SERVICE DELIVERY INDICATORS

Education | Health

Health Service Delivery in NIGERIA

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Consortium pour la Recherche Economique en Afrique

Report No: AUS0000099

Africa
Health Service Delivery in Nigeria
Results of 2014 Service Delivery Indicator Survey

GHNDR and GEDDR
AFRICA

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ACKNOWLEDGEMENTS

This report has been prepared in consultation with the Government of Nigeria by Obert Pimhidzai, Gayle Martin and Waly Wane (Task Team Leaders). The World Bank Team included Owen Ozier, together with the SDI Team members, Christophe Rockmore, Raihona Atakhodjayeva, Mikail Dastgir and Ashis Das.

Many others helped in various areas of the design, implementation, analysis and dissemination of the Survey, including, and in particular the Nigeria World Bank Health Task Team Leader, Dr. Ayodeji Oluwole Odutolu, as well as Dr. Opeyemi Fadeyebi (Field Coordinator), Dr. Ngozi Agbanusi (the Clinical Advisor), Essienawan Essien (Program Assistant) and Shafali Rajora (Program Assistant).

We would also want to thank the staff of Hanovia Medical Limited that undertook the data collection, with Mr. Segun Oguntoyinbo as the Project Manager.

The team would like to use the opportunity to thank the officials of the Federal and State Ministries of Health, National Primary Health Care Development Agency, the Program Delivery Unit of the Saving One Million Lives (SOML) and Local Government Authority (LGA) Primary Health Care (PHC) departments in the 12 states. We would also like to thank the World Bank's Nigeria Country Management Unit, especially Marie-Francois Nelly (former Country Director) and Foluso Okunmadewa (former Program Leader) for their guidance and support, as well as Trina Haque (Practice Manager) who provided managerial support and guidance to the team in the past.

Finally, the team gratefully acknowledges the financial support from the Bill and Melinda Gates Foundation, the William and Flora Hewlett Foundation, and the World Bank.

EXECUTIVE SUMMARY

The Service Delivery Indicators (SDIs) provides a set of indicators for benchmarking service delivery performance in health and education in Africa. The overall objective of the SDIs is to ascertain the quality of service delivery in basic health services and primary education. This would enable governments and service providers to identify gaps and to track progress over time and across countries. It is envisaged that the broad availability, high public awareness and a persistent focus on the indicators will help mobilize policymakers, citizens, service providers, donors and other stakeholders to take actions to improve the quality of services and ultimately improve development outcomes.

This report presents the findings from the SDI health survey in Nigeria between 2013 and 2014. Survey implementation took place following extensive consultations with the government and key stakeholders on survey design, sampling and adaptation of the survey instruments. Pre-testing of the survey instruments, training of enumerators, and field-work took place in the latter half of 2013/early 2014.

The health facility survey covered 2,480 rural and urban health facilities across twelve states, including 2,298 public providers and 182 private facilities. The survey also included 12,678 health providers measured for absence. The results provide a representative picture at the state level of the quality of service delivery, and the physical environment within which services are delivered at the three levels of health facilities: health posts, health centers, and the first level of hospitals. The survey covers three dimensions of service delivery: (i) three measures of provider knowledge and ability; (ii) two measures of provider effort[1], and (iii) five measures of the availability of key inputs, such as drugs, equipment and infrastructure[2].

Key Findings

- At the time of the survey, a little below a quarter (23.8 percent) of the facilities in Nigeria were found to have simultaneous availability of minimum infrastructure of clean water, improved sanitation and electricity.
- About half (49.2 percent) of priority drugs were in-stock and non-expired at facilities.
- Around one-fifths (21.7 percent) of facilities were found to meet minimum equipment requirements, i.e. simultaneous availability of at least one functional
- Provider effort could be reported as poor with the average provider absence rates being 31.7 percent, and average caseloads at health facilities were 5.2 patients per provider per day.
- Providers could correctly diagnose an average of 39.6 percent of tracer cases, and adhered to 31.9 percent of clinical guidelines.

[1] These include caseloads per day; Absence rate; Diagnostic accuracy; Adherence to Clinical Guidelines; and Management of Maternal and Neonatal Complications

[2] These include essential drugs (all); essential drugs for mothers; essential drugs for children; minimum equipment availability; and minimum infrastructure availability.

Table 1 presents the SDI findings for Nigeria, and country comparisons are provided in Table 2. The country does relatively better on the availability of drugs, with 49.2 percent of priority drugs in-stock (and non-expired) at facilities. In terms of the simultaneous availability of minimum infrastructure of clean water, improved sanitation and electricity. Only 23.8 percent of the facilities surveyed were found to meet these minimum infrastructure requirements at the time of the survey. Similarly, only 21.7 percent of facilities were found to meet minimum equipment requirements.[3] The country also performed relatively poorly with regards to provider effort. Average provider absence rates were approximately 31.7 percent, and average caseloads at health facilities were 5.2 patients per provider per day. Providers could correctly diagnose an average of 39.6 percent of tracer cases, and adhered to 31.9 percent of clinical guidelines.

Strengthening the relationship between existing public expenditure and health outcomes thereby remains the key challenge. These results seem to suggest that despite the availability of health professionals, they lack the necessary competence and are poorly managed. The health system is also plagued by significant gaps in input availability, particularly infrastructure and equipment. This suggests that a sharper focus on management, incentives, and accountability is needed in order to address gaps in provider knowledge and effort, together with enhanced efforts to increase the amount of inputs available at facilities.

What service providers know?

Health care providers were able to correctly diagnose 39.6 percent of the five tracer cases (including diarrhea with dehydration, malaria with anemia, pulmonary tuberculosis, diabetes, and pneumonia). Health providers in rural areas demonstrated relatively lower rates of diagnostic accuracy, correctly diagnosing 34.4 percent of the tracer cases versus 44.5 percent diagnostic accuracy among urban health providers. Diagnostic accuracy also differed significantly by level of health facility. Providers at health posts and health centers correctly diagnosed only 30.0 percent and 31.5 percent of the tracer cases, respectively, compared to providers at and first-level hospitals who diagnosed 58.3 percent of tracer cases. These point towards relatively large knowledge gaps among providers at rural and lower tier facilities relative to urban and higher tier facilities. Similarly, diagnostic accuracy varied by provider type, with doctors displaying the highest accuracy rates of 64.6 percent of the tracer cases, compared to 44.7 percent accuracy among nurses.

Adherence to clinical guidelines was also found to be very low, with providers following 31.9 percent of clinical guidelines, and 19.8 percent of the correct treatment actions needed for the management of maternal and neonatal complications. Adherence to clinical guidelines was slightly higher in urban facilities compared to rural facilities (34.5 percent versus 29.3 percent respectively). Adherence to clinical guidelines was better in higher tier facilities, with 42.3 percent of guidelines being adhered to by providers at first-level hospitals.

What service providers do?

The problem of low provider effort and misallocation of time is largely a reflection of suboptimal management of human resources. This is evidenced by the findings that the outpatient caseload (including immunization, antenatal care visits and other preventive care), adjusted for absence,

[3] These include weighing scales (adult, infant and child), stethoscopes, thermometers, and sphygmomanometers at all facilities, and refrigerators and sterilization equipment at health centers and first-level hospitals.

averaged 5.2 patients per day per health worker. Caseloads were reportedly similar between urban and rural facilities at 5.3 and 5.1 patients per day per health worker respectively. Caseloads, however, differed by level of health facility, with health centers having the highest caseloads at 5.6. In health posts, caseloads averaged at 2.3 patients per provider per day. These higher caseloads at higher tier facilities might potentially demonstrate the population's lack of confidence in lower tier facilities in delivering quality of care.

A third (31.7 percent) of the randomly selected health providers who were supposed to be at work were absent during an unannounced visit. Higher absence rates were observed in urban facilities at 34.2 percent, compared to 30.0 percent at rural facilities. Absence rates also differed by the type of health facility, with health centers displaying the highest overall absence rates at 33.6 percent, and the lowest at health posts at 24.3 percent. Absence rates among nurses were the highest at 40.9 percent.

What service providers have to work with?

Significant gaps existed in the availability of inputs at the frontline. An average of 23.8 percent of health facilities met the minimum infrastructure requirements of the simultaneous availability of clean water, improved sanitation and electricity. A major constraint was that only 33.8 percent of facilities had access to functional, improved sanitation. Notably, lower level facilities (health posts) had the least overall input availability, e.g. only 4.1 percent of health posts met minimum infrastructure requirements.

The Nigerian health sector also performed poorly in the availability of equipment. Only 21.7 percent of health facilities overall met the minimum equipment requirements. Rural facilities performed significantly poorer, with only 13.9 percent meeting minimum equipment requirements versus 35.1 percent of urban facilities. Lower level facilities again had the least equipment availability, with only 19.2 percent of health posts and 17.0 percent of health centers meeting minimum equipment requirements, compared to 56.4 percent of first-level hospitals.

Finally, 49.2 percent of the priority drugs tracked were available (and non-expired) at the facilities. Rural facilities had slightly lower levels of available priority drugs, at 47.5 percent, compared to 52.3 percent at urban facilities. Lower tier facilities again had lower levels of drug availability, with 46.9 percent of priority drugs present at health posts compared to 63.0 percent at first-level hospitals.

What does this mean for Nigeria?

Successful service delivery requires that all the measures of service delivery be present at a facility at the same time. Only 23.8 percent of facilities met the infrastructure requirements of simultaneous clean water, improved sanitation and a regular supply of electricity. The quality weaknesses appear less the result of unavailability of personnel, but more about the low productivity of the available workers. This was generally due to low provider knowledge and low provider effort. The results suggest that poor management of human resources was possibly a contributing factor to this low productivity.

Basic infrastructure and equipment were also generally lacking at the frontlines of service provision. Without good quality services, proximity and presence of structures does not translate into improved access. This was demonstrated by how people bypassed the primary health care facilities, which, despite being close, severely lacked quality.

