs were identified across the three child clinical cases with the least recognized in the pneumonia vignette. Doctors and nurses performed better than CHO/CHA but overall recognition of danger signs was very low (Figure 12). For example, as shown in Figure 13, 63 percent of providers did not identify a single danger sign in the pneumonia vignette.

Figure 12: Average number of danger signs identified by vignette
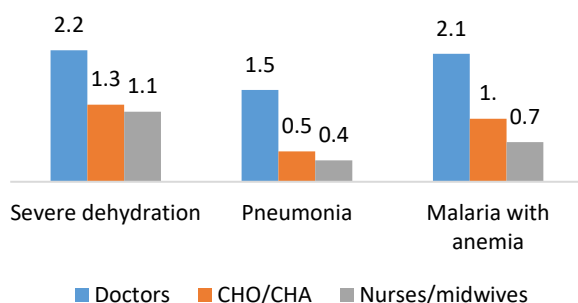
Figure 13: Distribution of each danger sign identified by vignette
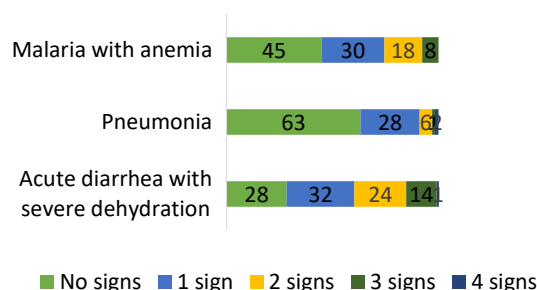
Table 189 shows for each tracer condition the share of providers by cadre and facility level who said they would refer the patient. Health posts provided the most referrals but even then referral rates were relatively low for most of the cases. Referral rates differ by cadre level. According to the IMCI guidelines an urgent referral is required whenever a danger sign is detected.[18] In the case when a child exhibited a danger sign and suffered severe dehydration, only 11.1 percent of the providers at health post recommended referral. This was also true for pneumonia and malaria with anemia. Only the pulmonary TB and post-partum hemorrhage clinical cases had both a relatively higher diagnostic

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[17] Three child clinical cases were administered to providers. Firstly, acute diarrhea with severe dehydration, where the child presented with diarrhea. Secondly, pneumonia, where the child presented with a cough. Lastly, malaria with anemia, where the child presented with fever symptoms

[18] JSI, Rapid Referral Assessment report

accuracy and referral rate as compared to the other clinical cases. Attention needs to be paid to identifying all danger signs, and referring cases when appropriate.

Table 19: Referral rates by cadre and facility level by clinical case[19]

% clinical cases	Severe dehydration	Pneumonia	Diabetes	Pulmonary TB	Malaria with anemia
Cadre					
Doctors	0.0	0.0	12.9	21.7	0.0
CHO/CHA	4.6	1.7	29.9	35.8	2.3
Nurses/midwives	8.9	5.1	46.3	62.7	6.8
Facilities					
Hospital	1.0	0.0	12.5	18.1	1.6
Health Center	3.1	1.8	38.6	36.9	4.8
Health Post	11.1	6.4	50.8	73.9	6.8

Source: Author's calculations using Sierra Leone 2018 SDI data

Figure 14 below shows referral rates of the different conditions juxtaposed with the diagnostic accuracy. For pulmonary tuberculosis the diagnostic accuracy and referral rates were coherent, i.e. the diagnostic accuracy was high in health posts and so was the referral rate as many of the health workers at that level may not be skilled enough to manage or may be referring to specific providers for further diagnosis and treatment. The challenge of poor diagnosis makes referral even more difficult where need be, as in the case of diabetes whereby even though diagnosis was at 51 percent, referral averaged about 35 percent.

Figure 14: Referral rates and diagnostic accuracy by clinical cases

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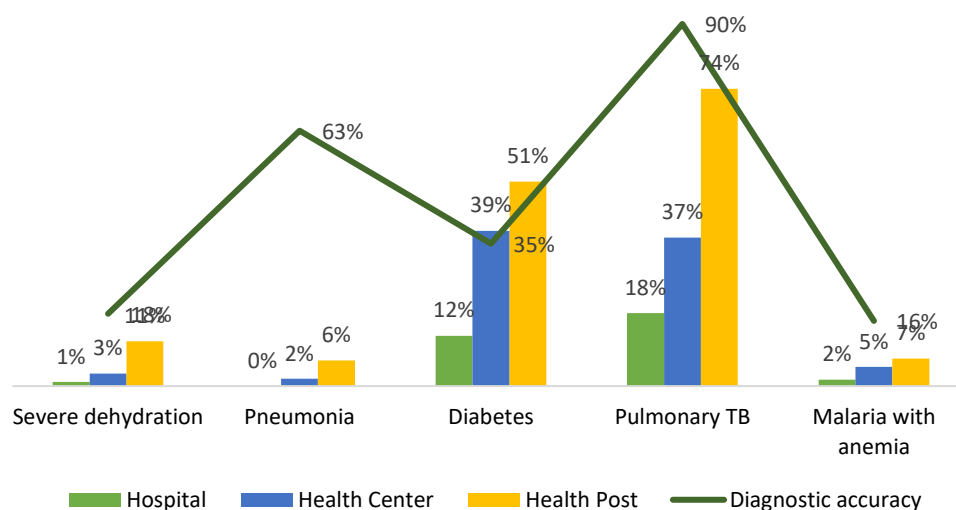
[19] Referral is not an option for neonatal asphyxia because it would be fatal for the newborn and it has thus not been included.

I. Management of Maternal and Neonatal Complications

The second process quality indicator is clinicians' ability to manage maternal and neonatal complications. This indicator reflects the unweighted share of relevant treatment actions proposed by the clinician. The set of questions is restricted to core or important questions as expressed in the Integrated Management of Childhood Illnesses (IMCI) and the Standard Treatment Guidelines.

Overall, providers adhered to only 31.2 percent of the clinical guidelines for managing maternal and neonatal complications (Table 20). Doctors adhered to a marginally larger share of guidelines (53.7 percent of guidelines) compared to nurses/ midwives (28.7 percent). There was very little variation across facilities in managing maternal and neonatal complications.

Table 20. Management of maternal and neonatal complications by cadre

% clinical cases	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	31.2	35.0	34.1	27.9	31.3	30.3
Cadre						
Doctors	53.7	48.4	53.7	0.0	56.7	38.5
CHO/CHA	27.9	24.3	27.8	28.5	27.8	28.8
Nurses/midwives	28.7	33.8	30.1	27.8	28.7	28.6
Facilities						
Hospital	42.6	40.4	42.6	0.0	45.0	33.6
Health Center	27.6	20.9	27.6	0.0	27.9	22.8
Health Post	27.9	28.4	27.7	27.9	27.7	29.2

Source: Author's calculations using Sierra Leone 2018 SDI data

J. Drug Availability

Methodological Note

This indicator is defined as the number of drugs of which a facility has one or more available, as a proportion of all the drugs on the list. The drugs have to be unexpired and have to be observed by the enumerator. The drug list contains tracer medicines for children and mothers identified by the World Health Organization (WHO) following a global consultation on facility-based surveys. The list of drugs has been adjusted to the level of facility as mentioned in the 2015 Sierra Leone Basic Package of Essential Health Services (BPEHS).

On average, 56 percent of priority drugs were available in Sierra Leonean facilities (Table 21). Urban facilities had higher availability of priority drugs (60.9 percent) compared to rural facilities (53.9 percent). Public facilities had marginally higher availability of all priority drugs. Priority drugs for mothers and children were available with average scores of 72.5 percent and 62.6 percent respectively. Although almost two thirds (64.3 percent) of the tracer drugs surveyed were available

in Sierra Leone only 32.2 percent of facilities had all tracer drugs available. Looking across the districts (

Table 22), Kambia (64.4 percent) had the highest availability with Bombali being the lowest (41.8 percent).[20] The detailed availability of drugs are given in the appendix (table 62).

Table 21. Availability of priority drugs by facility type

% drugs	Sierra Leone	Freetown	Urban	Rural	Public	Private
All priority drugs	56.0	52.2	60.9	53.9	56.3	53.4
Priority drugs for Mothers	72.5	65.2	69.3	73.9	73.5	61.3
Priority drugs for children	62.6	61.8	64.9	61.5	62.8	60.3
All tracer drugs	64.3	57.1	51.2	70.2	64.4	63.9
Have all tracers (% facility)	32.2	18.5	9.3	42.3	32.9	25.0

Table 22: Availability of priority drugs by district

	All priority drugs	Priority drugs for Mothers (local)	Priority drugs for children (local)	All tracer drugs	Have all tracers (% facility)
Bo	57.8	75.9	65.8	71.3	42.0
Bombali	41.8	48.5	47.5	41.3	10.0
Bonthe	50.8	62.2	59.8	61.1	13.5

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[20] World Health Organization (WHO) guidelines stated that priority drugs are for adults and children. For SDI, tracer drugs are those considered markers of drug availability according to the SARA 2017. SDI looked at 14 out of the 20 drugs for hospitals, 6 for health centers and 3 for health posts.

Kailahun	55.9	74.8	59.6	61.0	32.2
Kambia	64.4	84.8	67.7	73.3	46.3
Kenema	50.8	65.4	54.1	45.8	8.3
Koinadugu	64.4	85.8	68.6	68.2	36.4
Kono	57.5	67.2	67.3	76.8	50.9
Moyamba	53.8	70.5	63.4	55.1	2.9
Port Loko	64.3	81.7	71.2	77.8	53.7
Pujehun	56.6	76.9	66.0	74.0	44.8
Tonkolili	62.5	87.5	66.9	79.7	55.0
Western Rural	51.7	68.6	57.5	60.4	36.5
Western Urban	52.2	65.2	61.8	57.1	18.5

Source: Author's calculations using Sierra Leone 2018 SDI data

K. Availability of Vaccines Related Equipment and Supplies

Data from UNICEF and WHO in 2017 indicates immunization coverage is around 92 percent for BCG, 84 for DTP3-HepB-Hib and 73.5 for the measles vaccine.[21] In fact, the rates have declined for all these vaccines compared to 2013 values.

Almost all health facilities (96.4 percent) reported they provide vaccination service. However, only 56.4 percent of the facilities that offer immunization service store the vaccines in their premises. It is not clear where the other 43.6 percent that do vaccinate children store their vaccines and it was not possible to assess the conditions under which their vaccines are stored. Table 23 shows that 96.3 percent of all vaccines were available in Sierra Leonean facilities that store vaccines. Urban facilities (97.3 percent) had higher availability than rural (95.7 percent) and public (96.2 percent) higher than private ones (97.1 percent). Health centers (97.3 percent) and hospitals (97.2 percent) had higher availability than health posts (95.8 percent).

Table 23. Availability of vaccines by facility type

% vaccines	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	96.3	100	97.3	95.7	96.2	97.1
Hospital	97.2	100	97.2	.	100	93.7
Health Center	97.3	100	97.3	.	97.1	100
Health Post	95.8	100	97.5	95.7	95.8	96.4
# Facilities	317	11	105	212	303	14

Western Urban and Kambia had all vaccines available with Bo being the lowest (88.5 percent) as compared to the average for all of Sierra Leone (Table 24). Six hospitals did not store vaccines in their premises. Bo again had the lowest availability for health posts (75.9 percent).

Table 24: Availability of vaccines by facility type across districts

% vaccines	All	Hospital	Health Center	Health Post

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[21] Sierra Leone: WHO and UNICEF estimates of immunization coverage: 2016 revision. https://data.unicef.org/wp-content/uploads/country_profiles/Sierra%20Leone/immunization_country_profiles/immunization_sle.pdf

Bo	88.5	100.0	100.0	75.9
Bombali	94.3	.	83.3	98.1
Bonthe	94.9	.	100.0	92.6
Kailahun	98.0	100.0	94.4	98.9
Kambia	100.0	100.0	100.0	100.0
Kenema	93.5	83.3	90.7	96.3
Koinadugu	95.0	100.0	96.3	94.7
Kono	97.6	100.0	100.0	96.7
Moyamba	97.7	.	100.0	96.9
Port Loko	99.2	.	100.0	99.0
Pujehun	98.8	.	100.0	98.3
Tonkolili	97.3	100.0	100.0	95.2
Western Rural	95.4	.	100.0	91.5
Western Urban	100.0	100.0	100.0	100.0

Source: Author's calculations using Sierra Leone 2018 SDI data

Facilities that stored vaccines (n=317) were asked about the source of power for the refrigerators. Almost all (95 percent) of the refrigerators were powered by solar energy with only 4 percent by the national grid and 1 percent by generators (Figure 15). In rural areas reliance on solar energy was even higher with almost all (99 percent) of the refrigerators were solar powered.

Figure 15: Power sources for refrigerators in facilities with refrigerators in Sierra Leone.
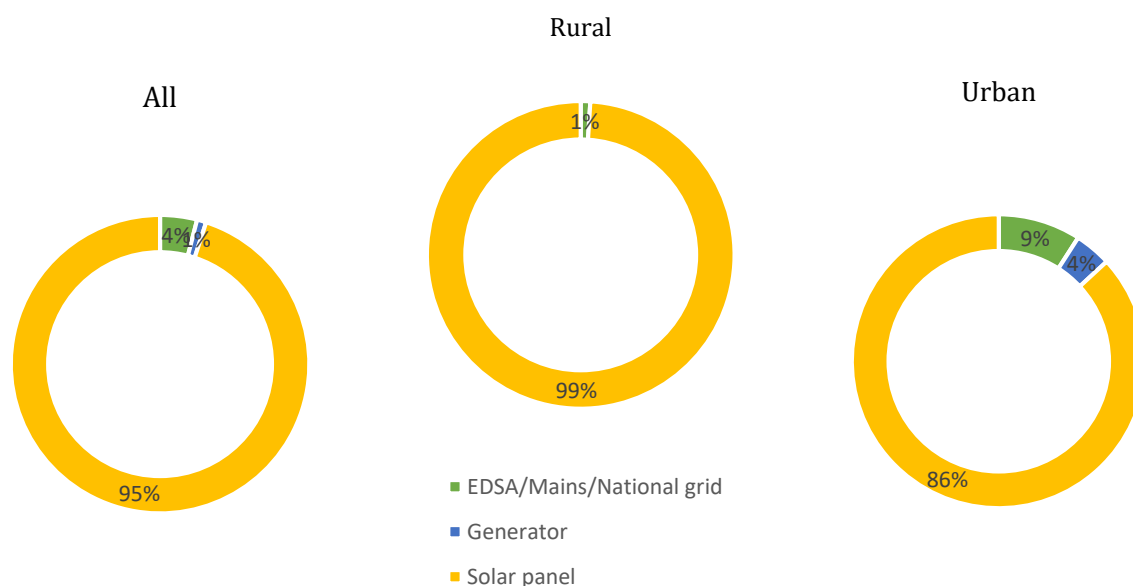
Considering only facilities that store vaccines (n=317), individual vaccines were usually available with the exception of Hepatitis B (Figure 16). Very little is known around the prevalence of hepatitis B in Sierra Leone but a recent study found a prevalence rate of up to 20 percent in the general

population.[22] Given this high rate, it is critical that primary care facilities stock more of the Hepatitis B vaccines. However, hepatitis B is included in the pentavalent vaccine that is administered to children.

Figure 16: Availability of individual vaccines by facility type
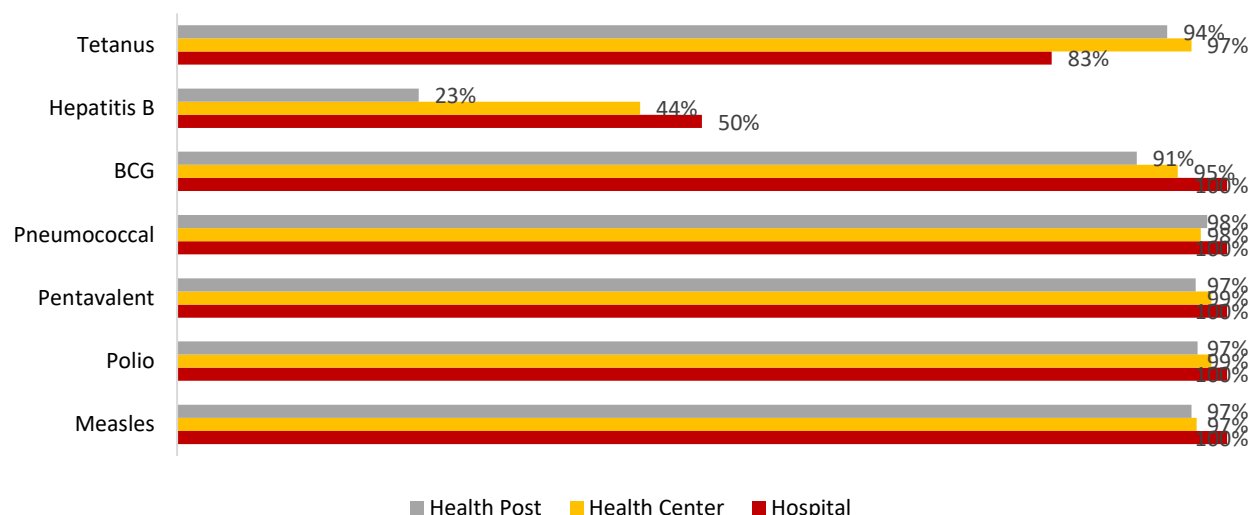
There was near universal availability of all necessary material and equipment for vaccination such as refrigerators, vaccine packs, vaccines carriers, sharps containers, and safe syringes (Figure 17)

Figure 17: Availability of equipment and vaccines-related supplies by facility type

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[22] Ansumana R, Dariano DF 3rd, Jacobsen KH, Leski TA, Lamin JM, Lahai J, Bangura U, Bockarie AS, Taitt CR, Yasuda C, Bockarie MJ, Stenger DA. Seroprevalence of hepatitis B surface antigen (HBsAg) in Bo, Sierra Leone, 2012-2013.BMC Res Notes. 2018 Feb 8;11(1):113.

Functional refrigerator: Health Post 97%, Health Center 98%, Hospital 100%

Sharps container: Health Post 100%, Health Center 100%, Hospital 100%

Ice packs: Health Post 100%, Health Center 100%, Hospital 100%

Vaccine carriers: Health Post 100%, Health Center 100%, Hospital 100%

Safe syringes: Health Post 99%, Health Center 97%, Hospital 100%

■ Health Post ■ Health Center ■ Hospital
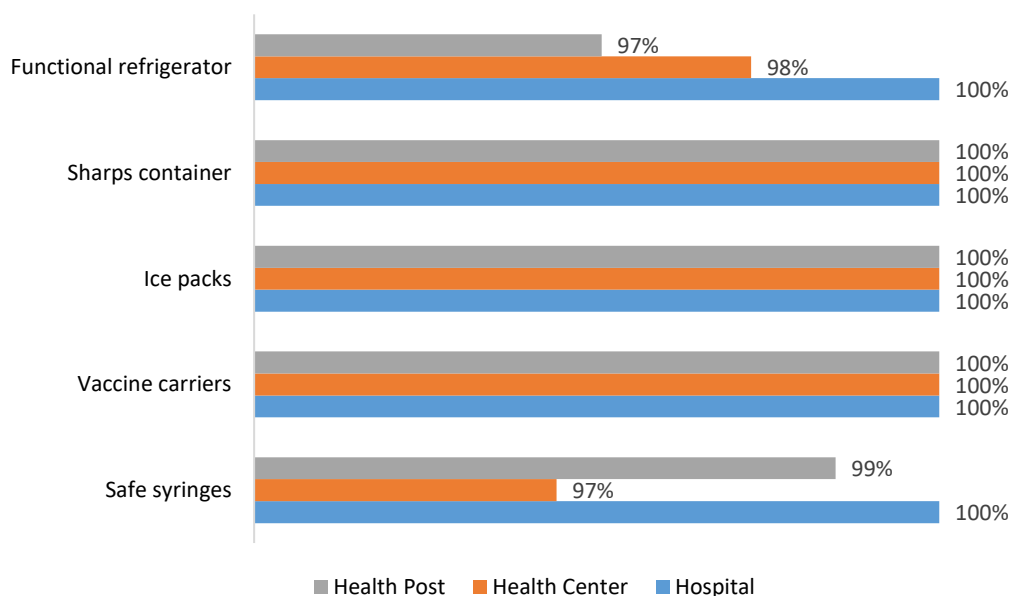
Note: Facilities are those that store vaccines

Vaccine storage conditions

Methodological Note

The main indicator to assess vaccines storage conditions is the temperature of the refrigerators. In order to independently and consistently measure fridges' temperature, each team was provided with a thermometer. The enumerator asked the permission to put the thermometer in the refrigerator where vaccines are stored during the time of the survey. At the end of the survey, after anywhere between 3 to 6 hours, the enumerator returned to note the temperature.

Vaccines need optimal storage conditions in order to maintain their potency and it is thus important to evaluate the storage conditions of vaccines across the country. A high proportion (93.5 percent) of refrigerators with vaccines had a temperature within the recommended 2 to 8 degrees Celsius (Table 25).[23] Interestingly, health centers were more likely to comply than hospitals and health posts. Among the districts, Western Rural had only two-thirds of facilities (66.8 percent) with within-range temperature, Kono, Kambia and Tonkolili had all facilities within range (see Table 26). Enumerators were also asked to check for any signs of temperature monitoring in the facility, and they found it to be 69.1 percent.

Table 25: Vaccines storage - Refrigerators with temperature between 2ᵒC and 8ᵒC

% facilities	**Sierra Leone**	**Freetown**	**Urban**	**Rural**	**Public**	**Private**

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[23] Wider variations were observed during the survey between the enumerator's thermometers and fridge thermometers. A quick verification of a few sample SDI facilities was done later to confirm and validate the temperature findings in 193 facilities from 10 districts.

All	93.5	95.2	95.8	92.2	93.8	87.0
Hospital	92.9	83.3	92.9	.	90.0	100.0
Health Center	95.8	100.0	95.8	.	97.7	75.0
Health Post	92.5	100.0	100.0	92.2	92.3	100.0
# Facilities	194	9	69	125	185	9

Table 26: Vaccines storage - Refrigerators with temperature between 2ºC and 8ºC (by district)

% facilities	All	Hospital	Health Center	Health Post	# Facilities
Bombali	91.0	.	100.0	88.2	22
Kambia	100.0	100.0	100.0	100.0	13
Kenema	96.0	100.0	88.9	100.0	19
Koinadugu	88.2	100.0	88.9	87.8	51
Kono	100.0	100.0	100.0	100.0	20
Moyamba	95.3	.	100.0	93.3	21
Port Loko	94.5	100.0	100.0	92.3	17
Tonkolili	100.0	100.0	100.0	100.0	12
Western Rural	66.8	.	75.9	59.0	10
Western Urban	95.2	83.3	100.0	100.0	9

Source: Author's calculations using Sierra Leone 2018 SDI data

L. Equipment Availability

Methodological Note
The equipment indicator focuses on the availability (observed and functioning by the enumerator) of minimum equipment expected at a facility. The pieces of equipment expected in all facilities are: a weighing scale (adult, child or infant), a stethoscope, a sphygmomanometer and a thermometer and a refrigerator, and additionally sterilization equipment at health center and hospital levels.

The survey found that less than a third (31.9 percent) of health facilities in Sierra Leone met the minimum medical equipment requirements (Table 27). Public facilities had better availability of equipment (32.9 percent) compared to private facilities (20.6 percent). In general, health posts had the lowest level of basic equipment available. However, a higher share of health centers (53.2 percent) had the minimum basic equipment available than the hospitals (34.5 percent).

Table 27. Availability of basic equipment by facility type, ownership and location

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	31.9	26.2	40.0	28.3	32.9	20.6
Hospital	34.5	62.5	34.5	NA	47.1	27.2
Health Center	53.2	50.0	53.2	NA	53.4	50.6
Health Post	26.2	7.7	5.6	28.3	27.3	8.4
# Facilities	547	21	165	382	501	46

Source: Author's calculations using Sierra Leone 2018 SDI data

Table 28 shows the availability of specific types of medical equipment in Sierra Leonean facilities. Most facilities had a scale and stethoscope. Over three-quarters of facilities had a thermometer and sphygmomanometer. However, only about a half of facilities (53.3 percent) had a functional refrigerator.

Table 28. Availability of equipment items in the equipment indicator

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private	Hospital	Health Center	Health Post
Any scale	98.7	100.0	98.2	98.9	99.1	93.5	97.8	100.0	98.4
Thermometer	78.5	80.0	83.8	76.2	77.9	85.9	85.8	86.1	76.2
Stethoscope	91.6	100.0	93.5	90.8	91.3	94.6	94.0	93.8	90.9
Sphygmomanometer	76.1	95.4	81.7	73.7	75.2	85.7	87.5	82.8	73.8
Refrigerator	53.3	33.8	60.8	50.0	55.8	26.2	38.8	81.0	46.8
Sterilization	76.9	84.6	87.6	72.2	77.4	70.9	77.2	94.8	72.2

Source: Author's calculations using Sierra Leone 2018 SDI data

Table 29 shows the availability of other supplies. Male and female condoms were not available across all facilities. Only 87.9 percent of facilities had male condoms and 56.9 percent of health facilities had female condoms. Rapid diagnostic tests for malaria were available in 98.8 percent of all facilities and only 61 percent facilities had HIV test kits. A major share of facilities (95.6 percent) had insecticide treated nets (ITNs). Test kits for tuberculosis and glucometers for potential diabetes patients were only available in 12.3 percent and 11.5 percent of the facilities respectively. Instruments for child growth monitoring were for the most apart available but to varying degrees. Most facilities (96.2 percent) had a tape measure and 94.6 percent had a length board. There was not much variation across the different strata for the availability of selected medical supplies except that more urban facilities had the availability for some medical supplies such as glucometer, HIV and TB test kits.

Table 29: Availability of selected medical supplies

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private	Hospital	Health Center	Health Post
Bag and mask	90.9	90.8	91.4	90.7	92.3	75.8	94.0	95.1	89.7
Upper airways	92.3	98.5	92.5	92.1	93.3	81.1	83.6	96.1	91.7
Male condoms	87.9	56.9	80.8	91.0	89.9	65.8	87.5	88.9	87.7
Female condoms	56.9	86.2	63.7	53.9	57.4	51.0	57.3	65.2	54.7
RDT	98.8	100.0	98.0	99.2	99.3	93.6	89.7	98.8	99.3
HIV kit	61.0	81.5	84.2	50.7	59.7	74.8	100.0	88.7	51.9
Glucometer	11.5	36.9	30.5	3.2	7.9	50.5	87.1	25.4	4.3
TB kit	12.3	18.5	35.9	1.8	11.8	17.4	61.6	43.9	1.6
ITN	95.6	100.0	94.2	96.2	96.8	81.7	83.6	96.9	95.8
Tape measure	96.2	100.0	93.7	97.3	97.2	84.9	81.5	97.1	96.7
Length board	94.6	95.4	93.2	95.3	95.7	83.0	83.6	97.1	94.5
MUAC tape	97.6	100.0	94.7	98.9	99.1	81.9	83.2	97.7	98.3
RUTF	34.9	50.8	48.6	28.9	34.6	38.6	53.4	54.5	28.9
F100	4.3	29.2	9.8	1.9	3.3	15.7	29.7	6.0	2.7
F75	2.9	4.6	5.4	1.8	2.5	7.3	25.4	2.5	1.9

Source: Author's calculations using Sierra Leone 2018 SDI data

Communications equipment

Table 30 shows the availability of communications equipment (radio, phone, computer) in Sierra Leonean health facilities. The study found that over half (51.1 percent) of health facilities had at least one of the three forms of communication equipment.[24] Urban and private facilities were more likely to have any communication instrument.

Table 30. Communication equipment availability

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	51.1	86.2	69.6	42.9	48.4	80.4
Hospital	97.8	100.0	97.8	NA	100.0	96.6
Health Center	64.0	100.0	64.0	NA	62.6	83.1
Health Post	45.5	76.9	70.5	42.9	43.8	71.6
# Facilities	547	21	165	382	501	46

Source: Author's calculations using Sierra Leone 2018 SDI data

The availability of specific types of communication equipment was also assessed (Table 31). Personal cell phones were the most widely available piece of equipment, followed by cell phones paid by the facility and computers. There was a large gap in the availability of computers in rural and urban facilities. Only 15.6 percent of rural facilities had computers compared to 36.7 percent of urban facilities. Access to internet, however, was more limited with only 14.4 percent of the facilities with that capacity. Public facilities were less likely to have access to internet (12.8 percent) than their private counterparts (32 percent).

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[24] Note that phone cellular phones, the indicator only accepts cell phone which belongs to the facility itself or a personal cell phone but the facility supports the cost of its calls. Cell phones which belong to a staff of the facility, paid for by the staff of the facility but used also by the facility are not included in computing the indicator.

Table 31. Access to various forms of communication

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
Communication	51.1	86.2	69.6	42.9	48.4	80.4
Communication+	90.5	90.8	92.2	89.8	90.5	90.7
Land line	2.7	0.0	4.2	2.0	2.2	8.4
Cellular Phone[1]	32.9	75.4	47.3	26.5	30.4	59.6
Cellular Phone[2]	64.8	36.9	56.4	68.5	66.6	45.8
Computer	15.6	35.4	36.7	6.3	12.7	46.9
Shortwave Radio	6.3	30.8	9.2	5.0	6.2	7.3
Internet	14.4	27.7	21.1	11.5	12.8	32.0

Source: Author's calculations using Sierra Leone 2018 SDI data
Communication + is an aggregate including cellular phone[2] (see footnote below).
Note: 1 - cell phone costs are paid for by the facility. 2 - Personal cell phone and costs are paid for by staff

Ambulance services

An effective referral system requires the availability of ambulance services. This need not be ownership of a dedicated emergency vehicle, but rather that the facility has access to an emergency vehicle. Ownership of an ambulance is very low (4.9 percent). However, 96.8 percent of health facilities had access to a vehicle to transport their patients. Additionally, there are road infrastructure challenges in Sierra Leone as mentioned earlier, with most roads in very poor condition.

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private	Hospital	Health Center	Health Post
Own ambulance	4.9	12.3	14.9	0.5	2.9	26.7	77.2	8.3	0.5
Access to ambulance	94.5	90.8	88.9	97.0	96.2	76.1	85.3	93.1	95.3
Access to a vehicle not ambulance	96.8	100.0	94.2	98.0	97.6	88.8	93.5	94.7	97.5

M. Infrastructure Availability

Methodological Note

The infrastructure indicator captures the availability of three inputs: water, sanitation and electricity. The indicator is an unweighted average of these three components. Eligible sources are:
Electricity sources-electric power grid, a fuel operated generator, a battery-operated generator or a solar powered system as their main source of electricity.
Water sources-piped into the facility, piped onto facility grounds or comes from a public tap/standpipe, tube well/borehole, a protected dug well, a protected spring, bottled water or a tanker truck.
Sanitation sources-functioning flush toilets or Ventilated and Improved (VIP) latrines, or covered pit latrine (with slab).

Less than half (47.7 percent) of the health facilities had access to all three types of basic infrastructure (Table 32). Only half of the rural facilities (36.5 percent) than their urban counterparts (73 percent) had the basic infrastructure. There was also a large difference between the private sector (74.3 percent) and the public sector (45.2 percent). The infrastructure indicator steadily improved with the level of the facility, from 38.2 percent in health posts to 75.4 percent in health center and 95.7 percent in hospitals.

Table 32. Availability of infrastructure by facility type

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	47.7	63.1	73.0	36.5	45.2	74.3
Hospital	95.7	100.0	95.7	.	94.1	96.6
Health Center	75.4	100.0	75.4	.	74.9	83.1
Health Post	38.2	38.5	54.3	36.5	36.7	60.7
# Facilities	547	21	165	382	501	46

Source: Author's calculations using Sierra Leone 2018 SDI data

Table 33 shows the availability of specific types of infrastructure in Sierra Leonean health facilities. When considered alone, 85.3 percent had access to clean water, 82.3 percent to toilets and 61.6 percent had access to electricity. The public-private and urban-rural gaps for electricity were very large. As shown in figure 16, solar power constitutes the major source of electricity in the facilities. The proportion increases further in rural and public facilities.

Table 33. Availability of specific types of infrastructure

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private	Hospital	Health Center	Health Post
Infrastructure Indicator	47.7	63.1	73.0	36.5	45.2	74.3	95.7	75.4	38.2
Clean water	85.3	86.2	92.4	82.2	85.1	87.9	97.8	94.5	82.3
Toilet	82.3	76.9	91.0	78.4	81.2	93.5	100.0	92.5	78.7
Electricity	61.6	95.4	84.5	51.5	59.0	89.3	97.8	83.3	54.2

Figure 18: Sources of electricity by facility type

	No power	Mains	Generator	Solar
Sierra Leone	38%	10%	4%	47%
Urban	16%	27%	11%	47%
Rural	49%	3%	1%	47%
Public	41%	8%	2%	49%
Private	11%	38%	25%	27%
Hospital	2%	49%	28%	22%
Health Center	17%	18%	6%	59%
Health Post	46%	6%	3%	45%

Location: Sierra Leone, Urban, Rural
Ownership: Public, Private
Facility type: Hospital, Health Center, Health Post
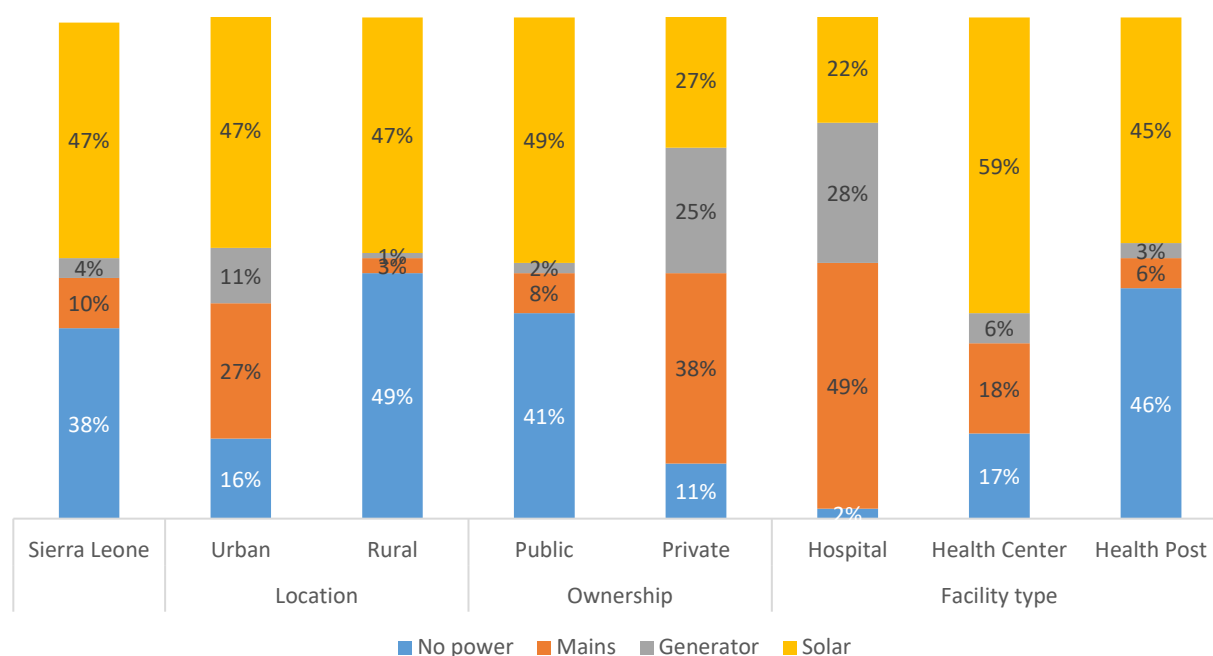
N. Waste Management

Health care waste is a product of health care activities and a potential source of infection if not disposed properly. In order to protect the public health from hazardous waste either directly or through vectors, health care waste must be destroyed or isolated from people, animals and disease vectors. This serves to avoid the recycling of pathogens in the community (WHO, 2005, p. 15). Using questionnaire and observation methods, the survey narrowed its scope to assessment of final disposal of medical waste and sharps, presence of guidelines and history of training in health care waste management.

Acceptable waste disposal.[25]

Most facilities (73.7 percent) carried out safe health care waste disposal (Table 34). However, 62.8 percent of facilities were observed to have guidelines on health care waste management and 83.8 percent had training. Of these, 58.8 percent had both the guidelines and history of training.

Table 34. Total proportion of facilities carrying out safe health care waste disposal

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[25] Protected ground/pit/incineration. These include incinerator burning, protected dumping and covered storage for off-site disposal. The actual safety of the method is debatable even if though it is accepted. The pits may have access to the water table and therefore potentially unsafe (WHO, 2005, p. 17). Burning of waste using a 1-chamber brick incinerator still have the risk of hazardous gases especially as their temperatures are not high enough to achieve complete combustion. Open burning, dumping on flat/unprotected ground are considered environmentally unacceptable and are discouraged (WHO, 2005, p. 41) (WHO, 1999, p. 120).

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	73.7	80.0	85.5	68.5	72.7	84.3
Hospital	81.0	87.5	81.0	NA	88.2	76.9
Health Center	91.0	100.0	91.0	NA	90.3	100.0
Health Post	68.8	69.2	72.5	68.5	67.9	83.3
# Facilities	547	21	165	382	501	46

Source: Author's calculations using Sierra Leone 2018 SDI data

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Box 4: Maternal Health: A Beneficiary Perspective

The perspective of the SDI is on the patient experience as beneficiaries utilize the health system. In this box, we focus on the experience of mothers as they navigate the Sierra Leonean health system. The most recent national Population and Housing Census Thematic Report on Mortality (2015) indicate the maternal mortality ratio in Sierra Leone is 1,165 maternal deaths per 100,000 live births. Using results from the SDI and other recent analytic pieces, Box 4**Error! Reference source not found.** (below) highlights the challenges of access and quality of care that women encounter through the primary health system.

Many factors contribute to Sierra Leone's high MMR including the high fertility rate: women have an average of five children (MDG Survey, 2012/2013). Many women are not utilizing the formal health system to give birth with only 54 percent of births in health facilities of any kind. This is concerning given that the Sierra Leone Maternal Death Surveillance and Response Report found that 62 percent of maternal deaths occur following childbirth. The primary cause is postpartum hemorrhage (32 percent) followed by pregnancy induced hypertension (16 percent), and anemia (13 percent).

In addition to demand side barriers, results from the SDI indicate a number of other challenges for mothers in accessing quality care. This includes high absenteeism of health personnel, low provider knowledge, only a few facilities equipped with basic emergency obstetric care (BEMOC) services in primary care facilities and comprehensive emergency for obstetric care (CEMOC) only being available at the district level, which is further limited by a weak referral system. In the case of post-partum hemorrhage, only 45.5 percent of diagnosed cases (while 90 percent are diagnosed correctly) are referred. This can only be addressed with improved training and a stronger referral system.

Box 4. Maternal Health: A Beneficiary Perspective (continued)

High levels of absenteeism of medical staff compromises antenatal, delivery and postnatal visits.

- 2015 health facility data indicated 97 percent of women went to one prenatal consultation but there is a *startling drop* to 76 percent for women who attended all four antental consultations. 54 percent delivered in facility. Over 80 percent of women attended postnatal consultations.
- Service delivery is affected by personnel absences especially at the primary health facility level. The absence rate in Sierra Leone's health sector is high with 29.9 percent of personnel absent during an unannounced visit.

Low level of knowledge

- Providers adhered to only 31.2 percent of the clinical guidelines for managing maternal and neonatal complications.

Access to essential equipment and medicines

- Most health facilities do not have the capacity to offer BEmOC, with only 4.8 percent of all facilities (mostly district level hospitals) offering these services. However, most district level hospitals are located in urban areas.
- Only a limited number of health centers (9.3 percent) and health posts (1.5 percent) offer full basic emergency obstetric care coverage.
- Only 10.6 percent of the health centers and 3.2 percent of health posts had the capacity to conduct assisted vaginal deliveries.
- **Less than half** of health facilities have access to priority drugs for mothers (49.9 percent) and children (36.2 percent).

Weak referral system especially in the case of obstetric complicatiions

- in the case of post partum hemorrhage (PPH) even though diagnosis was about 92 percent, referral averaged about 46 percent.
- Only district hospitals are equipped with comprehensive emergency (CEmONC). There is an imbalance between facilities that offer BEmONC and CEmONC.
- Given that most hospitals and health centers are located in urban areas, a strong referral system needs to be in place. This would mean primary care facilities need access to transportion and communication so they can refer patients to hospitals efficiently. Ownership of an ambulance is very low (4.9 percent).

Finding solutions to the challenges highlighted by the SDI results can contribute to bringing down maternal mortality in Sierra Leone. These include continuous and focused training to health providers especially for those that undertake outreach activities, better allocating existing human resources and managing absenteeism to ensure coverage especially in rural areas, providing all PHUs with BEmONC equipment and scaling up CEmONC equipment in hospitals along with appropriate training. Finally, the referral system needs to be strengthened. Ambulances and other modes of transportation need to be in place so that patients can better access appropriate care at tertiary level. In addition, addressing key demand side geographic and financial barriers to accessing care will play a critical role in improving maternal health outcomes.

O. Health Financing

The objective of this section is to analyze the financing of frontline health providers by level type, location, and other important dimensions. Providers' resources (financial and non-financial) originate from 3 broad sources i) households through user fees i.e. facilities charge patients for the services they provide, ii) direct transfers from government sources, and iii) transfers from non-government entities such as private donors. The survey collected financial information from the head of facility or the staff designated as the most knowledgeable when it comes to finances. To have a complete picture of providers' resources, it was decided to collect information on a full fiscal year and for that reason most of this section focuses on year 2017 unless explicitly stated.

Table 35 presents evidence on the receipt of financial resources from a variety of sources. Around a third of facilities (36.6 percent) reported that they received financial resources. Only 6.4 percent of health facilities received direct financial support from the central government, whereas 24.2 percent of facilities received finances from user fee and 13.4 percent from non-drug user fees. Higher proportion of facilities across levels of care, ownership or location received resources from user fees than any other source.

Table 35. Facilities that received financial resources from different sources

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private	Hospital	Health Center	Health Post
Central Government	6.4	9.2	7.4	6.0	6.2	9.2	23.3	5.5	5.8
Health Insurance	0.2	0.0	0.5	0.0	0.2	0.0	4.3	0.0	0.0
Local government	1.5	1.5	2.5	1.0	1.6	0.0	12.9	0.4	1.2
User Fees	24.2	20.0	24.9	23.9	22.8	38.7	40.1	24.9	23.2
User Fees (not drugs)	13.4	29.2	15.4	12.5	12.6	22.1	42.2	11.5	12.5
Donor Projects	4.2	3.1	7.4	2.8	3.4	13.1	28.0	6.2	2.6
NGO	1.8	6.2	5.3	0.2	1.0	10.3	17.2	3.9	0.5
Other	0.5	0.0	1.5	0.0	0.0	5.4	6.0	0.0	0.3
Total	36.6	40.0	39.6	35.3	34.7	57.2	74.1	36.3	34.9

Source: Author's calculations using Sierra Leone 2018 SDI data

Table 36 shows facilities on average received 26.2 million SLL in 2017.[26] Hospitals received a higher amount (421.8 million SLL) and health centers about a tenth of the hospitals (46.8 million SLL), while for health posts it was a miniscule of 1.9 million SLL. Average of Freetown health facilities (137.2 million SLL) was about five times of the national average. Urban facilities received 81.3 million SLL against 1.9 million in rural facilities. This could be driven by the fact that there were no health centers or hospitals in the rural sample and as such health posts have received minimal amounts. Private facilities (228 million SLL) received much higher amounts than the public ones (7.6 million SLL).

Table 36: Average total receipt of revenue from all sources in 2017

mean in million SLL	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	26.2	137.2	81.3	1.9	7.6	228.0
Hospitals	421.8	1104.2	421.8	.	374.5	449.1
Health centers	46.8	0.6	46.8	.	3.4	617.6
Health posts	1.9	1.8	2.2	1.9	1.9	3.2
# Facilities	183	10	63	120	158	25

Source: Author's calculations using Sierra Leone 2018 SDI data.

Breaking down the receipt by type of sources (Figure 19), it shows donor projects contributed the maximum share of resources (38 percent), followed by NGO and user fees (21 percent each) and the local government (9 percent). It is possible that some amount of donor funding was channeled through the NGOs and the respondents misclassified the sources. Central government's contribution was only 8 percent and health insurance just 1 percent.

Figure 19: Share of revenue by sources
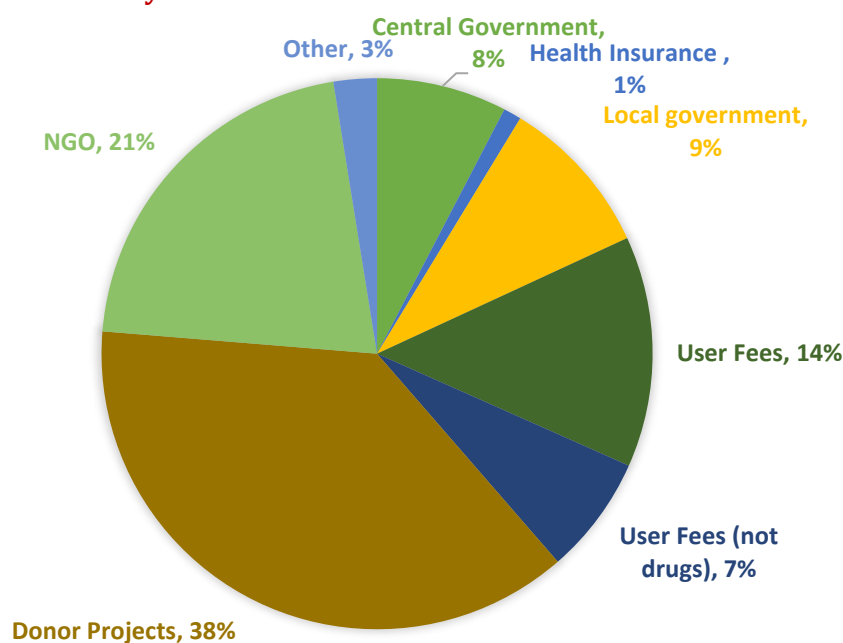
More number of facilities reported expenditure (n=487) than revenues (n=183). Average expenditure was 240 million SLL (Table 38), about 10 times higher than the average revenue. Apart from a lower number of facilities actually reporting revenues, there is also a possibility of facilities underreporting revenue and/or overreporting expenditure leading to a higher average expenditure than revenue. Similar to receipt of revenue, hospitals, urban and private facilities reported higher expenditure than their counterparts.