The results of the survey show significant variation by state across various dimensions of the quality of service provision. States in Northern Nigeria performed relatively better than the Southern states in provider competence (e.g. higher diagnostic accuracy and adherence to clinical guidelines) and lower absence rates. Kebbi and Kaduna states (in the North) had among the highest rates of diagnostic accuracy at 52.1 percent and 48.3 percent respectively. Absence rates were below 30 percent in Kebbi, Taraba and Niger states to the North. However, caseloads were demonstrably higher in the Northern versus Southern Nigerian states, with Kaduna state having the highest caseload of 11.8 patients per health worker per day which in itself is still quite modest. Availability of inputs was far weaker in the Northern states. While Kebbi state had the highest diagnostic accuracy overall, it was also among the lowest in the availability of inputs. Only 16.6 percent of priority drugs were available, and 10.1 percent of facilities met minimum infrastructure requirements in Kebbi.

The low levels of provider knowledge and high absence rates in the health sector overall suggest that a focus on management, incentives, and accountability are an important aspect of any package to improve service delivery. Furthermore, strengthening the relationship between existing public expenditure and health outcomes remains a key challenge. Finally, increasing the amount of inputs at the facilities, without addressing gaps in provider knowledge or taking steps to increase the effort provided, is unlikely to yield a positive impact.

Table 1. SDI At-A-Glance

	Nigeria	Rural	Urban	Health posts	Health centers	First-level Hospitals
Caseload (per provider per day)	5.2	5.1	5.3	2.3	5.6	5.4
Absence from facility (% providers)	31.7	30.0	34.2	24.3	33.6	-
Diagnostic accuracy (% clinical cases)	39.6	34.4	44.5	30.0	31.5	58.3
Adherence to clinical guidelines (%clinical guidelines)	31.9	29.3	34.5	25.5	27.7	42.3
Management of maternal and neonatal complications (% clinical guidelines)	19.8	17.4	22.1	13.3	15.8	29.8
Drug availability (% drugs)	49.2	47.5	52.3	46.9	47.3	63.0
Equipment availability (% facilities)	21.7	13.9	35.1	19.2	17.0	56.4
Infrastructure Availability (% facilities)	23.8	16.0	37.4	4.1	23.8	57.2

Table 1. SDI Country Comparisons

	Nigeria (2014)	Senegal (2012)	Tanzania (2012)	Kenya (2013)	Uganda (2013)	Tanzania (2014)	Togo (2014)	Mozambique (2014)
Caseload (per provider per day)	5.2	-	-	15.2	6.0	7.3	5.2	17.4
Absence from facility (% providers)	31.7	20.0	21.0	27.5	46.7	14.3	37.6	23.9
Diagnostic accuracy (% clinical cases)	39.6	34.0	57.0	72.2	58.1	60.2	48.5	58.3
Adherence to clinical guidelines (% clinical guidelines)	31.9	22.0	35.0	43.7	41.4	43.8	35.6	37.4
Management of maternal and neonatal complications (% clinical guidelines)	19.8	-	-	44.6	19.3	30.4	26.0	29.9
Drug availability (% drugs)	49.2	78.0	76.0	54.2	47.2	60.3	49.2	42.7
Equipment availability (% facilities)	21.7	53.0	78.0	76.4	21.9	83.5	92.6	79.5
Infrastructure Availability (% facilities)	23.8	39.0	19.0	46.8	63.5	50.0	39.2	34.0

I. INTRODUCTION[i]

In its Vision 20:2020 National Plan, Nigeria aims to rank among the top 20 global economies by 2020. Despite decent annual GDP growth of at least 6 percent in recent years, two fundamental questions have to be asked concerning the country's economic aspirations: firstly, whether Nigeria has the required human resources to become one of the top 20 economies in the world; secondly, whether Nigeria has been investing in human development to produce workers capable of competing in the global economy and meeting the demands of a vibrant private sector. Evidence shows that Nigeria has many challenges to overcome in its efforts to build a healthy and skilled workforce and population more generally.

Weak human development outcomes in Nigeria partly reflect a weak link between public expenditure and outcomes. For example, Nigeria spent an average of $PPP 161 per capita on health in 2012—versus $PPP 106 in Ghana[ii]. However, Nigeria's immunization coverage in 2012 was 60 percent for BCG, 41 percent for DPT3, and 59 percent for polio compared to Ghana's 98 percent for BCG, 92 percent for DPT3, and 91 percent for polio. At 124 deaths per 1,000 live births, Nigeria's under-five mortality rate is the ninth highest in the world.[iii] While funding gaps exist, more could be achieved with existing resources. Furthermore, without improved efficiency and effectiveness in service delivery, Nigeria's efforts to achieve its long term economic aspirations will be hindered.

The service delivery literature points towards the importance of functional health facilities, and more generally, the quality of service delivery.[iv] 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 (Box 1).[v] 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 2).[vi]

The objectives of the SDI survey were to assess the quality of service delivery along the following dimensions: (i) What providers know (diagnostic accuracy, adherence to clinical guidelines, and management of maternal and neonatal complications); (ii) What providers do (absence rates and provider caseload); and (iii) What providers have to work with (availability of inputs).

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 and education service delivery have human resource intensive service delivery models. SDI therefore focuses on frontline service delivery and provider behaviour 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.

Box 2. The Service Delivery Indicators (SDI) Program

A significant share of public spending on health and education is transformed to produce good quality services. Understanding what takes place at these frontline service provision units 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 have to work with (e.g. textbooks in schools), or how much work effort is exerted by nurses (e.g. how likely are they to come to work), and their competency would reveal the weak links in the service delivery chain.

To date, there is no robust, standardized set of indicators to measure the quality of health and education services as experienced by the user. Existing indicators tend to be fragmented and focus either on final outcomes or inputs, rather than on the intermediate outcomes and 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 to assess how service providers are performing and to take corrective action.

The SDI provides a set of metrics to benchmark the performance of health facilities and schools. The Indicators can be used to track progress within and across countries over time, and aim to enhance active monitoring of service delivery in order 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 users accessing a service. The Indicators can thus be viewed as a service delivery report card on education and 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 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 methodology was used in Nigeria to assess the quality of service delivery, and provide insights on the challenges facing health service provision in the country's frontline health facilities: health posts, health centers, and the first-level hospitals.

The SDI surveys were conducted in twelve states using provider assessments and exit interviews. Anambra, Bauchi, Bayelsa, Cross River, Ekiti, Imo, Kaduna, Kebbi, Kogi, Niger, Osun and Taraba are the states where the health facilities survey was implemented. Survey implementation was preceded by extensive consultation with Government and key stakeholders on survey design, sampling, and the adaptation of survey instruments. Pre-testing of the survey instruments, enumerator training and fieldwork took place in the latter half of 2013.

A total of 2,480 randomly selected primary health facilities and all first-level hospitals (i.e. 338 in total) in the twelve states were included.[4] In the process 5,153 and 12,678 health professionals were assessed for knowledge and effort, respectively. The results are representative at the State level, allowing for disaggregation by provider type (e.g. level of care) and location (rural/urban). The results presented in this report are not meant to be representative of Nigeria as a whole. That said, the selected states were not included because they were systematically weaker performers, and thus the results can be viewed as a snapshot of the service delivery experience of many Nigerians.

The foundation for delivering on health and healthcare goals, such as the Millennium Development Goals (MDGs), Universal Health Coverage, and Saving One Million Lives (SOML), depends on whether the fundamentals are in place: are health providers knowledgeable and adequately skilled, are they present at work, and are at least the basic inputs available such as equipment and drugs? SDI is essentially a return to the basic by shining the light on these fundamentals.

The survey used a multi-stage, cluster sampling strategy which allowed for disaggregation by geographic location (rural and urban), and facility type (health posts; health centers; and first-level hospitals) (see Table 3).[5, 6] As mentioned, the surveys were conducted in twelve states: Anambra, Bauchi, Bayelsa, Cross River, Ekiti, Imo, Kaduna, Kebbi, Kogi, Niger, Osun, and Taraba states, selected across the country's six geopolitical zones. Annex A provides details of the methodology and sample for the Nigeria Service Delivery Indicators survey. The modules of the survey instrument are shown in Annex A (Table A1) and Annex B (Table B 1).

Ethical clearance for the study was granted by the National Health Research Ethics Committee (NHREC) with approval number NHREC/01/01/2007-03/05/2013b.

[4] About 64 SURE-P facilities were additionally included in the sample to provide a baseline for the SURE-P impact evaluation. These were not randomly selected and are excluded from the analysis in this report

[5] Using the Nigeria designation, 2,480 facilities were included in the sample.

[6] A small sub-sample of private facilities were included in the second phase of the study, conducted in Bayelsa, Imo, Kaduna, Kogi, Osun, and Taraba states, at the request of Federal Government (SOML) stakeholders during survey update meetings, in order to gain a glimpse into the quality of health services provided by private practitioners. However, the small number of private facilities included in the survey (n=182), and only in the latter six states, would thereby not allow for meaningful disaggregation by facility ownership.

B. Sampling

Table 3. Health SDI sample in Nigeria

Variable	Sample	
	Total	Share of Total
Facilities	2,480[b]	100
Health posts (dispensaries)	537	22
Health centers & clinics	1,604	65
Hospitals (first level)	338	14
Ownership	2,480	100
Public	2,298	93
Private	182	7
Location	2,480[b]	100
Rural	1,481	60
Urban	998	40
Healthcare workers	12,678[b]	100
Doctors	544	4
Community Health Extension Workers	5,403	43
Nurses and midwives	2,519	20
Paraprofessionals	4,026	32
Patients	5,837	100
Adult Patients	3,054	52
Adults accompanying children <5yrs	2,783	48

Notes: Different weights were applied where the unit of analysis was facilities, and where unit of analysis was clinicians. No weights are provided for health care workers sampled in the roster; however, weights are applied to the subset of providers conducting outpatient consultations

b. Figures do not add up to 2,480 and 12,678 as facility type and location information is missing for one facility, and cadre type information is missing for 186 providers

Table 4. Sample for indicators of absence and competence

Cadre	Absence rate[a]		Competence indicators[b]	
	Total	Percent (%)	Total	Percent (%)
Doctors	544	4	544	11
Nurses	2,519	20	1,052	20
Community Health Extension Workers	5,403	43	3,100	60
Para-Professionals	4,026	32	367	7
Total	12,678[c]	100	5,153[c]	100

Notes: 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).

c. Totals do not add up to 12,678 health workers for absence and 5,153 health providers for competence as cadre types are missing for 186 health workers considered for absence and 90 workers considered for competence.

The survey used a sector-specific questionnaire with several modules (see Table A1), all of which were administered at the facility level. The questionnaires built on previous similar questionnaires based on international good practice for PETS, QSDS, SAS and observational surveys.

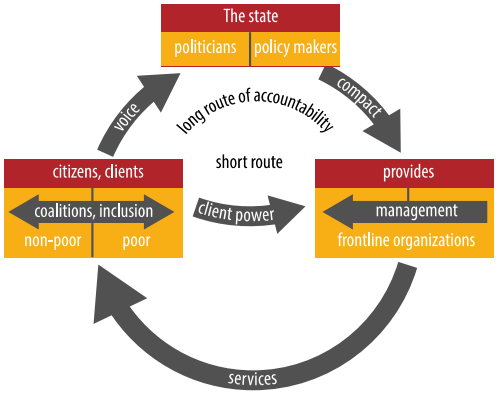
Table 5. Linking the survey instrument and indicators

Sample		Questionnaire Modules	Indicators
Health	Nationally representative, disaggregated by rural/urban. 2,480 facilities.	Health facility information	**INPUTS** - Infrastructure availability - Medical equipment availability - Drug availability **PROVIDER EFFORT** - Absence rate - Caseload per provider **PROVIDER ABILITY** - Diagnostic accuracy - Adherence to clinical guidelines - Management of maternal and neonatal complications
	12,678 health providers (nurses, CHWs, doctors, para-professionals, etc.)	Health provider information (including attendance)	
	Assessments of 5,153 health providers	Assessment of health provider knowledge and ability	
	Nationally representative, disaggregated by rural/urban. 2,480 facilities.	Assessment of health facility financial management	**HEALTH FACILITY FINANCING** - Cash support - Non-cash support - Expenditure - User Fees - Financial Management
	3,054 adult patients and 2,783 adults accompanying child patients under 5 years	Health Facility Exit Survey	**PATIENT SATISFACTION** -Time and Expense - Patient Satisfaction - Household Socioeconomic Status

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.

Figure 1. Relationships of accountability: citizens, service 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:

$$y = f(x,e,\theta) + \varepsilon$$

To assess the quality of services provided, one should ideally measure $f(x,e,\theta)$. Of course, it is notoriously difficult to measure all the arguments that enter the production function, 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 education. To a large extent, these data sets measure inputs and outcomes/outputs in the service delivery process, mostly from a household perspective. While providing a wealth of information, existing data sources (like Living Standards Measurement Survey (LSMS), Welfare Monitoring Surveys (WMS), and Core Welfare Indicators Questionnaire Survey (CWIQ)) cover only a sub-sample of countries and are, in many cases, outdated.

Notes: a. World Development Report, 2004.

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 and education 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 education and 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 education and 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 6. Health SDI Indicators

Dimension	Indicator
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: The indicators listed above are not the only metrics collected in SDI surveys. Below are some examples of management and governance data included in the instrument: 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.

III. RESULTS

C. Delivering Health Services

The number of days health facilities offer services and the number of hours per day they operate is amongst the most basic indicators for measuring health service delivery. In Nigeria, health facilities were open on average 6.3 days per week (Table 7). Lower level facilities such as health posts were open for patients 5.7 days per week, whereas health centers and first-level hospitals were open for almost seven days a week, both in urban and rural areas. There was quite some variation of opening hours across facility's level and location, with most hospitals offering services almost round-the-clock. Further information on the distribution of health personnel and clinicians conducting outpatient consultations by provider type, gender and level of facility are provided in Table C 1 to Table C 4 (Annex C).

Table 7. Hours and days of service delivery

	All	Rural Public	Urban Public	Percent difference (%)[a]
Hours outpatient consultations offered per day (hours)				
All facilities	15.6	14.8	17.0	-14.9***
Health posts	10.7	10.6	10.9	-2.8
Health centers	16.2	15.7	17.1	-8.9**
First-level hospitals	21.6	22.2	21.3	4.1
Number of days per week facility was open (days)				
All facilities	6.3	6.2	6.4	-3.2**
Health posts	5.7	5.7	5.6	1.8
Health centers	6.4	6.3	6.4	-1.6
First-level hospitals	6.9	6.8	6.9	-1.5

Notes: Level of significance: *** p<0.01, ** p<0.05, * p<0.1.

D. 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 out-patient consultation records; only providers conducting out-patient 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 visiting health facility, caseload—while not the only measure of workload—is arguably a critically important measure.

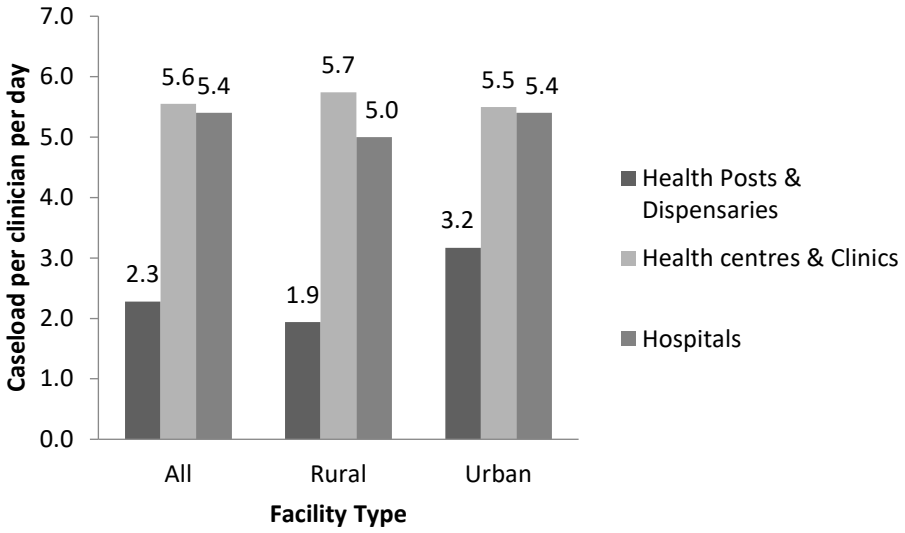
The average caseload in the health sector was relatively low at 5.2 patients per provider per day with no rural-urban differences (Table 8). Case mix across facility types may vary, so it is worth looking at comparisons by level of facility. The highest caseloads were found in health centers and first-level hospitals at 5.6 and 5.4 patients per provider per day, respectively, and only 2.3 patients per day at health posts. Variations in caseloads per day by facility type are shown in Figure 2 below. At the level of health posts the differences were significant: 3.2 patients at urban health posts 1.9 rural health posts. Rural health centers, however, had slightly higher patient caseloads compared to their urban counterparts. Further disaggregations of the caseload variable by facility location and health provider cadre type are also shown in Table 8 below.

Table 8. Caseload per clinician by facility and cadre type and location

	All	Rural Public	Urban Public	Percent Difference (%)
Facility-type				
All facilities	5.2	5.1	5.3	-4.3
Health posts	2.3	1.9	3.2	-68.4
Health centers	5.6	5.8	5.5	5.2
First-level hospitals	5.4	5.0	5.4	-8.0
Cadre-type				
All providers	6.0	5.7	6.2	-8.8
Doctors	8.3	11.2	7.5	33.0
Nurses	4.2	3.5	4.7	-34.3
CHWs	6.5	5.7	7.3	-28.1
Para-Professionals	2.4	2.7	2.0	25.9

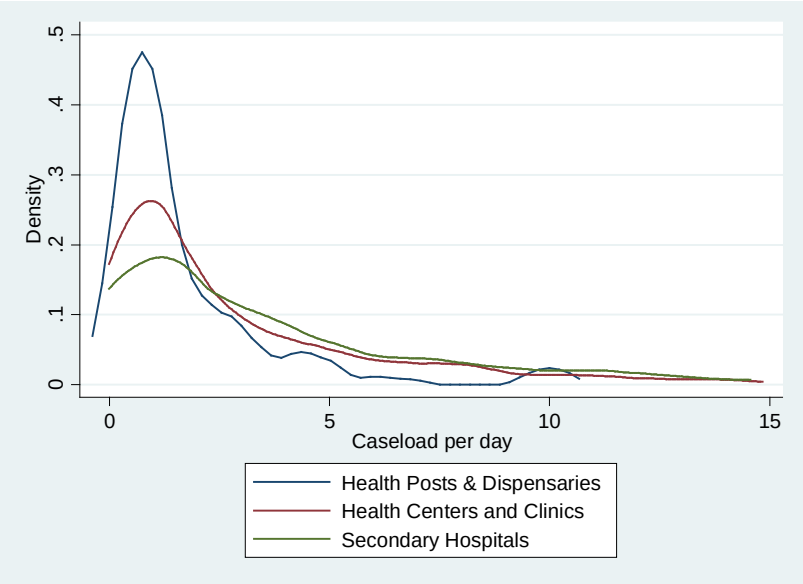
Notes: Levels of significance: *** p<0.01, ** p<0.05, * p<0.1.

Figure 2. Caseload by facility type



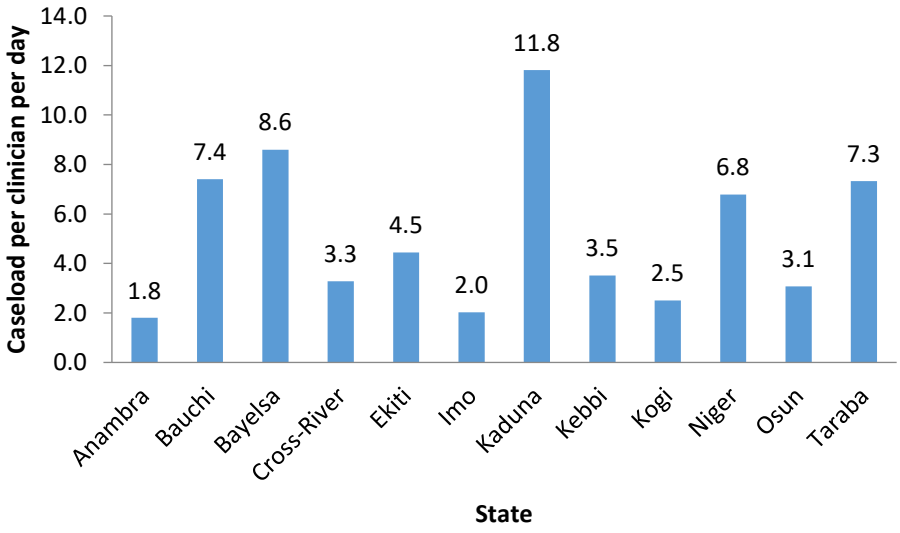
Caseloads are usually of concern because a shortage of health workers may cause caseloads to rise and potentially compromise service quality. The data for Nigeria suggests that a large share of health providers, especially those in moderately sized facilities, had very low caseload levels. It is worth noting that the caseload indicator takes into account the staff absence rates, which therefore considers the true workload of health staff members. The distribution of caseloads by facility type were also skewed (as Figure 3 shows), with the largest number of health posts having caseloads under 5 patients per provider per day, followed by health centers and first-level hospitals.