Table 38: Average total expenditure from all sources in 2017

mean in million SLL	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	240	239	775	4	9	2752
Hospitals	6227	1879	6227	.	268	9673
Health centers	43	5	43	.	6	524
Health posts	5	10	12	4	4	13
# Facilities	487	18	146	341	449	38

Source: Author's calculations using Sierra Leone 2018 SDI data.

Figure 20 shows expenditure by various activities. Most was spent on supplies and services (43 percent) followed by administration (28 percent) and employment expenses (24 percent).

Figure 20: Share of expenditure by category
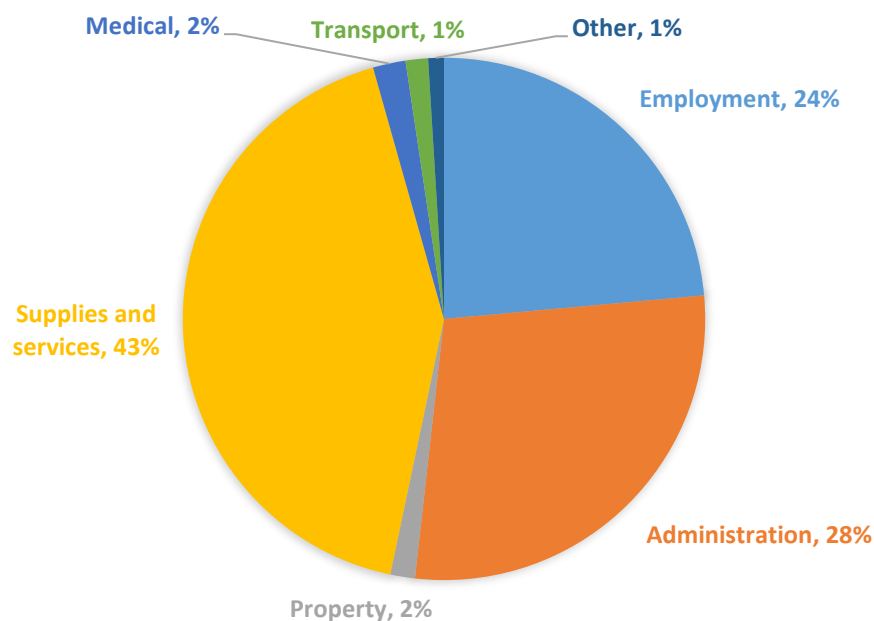
Table 37 shows receipt of in-kind resources. 80.9 percent of the facilities acknowledge receipts of in-kind resources from any source. Higher proportion of rural facilities received in-kind resources (81.3

percent) aid than urban ones (80.1 percent). Similarly, higher proportion of public facilities (82.9 percent) received in-kind than private (60.2 percent). A higher proportion of health centers (87.5 percent) and posts (80.1 percent) received in-kind resources, while it was 63.8 percent for the hospitals.

Table 37: Facilities that received in-kind resources from any source in 2017

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	80.9	78.5	80.1	81.3	82.9	60.2
Hospitals	63.8	75.0	63.8	.	82.4	53.1
Health centers	87.5	100.0	87.5	.	87.7	84.3
Health posts	80.1	69.2	67.8	81.3	81.6	56.5
# Facilities	547	21	165	382	501	46

Source: Author's calculations using Sierra Leone 2018 SDI data.

User Fees Policy and Practice

A little more than half of all facilities charge user fees for care (55 percent) (Table 38). Hospitals (80.2 percent) and health posts (55.7 percent) tended to charge user fees more than health centers (47.6 percent). While overall, 53.6 percent of public sector facilities charged user fees, the share was higher in urban public facilities (69.8 percent).

Table 38: Share of facilities that charge users for care

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	55.0	39.1	50.4	57.0	53.6	69.8
Hospitals	80.2	57.1	80.2	.	70.6	85.9
Health centers	47.6	0.0	47.6	.	44.9	83.1
Health posts	55.7	53.8	43.1	57.0	55.5	58.2
# Facilities	547	21	165	382	501	46

Source: Author's calculations using Sierra Leone 2018 SDI data

For the services that facilities charge a fee, overall a higher proportion do so in urban areas, private and higher-level facilities.

Table 39: Share of facilities that charge users for care by services

% facilities	N*	Mean Fee#	Sierra Leone	Freetown	Urban	Rural	Public	Private	Hospital	Health Center	Health Post
General Consultation	158	60	30.0	47.5	33.7	28.3	27.9	52.2	84.2	25.9	28.4
Specialist Consultation	58	19	56.4	17.9	41.5	68.6	55.7	61.0	71.2	36.7	61.5
Ultra sound examination	14	32	28.4	0.0	46.3	0.0	13.8	64.2	79.7	29.9	2.0
IUD	4	10	2.0	0.0	4.4	0.7	0.5	18.2	31.8	1.9	0.6
Progestogen pill	9	11	3.0	19.1	7.0	1.5	2.3	16.4	30.4	2.7	2.4
Malaria Test	12	10	4.2	5.8	10.5	0.0	0.0	41.6	48.2	3.2	0.9
Random Blood Sugar	38	14	67.1	80.0	72.5	28.7	60.2	77.7	85.3	60.4	51.7
Malaria treatment (above 5 years)	16	28	3.4	9.4	8.1	1.2	1.6	23.9	27.9	3.2	2.3
Hemoglobin test	38	12	63.6	91.2	66.2	14.4	59.0	73.3	77.7	62.1	44.8
Malaria treatment (under 5 years)	8	22	1.6	4.7	4.5	0.3	0.3	18.2	18.5	2.3	0.7
Urinalysis	45	8	37.0	52.9	54.9	5.3	29.1	69.1	85.2	47.6	10.5
Caesarian section	8	253	47.2	16.7	48.6	0.0	11.8	79.6	48.6		0.0
HIV/AIDS test kits	4	7	1.1	5.5	2.9	0.0	0.0	11.9	0.0	2.5	0.7
Amoxicillin Syrup	14	7	2.5	6.3	8.1	0.0	0.2	30.0	44.9	3.5	0.4
TB test kit	4	17	6.3	0.0	7.0	0.0	0.0	55.7	35.5	0.0	0.0
ANC visit	10	13	1.7	6.3	4.9	0.3	0.3	19.4	28.7	1.2	0.8
DEPO provera	9	6	2.3	4.9	3.6	1.7	1.3	16.8	14.5	2.4	1.9

Number of facilities that charge user fees by service; #User fee in 1000 SLLs

Out of all services, the maximum number of facilities (n=158) reported to charge for general consultations with an average of 5973 SLL.

It is considered good practice for facilities to post the prices of their services in a manner it is accessible to all patients they serve. In Sierra Leone, only 8.9 percent of the facilities visibly display user fees in a place all can see (Table C12, Annex C). While 31.6 percent of private facilities post their prices, only 6.2 percent public facilities visibly posted their prices.

Although almost all facilities charge fees, many facilities reported provide exemptions to a number of categories of patients even though this is not a direct policy implemented by the MoHS. (Table 40). For instance, 32.6 percent of facilities said that they exempted patients with chronic diseases from paying fees. Children under five, pregnant and lactating women, elderly, very poor people and those that deal with chronic disease were also beneficiaries of an exemption policy. Government of Sierra Leone introduced Free Health Care Initiative (FHCI) in 2010. Under this initiative, pregnant women, lactating women and children under five are exempt from paying user fees. Thus, a high proportion of exemptions for these categories of clients indicates near adequate implementation of FHCI.

Facilities were also asked the amount they did not collect or exempted from some clients under user fees. Overall 5 billion SL Leones were not collected in user fees.

Table 40: Exemption of user fees for specific groups

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
Chronic disease	32.6	70.3	44.6	27.3	32.2	37.4
Elderly	40.3	62.5	49.8	36.1	40.2	42.1
Very poor	56.0	82.8	59.5	54.4	55.9	57.2
Facility staff	82.5	70.3	81.3	83.0	83.4	73.0
Staff Relatives	63.4	59.4	62.3	63.9	64.9	47.5
Civil servants	27.8	40.6	31.9	26.0	28.5	19.8
Members of health management board	33.4	45.3	39.0	30.9	34.0	27.2
Politicians	25.4	48.4	33.4	21.8	25.0	29.2
Under 5s	96.1	79.7	90.3	98.6	98.1	74.0
Pregnant women	96.0	79.7	88.5	99.3	98.6	67.5
Lactating mothers	96.6	79.7	89.6	99.7	98.9	71.3
Ebola survivors	94.4	84.4	89.6	96.5	96.5	71.5
Disability	81.0	79.7	78.9	81.9	82.3	67.5
Sexual and Gender based violence clients	70.7	81.3	71.9	70.2	71.8	59.2
Estimated amount exempted (millions of SL Leones)	5096	252	2382	2714	4684	412

P. Governance in Health Service Delivery

Governance in Finance

The SDI survey also looked at financial planning, financial management instruments and reporting. The survey found that only 64.4 percent of facilities in Sierra Leone had a work plan for the current fiscal Year (Table 41) and 44 percent had an annual implementation plan (Table 42).

Table 41: Facilities that had a work plan for the current fiscal year

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	64.4	57.8	64.0	64.6	65.1	56.3
Hospitals	75.8	100.0	75.8	.	100.0	61.3
Health centers	67.5	50.0	67.5	.	66.3	84.3
Health posts	63.0	53.8	48.0	64.6	64.2	45.7
# Facilities	546	21	164	382	501	45

Source: Author's calculations using Sierra Leone 2018 SDI data

Table 42: Facilities that had an annual implementation plan

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	44.0	25.0	43.4	44.3	44.3	41.4
Hospitals	67.4	100.0	67.4	.	94.1	51.4
Health centers	44.9	0.0	44.9	.	44.4	50.6
Health posts	42.7	23.1	26.9	44.3	43.3	33.9
# Facilities	546	21	164	382	501	45

Source: Author's calculations using Sierra Leone 2018 SDI data

Documentation of funds disbursed and expended is crucial to financial accountability and planning, especially in the public sector. This is usually done through financial management instruments. However, only 15.1 percent of facilities have receipt books, 9.8 percent payment vouchers, and 12.9 percent cash books to manage their finances. (see Table 43 below). Urban and private facilities had more access to financial management instruments than their counterparts.

Table 43: Receipt of financial management instruments by public providers

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private	Hospital	Health Center	Health Post
Receipt books	15.1	32.8	30.0	8.5	14.1	26.0	56.8	23.9	10.8
Payment vouchers	9.8	23.4	20.3	5.2	8.6	22.5	43.6	16.6	6.5
Cash books	12.9	29.7	24.4	7.9	11.5	29.1	48.0	20.9	9.2
Other	1.3	0.0	3.3	0.5	0.9	6.6	8.8	3.1	0.5

Source: Author's calculations using Sierra Leone 2018 SDI data

Only 7.1 percent of the facilities could show that they submitted their financial report for the previous quarter (Table 44). Of those who reported not to have submitted their report (about 92.9 percent), the main reason was report not ready (35.4 percent) followed by no funding available (29.6 percent) and no financial activity to report (15.9 percent).

Table 44: Facilities that submitted a financial report for previous quarter

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	7.1	12.5	15.4	3.4	5.5	24.3
Hospitals	52.4	71.4	52.4	.	58.8	48.6
Health centers	11.5	0.0	11.5	.	8.5	50.6
Health posts	3.8	7.7	7.6	3.4	3.7	5.0
# Facilities	546	21	164	382	501	45

Accountability and information sharing with the community:

Only a quarter of the facilities (25.8 percent) shared the financial information with the community (Table 45). The difference is greatest between the public (27.7 percent) and private sectors (5.7 percent). 92 percent communicated financial information through meetings (Figure 21), whereas 67 percent verbally.

Table 45: Facilities that share financial information with community

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	25.8	6.3	25.9	25.8	27.7	5.7
Hospitals	15.4	14.3	15.4	.	41.2	0.0
Health centers	33.5	0.0	33.5	.	34.8	16.9
Health posts	24.3	7.7	9.6	25.8	25.6	5.0
# Facilities	547	21	165	382	501	46

Source: Author's calculations using Sierra Leone 2018 SDI data

Figure 21: Means by which facilities communicate with their community
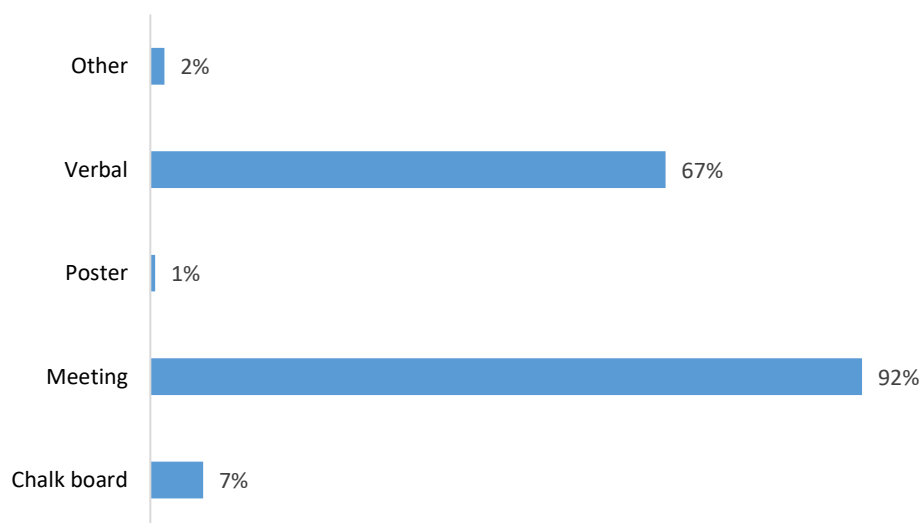
The display of essential medicines and health supplies (EMHS) was very high. 94.2 percent of facilities shared this information (Table 46). It is important to note that fewer urban facilities (86 percent) display EMHS information. This is also true for private facilities where only 55.7 percent of facilities display EMHS information. Figure 22 shows that 74 percent of the facilities shared information of essential medicines verbally and 59 percent through meetings.

Table 46: Facilities that share EMHS delivery information with community

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	94.2	86.2	86.0	97.9	97.8	55.7
Hospitals	46.6	62.5	46.6	.	70.6	32.7
Health centers	93.7	100.0	93.7	.	99.6	16.9
Health posts	96.7	84.6	84.6	97.9	97.8	78.6
# Facilities	547	21	165	382	501	46

Source: Author's calculations using Sierra Leone 2018 SDI data

Figure 22: Means by which facilities communicate with their community on EMHS
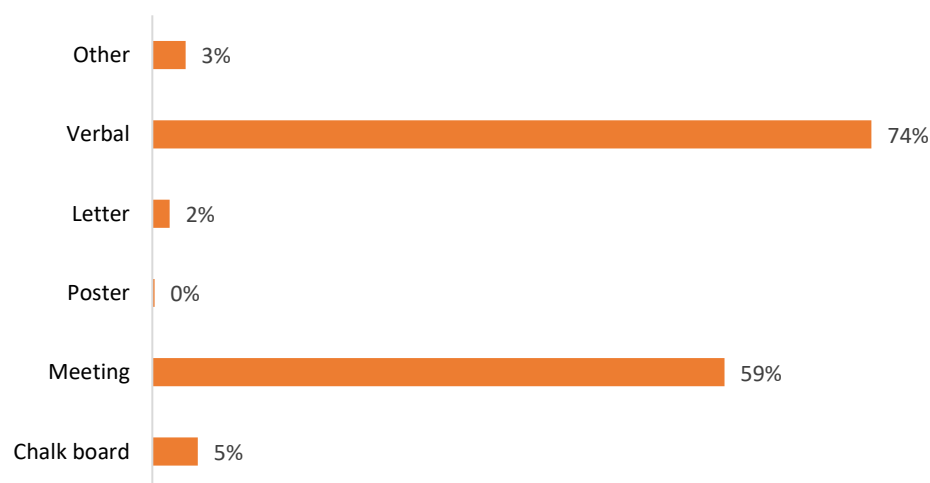
Source: Author's calculations using 2018 Sierra Leone SDI data

Supervision:

Technical supervision is a key factor in human resource appraisal and an important part of accountability for both the provider and the supervising body. This survey addressed supervision by the district health management teams. A larger proportion of facilities (91.3 percent) received a supervision visit from the DHMT in 2017 (Table 47). Supervision was highest in health posts (91.7 percent), followed by health centers (90.2 percent) and hospitals (86.8 percent). It is interesting to note that private facilities had poorer supervision rates than public facilities.

Table 47: Facilities that received supervision visit from DHMT in 2017

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	91.3	95.3	88.4	92.5	92.5	77.5
Hospitals	86.8	100.0	86.8	.	88.2	85.9
Health centers	90.2	100.0	90.2	.	91.9	67.4
Health posts	91.7	92.3	84.4	92.5	92.7	76.6
# Facilities	546	21	164	382	501	45

Source: Author's calculations using Sierra Leone 2018 SDI data

Presence and Activity of Health Facility Governing Committees.

Most facilities (93.6 percent) reported that they had a health facility governing committee (Table 48). Of these 77.1 percent met monthly and 20.2 percent quarterly. The facilities that showed evidence of minutes of meeting were 78.3 percent.

Table 48: Facilities with governing committees

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	93.6	90.6	86.9	96.6	96.8	58.9
Hospitals	49.8	100.0	49.8	NA	76.5	33.8
Health centers	94.1	100.0	94.1	NA	98.7	33.7
Health posts	95.6	84.6	85.5	96.6	96.7	78.3
# Facilities	546	21	164	382	501	45

Source: Author's calculations using Sierra Leone 2018 SDI data

Q. Community Health Workers

Community health workers (CHW) in Sierra Leone are selected as a joint effort between the community and the local PHU. The average number of CHWs per district is about 1000. Their training lasts for 24 days comprising of 3 modules of about 8 days each. Each of the CHWs is assigned to one or a maximum of 2 villages with population of 100 to 500 on average. They are supposed to perform home visits to observe and improve hygiene and sanitation practices in the homes, checking on vaccination status of children, the antenatal records of pregnant women. They are also expected to test fever cases with malaria RDT tests and administer ACTs to positive malaria cases and refer those that do not improve to the neighboring PHUs. They are also expected to have cotrimoxazole for the treatment of ARI, and ORS and zinc for diarrhea. They are expected to facilitate the utilization of facilities by patients that need these services.

As shown in table 49, majority of the facilities (83.8 percent) had a CHW with a higher proportion at the lower levels of facility (health center 87.5 percent and health post 86.1 percent). Rural facilities had a higher share (88.4 percent) than urban (73.4 percent) and public being higher (86.7 percent) than private (51.7 percent).

Table 49: Facilities with community health workers

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	83.8	67.7	73.4	88.4	86.7	51.7
Hospitals	15.1	25.0	15.1	.	17.6	13.6
Health centers	87.5	100.0	87.5	.	90.3	50.6
Health posts	86.1	61.5	64.1	88.4	87.1	70.7
# Facilities	547	21	165	382	501	46

Source: Author's calculations using Sierra Leone 2018 SDI data

All districts in the sample had CHWs in place (table 50). Among those, the highest was in Kenema (99.1 percent) and the lowest in Bombali (51 percent).

Table 50: Facilities with community health workers by district

% facilities	All	Hospital	Health Center	Health Post
Bo	85.7	0.0	84.6	93.1
Bombali	51.0	0.0	38.0	60.6
Bonthe	85.4	0.0	66.7	93.1
Kailahun	92.0	0.0	100.0	94.4
Kambia	94.4	0.0	100.0	94.4
Kenema	99.1	75.0	100.0	100.0
Koinadugu	84.4	0.0	100.0	83.3
Kono	95.4	0.0	85.7	100.0
Moyamba	87.7	0.0	100.0	85.7
Port Loko	62.4	28.6	100.0	59.4
Pujehun	95.0	0.0	100.0	95.5
Tonkolili	96.3	0.0	80.0	100.0
Western Rural	87.5	.	93.5	85.1
Western Urban	67.7	25.0	100.0	61.5

Average number of CHWs was 11.2 per facility with urban (13.2) more than rural (10.4) and equal among public (11.1) and private sectors (11.3). Figure 23 below shows the distribution of community health workers and other health workers (doctors, CHO/CHA and nurses/midwives) by district. On an average, health facilities in Pujehun and Koinadugu had the highest averages with 14 CHWs while the lowest was in Bombali (6.6).

Districts with a lower level of average staff per facility in general seem to have higher CHWs per facility except for Pujehun where both CHWs and other health workers were higher than the national averages.

Figure 23: Distribution of health workers by district

Legend: CHW (orange), Other Health Workers (yellow)

Data by district (CHW, Other Health Workers):
- Bo: 8.1, 4.6
- Bombali: 6.6, 5.3
- Bonthe: 13.7, 3.2
- Kailahun: 10.6, 5.6
- Kambia: 13.1, 4.3
- Kenema: 11.0, 3.5
- Koinadugu: 14.3, 3.5
- Kono: 11.4, 5.5
- Moyamba: 10.1, 3.4
- Port Loko: 12.2, 5.3
- Pujehun: 14.8, 18.2
- Tonkolili: 11.8, 3.9
- Western Rural: 9.3, 10.1
- Western Urban: 9.8, 22.5

Average age of CHWs was 38.4 years, which was lower than all other category of health workers (Figure 24). Doctors had the highest average age (51.9 years) followed by CHO/CHA and nurses/midwives with around 41 years each.

Figure 24: Average age among various health workers

Average age:
- Doctor: 51.9
- CHO/CHA: 41.6
- Nurse/midwives: 41
- CHW: 38.4
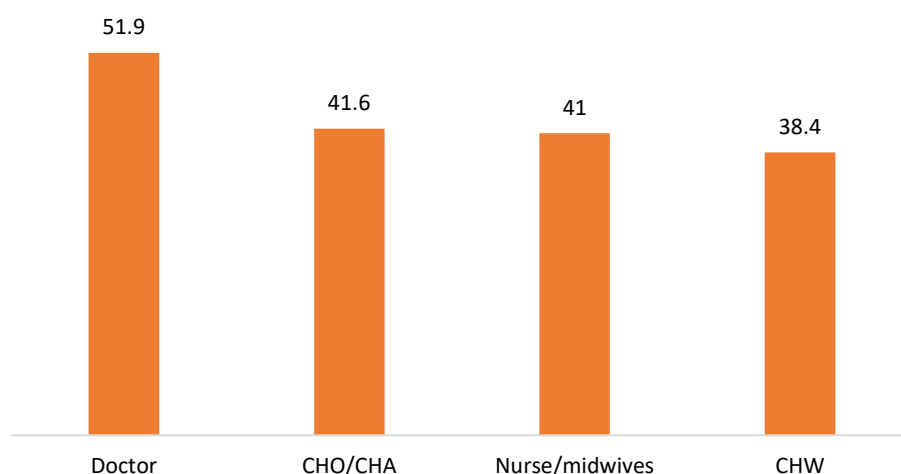
Majority of the CHW in the sample (Figure 25) were males (84.4 percent) even though the policies say preference should be given to women candidates for selection.[27] Compared to other health workers, proportion of males is the highest among CHWs. As one would expect, proportion of females was higher among nurse/midwives (89 percent), while males dominate among doctors (79 percent) and CHO/CHA (66 percent) categories.

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[27] Sierra Leone National Community Health Worker Policy 2016-2020

Figure 25: Gender distribution among various health workers
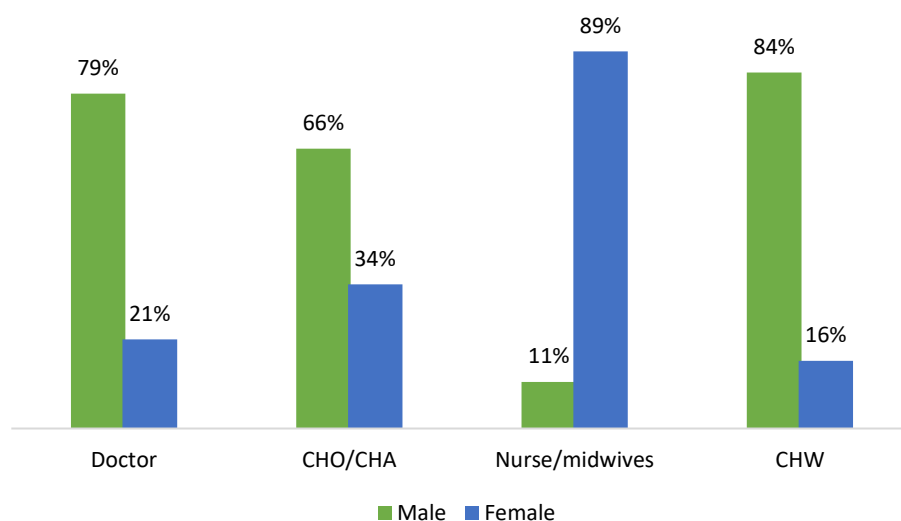
Figure 26 shows the education levels of CHWs vis-à-vis other health workers. Most CHWs had education up to the secondary level (72 percent). Half of nurse/midwives also had secondary education and 48 percent at college level. Among CHO/CHA, 81 percent had college level education and most doctors had obtained a degree (63 percent). Overall, it shows that CHWs had lower levels of education compared to other health workers. It also reflects the national guidelines on selection where literacy and basic numerical adequacy are considered preferable, but not an absolute necessity.

Figure 26: Education levels among various health workers
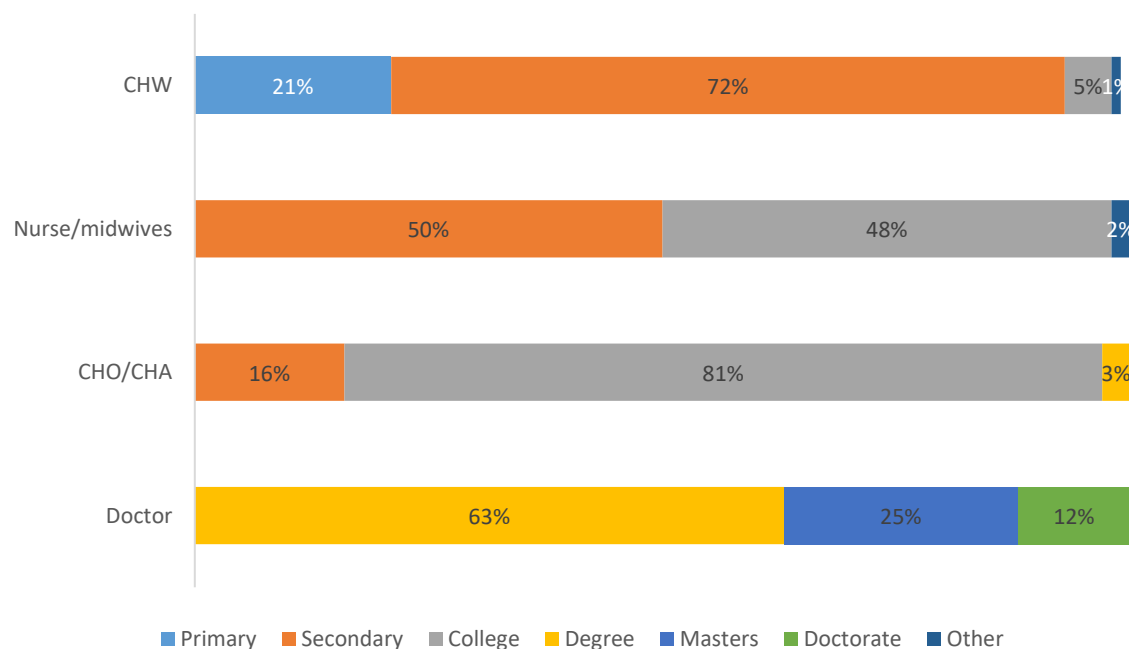
IV.   COMPARATIVE SDI

After the SDI pilot in Senegal and Tanzania was carried out in 2010, the SDI was revised and rolled out in a number of countries such as Kenya and Uganda (2013), Nigeria, Togo, and Mozambique (2015), Madagascar and Niger (2016). Tanzania was, however, the first country to implement a repeat survey that would allow for trend analysis. This second SDI has a great deal of overlap with the pilot, although there were a few indicators which were not comparable. It was, however, fully comparable to the 2013 and 2014 SDIs. For the patient case simulations (or vignettes) the 2010 Pelvic Inflammatory Disease was replaced in 2014 by a Diabetes Mellitus case as diabetes is becoming more of a concern for policy makers and its incidence seems to be growing.

R. Comparing Sierra Leone to nine other SDI countries.

SDI has been carried out in Senegal (2010), Nigeria, Togo, Kenya and Uganda in 2013, twice in Tanzania: in 2010 and 2014, Nigeria and Mozambique (2014), Niger and Madagascar (2016). The instruments used (except in Senegal Tanzania 2010) are fully comparable as well as the survey implementation methodology. It should also be noted that other SDI surveys among the comparators are at least two years older.

Table 51 shows how Sierra Leone compared to other countries for a few select indicators. Sierra Leone performed higher than the average on caseload, management of maternal and neonatal complications, availability of drugs and infrastructure. Sierra Leonean facilities had the highest caseload following Kenya and Mozambique (10 patients per provider per day).

Sierra Leone performed below average in comparison in the areas of absence rate, diagnostic accuracy, adherence to clinical guidelines and equipment availability. Thus, the quality of service delivery on diagnosing and managing patients of common ailments was poor.

Table 51: Sierra Leone in comparison with other countries in health service delivery.

	Countries' average	Sierra Leone (2018)	MD (2016)	NG (2015)	MZ (2015)	TZ (2014)	NR (2013)	TG (2013)	UG (2013)	KE (2013)	SG (2010)
Caseload (per provider per day)	9.03	10.0	5.2	9.8	17.4	7.3	5.2	5.2	6	15.2	-
Absence from facility (% providers)	30.2	29.9	27.4	33.1	23.9	14.3	31.7	37.6	46.7	27.5	20
Diagnostic accuracy (% clinical cases)	47.23	44.5	30	26.9	58.3	60.2	39.6	48.5	58.1	72.2	34
Adherence to clinical guidelines (% clinical guidelines)	33.4	30.2	31	17.4	37.4	43.8	31.9	35.6	41.4	43.7	22
Management of maternal and neonatal complications (% clinical guidelines)	23.52	31.21	21.9	12.0	29.9	30.4	19.8	26	19.3	44.6	-
Drug availability (% drugs)	53.52	56.0	48	50.4	42.7	60.3	49.2	49.2	47.2	54.2	78
Equipment availability (% facilities)	55.84	31.86	62	35.9	79.5	83.5	21.7	92.6	21.9	76.4	53
Infrastructure Availability (% facilities)	38.57	47.7	28.4	13.3	34	50	23.8	39.2	63.5	46.8	39

* MD – Madagascar; NG – Niger; MZ – Mozambique; TZ – Tanzania; NR – Nigeria; TG – Togo; UG – Uganda; KE – Kenya; SG – Senegal

S. Poverty and health service delivery in Sierra Leone

Table 52 below shows the key service delivery indicators by district against the district level poverty head count. More than half (53 percent) of the national population are poor as per the estimates from the 2011 Sierra Leone Integrated Household Survey (SLIHS). Only three districts (Kambia, Bo and Western Urban) have lower poverty than the national average.

Overall, districts with higher poverty have higher caseloads except for Kailahun (27.5 per provider per day) and Koinadugu (24.6). It is possible that the districts with higher poverty are also rural and there could be a shortage of health workers leading to higher caseloads provided the disease burden profiles remain similar across districts. While there is no particular trend for absence rate by district level poverty, Western Rural with poverty levels higher than the national average has the highest absenteeism.

Providers in most poor district of Tonkolili have in fact the best diagnostic accuracy (59.6 percent), adherence to clinical guidelines (49.8 percent) and management of maternal and neonatal complications (59.6 percent) skills. It is worth noting than Tonkolili had lower than national level scores for equipment and infrastructure availability. Providers in few of the less poor districts (Bonthe and Bo) in fact have worse diagnostic and management abilities. These two districts also had lower than national scores for availability of equipment. However, availability of minimum equipment and infrastructure did not impact the diagnostic accuracy for the whole sample (shown

in the regressions of Table 63). Thus, it is less likely that lower availability of equipment would have reduced the clinical skills of the providers in the survey.

As far as the availability of minimum infrastructure is concerned, districts with lower poverty levels have relatively higher scores. While, there is no clear trend for the availability of minimum equipment with the poverty levels.

Table 52: Poverty and health service delivery in Sierra Leone

	Poverty head count (%)	Caseload (per provider per day)	Absence from facility (% providers)	Diagnostic accuracy (% clinical cases)	Adherence to clinical guidelines (% clinical guidelines)	Management of maternal and neonatal complications (% clinical guidelines)	Drug availability (% drugs)	Equipment availability (% facilities)	Infrastructure Availability (% facilities)
Tonkolili	76.4	10.1	19.1	59.6	49.8	59.6	62.5	24.9	45.0
Moyamba	70.8	18.8	27.6	54.1	25.7	28.9	53.8	28.4	40.7
Kenema	61.6	8.4	33.5	53.0	33.0	37.3	50.8	25.9	22.4
Kono	61.3	7.6	41.9	34.1	18.3	18.9	57.5	42.1	18.3
Kailahun	60.9	27.5	12.7	55.7	44.8	47.1	55.9	27.6	27.6
Port Loko	59.9	5.4	23.8	38.7	23.9	25.5	64.3	32.2	63.3
Bombali	57.9	5.3	44.6	35.5	26.2	22.7	41.8	33.4	53.8
Western Rural	57.1	6.7	50.7	41.5	31.3	31.5	51.7	38.3	83.1
Koinadugu	54.3	24.6	20.0	44.5	39.4	40.8	64.4	55.8	37.7
Pujehun	54.1	7.5	19.6	39.8	31.2	25.2	56.6	38.2	66.0
Kambia	53.9	2.3	22.6	47.7	27.7	22.9	64.4	45.7	41.5
Bonthe	51.4	3.0	37.1	30.2	15.0	15.0	50.8	21.3	49.5
Bo	50.7	6.0	30.4	24.3	21.2	20.9	57.8	19.4	65.2
Western Urban	20.7	5.7	33.2	54.6	31.9	35.0	52.2	26.2	63.1
Sierra Leone	53	10	29.9	44.5	30.2	31.21	56	31.86	47.7

V.   WHAT DOES THIS MEAN FOR SIERRA LEONE?

What does this mean for Sierra Leone?

Sierra Leone continues to lag far, far behind in maternal, infant, and child mortality compared to its regional peers. **Equitable access to quality health services remains a key challenge**. While there has been some progress in Sierra Leone's health sector, more can be done to improve service delivery. Perception of quality at facilities is often a deciding factor in service utilization. Like many countries, Sierra Leone faces an inequitable geographic distribution of service quality. Quality and provider availability, which is still low is better in urban areas. The availability of medical equipment and level of diagnostic accuracy are also higher in urban areas than rural areas.

Inputs are important and the lack of medical equipment and infrastructure in facilities are concerning. Basic equipment as mandated by the Government, is not available at most primary health facilities. This is alarming given the fact that most of the population accesses care at a public primary health facility. There are also major challenges around infrastructure and drug availability. Less than half of the facilities in Sierra Leone have the required components for infrastructure. Drug availability, particularly for mothers and children is quite poor.

Availability of skilled human resources for health (HRH) remains a major bottleneck to improving quality of care. In addition to increasing the volume of health workers to address the shortage of providers this issue, improvements in management, supervision and training are critical to ensure quality health service delivery by a skilled HRH base. The survey found that provider knowledge and abilities are very low to deliver quality services. Training needs to be better focused with the main objective of capacitating health workers to accurately diagnose and treat the main causes of illness as well as to have the skills to refer complicated cases up to higher levels of care. There should also be a concerted emphasis on adhering to the national guidelines as far as managing critical health conditions is concerned. Secondly, the Government should ensure establishing systems for tracking staff availability during facility operation hours to reduce absenteeism.

Using data for decision making. SSL and the Ministry of Health and Sanitation played a critical role in implementing this first round of the SDI. There is strong capacity within SSL and the Ministry of Health and Sanitation to support data collection. Further capacity building efforts are needed in using this data for decision making through all levels of the health system. The next step would be to utilize annual health facility data along with other population-based surveys to target and support interventions especially in rural and vulnerable regions of the country. In addition, this first round of the SDI provided a good overview of the status of health service delivery and it also highlighted a number of nuances and intricacies of the Sierra Leonean health system.

An Important Opportunity.   Sierra Leone emerged from a civil war (2002) and Ebola outbreak (2014) and since then, a bit progress has been made in the health sector but much remains to be done. The opportunity to accelerate progress exists with the political will behind the Government's recently approved National Health Sector Strategic Plan that includes action points to improve maternal and child health as one of the key objectives. Finally, the Government can make strides by implementing set of targeted and equitable reforms in the short, medium, and long term that address the key challenges highlighted under the SDI and other recent analytic pieces to improve availability of quality public health services especially in rural primary health facilities.

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VII. ANNEXES

ANNEX A. SAMPLING STRATEGY

The overall objective of the SDI is to produce accurate and representative indicators at the national, urban and rural levels. In some countries, like Sierra Leone, it may be required that the indicators be representative at a sub-national level e.g. region or district. The main units of analysis are facilities as well as providers health workers. The SDI also aims to produce accurate information on providers at varying levels in the pyramid i.e. hospital, health center and health post; as well as ownership status e.g. public versus private and location (urban and rural).

It is important to note here that the sampling strategy for the SDI in Sierra Leone was done by the national statistical office (Statistics Sierra Leone - SSL). The list of facilities to include was sent to SSL (the firm responsible for the data collection) by MoHS.

A. Sampling Frame for the 2018 Sierra Leone SDI

Administratively, Sierra Leone's health system is divided into 14 health districts. Each health district is divided into chiefdoms, and managed by a District Health Management Team (DHMT). The Sampling Frame used is a list of health facilities provided by the MoHS. The list contains a total of 1,300 facilities, with geographic identifications of Region, District and Chiefdom; as well as ownership status such as Public or Private. In addition to the list, facility type such as health posts, health centers, clinics, and hospitals; with their location in either Rural or Urban as provided by the nation's statistical agency - SSL.

The study was intended to be conducted in all 14 health districts; but however, in two of the 14 districts, i.e. Kailahun (87 facilities) and Koinadugu (78 facilities) a census was done; while in the remaining 12, a survey was conducted. Therefore, the sampling frame excludes the list of facilities for the two census districts, which gives a total of 1,135 facilities. Tables 52, 53 and 54 below show the distribution of facilities by type, Ownership and Location respectively.

Table 53: Distribution of facilities by Type

DISTRICT	CHC	CHP	CLINIC	HOSPITAL	MCHP	Total
Bo	34	28		7	64	133
Bombali	20	71	11	6	9	117
Bonthe	12	16	5	4	29	66
Kambia	13	17		1	39	70
Kenema	26	30	4	5	64	129
Kono	15	13	7	1	54	90
Moyamba	18	11	7	1	69	106
Port Loko	14	33	3	5	62	117
Pujehun	13	15		1	49	78
Tonkolili	12	8	1	3	84	108
Western Rural	11	22		1	21	55
Western Urban	19	22		11	14	66
Grand Total	**207**	**286**	**38**	**46**	**558**	**1135**

Source: SSL sampling report

Table 54: Distribution by Ownership

DISTRICT	Ownership			Proportion		
	Private	Public	Total	Percent of Total	Percent Public	Percent Private
Bo	6	127	133	11.72%	95.49%	4.51%
Bombali	14	103	117	10.31%	88.03%	11.97%
Bonthe	7	59	66	5.81%	89.39%	10.61%
Kambia		70	70	6.17%	100.00%	0.00%
Kenema	6	123	129	11.37%	95.35%	4.65%
Kono	6	84	90	7.93%	93.33%	6.67%
Moyamba	6	100	106	9.34%	94.34%	5.66%
Port Loko	4	113	117	10.31%	96.58%	3.42%
Pujehun		78	78	6.87%	100.00%	0.00%
Tonkolili	3	105	108	9.52%	97.22%	2.78%
Western Rural	12	43	55	4.85%	78.18%	21.82%
Western Urban	30	36	66	5.81%	54.55%	45.45%
Grand Total	94	1041	1135	100.00%	91.72%	8.28%

Source: SSL sampling report

Table 55:Distribution by Location

DISTRICT	Location				Proportion		
	Private (Urban)	Public (Rural)	Public (Urban)	Total	Private (Urban)	Public (Rural)	Public (Urban)
Bo	6	86	41	133	4.51%	64.66%	30.83%
Bombali	14	80	23	117	11.97%	68.38%	19.66%
Bonthe	7	44	15	66	10.61%	66.67%	22.73%
Kambia		53	17	70	0.00%	75.71%	24.29%
Kenema	6	78	45	129	4.65%	60.47%	34.88%
Kono	6	65	19	90	6.67%	72.22%	21.11%
Moyamba	6	80	20	106	5.66%	75.47%	18.87%
Port Loko	4	95	18	117	3.42%	81.20%	15.38%
Pujehun		64	14	78	0.00%	82.05%	17.95%
Tonkolili	3	92	13	108	2.78%	85.19%	12.04%
Western Rural	12	12	31	55	21.82%	21.82%	56.36%
Western Urban	30		36	66	45.45%	0.00%	54.55%
Grand Total	94	749	292	1135	8.28%	65.99%	25.73%

Source: SSL sampling report

In total, there are 91.72% of the facilities that are Public with a little over 8 percent Private. About 66% are located in rural areas and 34 percent in urban areas.

B. Sample Size and Sample allocation for the 2018 Sierra Leone SDI

The sample for SDI study was arrived at by using the formula:

$$n = Deft^2 \frac{(1/P - 1)}{\alpha^2}$$

Where:
n = total sample size
P = Estimate prevalence of the outcome being measured (Assuming the Absence rate for Senegal, 20%)
Deft = Design effect (1.2)
α = Minimum desired precision or maximum tolerable error (relative standard error of 10%, which gives a standard error of 2%); with 95% Confidence Limits: P-2SE, P+2SE i.e. 0.16 - 0.24.
When applying this formula using the parameters above, the total sample size yielded 383 facilities.

The sample for SDI study is a stratified sample selected in two stages from the sampling frame. Stratification is achieved by separating the list of facilities into ownership (public or private), urban and rural areas. In total, 36 sampling strata have been constructed, since there are no private facilities in the rural areas. Samples will be selected independently in each stratum, by a two-stage selection. In the first stage, facilities will be selected randomly. An implicit stratification and proportional allocation will be achieved at each of the lower administrative levels by sorting the list, within each sampling stratum, according to lower administrative units. Also, in order to have a gain in precision, facilities such as hospitals and health centers will be selected and assigned a probability of 1 within each sampling stratum.

The sample allocation took the precision consideration at domain level into account. The allocation was done in two steps: firstly, a proportional allocation was used to allocate the target number of facilities to each study domain; then the domain sample size was proportionally allocated to each sampling stratum (that is, the ownership, urban and rural areas) within the domain. Table 55 below gives the sample allocation of facilities among the various sampling strata.

Table 56: Sample Allocation of Facilities

DISTRICT	Sample Allocation			
	Private (Urban)	Public (Rural)	Public (Urban)	Total
Bo	2	29	14	45
Bombali	5	27	8	39
Bonthe	2	15	5	22
Kambia	0	18	6	24
Kenema	2	26	15	44
Kono	2	22	6	30
Moyamba	2	27	7	36
Port Loko	1	32	6	39
Pujehun	0	22	5	26
Tonkolili	1	31	4	36
Western Rural	4	4	11	19
Western Urban	10	0	12	22
Total	32	253	99	383

Source: SSL sampling report

C. Sampling Health Facilities and Health Workers

The next stage is the selection of health staff for interviews. Prior to canvassing in the selected facility, a listing of health workers, detailing categories of staff will be provided. This list will serve as the sampling frame for the selection of health staff to be interviewed. Within each health facility, up to 10 health workers will be selected. There are 2 different procedures for measuring absenteeism or assessing knowledge. For absence, 10 health workers will be selected in the staff roster using a random numbers table and the whereabouts of those health workers is ascertained in a return surprise visit. For the assessment, however, only health workers who actually see patients i.e. provide a diagnostic and treatment are eligible. These procedures imply that facilities across strata as well as health workers across strata and within facility do not all have the same probability of selection. It is therefore necessary to compute weights for reporting the survey results.

D. Weights for health facilities and providers

To be representative of the population of interest, sample estimates from the 2018 Sierra Leone SDI have to be properly weighted using a sampling weight, or expansion factor. Note that different weights will need to be applied depending on the relevant level for the variable which can be the facility or the staff. The basic weight for each entity is equal to the inverse of its probability of selection which is computed by multiplying the probabilities of selection at each sampling stage. All the weights have been computed and included in the dataset.

Sampling probabilities were calculated separately for each sampling stage. We use the following notations:

P1hi: first-stage sampling probability of the ith facility in stratum h
P2hi: second -stage sampling probability within the ith facility (staff selection)

The overall selection probability of each staff in facility i of stratum h is therefore the production of the two stages selection probabilities:

$$P_{hi} = P_{1hi} \times P_{2hi}$$

Sampling weights will be required to ensure the actual representability of the sample at the national level and at the domain level as well. The sampling weight for each staff in facility i of stratum h is the inverse of its overall selection probability:

$$W_{hi} = 1/P_{hi}$$

Table 57: Health survey instrument

Module	Description

Module 1: Facility Questionnaire
    Section A: General Information
    Section B: General Information
    Section C: Infrastructure
    Section D: Equipment, Materials and Supplies
    Section E: Drugs
	Administered to the in-charge or the most senior medical staff at the facility.
	Self-reported and administrative data on health facility characteristics, staffing, and resources flows.

Module 2: Staff Roster
    Section A: Facility First Visit
    Section B: Facility Second Visit
	Administered to the in-charge or the most senior medical staff at the facility. Administered to (a maximum of) ten medical staff randomly selected from the list of all medical staff. Second visit is administered to the same ten medical staff as in module 4. An unannounced visit about a week after the initial survey to measure the absence rates.

Module 3: Clinical case Simulations
    Section B: Introduction
    Section C: Example
    Section D: Clinical case 1
        Acute Diarrhea + Dehydration
    Section E: Clinical case Patient 2
        Pneumonia
    Section F: Clinical case Patient 3
        Diabetes Mellitus
    Section G: Clinical case Patient 4
        Pulmonary Tuberculosis
    Section H: Clinical case Patient 5
        Malaria + Anemia
    Section I: Clinical case Patient 6
        Post-partum hemorrhage
    Section J: Clinical case Patient 7
        Neonatal Asphyxia
    Section K: Frequency of different types of consultations
    Section L: Management
	Administered to medical staff in facility to assess clinical performance.