Figure 3. Distribution of caseload



Variations in caseloads across states were also observed. On average, caseloads were higher in the northern Nigerian states surveyed (Bauchi, Kaduna, Kebbi, Taraba, and Niger) compared to the Southern states (Anambra, Bayelsa, Cross-River, Ekiti, Imo, Kogi, and Osun). Kaduna state in the north had the highest caseload overall, at 11.8 patients per provider per day. Some of the lowest caseloads were found in health facilities in the southern states of Anambra and Imo at 1.8 and 2.0 patients per provider per day respectively (Figure 4).

Figure 4. Caseload: Regional Differences



E. 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. 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 indicator was not estimated for hospitals because of the complex off-duty arrangements, interdepartmental shifts etc.

Close to a third (31.7 percent) of providers in health facilities overall were found to be absent. Rural-urban differenc3es were not significant, except at the level of health posts (20.4 percent versus 36.6 percent). Absence rates also differed by level of facility, with health centers having higher absence rates of 33.6 percent compared to 24.3 percent at health posts. Figure 5 presents disaggregations of absence rates by cadre type, showing that nurses displayed the highest absence rates, and doctors the lowest. The caseload of health workers is to some degree influenced by service utilization and demand-side factors, which may contribute to lower caseloads in rural areas and lower level facilities. Absence rates in some rural facilities was higher at 33.3 percent for health centers compared to 20.4 percent in health posts (Table 9).

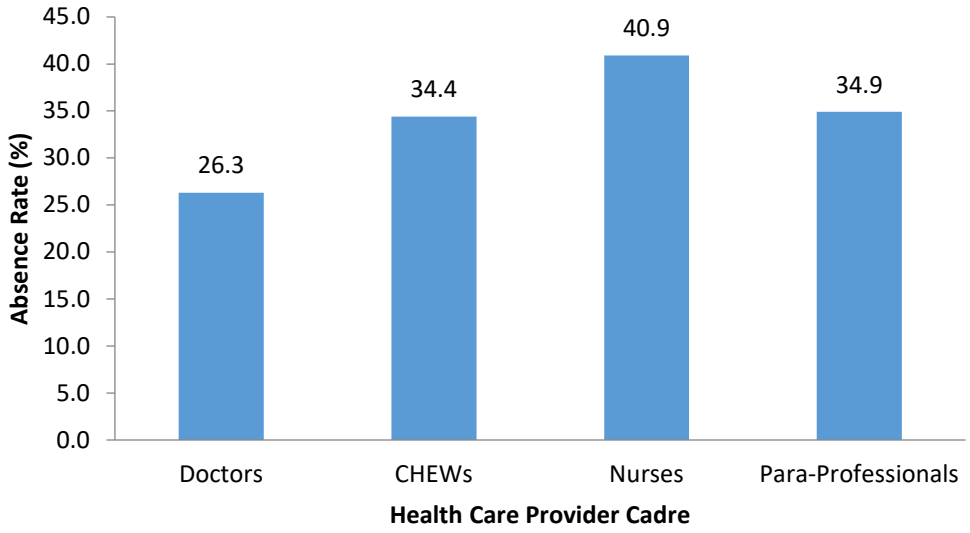
These findings on absence and caseload suggest that there is some room for improvement in health service delivery. For example, reducing absence rates in urban facilities, which see greater caseloads, might influence service utilization and demand-side factors, and thereby reduce caseload pressures at higher level facilities.

Table 9. Absence rate by facility type and cadre type

% of providers	All	Rural Public	Urban Public	Percent Difference (%)
		Facility-type		
All facilities	31.7	30.0	34.2	-13.9
Health posts	24.3	20.4	36.6	-79.4***
Health centers	33.6	33.3	34.0	-2.1
		Cadre-type		
All providers	35.3	35.8	34.9	2.5
Doctors	26.3	37.2	23.9	35.8
CHWs	34.4	34.7	34.0	2.0
Nurses	40.9	32.9	44.1	-34.0
Para-Professionals	34.9	38.5	31.6	17.9*

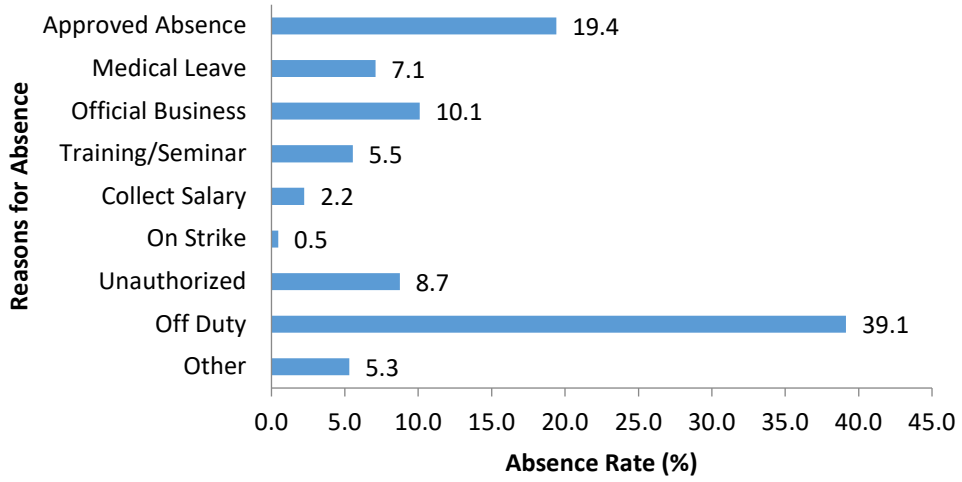
Notes: Levels of significance: *** p<0.01, ** p<0.05, * p<0.1.

Figure 5. Absence rate by cadre



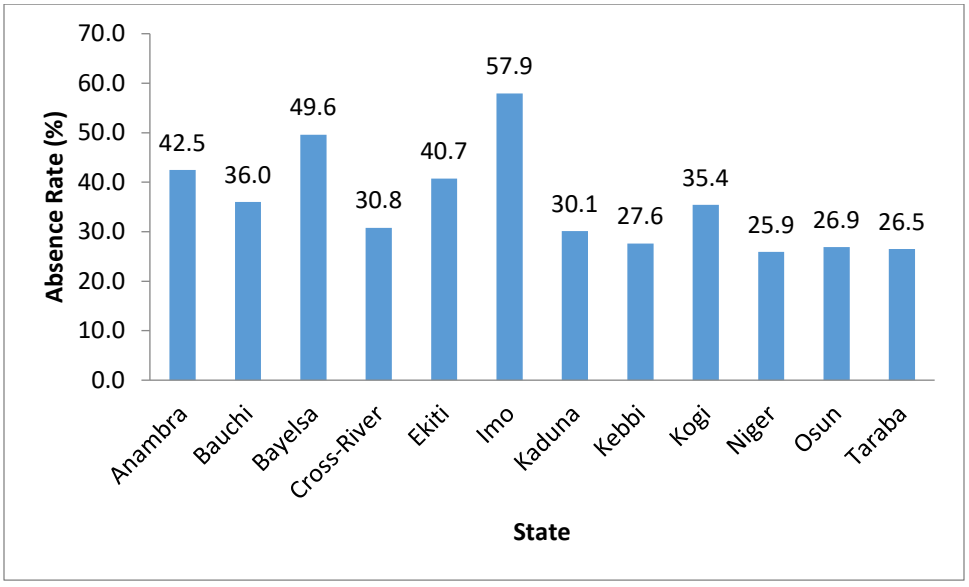
In any workplace setting, absence may be approved or not approved. The survey found that 44.3 percent of absence was sanctioned (e.g. training and seminars, sick and maternity leave, official missions, and out to retrieve salary) (Figure 6). But, from the consumer's perspective, these providers are not available to deliver services—whether approved or not. It is possible that absence can be improved by more prudent sanctioning of absence. This suggests that management improvements and better organization and management of staff can potentially improve the availability of staff for service delivery.

Figure 6. Reasons for absence from health facilities



Absence rates were found to be lower in the northern Nigerian states compared to the southern states. Niger and Taraba states in the north had the lowest absence rates at 25.9 percent and 26.5 percent respectively. The highest absence rates were observed in the southern states of Imo at 57.9 percent and Bayelsa at 49.6 percent (Figure 7).

Figure 7. Absence rate: Regional Differences



The multivariate analysis presented in Table C 5 (Annex C) shows that absence was more likely among health providers in rural facilities ($p<0.05$) and in facilities with staff in excess of three workers ($p<0.01$).

F. 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 haemorrhage 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 vignettes. Clinical vignettes 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 (standardized patients and clinical case direct observations) 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.

While the SDI survey does not typically collect information on quality from the client's perspective or health outcomes, the results could potentially be linked with household surveys using geographic location information.

The SDI survey assessed provider ability and knowledge using two process quality indicators (the adherence to clinical guidelines in the tracer conditions, and the management of maternal and

newborn complications, and an outcome quality indicator, diagnostic accuracy in five tracer conditions).

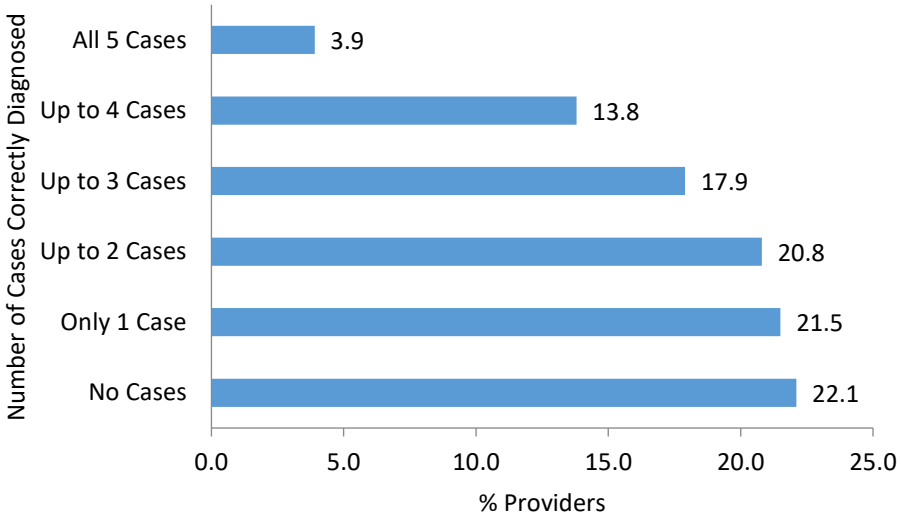
There were variations in measures of provider knowledge and ability across rural and urban health providers. Provider ability scores progressively declined among the cadre types. Providers correctly diagnosed 39.6 percent of the tracer conditions (Table 10). Diagnostic accuracy differed between rural and urban providers. Rural providers correctly diagnosed 34.4 percent of the tracer conditions, compared to urban providers who correctly diagnosed 44.5 percent of tracer conditions ($p<0.01$). Diagnostic accuracy rates also declined with cadre type and facility type, with doctors correctly diagnosing 64.6 percent of the tracer conditions, followed by nurses (44.7 percent). Providers at health posts diagnosed 30.0 percent of tracer conditions, 31.5 percent in health centers, and 58.3 percent in first-level hospitals. Only 3.9 percent of providers were able to correctly diagnose all five of the tracer conditions, and 13.8 percent could diagnose four out of the five cases (Figure 8). Additional results on diagnostic accuracy by both cadre type and facility type are presented in Annex C (Table C 8 and Table C 9).

Table 10. Diagnostic accuracy by cadre and facility type and location

% of conditions	All	Rural Public	Urban Public	Percent Difference (%)
Cadre-type				
All cadres	39.6	34.4	44.5	-29.4***
Doctors	64.6	65.5	64.4	1.7
Nurses	44.7	39.6	48.0	-21.2**
Facility-type				
All facilities	39.6	34.4	44.5	-29.4***
Health Posts	30.0	31.6	25.8	18.4*
Health Centers	31.5	30.7	32.7	-6.5
First-level hospitals	58.3	54.0	59.7	-10.6

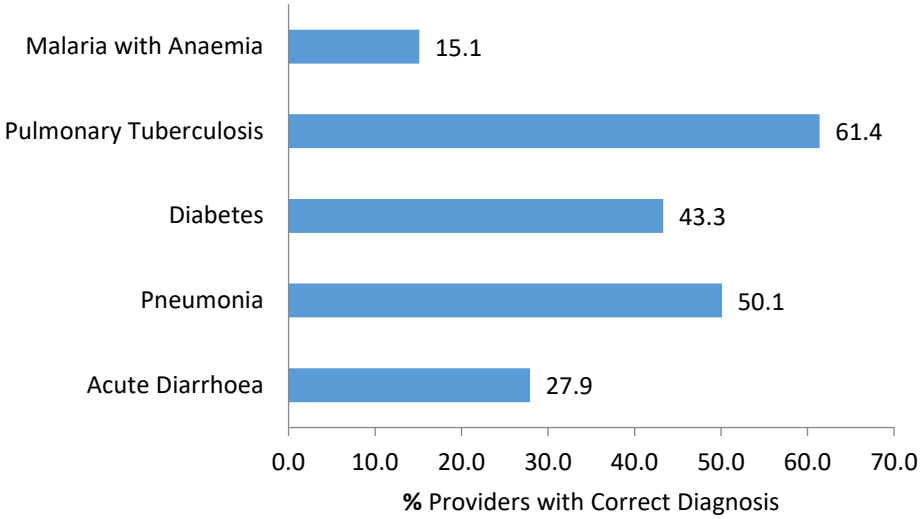
Notes: Level of significance:*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Figure 8. Number of cases correctly diagnosed



The diagnostic accuracy rate varied across case conditions. This ranged from as low as 15.1 percent of providers correctly diagnosing malaria with anemia to 61.4 percent of providers correctly diagnosing pulmonary tuberculosis (Figure 9). Half of the clinicians assessed were not able to correctly diagnose a relatively common condition such as pneumonia. Additional results on a provider's ability to reach a correct diagnosis based on individual questions asked for each of the five tracer conditions are presented in Annex C (Figure C 1 to C5).

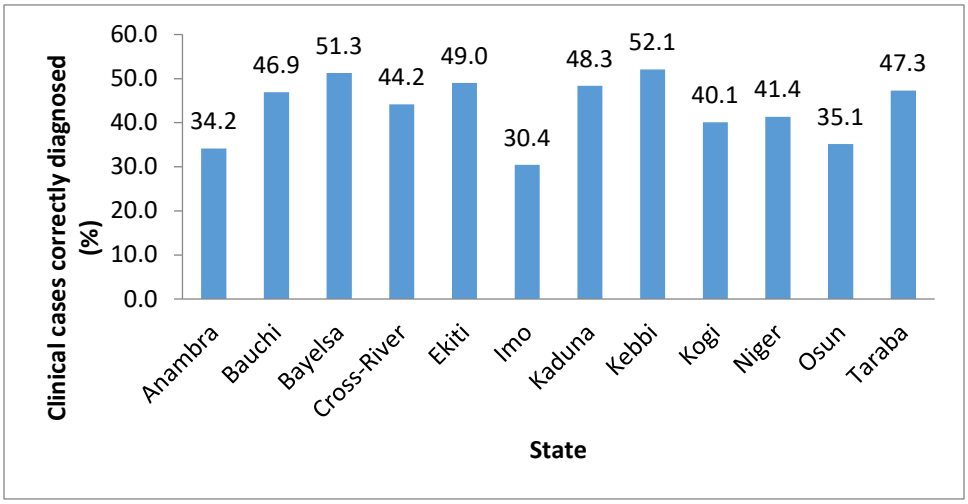
Figure 9. Diagnostic accuracy by clinical case



Variations in diagnostic accuracy were also observed at the state level. Clinicians in the northern Nigerian states surveyed performed better in terms of diagnostic accuracy compared to their southern Nigerian counterparts. The highest diagnostic accuracy was found in Kebbi state in northern Nigeria, where clinicians correctly diagnosed 52.1 percent of cases, followed by Bayelsa

state in southern Nigeria (51.3 percent). The lowest diagnostic accuracy were found in the southern Nigerian states of Imo (30.4 percent), Anambra (34.2 percent), and Osun (35.1 percent) states (Figure 10).

Figure 10. Diagnostic accuracy: Regional Differences



G. 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 haemorrhage 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) and the Nigeria's Standard Treatment Guidelines for the tracer conditions.

Providers in Nigeria adhered to 31.9 percent of the clinical guidelines in the management of the five tracer conditions. This relatively modest performance varied between rural (29.3 percent) and urban providers (34.5 percent) ($p<0.01$) (Table 11). Adherence to clinical guidelines progressively declined by cadre type. Highest adherence was observed among doctors (46.7 percent), followed by nurses (32.6 percent). It also declined by facility type, ranging from 42.3 percent adherence to clinical guidelines in first-level hospitals to 25.5 percent adherence in health posts. Adherence was highest among urban doctors who followed 47.0 percent of clinical guidelines. Additional results on the adherence to all clinical guidelines by cadre type and facility type are found in Table C 6 and Table C 7 respectively (Annex C).

Table 11. Adherence to main clinical guidelines by cadre and facility type and location

% of guidelines	All	Rural Public	Urban Public	Percent Difference (%)
		Cadre-type		
All cadres	31.9	29.3	34.5	-17.7***
Doctors	46.7	45.8	47.0	-2.6
Nurses	32.6	29.5	34.7	-17.6***
		Facility-type		
Health Posts	25.5	27.1	21.5	20.7***
Health Centers	27.7	27.6	28.0	-1.4
First-level hospitals	42.3	39.1	43.4	-11.0

Notes: Level of significance:*** p<0.01, ** p<0.05, * p<0.1.

At the state level, the northern Nigerian states performed somewhat better than the southern states surveyed in this study in terms of adherence to clinical guidelines (Figure 11). The highest adherence was found in the northern Nigerian state of Niger at 33.1 percent, followed by 32.5 percent in the southern state of Bayelsa. The lowest adherence to clinical guidelines was found in the southern states of Imo (15.8 percent) and Anambra (17.1 percent), and the northern state of Bauchi (18.4 percent). The data therefore illustrates that states with lowest levels of clinical guideline adherence had relatively lower rates of diagnostic accuracy, e.g. Imo and Anambra states to the South. The exception appeared to be Bauchi state in the north, where diagnostic accuracy was among the highest of the states surveyed, despite having one of the lowest rates of adherence to clinical guidelines.

H. Management of Maternal and Neonatal Complications

Nigerian providers adhered to 19.8 percent of the clinical guidelines related to the management of maternal and neonatal complications. Urban providers performed better than their rural counterparts (22.1 percent versus 17.4 percent respectively), which was statistically significant (p<0.01). This indicator progressively declined by cadre type (Table 12) and by facility level. Doctors adhered to 33.2 percent of the above guidelines, followed by nurses (23.9 percent). Providers at health posts adhered to only 13.3 percent of guidelines, followed by health centers (15.8 percent) and first-level hospitals (29.8 percent). Figure C 6 and Figure C 7 (Annex C) display the proportion of correct treatment actions proposed for the two maternal and neonatal conditions by the questions asked, and physical examination and clinical management actions undertaken.