Module 4: Health Facility Financing
    Section A: Management
    Section B: Financial (Cash) Support
    Section C: Community Involvement
	Administered to the in- charge or the most senior medical staff at the facility.

Figure 27: Map of health facilities visited by SDI in Sierra Leone
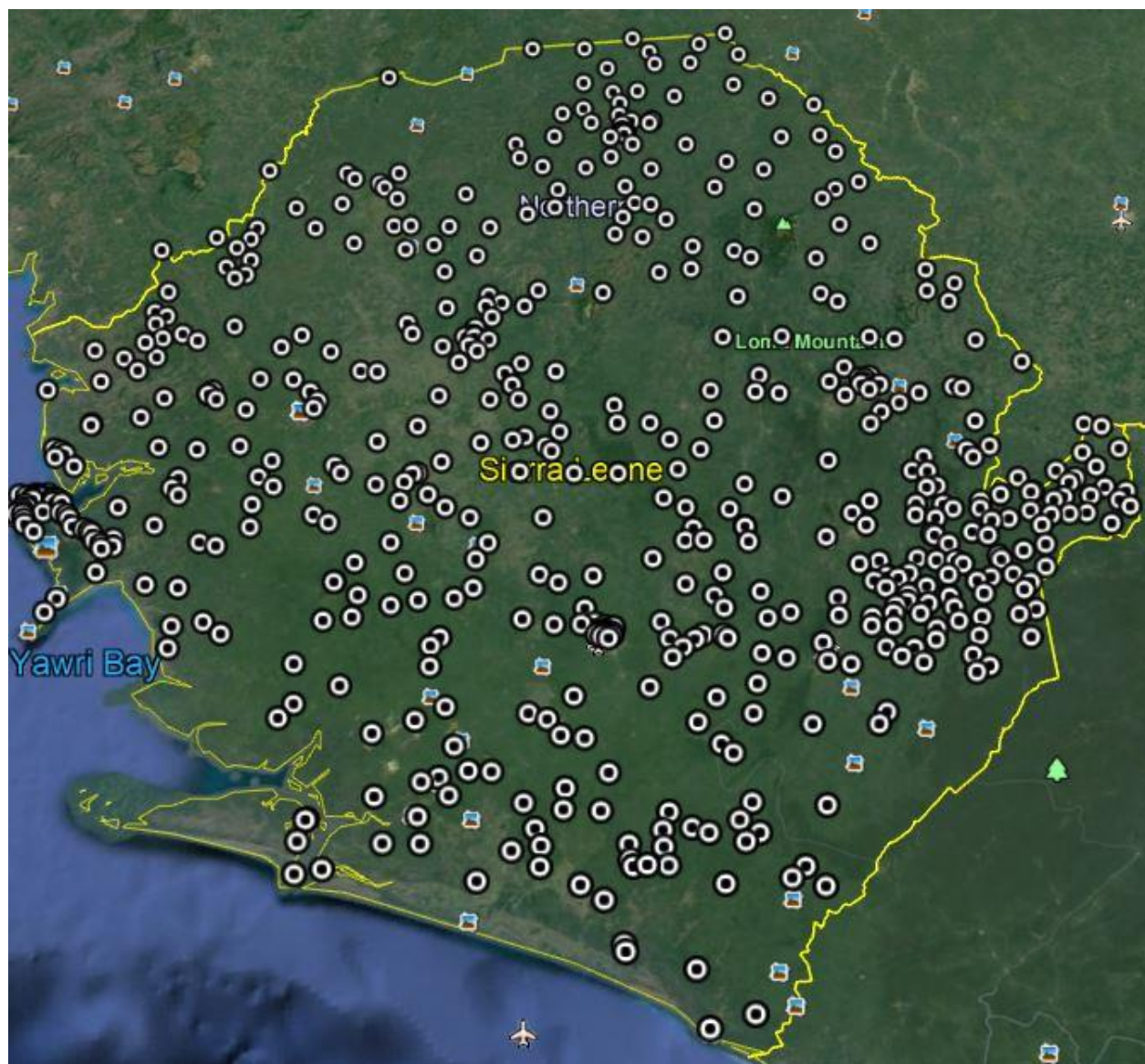
ANNEX B. DEFINITION OF INDICATORS

Table 58: Indicator definition and method of calculation

Caseload per health provider	
Number of outpatient visits per clinician per day.	The number of outpatient visits recorded in outpatient records in the three months prior to the survey, divided by the number of days the facility was open during the three month period and the number of health professionals who conduct patient consultations (i.e. excluding cadre-types such as public health nurses and out-reach workers).
Absence rate	
Share of a maximum of 10 randomly selected providers absent from the facility during an unannounced visit.	Number of health professionals that are not off duty who are absent from the facility on an unannounced visit as a share of ten randomly sampled workers. Health professionals doing fieldwork (mainly community and public health professionals) were counted as present.
Adherence to clinical guidelines	
Unweighted average of the share of relevant history taking questions, the share of relevant examinations performed.	For each of the following five clinical cases: (i) acute diarrhea; (ii) pneumonia; (iii) diabetes mellitus; (iv) pulmonary tuberculosis; (v) malaria with anemia. History Taking Questions: Assign a score of one if a relevant history taking question is asked. The number of relevant history taking questions asked by the clinician during consultation is expressed as a percentage of the total number of relevant history questions included in the questionnaire. Relevant Examination Questions: Assign a score of one if a relevant examination question is asked. The number of relevant examination taking questions asked by the clinician during consultation is expressed as a percentage of the total number of relevant examination questions included in the questionnaire. For each clinical case: Unweighted average of the: relevant history questions asked, and the percentage of physical examination questions asked. The history and examination questions considered are based on the Sierra Leone Standard National Guidelines and the guidelines for Integrated Management of Childhood Illnesses (IMCI).
Management of maternal and neonatal complications	
Share of relevant treatment actions proposed by the clinician.	For each of the following two clinical cases: (i) post-partum hemorrhage; and (ii) neonatal asphyxia. Assign a score of one if a relevant action is proposed. The number of relevant treatment actions proposed by the clinician during consultation is expressed as a percentage of the total number of relevant treatment actions included in the questionnaire.
Diagnostic accuracy	
Average share of correct diagnoses provided in the five clinical cases.	For each of the following five clinical cases: (i) acute diarrhea; (ii) pneumonia; (iii) diabetes mellitus; (iv) pulmonary tuberculosis; (v) malaria with anemia. For each clinical case, assign a score of one as correct diagnosis for each clinical case if diagnosis is mentioned. Sum the total number of correct diagnoses identified. Divide by the total number of clinical case. Where multiple diagnoses were provided by the clinician, the diagnosis is coded as correct as long as it is mentioned, irrespective of what other alternative diagnoses were given.

Drug availability	
Share of basic drugs which at the time of the survey were available at the health facilities.	Priority medicines for mothers: Assign score of one if facility reports and enumerator confirms/observes the facility has the drug available and non-expired on the day of visit for the following medicines: Oxytocin (injectable), misoprostol (cap/tab), sodium chloride (saline solution) (injectable solution), azithromycin (cap/tab or oral liquid), calcium gluconate (injectable), cefixime (cap/tab), magnesium sulfate (injectable), benzathinebenzylpenicillin powder (for injection), ampicillin powder (for injection), betamethasone or dexamethasone (injectable), gentamicin (injectable) nifedipine (cap/tab), metronidazole (injectable), medroxyprogesterone acetate (Depo-Provera) (injectable), iron supplements (cap/tab) and folic acid supplements (cap/tab).
	Priority medicines for children: Assign score of one if facility reports and enumerator confirms after observing that the facility has the drug available and non-expired on the day of visit for the following medicines: Amoxicillin (syrup/suspension), oral rehydration salts (ORS sachets), zinc (tablets), ceftriaxone (powder for injection), artemisinin combination therapy (ACT), artusunate (rectal or injectable), benzylpenicillin (powder for injection), vitamin A (capsules)
	We take out of analysis of the child tracer medicines two medicines (Gentamicin and ampicillin powder) that are included in the mother and in the child tracer medicine list to avoid double counting.
	The aggregate is adjusted by facility type to accommodate the fact that not all drugs (injectables) are expected to be at the lowest level facility, CSB1, where health workers are not expected to offer injections.
Equipment availability	
Share of facilities with thermometer, stethoscope and weighing scale, refrigerator and sterilization equipment.	Medical Equipment aggregate: Assign score of one if enumerator confirms the facility has one or more functioning of each of the following: thermometers, stethoscopes, sphygmomanometers and a weighing scale (adult or child or infant weighing scale) as defined below. CSB2 and CHRD are expected to include two additional pieces of equipment: a refrigerator and sterilization device/equipment.
	Thermometer: Assign score of one if facility reports and enumerator observes facility has one or more functioning thermometers.
	Stethoscope: Assign score of one if facility reports and enumerator confirms facility has one or more functioning stethoscopes.
	Sphygmomanometer: Assign score of one if facility reports and enumerator confirms facility has one or more functioning sphygmomanometers.
	Weighing Scale: Assign score of one if facility reports and enumerator confirms facility has one or more functioning Adult, or Child or Infant weighing scale.
	Refrigerator: Assign score of one if facility reports and enumerator confirms facility has one or more functioning refrigerator.
	Sterilization equipment: Assign score of one if facility reports and enumerator confirms facility has one or more functioning Sterilization device/equipment.
Infrastructure availability	
Share of facilities with electricity, clean water and improved sanitation.	Infrastructure aggregate: Assign score of one if facility reports and enumerator confirms facility has electricity and water and sanitation as defined.
	Electricity: Assign score of one if facility reports having the electric power grid, a fuel operated generator, a battery-operated generator or a solar powered system as their main source of electricity.
	Water: Assign score of one if facility reports their main source of water is piped into the facility, piped onto facility grounds or comes from a public tap/standpipe, tubewell/borehole, a protected dug well, a protected spring, bottled water or a tanker truck.
	Sanitation: Assign score of one if facility reports and enumerator confirms facility has one or more functioning flush toilets or VIP latrines, or covered pit latrine (with slab).

ANNEX C. ADDITIONAL RESULTS

Table 59: Distribution of health personnel by facility type and ownership

	Sierra Leone	Hospital	Health center	Health post	Private	Public
Physician/Medical Doctor (Specialist)	0.87	2.64	0.17	0	2.08	0.58
Medical Officer	0.65	1.88	0.16	0.04	2.08	0.31
Community Health Officer	7.28	5.1	15.9	2.65	6.7	7.42
Community Health Assistant	2.68	0.4	4.95	2.78	0.8	3.13
Nurse/Nurse Midwife	3.91	8.09	4.09	0.5	5.84	3.44
Maternal and Child Health (MCH) Aide	37.15	3.8	33.87	65.63	13.09	42.9
Nursing Aide	6.74	16.32	2.33	2.51	11.14	5.69
SRN	3.33	10.33	0.17	0.17	3.51	3.28
SECHN	34.32	48.83	32.27	24.49	51.77	30.15
SECHN - midwife	2.73	1.81	5.92	1.09	2.27	2.83
Nursing officer	0.35	0.79	0.16	0.13	0.72	0.26
Total	100	100	100	100	100	100

Table 60: Distribution of health personnel by location

	Freetown	Rural	Urban	East	West	North	South
Physician/Medical Doctor (Specialist)	0.88	0	1.26	0.48	0.63	0.94	1.49
Medical Officer	1.05	0.06	0.91	0.1	0.75	1.15	0.13
Community Health Officer	5.66	2.61	9.34	8.7	6.21	7.39	7.46
Community Health Assistant	3.08	3.27	2.42	2.02	2.56	1.65	5.25
Nurse/Nurse Midwife	9.13	0	5.63	2.5	7.25	2.83	1.87
Maternal and Child Health (MCH) Aide	22.98	73.14	21.29	39.81	29.52	36.57	47.63
Nursing Aide	6.24	1.96	8.85	5.03	5.23	11.7	2.04
SRN	6.86	0	4.79	2.49	4.92	2.43	3.17
SECHN	42.89	17.92	41.54	35.47	41.41	30.86	28.21
SECHN - midwife	0.85	1.04	3.47	3.4	1.09	3.91	2.58
Nursing officer	0.39	0	0.5	0	0.44	0.56	0.15
Total	100	100	100	100	100	100	100

Table 61: Distribution of health personnel by gender and mean age

	Male	Female	Age
Physician/Medical Doctor (Specialist)	3.99	0.22	53.4
Medical Officer	2.98	0.16	49.8
Community Health Officer	28.76	2.81	42.3
Community Health Assistant	9.6	1.24	39.7
Nurse/Nurse Midwife	0.71	4.57	48.3
Maternal and Child Health (MCH) Aide	0.95	44.69	42.2
Nursing Aide	11.56	5.74	41.4
SRN	3.6	3.27	39.9
SECHN	37.18	33.72	38.3
SECHN - midwife	0.07	3.28	47.7
Nursing officer	0.59	0.3	45.6
Total	100	100	41.2

Table 62: Average age of health personnel by district

District	Mean age	Standard error
Bo	41.3	1.2
Bombali	38.7	0.6
Bonthe	62.2	3.2
Kailahun	40.3	1.4
Kambia	39.5	0.8
Kenema	41.0	1.1
Koinadugu	38.6	1.4
Kono	38.5	0.7
Moyamba	40.8	3.1
Port Loko	38.5	0.8
Pujehun	37.7	1.5
Tonkolili	39.4	0.9
Western Rural	40.5	1.8
Western Urban	43.6	4.3
Total	41.2	1.0

Table 63: Determinants of Absenteeism: regression results

VARIABLES	(1)	(2)	(3)	(4)	(5)
Dependent variable: Absence rate					
Private sector is reference group					
Public					-0.0057
					(0.0592)
Rural is reference group					
Urban					0.0875
					(0.0795)
Bo is reference district					
Bombali					0.0753
					(0.0603)
Bonthe					-0.0870
					(0.0608)
Kailahun					-0.167***
					(0.0437)
Kambia					-0.0697
					(0.0590)
Kenema					-0.0207
					(0.0527)
Koinadugu					-0.0817
					(0.0585)
Kono					0.0207
					(0.0638)
Moyamba					-0.0851
					(0.0572)
Port Loko					0.0109
					(0.0536)
Pujehun					-0.0665
					(0.0626)
Tonkolili					-0.0497
					(0.0501)
Western Rural					0.133
					(0.0860)
Western Urban					-0.0103
					(0.0728)
Hospital is reference group					
Health center				-0.00469	-0.0197
				(0.0649)	(0.0584)
Health post				0.0671	0.107
				(0.0704)	(0.0993)
Facility with 1-2 health workers is reference group					
Size 3 to 5 HWs			0.151***	0.166***	0.111***
			(0.0290)	(0.0304)	(0.0314)
Size 6 to 10 HWs			0.104***	0.147***	0.0601
			(0.0384)	(0.0482)	(0.0446)
Size 11 to 20 HWs			0.0742	0.104**	0.0455
			(0.0462)	(0.0510)	(0.0485)
Size 20+ HWs			0.0539	0.116*	0.0232
			(0.0370)	(0.0680)	(0.0715)
Doctor is reference group					
CHO/CHA		0.161**	0.131*	0.140*	0.161**
		(0.0678)	(0.0691)	(0.0713)	(0.0724)
Nurse/midwife		0.107	0.0993	0.0916	0.113
		(0.0664)	(0.0680)	(0.0687)	(0.0700)
Health Worker Characteristics					
Female provider	-0.000196	0.0132	0.0182	0.0170	-0.0128
	(0.0274)	(0.0322)	(0.0325)	(0.0322)	(0.0330)
Age of provider	0.00148	0.00198**	0.00205**	0.00212**	0.00232**
	(0.000963)	(0.000979)	(0.000951)	(0.000934)	(0.00100)
Government contract is reference group					
Volunteer		0.0588**	0.0492*	0.0484*	0.0449
		(0.0275)	(0.0277)	(0.0278)	(0.0275)
Nongovernment		0.0209	0.0264	0.0288	0.0359
		(0.0370)	(0.0377)	(0.0370)	(0.0435)
Constant	0.147***	-0.00983	-0.0837	-0.143	-0.125
	(0.0486)	(0.0743)	(0.0780)	(0.0977)	(0.145)
Observations	1,700	1,700	1,700	1,700	1,686
R-squared	0.003	0.008	0.028	0.032	0.074

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 64: Determinants of diagnostic accuracy: regression results

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	*Dependent variable: Diagnostic accuracy*					
Process quality						0.621***
						(0.0446)
Minimum equipment					0.00472	-0.000135
					(0.0186)	(0.0164)
Infrastructure					0.0104	0.00738
					(0.0182)	(0.0155)
Communication					-0.0143	0.00197
					(0.0186)	(0.0159)
Ambulance access					0.0826	0.0737
					(0.0509)	(0.0462)
Drug availability					-0.00847	-0.0784
					(0.0582)	(0.0528)
Hospital is reference group						
Health center	-0.102***	-0.100***	-0.0486	-0.0437	-0.0453	-0.0516
	(0.0308)	(0.0328)	(0.0429)	(0.0448)	(0.0444)	(0.0469)
Health post	-0.158***	-0.156***	-0.0400	-0.0310	-0.0260	-0.0624
	(0.0269)	(0.0296)	(0.0483)	(0.0487)	(0.0505)	(0.0499)
Private sector is reference group						
Public		-0.00389	0.0159	0.0161	0.00481	0.00301
		(0.0273)	(0.0336)	(0.0343)	(0.0361)	(0.0361)
Rural location is reference group						
Urban			0.0439	0.0451	0.0536	0.0165
			(0.0396)	(0.0401)	(0.0413)	(0.0391)
Doctor is reference group						
CHO/CHA			-0.121**	-0.127**	-0.132***	-0.0618
			(0.0494)	(0.0501)	(0.0483)	(0.0493)
Nurse/Midwife			-0.194***	-0.180***	-0.184***	-0.0826*
			(0.0500)	(0.0506)	(0.0495)	(0.0498)
Health Worker Characteristics						
Female provider				-0.0415*	-0.0399*	-0.00621
				(0.0215)	(0.0216)	(0.0200)
Age of provider				-0.000607	-0.000585	-0.000112
				(0.000843)	(0.000842)	(0.000750)
Constant	0.546***	0.548***	0.596***	0.635***	0.564***	0.308***
	(0.0250)	(0.0286)	(0.0636)	(0.0731)	(0.0939)	(0.0841)
Observations	820	820	820	820	820	820
R-squared	0.051	0.051	0.083	0.088	0.095	0.269

Robust standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Figure 28: Diagnostic accuracy by questions asked: Severe dehydration

	Wrong Diagnosis	Correct Diagnosis
Offer drink	14%	45%
Edema of feet	4%	11%
Check weight	3%	5%
Sunken eyes	49%	91%
Skin pinch	35%	81%
Feeding well	19%	27%
Blood in stool	24%	31%
Frequency of diarrhea	45%	74%
Duration of diarrhea	82%	90%
Able to drink	43%	59%
Convulsions	5%	6%
Lethargic	21%	48%
Vomit	48%	64%

Figure 29: Diagnostic accuracy by questions asked: Pneumonia

	Wrong Diagnosis	Correct Diagnosis
Examine ear	2%	7%
Examine throat	1%	3%
Auscultate chest	15%	22%
Difficulty breathing	25%	49%
Count respiratory rate	31%	61%
History of measles	1%	3%
Fever	65%	74%
Duration of cough	87%	85%
Able to drink	2%	6%
Convulsions	3%	9%
Lethargic	6%	14%
Vomit	24%	34%

Figure 30: Diagnostic accuracy by questions asked: Malaria and anemia

Respiratory rate — Wrong Diagnosis 26%, Correct Diagnosis 51%
Neck stiffness — Wrong Diagnosis 3%, Correct Diagnosis 5%
Temperature — Wrong Diagnosis 53%, Correct Diagnosis 77%
Red eyes — Wrong Diagnosis 6%, Correct Diagnosis 13%
Palmar pallor — Wrong Diagnosis 21%, Correct Diagnosis 53%
General condition — Wrong Diagnosis 15%, Correct Diagnosis 23%
Convulsions — Wrong Diagnosis 16%, Correct Diagnosis 41%
Lethargic — Wrong Diagnosis 22%, Correct Diagnosis 28%
Vomit — Wrong Diagnosis 43%, Correct Diagnosis 60%

Wrong Diagnosis   Correct Diagnosis

Figure 31: Diagnostic accuracy by questions asked: Diabetes Mellitus

Urination — Wrong Diagnosis 28%, Correct Diagnosis 60%
Exercise — Wrong Diagnosis 4%, Correct Diagnosis 12%
Blood pressure — Wrong Diagnosis 4%, Correct Diagnosis 24%
Abdomen/Liver — Wrong Diagnosis 3%, Correct Diagnosis 17%
Diabetes in family — Wrong Diagnosis 14%, Correct Diagnosis 44%
Thirst — Wrong Diagnosis 15%, Correct Diagnosis 51%
Appetite — Wrong Diagnosis 19%, Correct Diagnosis 38%
Dizziness — Wrong Diagnosis 8%, Correct Diagnosis 22%
Weight — Wrong Diagnosis 17%, Correct Diagnosis 31%

Wrong Diagnosis   Correct Diagnosis

Figure 32: Diagnostic accuracy by questions asked: Pulmonary Tuberculosis

Chart showing Wrong Diagnosis and Correct Diagnosis percentages by question asked:

Question	Wrong Diagnosis	Correct Diagnosis
Blood pressure	21%	33%
Chest retraction	2%	6%
Chest exam	3%	18%
Count respiratory rate	11%	30%
Take pulse	12%	28%
Check height	3%	6%
Check weight	11%	27%
Take temperature	20%	40%
General condition	3%	11%
Appetite	10%	27%
Weight loss	13%	33%
HIV test taken	16%	39%
Fever pattern	6%	19%
Night sweats	19%	44%
Chest pain	16%	33%
Blood in sputum	14%	41%
Duration of cough	72%	94%

Wrong Diagnosis   Correct Diagnosis

Figure 33: Correct treatment actions: Post-partum Hemorrhage

Action	Wrong Diagnosis	Correct Diagnosis
Genital examination	4%	25%
Palpate uterus	16%	42%
Ruptured uterus	6%	12%
Respiratory rate	9%	28%
Pulse	13%	32%
Hypertension	0%	8%
Multiple pregnancies	0%	5%
Excess fluid	0%	0%
History of PPH	0%	12%
Placenta delivery	43%	39%
Gestity	2%	12%
Number of pads	5%	29%

Figure 34: Correct treatment actions: Neonatal Asphyxia

Action	Wrong Diagnosis	Correct Diagnosis
Observe respiratory effort	10%	31%
Check muscle tone	5%	18%
Test irritability reflex	6%	17%
Look at baby color	20%	34%
Compute APGAR	12%	22%
Clear airways	68%	80%
Keep baby warm	64%	80%
Use bag and mask	60%	63%
Give 5 inflations	33%	45%
Check heart rate	26%	31%
Check chest moving	40%	39%
Check breathing improve	21%	24%
Provide oxygen	3%	14%
Call for help	31%	54%

Table 65: Danger signs for sick child vignette by cadre type

Cadre	Acute Diarrhea (Diarrhea)				Pneumonia (Cough)				Malaria with anemia (Fever)		
	Vomit	Conv	Lethargic	Drink	Vomit	Conv.	Lethargic	Drink	Vomit	Conv.	Lethargic
Doctors	72.5	23.9	43.6	75.1	58.7	31.1	27.6	26.4	99.6	51.9	57.5
CHO/CHA	53.3	3.0	32.7	37.2	36.2	3.0	13.7	1.9	58.2	20.8	24.0
Nurses/ midwives	46.6	2.8	21.5	43.4	24.3	4.7	7.6	2.1	32.9	15.1	17.2
Total	50.8	5.1	26.3	45.5	30.5	7.2	11.0	4.7	45.5	20.3	23.0

Table 66: Drug availability for the full SDI list

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private	Hospital	Health Center	Health Post
Core Medications									
Amoxicillin*	62.1	43.1	55.1	65.2	61.6	67.7	75.0	53.4	63.8
Ceftriaxone***	10.7	20.0	27.3	3.4	8.0	39.8	77.2	25.0	3.8
Ciprofloxacin**	66.5	41.5	58.1	70.2	67.1	59.3	82.8	57.5	68.0
Diclofenac*	10.3	23.1	24.2	4.2	6.3	53.5	74.6	15.7	5.8
Atenolol*	6.7	9.2	15.9	2.6	4.1	34.0	64.2	11.2	2.7
Captopril***	2.5	4.6	7.8	0.1	1.2	16.4	27.6	6.6	0.2
Simvastatin***	1.2	0.0	3.8	0.0	0.0	13.8	25.4	1.2	0.0
Glibenclamide***	2.2	10.8	7.1	0.0	0.6	19.4	31.9	2.4	0.7
Oral hypoglycaemic ***	3.0	10.8	9.9	0.0	0.7	27.7	50.9	4.2	0.4
Insulin for injection***	1.8	3.1	5.9	0.0	0.3	18.5	40.5	1.2	0.1
Salbutamol***	26.3	20.0	28.1	25.5	24.9	41.7	81.0	24.0	24.2
Omeprazole***	49.3	36.9	41.8	52.6	47.8	65.6	85.3	35.6	51.1
Diazepam*	56.2	47.7	58.8	55.1	56.5	53.8	83.2	60.0	54.0
Amitriptyline***	1.8	0.0	5.2	0.3	0.5	15.9	34.5	1.6	0.3
Rifampicin*	12.3	3.1	35.1	2.1	11.9	15.5	46.6	44.3	2.3
Isoniazid*	12.6	6.2	35.1	2.6	12.5	12.7	50.9	44.7	2.4
Pyrazinamide*	11.9	4.6	34.3	1.9	11.8	12.7	48.7	43.9	1.7
Ethambutol*	11.3	4.6	32.4	1.9	11.1	12.7	48.7	40.9	1.7
Essential Medications for mothers									
Oxytocin(Syntocinon)*	73.5	76.9	76.6	72.1	74.9	58.7	68.5	83.4	71.2
Calcium Gluconate***	53.9	53.8	65.3	48.9	54.4	48.1	49.6	74.7	48.7
Magnesium sulphate**	88.8	75.4	85.1	90.4	90.4	71.8	75.0	89.7	89.2
Sodium Chloride*	67.7	35.4	59.8	71.2	67.5	69.3	93.5	58.7	68.8
Misoprostol (Mifepristone)*	15.2	29.2	38.3	4.9	14.2	26.2	60.3	41.8	6.1
Ampicillin***	8.4	12.3	15.4	5.3	5.7	37.9	64.2	7.2	6.0
Gentamicin*	11.6	16.9	23.5	6.3	7.8	52.8	76.3	14.2	7.8
Metronidazole*	26.6	41.5	34.7	23.0	23.3	63.1	84.9	25.1	24.2
Azithromycin***	11.0	7.7	15.9	8.8	9.6	25.8	62.1	11.5	8.4
Cefixime****	2.5	7.7	7.3	0.5	1.7	12.1	32.3	4.4	0.6
Benzathine benzyl penicillin**	41.4	53.8	53.4	36.0	40.5	50.4	74.6	60.0	34.9
Betamethasone****	21.1	20.0	23.2	20.1	18.9	44.8	81.0	13.6	20.1
Nifedipine***	15.5	69.2	37.5	5.8	12.3	50.8	72.4	32.3	8.5
Methyldopa	73.1	70.8	63.5	77.3	74.8	54.0	68.5	65.2	75.3
Hydralazine	12.0	6.2	21.2	7.9	11.3	19.4	57.8	22.0	7.1
Oral contraceptive pill (OCP)*	90.4	86.2	85.0	92.8	92.5	67.3	56.0	92.3	91.6
Medroxyprogesterone acetate*	66.2	72.3	60.7	68.7	66.8	60.6	45.3	60.5	68.7
Ferrous salt*	73.0	53.8	71.1	73.9	76.1	40.2	49.6	89.9	69.8
Ferrous salt and foclic acid*	71.2	70.8	71.1	71.2	71.9	62.6	47.4	75.0	71.3
Folic Acid*	49.7	30.8	50.3	49.5	50.0	46.7	60.3	51.1	48.9
Sulfadoxine/pyrimethamine*	60.4	24.6	51.4	64.4	61.7	46.5	60.3	55.6	61.7
Essential Medications for children									
Paracetamol*	66.5	64.6	63.8	67.6	66.2	69.1	66.4	65.6	66.7
Morphine***	0.8	3.1	2.3	0.1	0.6	2.8	12.9	0.0	0.4
Amoxicillin*	69.1	60.0	64.1	71.3	69.6	63.6	71.1	67.5	69.5
Cotrimoxazole*	68.9	70.8	73.5	66.9	69.2	65.3	87.5	76.5	66.0
Benzylpenicillin*	18.2	26.2	27.9	13.9	16.3	38.5	65.9	26.9	13.6
Oral Rehydration Solution*	77.5	90.8	80.7	76.1	77.1	81.5	85.3	80.4	76.4
Vitamin A*	92.7	86.2	89.0	94.3	93.7	81.1	77.2	90.0	94.1
Zinc*	62.8	64.6	62.4	63.1	64.0	50.3	56.0	66.7	62.2
ACT or ALU*	98.3	100.0	97.1	98.9	98.9	91.8	94.0	97.8	98.7
Artesunate***	12.0	16.9	17.2	9.7	10.5	28.4	47.0	12.5	10.2
Albendazole*	82.7	69.2	74.1	86.5	83.2	76.5	79.3	78.5	83.9
Mebendazole*	17.7	10.8	19.7	16.7	16.3	32.6	49.1	15.3	16.8
Artesunate Suppository	8.1	1.5	9.3	7.6	8.1	7.9	4.3	10.5	7.7
Chlorhexidine	91.3	89.2	85.8	93.8	94.3	59.8	56.0	93.2	92.5
Tetracycline eye ointment	11.4	7.7	15.8	9.5	9.8	28.5	69.0	9.1	9.3

Note: Should be carried by * Health posts and above, ** Health Centers and above, *** Hospitals and above according to the 2015 Basic Package of Essential Health Services (BPEHS)

Figure 35: Availability of individual tracer drugs (14) by type of facility

Zinc*: Health Center 63%, Health Post 67%, Hospital 56%
Oral Rehydration Solution (ORS)*: 76%, 82%, 84%
Gentamicin: 7%, 18%, 75%
Ampicillin: 5%, 10%, 59%
Amoxicillin (oral liquid/tablet)*: 69%, 70%, 62%
Nifedipine: 9%, 30%, 69%
Amitriptyline**: 0%, 2%, 28%
Omeprazole**: 52%, 40%, 84%
Salbutamol: 24%, 24%, 75%
Insulin for subcutaneous injection: 0%, 2%, 33%
Glibenclamide: 1%, 3%, 25%
Simvastatin: 0%, 1%, 19%
Captopril: 0%, 7%, 31%
Ceftriaxone**: 4%, 23%, 76%

■ Health Post   ▨ Health Center   ■ Hospital

Note: * Tracer drugs for both HC and HP. ** Tracer drugs specific to HC. The rest of the drugs are tracers for Hospitals according to the 2015 BPHS

Table 67: Drug availability for 14 tracer drugs

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	32.2	18.5	9.3	42.3	32.9	25.0
Hospitals	2.2	0.0	2.2	.	0.0	3.4
Health centers	0.0	0.0	0.0	.	0.0	0.0
Health posts	42.0	30.8	39.4	42.3	42.0	43.1
# Facilities	547	21	165	382	501	46

Table 68: Share of facilities where user fees are visibly displayed

% facilities	Sierra Leone	Freetown	Urban	Rural	Public	Private
All	8.9	32.0	20.1	4.6	6.2	31.6
Hospitals	37.9	50.0	37.9	.	75.0	19.7
Health centers	13.0		13.0	.	6.4	59.5
Health posts	6.1	28.6	25.4	4.6	4.5	28.2
# Facilities	304	11	88	216	274	30

ANNEX D. District level results maps

Map 1: Absence Rate across Districts

Koinadugu

Bombali

Kambia

Port Loko

Tonkolili

Kono

W. Urban

W. Rural

Moyamba

Bo

Kenema

Kailahun

Bonthe

Pujehun

Absence rate (%)
- (37.099998,50.7]
- (29,37.099998]
- (20,29]
- [12.7,20]
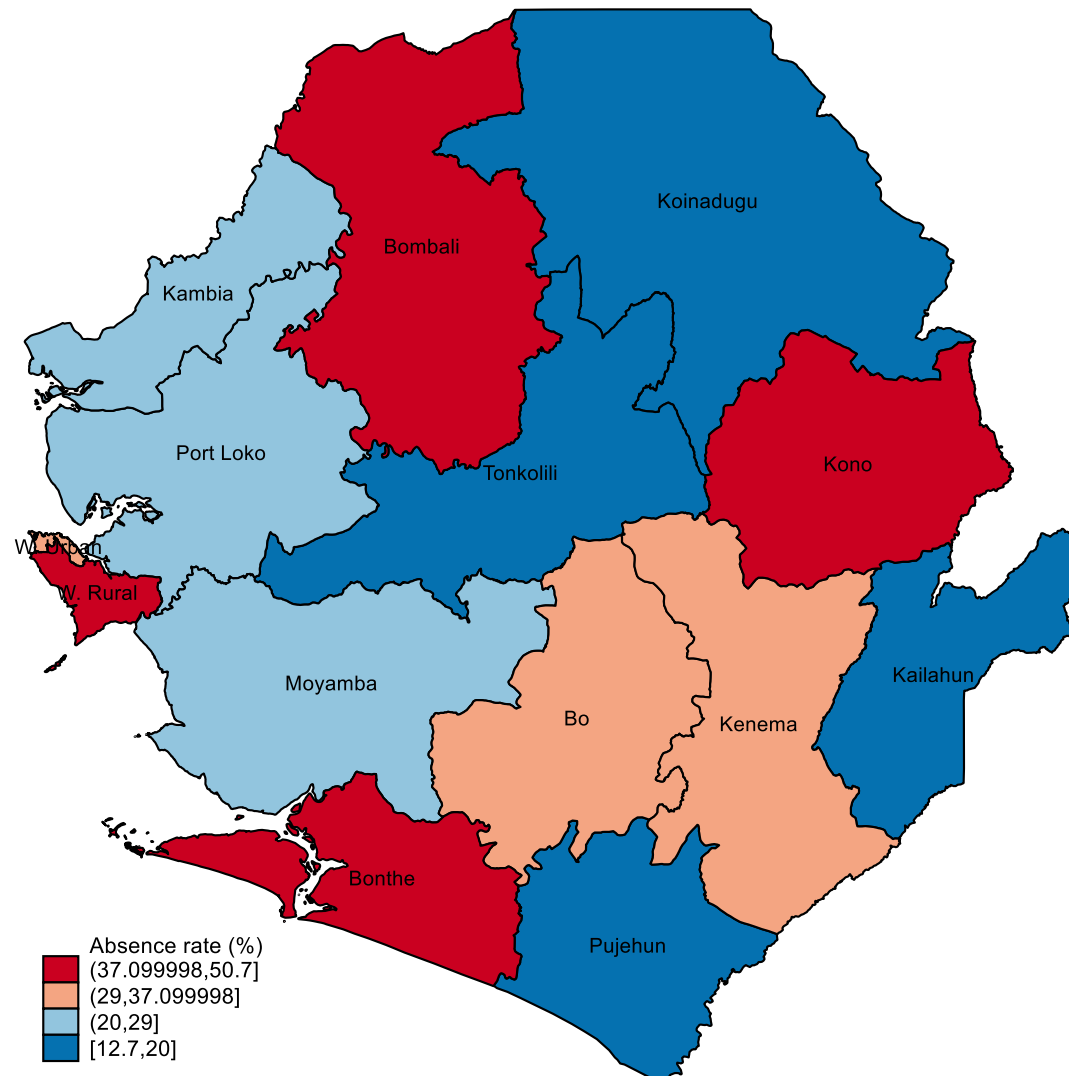
Map 2: Prevalence of User Fees Charging across Districts
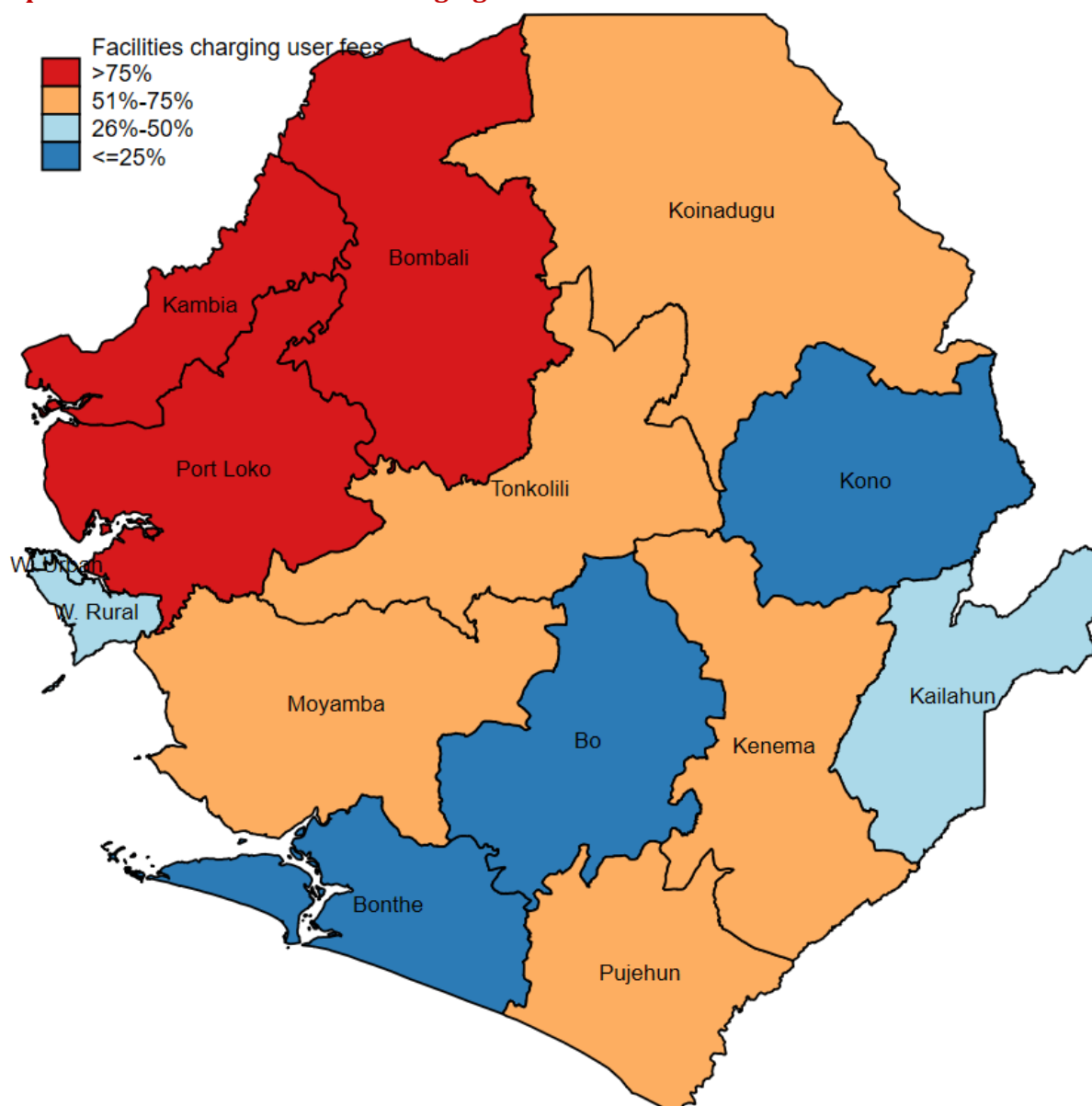
Source: Service Delivery Indicators Survey, 2018

Map 3: Availability of Tracer Drugs across Districts
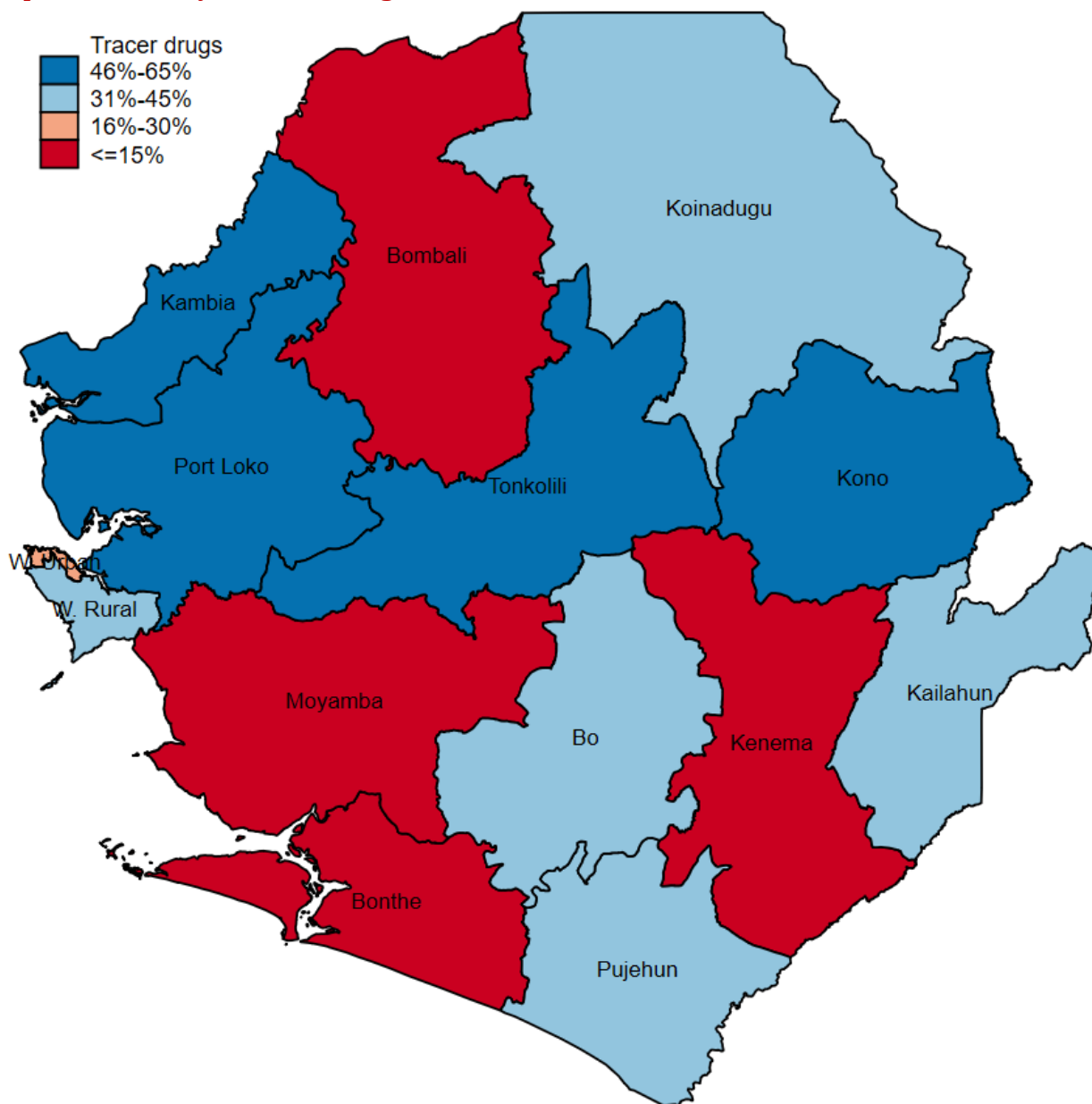
Source: Service Delivery Indicators Survey, 2018

Map 4: Availability of Priority Drugs across Districts

Priority drugs
61%-65%
51%-60%
<=50%

Koinadugu

Bombali

Kambia

Port Loko

Tonkolili

Kono

W. Urban

W. Rural

Moyamba

Bo

Kenema

Kailahun

Bonthe

Pujehun
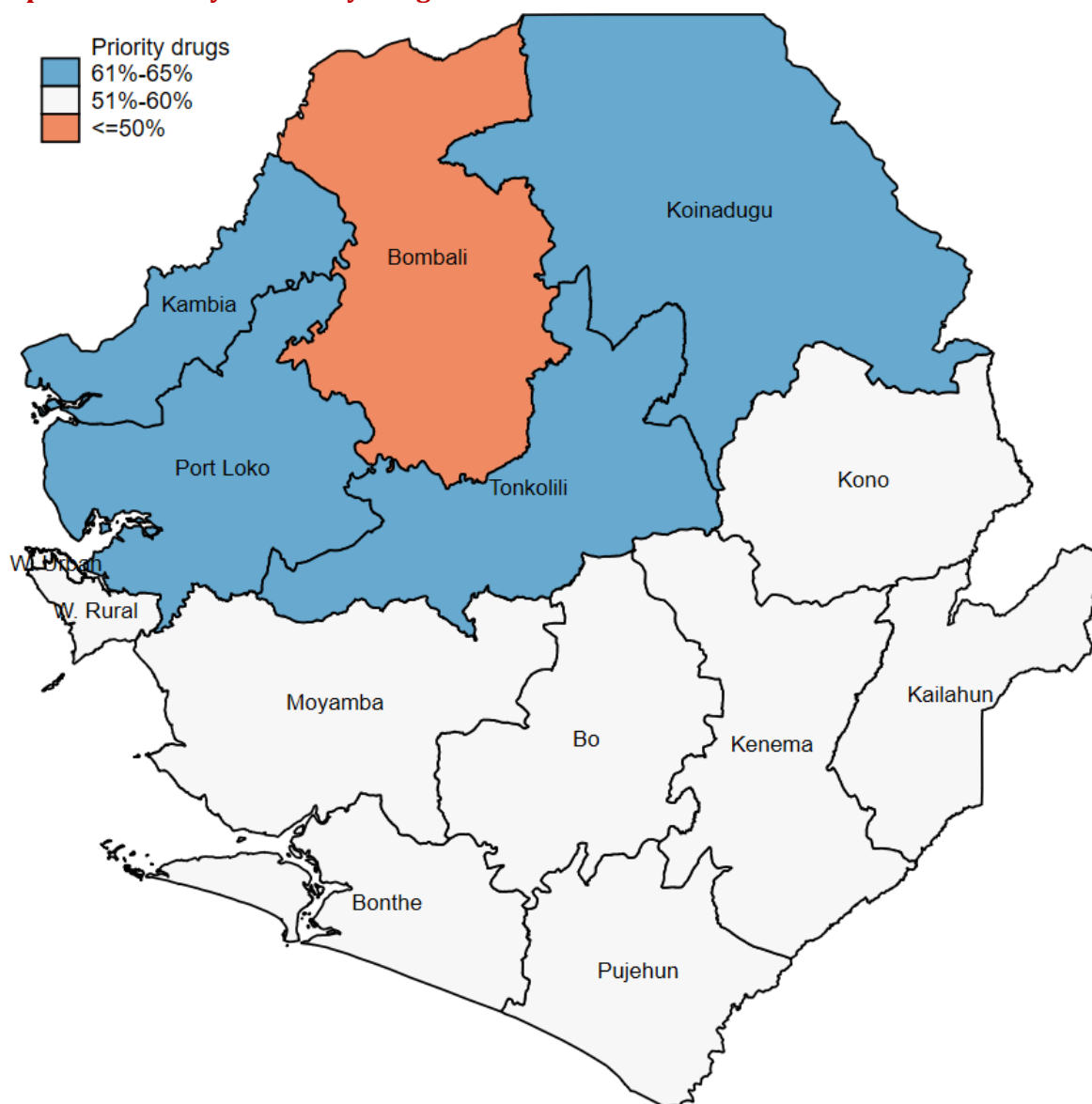
Source: Service Delivery Indicators Survey, 2018