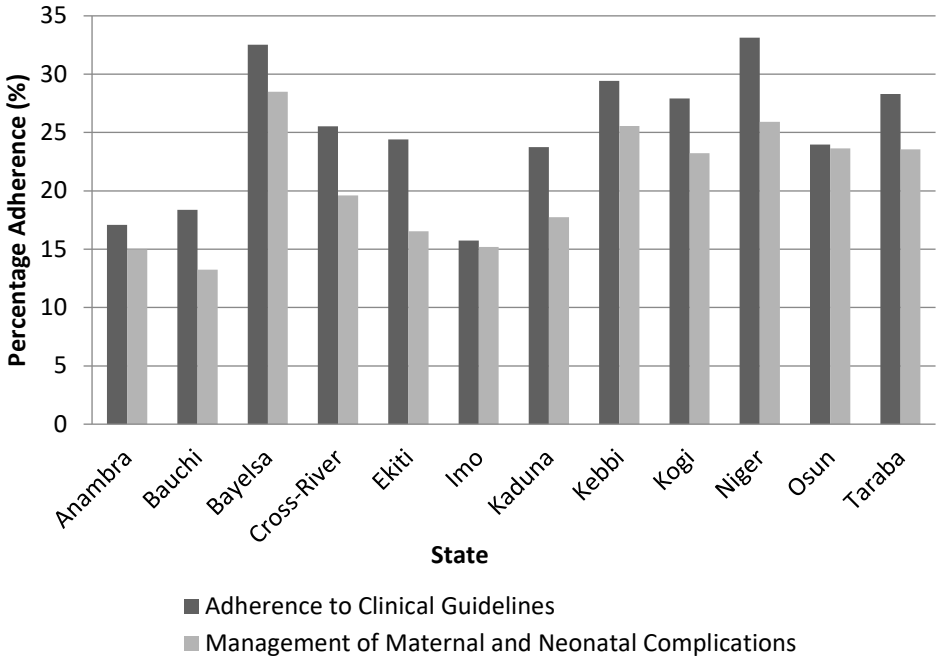
Table 12. Management of maternal and neonatal complications by cadre type

% of guidelines	All	Rural Public	Urban Public	Percent Difference (%)
		Cadre-type		
All cadres	19.8	17.4	22.1	-26.9***
Doctors	33.2	37.7	32.0	15.1
Nurses	23.9	22.9	24.6	-7.4
		Facility-type		
Health Posts	13.3	14.2	10.7	24.6*
Health Centers	15.8	15.4	16.3	-5.8
First-level hospitals	29.8	29.6	29.9	-1.0

Notes: Level of significance:*** p<0.01, ** p<0.05, * p<0.1.

The southern and northern Nigerian states performed relatively similarly in adherence to the clinical guidelines related to the management of maternal and neonatal complications (Figure 11). Bayelsa state (South) had the highest adherence, but was still only 28.5 percent, followed by Niger and Kebbi states (North) at 25.9 percent and 25.6 percent respectively. Incidentally, Kebbi and Bayelsa states had among the two highest rates of diagnostic accuracy, despite the relatively low levels of adherence to clinical guidelines and the management of maternal and neonatal complications. Bauchi state (North) had the lowest adherence to guidelines related to the management of maternal and neonatal complications at 13.3 percent, followed by Anambra and Imo states (South) at 15.0 percent and 15.2 percent respectively.

Figure 11. Measures of process quality: Regional Differences



I. 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 priority drugs are listed in Table B 2. For comparison with the SARA, the availability of 14 specific tracer drugs identified in SARA is shown in Table B 2.

Overall, health facilities had only half (49.2 percent) of the priority drugs available. The availability of priority drugs for mothers and children were similar at 49.6 percent and 49.0 percent respectively (Table 13). Table B 2 (Annex B) provides the complete list of all priority, maternal and child drugs included in the survey. Given the concern for maternal mortality and efforts to improve maternal health outcomes, the availability of priority drugs for mothers was therefore lower than ideal. Rural facilities tended to commonly suffer drug shortages compared to their urban counterparts. Rural facilities had less availability of all priority drugs (47.5 percent) compared to urban facilities (52.3 percent), ($p<0.05$). Rural facilities also had less availability of priority drugs for children compared to urban facilities ($p<0.01$).

Table 13. Availability of priority drugs by facility type

% of drugs	All	Rural Public	Urban Public	Percent Difference (%)
All essential drugs	49.2	47.5	52.3	-10.1**
Essential drugs for mothers	49.6	48.3	51.8	-7.4
Essential drugs for children	49.0	46.6	53.2	-14.1***

Notes: Level of significance:*** p<0.01, ** p<0.05, * p<0.1.

The availability of priority drugs also varied by type of facility. First-level hospitals had a higher proportion of all priority drugs (63.0 percent) compared to health centers (47.3 percent) and health posts (46.9 percent) (Table 14). Figure C 8 (Annex C) provides more detail on the availability of each individual drug by facility level.

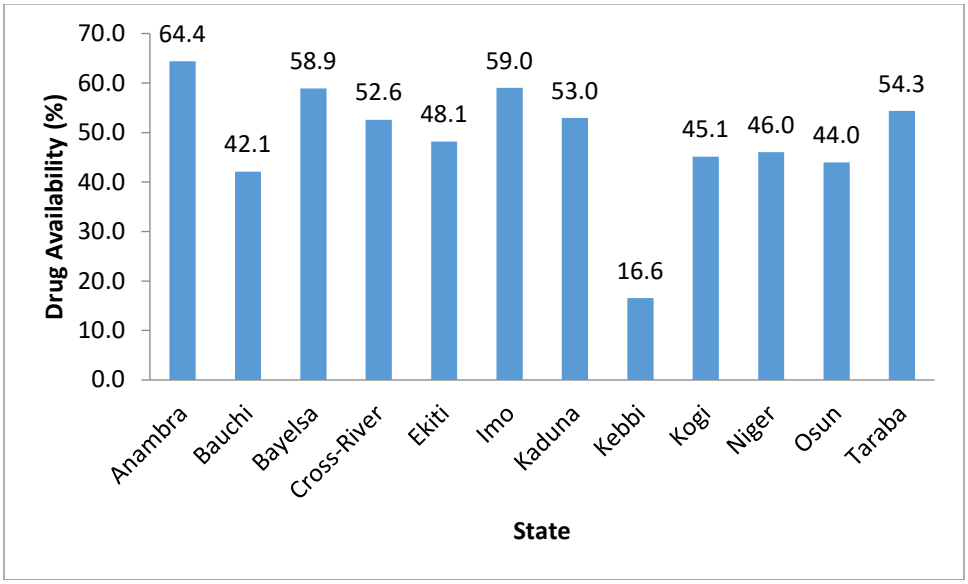
Table 14. Availability of priority drugs by facility level and location

% of drugs	All	Rural Public	Urban Public	Percent Difference (%)
Health posts	46.9	45.0	53.0	-17.8*
Health centers	47.3	47.0	47.7	-1.5
First-level hospitals	63.0	62.4	69.1	-10.7

Notes: Level of significance:*** p<0.01, ** p<0.05, * p<0.1.

The southern Nigerian states outperformed the northern Nigerian states in the availability of priority drugs. The highest level of priority drug availability was seen in Anambra state (South), with 64.4 percent of all priority drugs available at facilities (Figure 12). Drug availability was lowest in Kebbi state (North) at 16.6 percent. However, despite the low availability of drugs, Kebbi state still had one of the highest rates of diagnostic accuracy at 52.1 percent. Constraints in the availability of key inputs and infrastructure can however limit gains in health outcomes, even with relatively higher rates of diagnostic accuracy.

Figure 12. Availability of priority drugs: Regional Differences



Availability of vaccines related equipment and supplies

Health posts were stocked with almost three-quarters (73.8 percent) of priority vaccines. Urban health posts were better stocked with priority vaccines (76.1 percent) compared to rural health posts (72.6 percent) ($p<0.05$) (Table 15). Unsurprisingly, first-level hospitals had the highest stock of priority vaccines (75.6 percent) compared to 66.5 percent in health centers.

Table 15. Availability of vaccines by facility type

% of vaccines	All	Rural Public	Urban Public	Percent Difference (%)
Health posts	73.8	72.6	76.1	-4.8**
Health centers	66.5	64.8	71.8	-10.8
First-level hospitals	75.6	75.1	76.6	-2.0

Notes: Level of significance:*** p<0.01, ** p<0.05, * p<0.1.

With the exception of the pneumococcal vaccine, first-level hospitals were relatively well stocked with the remaining priority vaccines (Figure 13). Health posts were stocked with two-thirds of the priority vaccines. All health facility types were relatively well stocked with vaccine-related commodities (Figure 14), including safe syringes (either auto-disable or disposable), sharps

containers, vaccine carriers and packs. However, a working refrigerator appeared to be a significant limiting constraint, with only 63.7 percent of first-level hospitals, and just 9.1 percent of health posts equipped with a working refrigerator.

Figure 13. Availability of specific vaccines by facility type

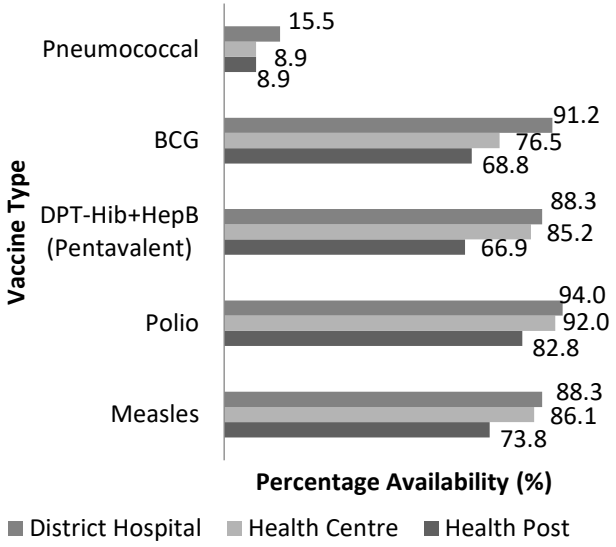
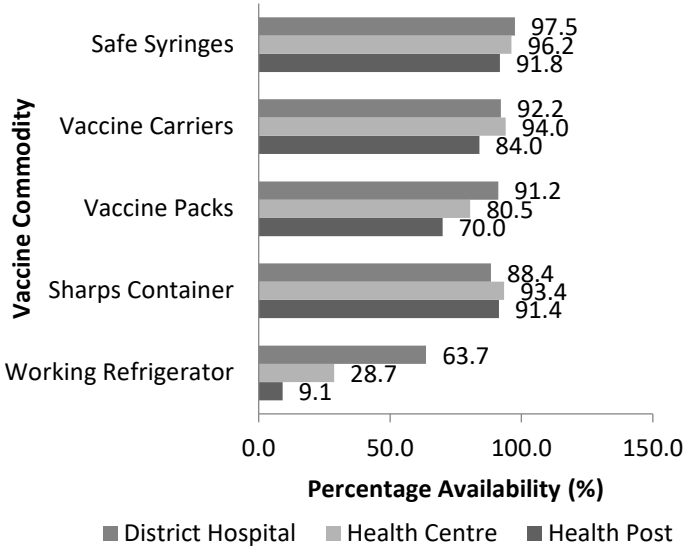


Figure 14. Availability of vaccine supplies by facility type



J. 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. In addition, it is expected that the following pieces of equipment be available at health centers and first-level hospitals: sterilizing equipment and a refrigerator.