Map 5: Capacity to Manage Maternal and Neonatal Complications across Districts
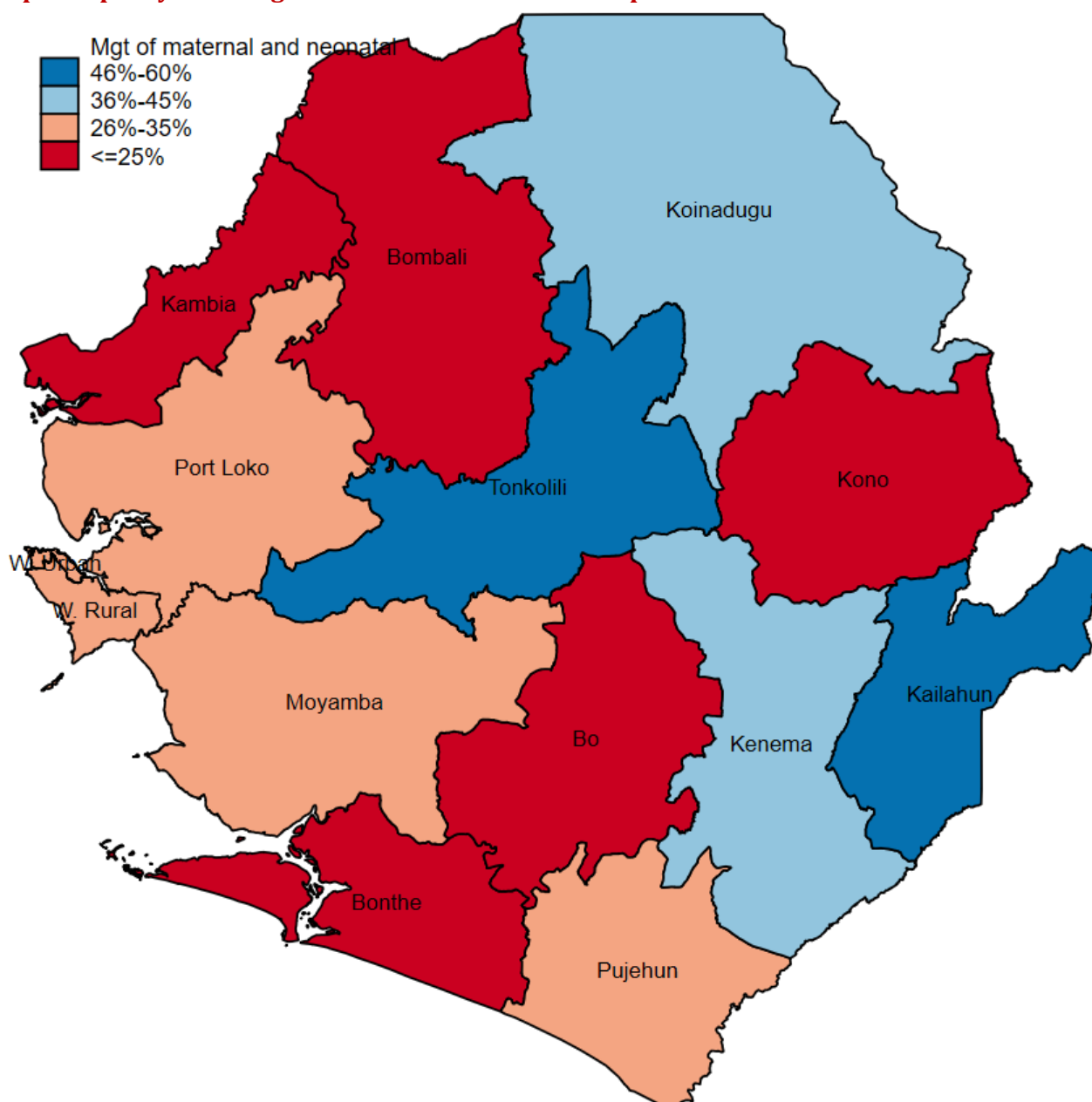
Source: Service Delivery Indicators Survey, 2018

Map 6: Availability of Minimum Infrastructure across Districts
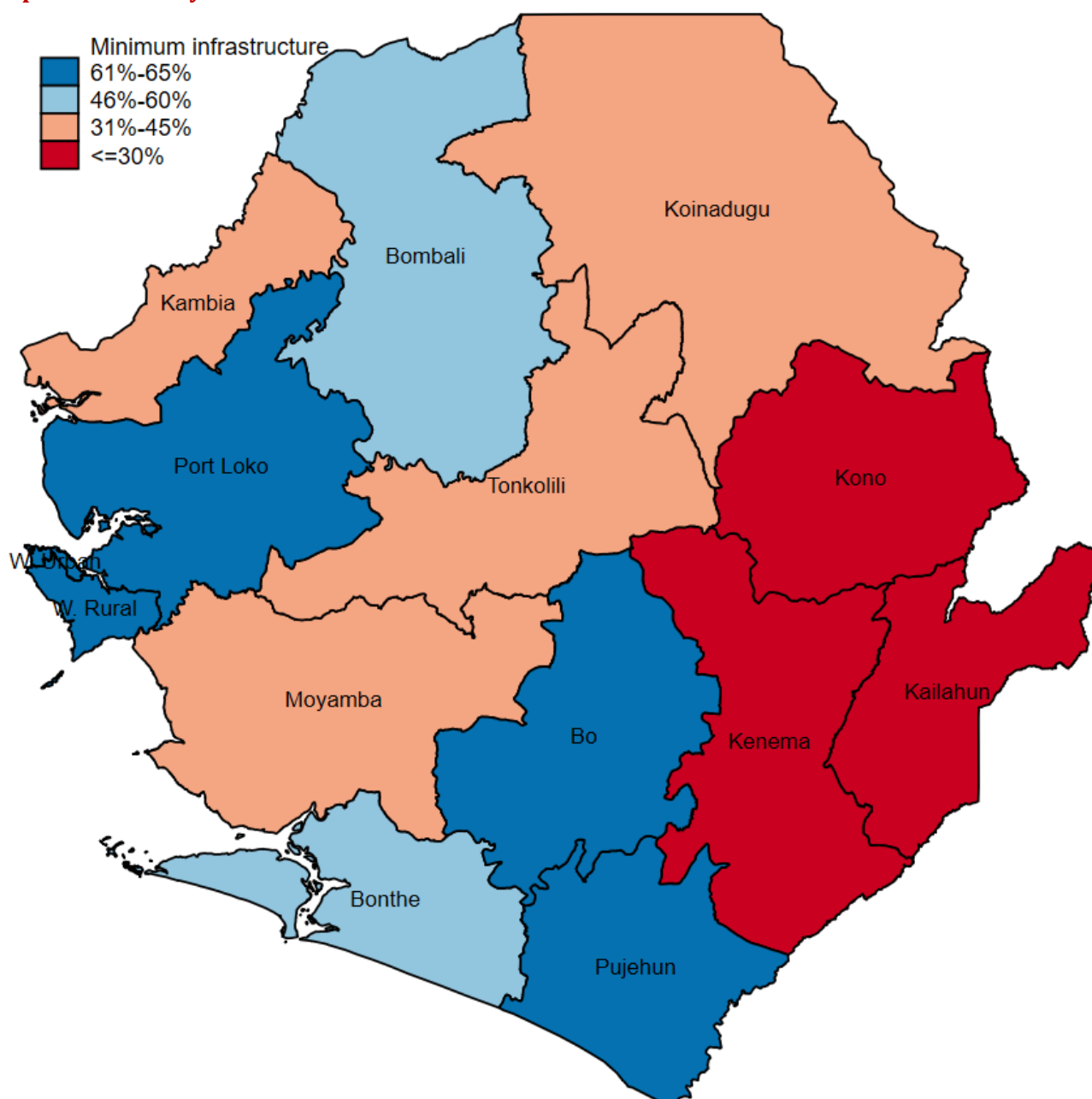
Source: Service Delivery Indicators Survey, 2018

Map 7: Share of Facilities with Minimum Equipment across Districts

Minimum equipment
- 46%-60%
- 36%-45%
- 26%-35%
- <=25%
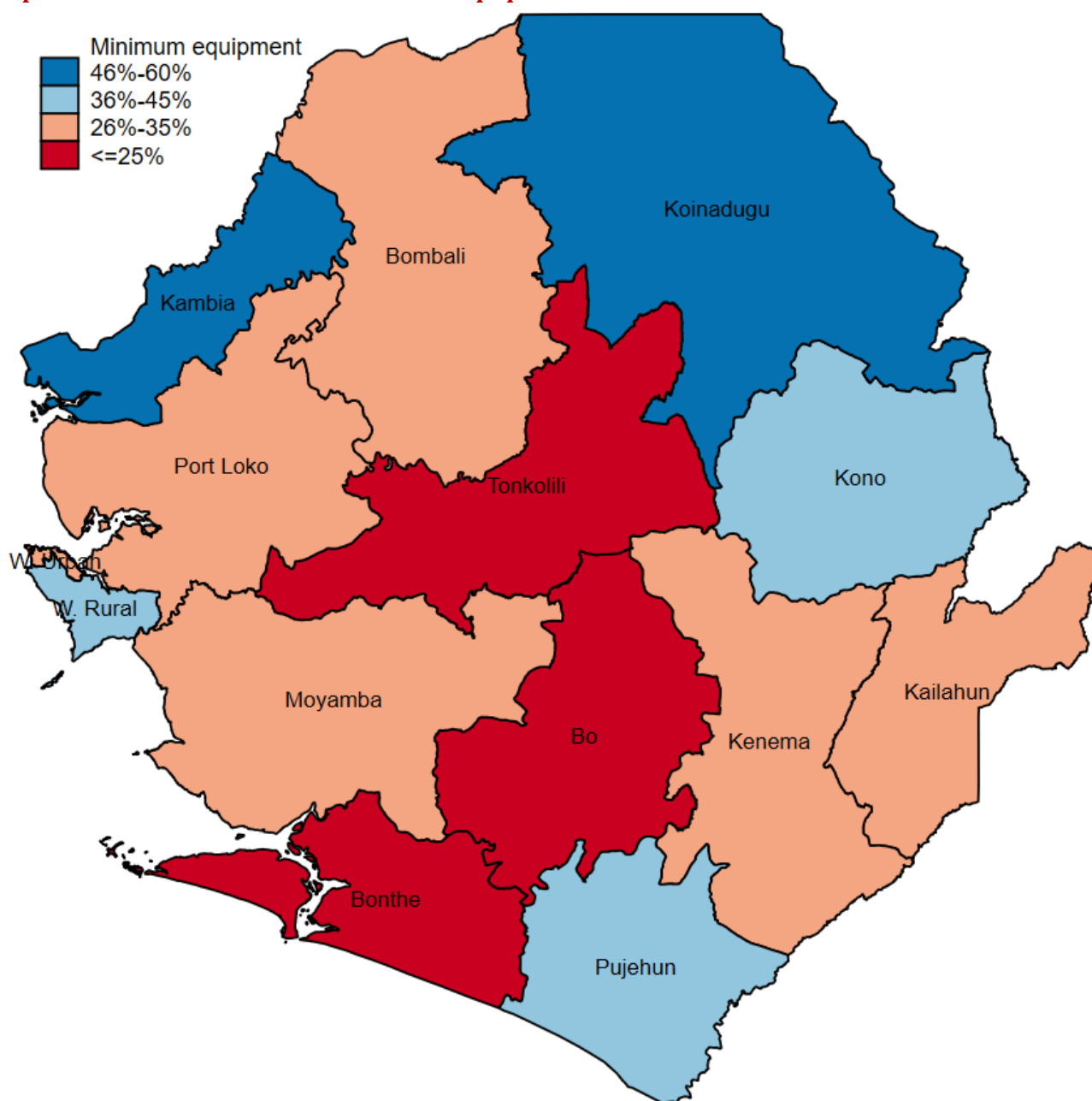
Source: Service Delivery Indicators Survey, 2018

Map 8: Average Diagnostic Accuracy of Common Conditions across Districts

Diagnostic accuracy
- 54%-60%
- 43%-54%
- 35%-42%
- <=35%

Koinadugu

Bombali

Kambia

Port Loko

Tonkolili

Kono

W. Urban

W. Rural

Moyamba

Bo

Kenema

Kailahun

Bonthe

Pujehun
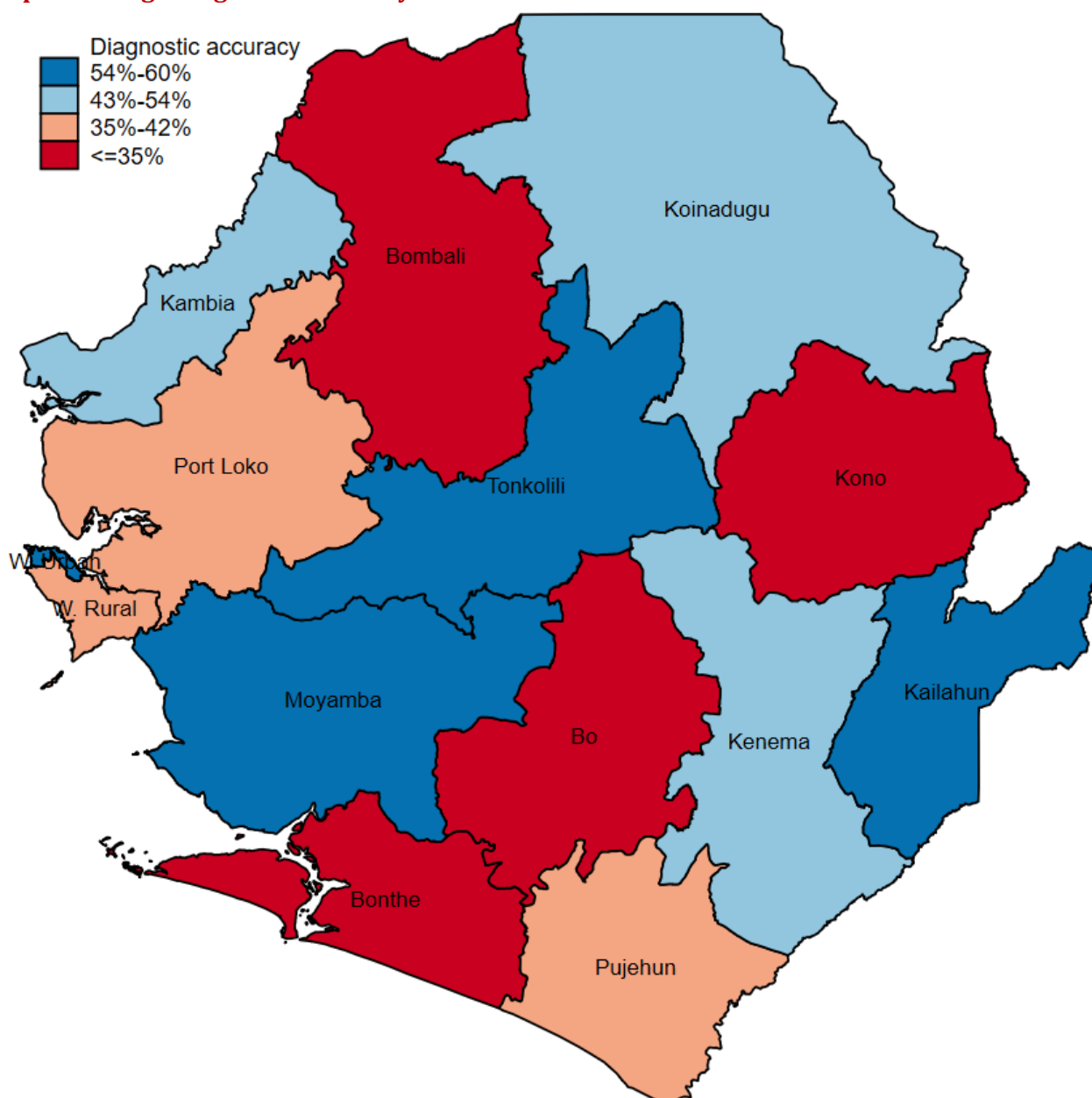
Source: Service Delivery Indicators Survey, 2018

Map 9: Average Adherence to Clinical Guidelines across Districts

Adherence to guidelines
- 36%-50%
- 26%-35%
- <=25%

Koinadugu
Bombali
Kambia
Port Loko
Tonkolili
Kono
W. Urban
W. Rural
Moyamba
Bo
Kenema
Kailahun
Bonthe
Pujehun
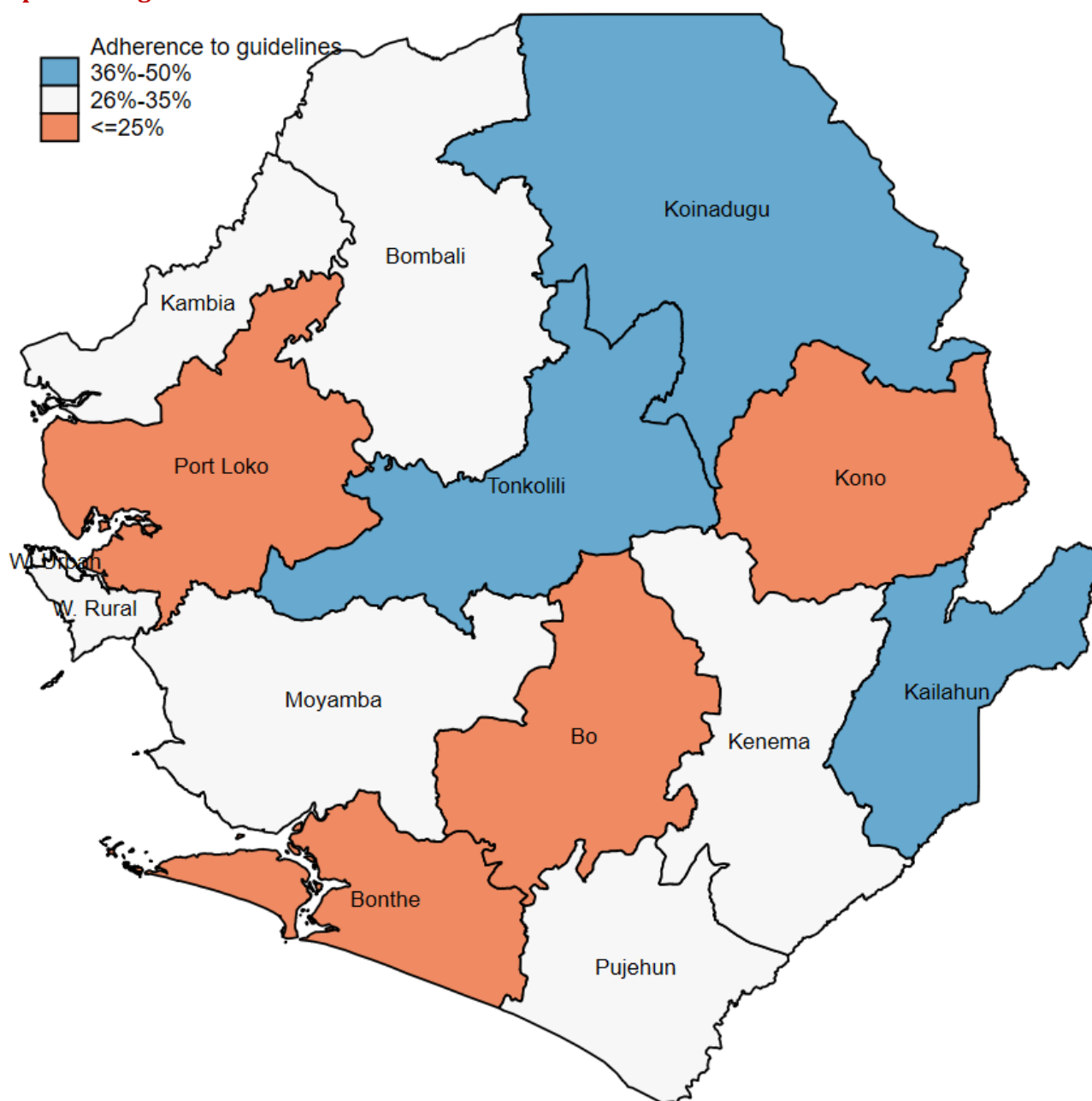
Source: Service Delivery Indicators Survey, 2018

ANNEX E. Additional District Level Results

Table A1. Days of service delivery

	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	6.7	6.9	6.7	6.9	7.0	7.0	7.0	6.9	7.0	6.9	7.0	6.9	6.9	6.9
Hospital	7.0	6.4	7.0	7.0	7.0	6.8	7.0	7.0	7.0	7.0	7.0	7.0	.	6.9
Health Center	6.5	6.9	7.0	6.9	7.0	7.0	6.9	6.9	6.9	7.0	7.0	6.6	7.0	7.0
Health Post	6.7	7.0	6.6	6.9	7.0	7.0	7.0	6.9	7.0	6.9	7.0	6.9	6.9	6.8

Table A2. Hours of service delivery

	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	14.4	23.3	13.0	23.1	24.0	23.1	23.6	22.3	23.1	22.1	24.0	22.7	22.6	22.1
Hospital	17.4	19.2	24.0	24.0	24.0	21.0	24.0	24.0	24.0	24.0	24.0	24.0	.	22.0
Health Center	11.4	22.3	14.0	22.8	24.0	24.0	22.4	19.9	21.8	24.0	24.0	20.8	24.0	24.0
Health Post	15.4	24.0	12.3	23.2	24.0	22.8	23.8	23.0	23.4	21.7	24.0	23.0	22.1	21.2

Table A3. Facilities where women give birth

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	97.6	90.4	100.0	97.7	100.0	99.1	93.5	96.6	94.3	96.6	96.3	97.3	100.0	98.5
Hospital	57.1	40.4	100.0	100.0	100.0	75.0	100.0	100.0	100.0	85.7	100.0	100.0	.	87.5
Health Center	100.0	88.7	100.0	100.0	100.0	100.0	90.0	85.7	85.7	100.0	100.0	100.0	100.0	100.0
Health Post	100.0	96.6	100.0	97.2	100.0	100.0	93.9	100.0	96.4	96.9	95.5	96.8	100.0	100.0

Table A4. Availability of basic emergency obstetric and neonatal care

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	2.4	9.5	0.0	5.9	5.6	6.3	4.2	4.8	4.0	3.5	1.3	0.0	15.4	9.4
Hospital	75.0	100.0	0.0	33.3	100.0	100.0	100.0	100.0	100.0	16.7	100.0	0.0	.	85.7
Health Center	0.0	28.6	0.0	0.0	0.0	14.3	11.1	16.7	16.7	0.0	0.0	0.0	36.9	0.0

	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
Health Post	0.0	0.0	0.0	5.7	5.6	0.0	1.6	0.0	0.0	3.2	0.0	0.0	7.4	0.0

Table A5. Availability of priority drugs

% drugs	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All priority drugs	57.8	41.8	50.8	55.9	64.4	50.8	64.4	57.5	53.8	64.3	56.6	62.5	51.7	52.2
Priority drugs for Mothers (local)	75.9	48.5	62.2	74.8	84.8	65.4	85.8	67.2	70.5	81.7	76.9	87.5	68.6	65.2
Priority drugs for Mothers (WHO)	57.8	21.2	51.6	47.7	60.5	54.4	60.1	48.7	38.0	49.6	55.0	56.4	45.2	65.4
Priority drugs for children (local)	65.8	47.5	59.8	59.6	67.7	54.1	68.6	67.3	63.4	71.2	66.0	66.9	57.5	61.8
Priority drugs for children (WHO)	37.8	27.3	32.2	33.2	41.3	30.2	41.3	35.6	40.2	42.8	34.0	37.7	37.3	37.5
All tracer drugs	71.3	41.3	61.1	61.0	73.3	45.8	68.2	76.8	55.1	77.8	74.0	79.7	60.4	57.1
Have all tracers (facility)	42.0	10.0	13.5	32.2	46.3	8.3	36.4	50.9	2.9	53.7	44.8	55.0	36.5	18.5

Table A6. Availability of all tracer drugs

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	42.0	10.0	13.5	32.2	46.3	8.3	36.4	50.9	2.9	53.7	44.8	55.0	36.5	18.5
Hospital	0.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.	0.0
Health Center	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health Post	62.1	14.1	17.3	37.5	61.1	11.5	42.4	68.2	3.6	65.6	54.5	64.5	50.2	30.8

Table A7. Availability of vaccines

% vaccines	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	88.5	94.3	94.9	98	100	93.5	95	97.6	97.7	99.2	98.8	97.3	95.4	100
Hospital	100	.	.	100	100	83.3	100	100	.	.	.	100	.	100
Health Center	100	83.3	100	94.4	100	90.7	96.3	100	100	100	100	100	100	100
Health Post	75.9	98.1	92.6	98.9	100	96.3	94.7	96.7	96.9	99	98.3	95.2	91.5	100

Table A8. Availability of individual vaccines

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
Measles	78.8	95.6	100.0	100.0	100.0	96.0	96.5	100.0	100.0	100.0	100.0	100.0	90.9	100.0
Polio	94.7	95.6	92.4	100.0	100.0	100.0	93.0	100.0	100.0	100.0	100.0	100.0	90.9	100.0
Pentavalent	94.7	91.5	100.0	98.3	100.0	93.6	98.2	100.0	100.0	100.0	100.0	100.0	90.9	100.0
Pneumococcal	94.7	91.5	100.0	94.9	100.0	100.0	96.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BCG	78.8	95.6	92.4	100.0	100.0	81.7	89.5	85.3	95.5	100.0	93.1	91.9	100.0	100.0
Hepatitis B	68.8	0.0	69.4	3.4	39.8	4.0	45.6	41.1	22.7	19.1	37.0	10.8	35.9	60.0
Tetanus	89.4	95.6	84.7	94.9	100.0	89.6	96.5	100.0	90.9	95.4	100.0	91.9	100.0	100.0

Table A9. Vaccines storage - Refrigerators with temperature between 2oC and 8oC

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	83.8	0.0	33.3	45.8	0.0	0.0	0.0	5.2	0.0	4.8	85.4	0.0	9.1	59.1
Hospital	100.0			0.0	0.0	0.0	0.0	0.0				0.0	.	14.3
Health Center	90.0	0.0	33.3	58.3	0.0	0.0	0.0	0.0	0.0	0.0	75.0	0.0	19.6	100.0
Health Post	75.0	0.0	33.3	43.5	0.0	0.0	0.0	7.1	0.0	6.3	90.0	0.0	0.0	50.0

Table A10. Availability of communication equipment

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	73.1	51.6	42.6	16.1	71.0	20.6	19.5	38.8	46.2	66.4	47.3	60.6	84.9	86.2
Hospital	100.0	100.0	100.0	66.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	.	100.0
Health Center	69.2	74.7	33.3	25.0	65.0	35.7	70.0	71.4	57.1	33.3	75.0	73.3	100.0	100.0
Health Post	72.4	39.2	42.5	12.5	72.2	11.5	10.6	27.3	42.8	68.8	40.9	58.1	79.2	76.9

Table A11. Access to various forms of communication

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
Communication	73.1	51.6	42.6	16.1	71.0	20.6	19.5	38.8	46.2	66.4	47.3	60.6	84.9	86.2
Communication+	90.9	97.5	84.8	71.3	75.3	95.5	90.9	100.0	94.3	87.2	84.6	100.0	95.0	90.8
Land line	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	16.8	0.0	2.7	15.7	0.0
Cellular Phone1	68.7	11.0	42.6	6.9	71.0	20.6	5.2	11.4	32.0	40.1	20.8	9.2	74.2	75.4
Cellular Phone2	17.9	91.5	72.6	69.0	8.0	92.7	85.7	92.0	65.1	49.9	80.9	96.3	25.5	36.9
Computer	11.7	23.6	3.1	10.3	1.4	6.2	14.3	11.5	12.4	31.6	17.1	19.4	15.4	35.4
Shortwave Radio	6.7	4.9	0.0	0.0	0.0	0.0	6.5	6.8	0.0	6.0	24.1	8.2	0.0	30.8
Internet	0.8	39.1	0.0	3.4	0.0	0.0	3.9	28.5	8.5	23.1	4.2	33.9	21.1	27.7

Table A12. Access to ambulance

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
Own ambulance	3.1	8.3	9.2	5.7	1.4	5.6	3.9	4.6	3.8	5.2	1.3	3.7	0.0	12.3
Access to ambulance	88.6	95.2	84.8	100.0	95.7	91.8	98.7	96.6	94.3	97.4	96.3	100.0	89.6	90.8
Access to a vehicle not ambulance	88.6	100.0	100.0	100.0	95.7	92.7	100.0	96.6	94.3	97.4	100.0	100.0	94.6	100.0

Table A13. Availability of specific types of infrastructure

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
Infrastructure Indicator	65.2	53.8	49.5	27.6	41.5	22.4	37.7	18.3	40.7	63.3	66.0	45.0	83.1	63.1
Clean water	90.7	94.9	81.9	79.3	96.3	80.6	90.9	72.8	74.6	94.9	84.6	78.0	88.1	86.2
Toilet	88.3	97.3	59.4	77.0	74.8	74.3	89.6	52.3	91.5	87.2	88.8	83.5	100.0	76.9
Electricity	79.3	56.5	81.1	46.0	57.9	26.9	41.6	38.7	52.0	71.0	85.1	64.3	89.9	95.4

Table A14. Total proportion of facilities carrying out safe health care waste disposal

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	55.9	84.8	50.4	79.3	100.0	81.6	61.0	52.4	63.2	86.3	80.9	78.0	79.5	80.0
Hospital	57.1	70.2	100.0	66.7	100.0	100.0	100.0	100.0	100.0	85.7	100.0	100.0	.	87.5
Health Center	92.3	87.3	100.0	100.0	100.0	92.9	100.0	71.4	85.7	100.0	75.0	100.0	81.5	100.0
Health Post	41.4	85.7	36.7	76.4	100.0	76.9	54.5	45.5	57.1	84.4	81.8	74.2	78.8	69.2

Table A15. Availability of basic equipment

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	19.4	33.4	21.3	27.6	45.7	25.9	55.8	42.1	28.4	32.2	38.2	24.9	38.3	26.2
Hospital	42.9	0.0	0.0	33.3	100.0	75.0	100.0	100.0	0.0	0.0	0.0	100.0	.	62.5
Health Center	46.2	38.0	66.7	50.0	65.0	50.0	70.0	42.9	57.1	33.3	50.0	73.3	81.5	50.0
Health Post	6.9	35.8	11.5	23.6	38.9	15.4	53.0	40.9	21.4	34.4	36.4	16.1	22.1	7.7

Table A16. Availability of equipment

facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
Any scale	100.0	97.5	100.0	96.6	100.0	96.3	98.7	100.0	97.1	100.0	100.0	100.0	94.6	100.0
Thermometer	79.3	79.9	52.4	69.0	91.6	78.2	92.2	93.2	68.9	80.6	80.9	68.8	89.9	80.0
Stethoscope	84.2	90.0	95.5	80.5	96.3	98.3	96.1	89.8	77.4	94.9	92.5	100.0	95.0	100.0
Sphygmomanometer	61.1	84.8	63.0	62.1	87.3	72.6	89.6	62.5	66.1	83.2	77.2	89.0	79.9	95.4
Bag and mask	86.3	92.8	76.6	93.1	91.6	100.0	96.1	96.6	66.1	97.4	88.8	97.3	100.0	90.8
Upper airways	100.0	87.9	91.0	96.6	100.0	96.3	97.4	93.2	54.8	97.4	92.5	97.3	95.0	98.5
Sterilizing equipment	60.8	82.6	45.0	80.5	74.8	99.1	85.7	83.0	43.5	82.1	77.6	89.0	89.9	84.6
Adult scale	58.0	89.9	47.0	54.0	83.2	44.3	92.2	86.4	37.8	74.4	62.7	89.0	79.2	69.2
Child scale	93.0	80.4	100.0	89.7	100.0	85.2	94.8	93.2	88.7	54.7	100.0	89.0	64.1	93.8
Infant scale	81.9	70.2	72.9	60.9	83.2	67.2	76.6	82.9	83.0	77.2	73.5	77.1	67.4	84.6
Refrigerator	41.6	59.0	59.1	67.8	54.2	43.3	72.7	65.9	62.3	53.0	54.0	34.1	53.4	33.8

Table A17. Availability of Standard Treatment Guidelines

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	45.0	25.8	46.3	69.0	58.8	80.0	48.1	66.0	66.0	53.3	0.0	69.8	46.3	50.8
Hospital	0.0	0.0	50.0	66.7	100.0	75.0	0.0	100.0	100.0	28.6	0.0	100.0	.	37.5
Health Center	46.2	38.0	66.7	66.7	48.7	78.6	40.0	85.7	42.9	66.7	0.0	100.0	55.4	50.0
Health Post	48.3	25.0	41.4	69.4	61.1	80.8	50.0	59.1	71.4	53.1	0.0	64.5	42.9	53.8

Table A18. Outpatient caseload

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	6.0	5.3	3.0	27.5	2.3	8.4	24.6	7.6	18.8	5.4	7.5	10.1	6.7	5.7
Hospital	6.7	6.3	1.0	4.0	1.4	8.1	2.1	0.6	1.4	6.7	1.0	1.7	.	6.7
Health Center	5.0	6.7	2.6	18.4	2.5	8.2	31.6	7.9	23.4	3.0	4.6	7.7	3.5	10.2
Health Post	6.4	4.7	3.2	30.0	2.2	8.4	23.8	7.7	17.8	5.7	8.1	10.5	7.9	3.4

Table A19. Facilities with community health workers

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	85.7	51.0	85.4	92.0	94.4	99.1	84.4	95.4	87.7	62.4	95.0	96.3	87.5	67.7
Hospital	0.0	0.0	0.0	0.0	0.0	75.0	0.0	0.0	0.0	28.6	0.0	0.0	.	25.0
Health Center	84.6	38.0	66.7	100.0	100.0	100.0	100.0	85.7	100.0	100.0	100.0	80.0	93.5	100.0
Health Post	93.1	60.6	93.1	94.4	94.4	100.0	83.3	100.0	85.7	59.4	95.5	100.0	85.1	61.5

Table A20. Average number of community health workers

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	8.1	6.6	13.7	10.6	13.1	11.0	14.3	11.4	10.1	12.2	14.8	11.8	9.3	9.8
Hospital						18.0				10.0			.	15.0
Health Center	11.4	10.7	17.0	15.8	15.5	14.3	17.9	12.5	14.9	18.0	19.3	15.0	9.8	10.0
Health Post	7.0	5.9	13.2	9.6	12.3	9.7	13.7	11.1	8.7	10.8	13.8	11.4	9.1	9.3

Table A21. Average health workers per facility

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	4.6	5.3	3.2	5.6	4.3	3.5	3.5	5.5	3.4	5.3	18.2	3.9	10.1	22.5
Hospital	23.3	27.7	18.5	41.0	60.0	14.5	101.0	159.0	88.0	36.6	92.0	95.0	.	85.4
Health Center	6.5	5.4	3.7	9.5	6.3	5.0	3.9	7.3	4.7	7.3	28.5	6.1	21.1	26.5
Health Post	2.4	2.7	2.4	3.5	2.6	2.4	2.0	2.5	2.0	2.7	15.0	2.5	5.6	7.7

Table A22. Absence rate by cadre and facility type

	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All facilities	30.4	44.6	37.1	12.7	22.6	33.5	20.0	41.9	27.6	23.8	19.6	19.1	50.7	33.2
Facility type														
Hospital	24.5	43.7	51.8	5.9	50.0	19.7	28.6	60.0	0	15.4	33.3	12.5	.	44.5
Health Center	32.7	49.1	22.0	14.4	21.8	48.1	16.9	29.8	65.1	45.5	16.4	26.0	50.2	8.9
Health Post	31.8	42.8	36.9	16.8	15.6	28.3	12.5	41.7	26.4	21.4	19.5	19.0	51.4	45.3
Cadre														
Doctors	31.3	45.0	74.0	0	100.0	0	0	0	.	0	0	0	.	41.8
CHO/CHA	15.6	47.5	38.5	9.8	8.9	65.2	2.6	44.4	44.3	50.3	44.8	27.2	49.4	1.8
Nurses/midwives	33.1	44.2	35.7	13.2	22.5	28.3	24.2	43.9	25.8	23.5	16.9	18.8	50.8	35.3

Table A23. Diagnostic accuracy

% clinical cases	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
Severe dehydration	10.5	9.9	3.1	6.8	2.3	41.6	17.6	3.4	37.7	6.7	22.8	51.8	14.2	18.1
Pneumonia	56.2	43.9	73.9	61.6	77.8	77.6	61.1	38.7	75.1	42.2	63.1	70.1	47.9	84.0
Diabetes	6.4	26.7	8.7	58.4	60.1	32.1	41.6	30.5	41.9	33.5	15.5	22.8	37.4	57.6
TB	44.4	86.2	67.2	98.7	93.2	96.6	95.4	95.7	96.7	91.7	92.3	98.8	100.0	99.0
Malaria & anemia	4.2	10.7	2.3	54.1	5.3	17.1	7.0	2.3	19.1	19.5	5.1	54.8	7.9	14.2
Malaria	98.6	99.2	94.2	99.0	100.0	66.7	81.1	100.0	98.3	99.3	98.6	88.8	93.9	98.0
PPH	86.8	83.6	95.3	93.4	96.7	97.7	86.5	100.0	100.0	96.1	90.6	100.0	94.4	86.0
Neonatal asphyxia	88.6	71.3	82.5	93.9	97.0	92.0	91.6	85.0	98.3	94.1	60.7	100.0	85.1	94.3
All 5	24.3	35.5	30.2	55.7	47.7	53.0	44.5	34.1	54.1	38.7	39.8	59.6	41.5	54.6
All 7	**42.4**	**47.5**	**46.3**	**66.4**	**61.7**	**65.0**	57.3	50.8	67.0	54.8	50.0	71.2	55.3	64.7

Table A24. Treatment accuracy

% clinical cases	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
Severe dehydration	87.7	63.5	97.3	65.9	67.6	85.7	92.4	77.7	78.4	63.8	59.4	71.3	94.7	51.5
Pneumonia	67.1	74.7	75.9	94.1	95.5	62.6	76.0	53.4	89.2	87.9	69.0	74.5	83.7	68.8
Diabetes	59.4	62.1	14.4	85.5	57.8	60.6	77.0	63.3	71.8	77.0	60.9	88.6	59.7	72.7
TB	0.0	3.4	0.0	4.0	0.0	4.5	12.2	0.0	1.7	3.3	20.1	0.0	0.0	1.9
Malaria & anemia	40.4	63.4	44.1	83.0	36.4	56.8	59.7	32.8	56.0	44.4	34.5	87.4	45.9	66.6
Malaria	96.2	83.5	97.3	95.7	93.2	78.2	84.9	100.0	86.7	90.0	95.5	96.3	97.4	83.5
PPH	15.4	11.7	17.5	37.0	0.0	35.0	51.3	7.8	34.4	11.5	11.1	55.2	12.2	22.2
Neonatal asphyxia	23.7	32.2	24.4	79.3	31.8	55.2	70.0	15.5	41.8	23.4	40.4	87.0	21.9	34.4

Table A25. Management of maternal and neonatal complications

% clinical cases	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
PPH	16.7	18.4	11.3	41.5	14.8	30.7	38.1	15.6	25.2	17.4	20.0	48.2	23.0	26.3
Neonatal asphyxia	25.2	26.9	18.7	52.8	31.0	43.9	43.4	22.1	32.5	33.6	30.5	71.0	40.1	43.7
Both	20.9	22.7	15.0	47.1	22.9	37.3	40.8	18.9	28.9	25.5	25.2	59.6	31.5	35.0

Table A26. Adherence to clinical guidelines

% clinical cases	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
history and examination important	12.6	16.2	7.6	36.0	18.3	22.9	29.7	11.0	16.2	14.4	20.8	38.5	21.1	21.4
history and examination	21.2	26.2	15.0	44.8	27.7	33.0	39.4	18.3	25.7	23.9	31.2	49.8	31.3	31.9
history, examination and test	20.2	27.4	16.4	46.2	27.4	34.0	40.6	21.9	27.3	25.9	28.9	46.6	31.6	35.2

Table A27. Identification of danger signs

# signs	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
Acute diarrhea with severe dehydration	0.9	1.3	0.9	2.	0.8	1.5	1.6	0.9	1.	0.8	1.5	2.1	1.3	1.3
Pneumonia	0.3	0.4	0.1	1.6	0.2	0.4	1.	0.3	0.4	0.3	0.3	0.9	0.8	0.5
Malaria with anemia	0.6	0.8	0.3	1.4	0.3	0.9	1.	0.5	0.7	1.	0.8	1.5	1.	1.1

Table A28. Referral rates by clinical case

% clinical cases	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
Severe dehydration	3.6	9.0	0.0	4.0	0.0	13.9	9.5	4.3	5.0	6.4	2.6	33.4	7.3	0.9
Pneumonia	6.1	1.7	0.0	3.5	0.0	5.7	4.9	6.4	0.0	4.9	2.6	15.9	5.1	0.0
Diabetes	51.5	42.0	11.3	45.1	40.4	44.3	52.4	38.1	18.2	47.0	39.9	66.7	38.6	19.6
TB	67.8	52.8	60.6	51.1	56.3	57.3	42.5	59.4	59.0	37.2	47.4	60.9	54.4	45.0
Malaria	0.9	4.7	2.3	2.0	1.5	20.9	1.6	0.0	0.0	6.7	4.3	19.5	6.1	1.0
PPH	53.2	37.7	36.0	62.0	27.0	73.3	35.7	68.7	33.2	56.0	51.6	55.5	71.4	16.6

Table A29. Facilities that received resources from any source

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	20.8	58.3	10.7	10.3	1.4	12.7	28.6	18.3	66.1	40.8	73.0	74.3	36.5	40.0
Hospital	42.9	89.4	0.0	33.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	.	62.5
Health Center	7.7	62.0	33.3	0.0	0.0	14.3	20.0	57.1	71.4	33.3	50.0	73.3	36.9	50.0
Health Post	24.1	53.7	5.8	11.1	0.0	7.7	28.8	4.5	64.3	37.5	77.3	74.2	36.4	30.8

Table A30. Facilities that received in-kind resources from any source

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	62.9	86.6	15.2	47.1	75.3	100.0	96.1	98.9	80.2	89.1	24.5	100.0	87.8	64.6
Hospital	42.9	59.6	0.0	33.3	100.0	100.0	0.0	0.0	100.0	28.6	100.0	100.0	.	75.0
Health Center	69.2	76.0	33.3	75.0	83.8	100.0	100.0	100.0	85.7	66.7	50.0	100.0	93.5	50.0
Health Post	62.1	92.8	11.5	43.1	72.2	100.0	97.0	100.0	78.5	96.9	18.2	100.0	85.7	69.2

Table A31. Share of facilities that charge users for care

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	24.9	84.5	0.0	40.2	79.4	62.7	71.4	10.3	74.5	78.1	73.0	68.8	31.2	39.1
Hospital	85.7	100.0	0.0	66.7	100.0	75.0	100.0	0.0	100.0	100.0	100.0	100.0	.	57.1
Health Center	23.1	74.7	0.0	41.7	65.0	64.3	50.0	28.6	85.7	66.7	50.0	73.3	36.9	0.0
Health Post	20.7	85.7	0.0	38.9	83.3	61.5	74.2	4.5	71.4	78.1	77.3	67.7	29.0	53.8

Table A32. Facilities that had a work plan for the current fiscal year

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	29.0	87.5	81.1	51.7	30.0	86.2	89.6	83.0	51.9	96.6	1.3	86.3	43.7	57.8
Hospital	0.0	100.0	100.0	33.3	100.0	75.0	100.0	100.0	100.0	85.7	100.0	100.0	.	100.0
Health Center	38.5	88.7	100.0	41.7	51.3	92.9	80.0	100.0	57.1	100.0	0.0	100.0	44.6	50.0
Health Post	27.6	85.7	75.9	54.2	22.2	84.6	90.9	77.3	50.0	96.9	0.0	83.9	43.3	53.8

Table A33. Facilities that received supervision visit

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	99.2	95.1	15.1	93.1	100.0	100.0	98.7	93.2	91.5	96.6	100.0	81.6	100.0	95.3
Hospital	85.7	100.0	50.0	33.3	100.0	100.0	100.0	100.0	100.0	85.7	100.0	0.0	.	100.0
Health Center	100.0	88.7	0.0	100.0	100.0	100.0	100.0	100.0	85.7	100.0	100.0	53.3	100.0	100.0
Health Post	100.0	96.4	17.3	94.4	100.0	100.0	98.5	90.9	92.8	96.9	100.0	87.1	100.0	92.3

Table A34. Facilities with governing committees

% facilities	Bo	Bombali	Bonthe	Kailahun	Kambia	Kenema	Koinadugu	Kono	Moyamba	Port Loko	Pujehun	Tonkolili	Western Rural	Western Urban
All	94.5	91.8	100.0	94.3	85.9	88.0	94.8	88.6	97.1	92.3	100.0	96.3	100.0	90.6
Hospital	0.0	59.6	100.0	33.3	0.0	75.0	100.0	0.0	100.0	14.3	100.0	0.0	.	100.0
Health Center	100.0	88.7	100.0	100.0	81.2	100.0	100.0	71.4	100.0	100.0	100.0	80.0	100.0	100.0
Health Post	100.0	96.4	100.0	95.8	88.9	84.6	93.9	95.5	96.4	96.9	100.0	100.0	100.0	84.6