Less than a quarter of all health facilities (21.7 percent) met the requirements that make up the equipment indicator, adjusted for health facility level (Table 16; see Table C 10 for unadjusted estimates). The rural-urban gap was especially large: 35.1 percent in urban facilities compared to 13.9 percent at rural facilities ($p<0.01$). Equipment availability also varied by facility type, with 56.4 percent of first-level hospitals meeting the minimum equipment requirements (which also included sterilizing equipment and refrigerators), followed by health centers (17.0 percent) and health posts (19.2 percent).

Table 16. Availability of equipment

% of facilities	All	Rural Public	Urban Public	Percent Difference (%)
All facilities	21.7	13.9	35.1	-152.5***
Health posts	19.2	18.0	23.3	-29.4
Health centers	17.0	9.9	30.0	-203.0***
First-level hospitals	56.4	44.5	62.5	-40.4*

Notes: Level of significance:*** p<0.01, ** p<0.05, * p<0.1.

Table 17 shows the availability of the specific types of medical equipment at health facilities. Over 70 percent of health facilities had thermometers, weighing scales, and stethoscopes, and just under 70 percent had sphygmomanometers. However, the share of health centers and first-level hospitals with refrigerators and sterilizing equipment remained relatively low at 25.3 percent and 42.8 percent respectively. In rural health facilities, only 15.4 percent of health centers and hospitals had refrigerators, and 31.2 percent had sterilization equipment. Table C 11 and Table C 12 (Annex C) provide a more detailed list of the availability of individual types of equipment by location and facility type.

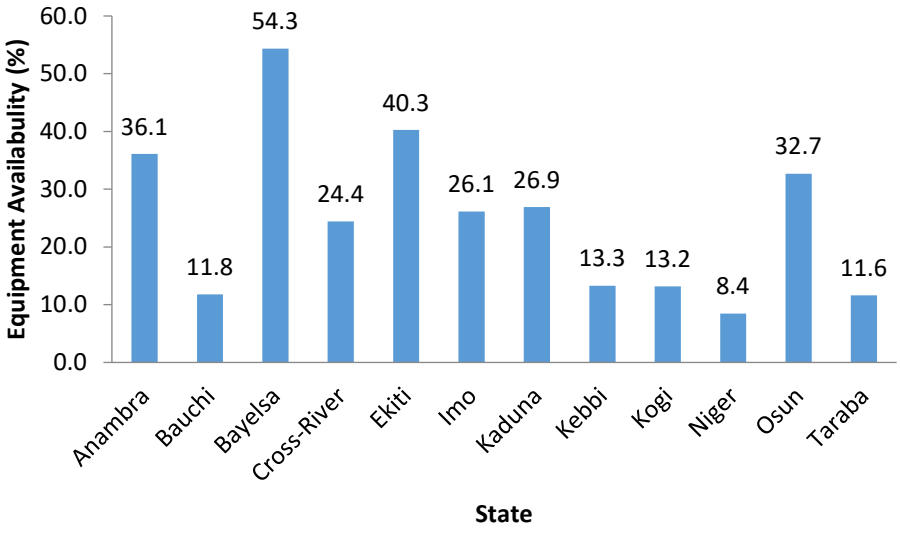
Table 17. Availability of items of equipment

% of facilities	All	Rural Public	Urban Public	Percent Difference (%)
Any scale (adult, child, infant)	75.8	69.7	86.6	-24.3***
Thermometer	71.1	66.9	78.4	-17.0***
Stethoscope	76.7	73.0	83.3	-14.1***
Sphygmomanometer	67.6	63.2	75.3	-19.1***
Refrigerator (Health centers and first-level hospitals only)	25.3	15.4	42.4	-174.9***
Sterilization equipment (Health centers and first-level hospitals only)	42.8	31.2	63.3	-102.8***

Notes: Level of significance:*** p<0.01, ** p<0.05, * p<0.1.

Equipment availability was higher in the southern Nigerian states compared to the northern states, although still relatively poor. In Bayelsa state (South), 54.3 percent of facilities met minimum equipment requirements, followed by Ekiti state (40.3 percent) and Anambra state (36.1 percent), also in the south. Bayelsa state also had among the highest rates of diagnostic accuracy, at 51.3 percent. The northern state with highest equipment availability was Kaduna with 26.9 percent of facilities meeting minimum equipment requirements. Niger state (North) had the lowest equipment availability (8.4 percent), followed closely by Taraba (North) at 11.6 percent.

Figure 15. Availability of equipment: Regional Differences



K. 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 include electric power grid, a fuel operated generator, a battery operated generator or a solar powered system as their main source of electricity.
Water sources include 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 sources include functioning flush toilets or Ventilated Improved Pit (VIP) latrines, or covered pit latrine (with slab).

Less than a quarter of health facilities (23.8 percent) met the minimum infrastructure requirements (Table 18). Only 4.1 percent of health posts met the minimum infrastructure requirements compared to first-level hospitals (57.2 percent) and health centers (23.8 percent). While the average estimates of individual components of infrastructure were relatively high (80.7 percent of all facilities had clean water, 55.0 percent had access to electricity, and 33.8 percent had an improved toilet) (Table 19), only 23.8 percent of facilities had *all* three inputs available in the same facility simultaneously. In rural areas, electricity and improved toilets were important infrastructure constraints: only 45.0 percent of rural facilities had access to electricity and 26.5 percent had access to improved toilets.

Table 18. Availability of infrastructure

% of facilities	All	Rural Public	Urban Public	Percent Difference (%)
All facilities	23.8	16.0	37.4	-134.3***
Health posts	4.1	2.9	8.1	-179.3**
Health centers	23.8	16.9	36.3	-114.8***
First-level hospitals	57.2	57.8	63.6	-10.0

Notes: Level of significance:*** p<0.01, ** p<0.05, * p<0.1.

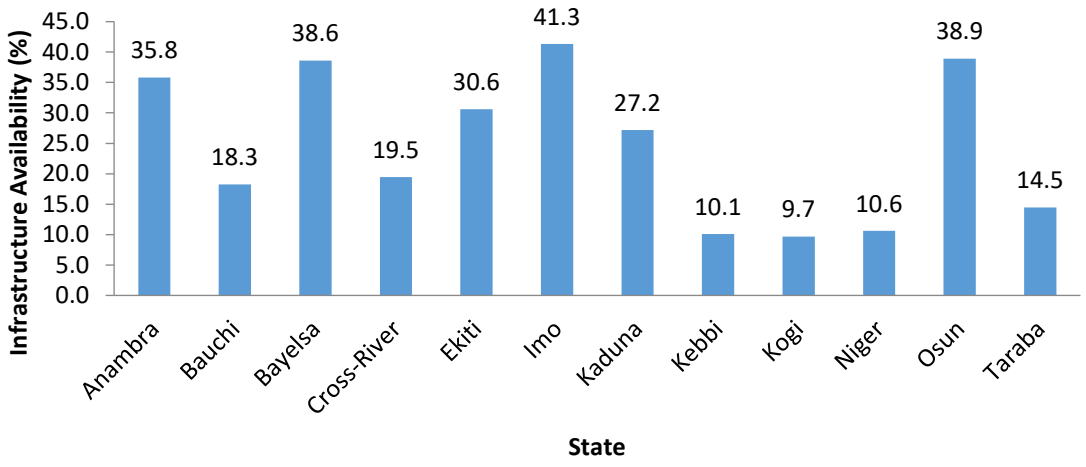
Table 19. Availability of items in the infrastructure indicator

% of facilities	All	Rural Public	Urban Public	Percent Difference (%)
Clean water	80.7	80.0	81.0	-1.25
Toilet	33.8	26.5	46.5	-75.7***
Electricity	55.0	45.0	74.0	-64.4***

Notes: *** p<0.01, ** p<0.05, * p<0.1

Availability of infrastructure was higher in the southern states compared to the northern states (Figure 16). Imo state had the highest infrastructure availability at 41.3 percent of health facilities, followed by Osun (38.9 percent) and Bayelsa (38.6 percent). However, infrastructure availability in other southern states was weak at only 10.1 percent in Kogi, and 19.5 percent in Cross River. Infrastructure availability in the northern states was almost consistently weak, with Kaduna state having the highest infrastructure availability in the north (27.2 percent). Despite deficiencies in drug, equipment and infrastructure availability, Kebbi state had among the highest rates of diagnostic accuracy. This suggests relatively stronger provider competence in spite of resource constraints in these and other similar northern Nigerian states such as Bauchi and Kaduna states.

Figure 16. Availability of infrastructure: Regional Differences



IV. WHAT DOES THIS MEAN FOR NIGERIA?

While there may be constraints in the availability of certain cadre of provider, the most important human resource challenge facing Nigerian health service delivery is the low productivity of the available workers. This is due to low provider knowledge, relatively high absence rates, and low provider productivity, rather than a shortage of health professionals themselves. Consulting an average of five outpatients a day also indicates that the clinical workload is minimal. Results suggest that poor management of human resources is possibly a contributing factor to this low productivity. All these are aspects that can be improved through better management of human resources in the areas of supervision.

Basic infrastructure is also severely lacking at the frontlines of service provision in the Nigerian health care system, as are equipment availability and drugs. Without quality services, proximity and presence of structures do not translate into improved access. This is evident in the way people bypass the primary health care system, which are in close proximity but severely lacking in almost all dimensions of quality, to visit first-level referral hospitals where the perceived quality is better.

The results of the survey show significant variation by State across various dimensions of the quality of service provision. States in northern Nigeria perform relatively better in the health sector in terms of provider knowledge and effort, but severely lag behind in terms of the availability of inputs relative to their southern counterparts. While improvements in provider knowledge and effort is critical through the better management of human resources, such improvements in human resource management need to be accompanied by investments in resource availability in order to result in improved health outcomes.

The low level of provider knowledge and high absence rates thereby suggest that a focus on management, incentives and accountability should be an important aspect of efforts to improve service delivery. The challenge to Universal Health Coverage is clear: increasing access, without addressing gaps in provider knowledge, increasing the effort provided, and the availability of key inputs is unlikely to yield positive health outcomes.

V. ANNEXES

ANNEX A. SAMPLING STRATEGY

The sampling strategy was designed with the dual aims of producing nationally representative estimates and having a minimum power of 80 percent with 0.05 significance level for comparison of key service delivery indicators (Table 3). For example, provider absence rates will be estimated with sufficient precision to identify changes in the indicator of 4.4 percentage points at the state level. The sampling strategy also allows for disaggregation by geographic location (rural/urban) and facility-type categories (Table 3). The sampling approach is a multistage, cluster sampling.

Table 3. Health SDI sample in Nigeria

Variable	Sample	
	Total	Share of Total
Facilities	2,480[b]	100
Health posts (dispensaries)	537	22
Health centers & clinics	1,604	65
Hospitals (first level)	338	14
Ownership	2,480	100
Public	2,298	93
Private	182	7
Location	2,480[b]	100
Rural	1,481	60
Urban	998	40
Healthcare workers	12,678[b]	100
Doctors	544	4
Community Health Extension Workers	5,403	43
Nurses and midwives	2,519	20
Paraprofessionals	4,026	32
Patients	5,837	100
Adult Patients	3,054	52
Adults accompanying children <5yrs	2,783	48

Notes: Different weights were applied where the unit of analysis was facilities, and where unit of analysis was clinicians. No weights are provided for health care workers sampled in the roster; however, weights are applied to the subset of providers conducting outpatient consultations

b. Figures do not add up to 2,480 and 12,678 as facility type and location information is missing for one facility, and cadre type information is missing for 186 providers

Strategy. The sampling strategy represents a trade-off: for a fixed sample size and the quality of comparisons between sub-state level facilities. There were also practical considerations such as cost and logistical effort. A simple random sample would imply added costs of travel and administration. With this in mind the first stratification was by LGAs (versus facilities) in order to manage the geographic spread of the sample. Backup facilities were drawn from each location in case the sampling frame includes facilities that no longer exist,

are not functional or are inaccessible due to security or extreme weather conditions. Note, these back-up facilities are not to be used for logistical replacement facilities were selected in keeping with the probability sampling approach.

Sampling Frame. The target population is the population of selected states in Nigeria (Anambra, Bauchi, Bayelsa, Cross River, Ekiti, Imo, Kaduna, Kebbi, Kogi, Niger, Osun and Taraba). Four data sources were used in developing the sampling frame: (i) Public facilities: Ministries of Health; (ii) Location-specific data on the fraction of the local population living in poverty was obtained from the Nigeria national statistical authority; and (iii) The fraction living in urban areas, was obtained from the national statistical authority. This note assumes that the sampling frame provided by the Ministry of Health is complete, and that the poverty data are the latest available. Population estimates were obtained from the latest population projections provided by the National Population Commission (NPC), using the latest census data. There are numerous types of facilities. The facility list was restricted to three major categories: Health Posts; Health centers (including medical clinics); First-level hospitals. Taking ownership into account, the facilities were then aggregated into six categories (the assumptions and definitions used are shown in Table B 1)

Stratification. Based on the most recent available from national statistical authority, the facilities were categorized as rural or urban and poor on non-poor. These two binary distinctions yield four strata within which to sample facilities. Within each stratum, facilities are selected randomly.

Sample Size and Level of Power. To anticipate the statistical properties of the sample, an intra-cluster correlation of selected service delivery indicators from other service delivery surveys. This was used to generate various scenarios (number of facilities, statistical properties associated with selected indicators for state-level and health center-level comparisons). The minimum detectable effect (in terms of percentage points) shown in the scenarios is what can be detected with power 80 percent and confidence level 95 percent.]

Table A1. 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. Up to 50 health workers are listed in the roster during the first visit. Second visit is administered to (a maximum of) ten medical staff randomly selected from the list of all medical staff. 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/administrative officer/accounts manager at the facility.
Module 5: Exit Interviews	Administered to 4 randomly selected outpatients (2 adults and 2 adults accompanying a child under 5 years)

ANNEX B. DEFINITION OF INDICATORS

Table B 1. 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. The absence indicator was not estimated for hospitals because of the complex arrangements of off duty, interdepartmental shifts etc.
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 questions asked by the clinician during consultation is expressed as a percentage of the total number of relevant examination questions included in the questionnaire. Adherence to guidelines 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 Nigeria National Clinical 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 case: (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, dispensaries. health posts 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. Health centers and first-level hospitals 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).

Table B 2. Drugs identified in the SARA and Nigeria SDI survey

% facilities with drug	Nigeria SDI (all)	Nigeria SDI (mothers)	Nigeria SDI (children)	SARA (all)	SARA (mothers)	SARA (children)
Albendazole cap/tab	X		X	X		
Amoxicillin syrup/suspension	X			X		X
Ampicillin powder for injection	X	X	X	X	X	
Artemisinin combination therapy tab	X		X	X		
Azithromycin inj/cap/tab or oral liquid	X	X		X	X	
Benzathine benzylpenicillin powder (injection)	X	X		X	X	X
Betamethasone/Dexamethasone injectable	X	X		X	X	
Calcium gluconate tablets	X	X		X	X	
Ceftriaxone powder for injection	X		X	X		
Chloramphenicol	X		X			
Cotrimoxazole	X	X		X		X
Diazepam	X		X	X		
Ergometrine injection	X	X				
Gentamicin injectable	X	X		X	X	X
Magnesium sulfate inj/tab/cap	X	X		X	X	
Metronidazole inj/tab	X	X		X	X	
Misoprostol cap/tab	X	X		X	X	
Nifedipine cap/tab	X	X		X	X	
Oral rehydration salts (sachets)	X		X	X		X
Oxytocin injectable	X	X		X	X	
Paracetamol	X		X	X		X
Sodium chloride injectable solution	X	X		X	X	
Zinc oral liquid	X		X	X		X
Vitamin A capsule	X		X	X		X
Folic acid supplements cap/tab	X	X		X	X	
Iron supplements cap/tab	X	X		X	X	
Medroxyprogesterone acetate injectable	X	X		X	X	

ANNEX C. ADDITIONAL RESULTS

Table C 1. Distribution of health personnel by provider type and location

% of personnel	All	Rural	Urban
Doctors	7.7	3.2	10.9
CHWs	34.2	45.9	25.8
Nurses and Midwives	24.9	16.7	30.7
Para-professionals	33.2	34.2	32.5
Totals	100	100.0	100.0

n=11,918

Table C 2. Distribution of health clinicians[a] by provider type and location

% of clinicians	All	Rural	Urban
Doctors	22.3	9.9	34.0
CHWs	51.0	65.4	37.5
Nurses and Midwives	19.3	15.8	22.6
Para-professionals	7.4	8.9	5.9
Totals	100.0	100.0	100.0

n=4,844

Note: a. Clinicians are those health providers conducting outpatient consultations

Table C 3. Distribution of health personnel by facility type

% of providers	All	Health Posts	Health centers	First-level Hospitals
Doctors	7.7	1.2	2.5	16.0
CHWs	34.2	64.2	49.3	8.5
Nurses and Midwives	24.9	3.9	13.7	43.7
Para-professionals	33.2	30.6	34.5	31.8
Totals	100.0	100.0	100.0	100.0

n=11,918

Table C 4. Distribution of health personnel by gender

% of providers	All	Female	Male
Doctors	7.7	2.1	19.1
CHWs	34.2	35.3	32.1
Nurses and Midwives	24.9	29.3	16.0
Para-professionals	33.2	33.3	32.9
Totals	100.0	100.0	100.0

n=11,918

Table C 5.Correlates of Absence

	Unweighted regression		Weighted regression	
VARIABLES	Normal standard error	Robust standard error	Normal standard error	Robust standard error
Sex	-0.0796***	-0.0796***	-0.0814***	-0.0814***
	(0.0127)	(0.0127)	(0.0164)	(0.0164)
Public Facility	0.127***	0.127***	0.137***	0.137***
	(0.0239)	(0.0242)	(0.0262)	(0.0262)
Rural Facility	0.0300**	0.0300**	0.0269*	0.0269*
	(0.0120)	(0.0121)	(0.0163)	(0.0163)
Health Post	-0.00778	-0.00778	-0.00890	-0.00890
	(0.0177)	(0.0177)	(0.0206)	(0.0206)
Infrastructure Availability	-0.0366***	-0.0366***	-0.0207	-0.0207
	(0.0141)	(0.0141)	(0.0196)	(0.0196)
Equipment availability (incl. refrigerator/sterilization equipment for health centers and hospitals)	-0.0376***	-0.0376***	-0.0364*	-0.0364*
	(0.0141)	(0.0141)	(0.0201)	(0.0201)
Drug availability	0.0242	0.0242	-0.0165	-0.0165
	(0.0221)	(0.0221)	(0.0289)	(0.0289)
Facility size 3-5 workers	0.146***	0.146***	0.142***	0.142***
	(0.0199)	(0.0201)	(0.0243)	(0.0243)
Facility size 6-10 workers	0.166***	0.166***	0.155***	0.155***
	(0.0206)	(0.0208)	(0.0257)	(0.0257)
Facility size 11-20 workers	0.169***	0.169***	0.158***	0.158***
	(0.0225)	(0.0228)	(0.0290)	(0.0290)
Facility size >21 workers	0.178***	0.178***	0.185***	0.185***
	(0.0270)	(0.0273)	(0.0350)	(0.0350)
CHWs	-0.0517	-0.0517	-0.121**	-0.121**
	(0.0417)	(0.0423)	(0.0614)	(0.0614)
Nurse/midwife	-0.0646	-0.0646	-0.112*	-0.112*
	(0.0421)	(0.0427)	(0.0583)	(0.0583)
Para-professional	-0.0182	-0.0182	-0.0674	-0.0674
	(0.0416)	(0.0423)	(0.0604)	(0.0604)
Observations	7,821	7,821	7,444	7,444
Pseudo R2	0.020	0.020	0.026	0.026

Probit marginal effects reported. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table C 6. Adherence to all clinical guidelines (%) by cadre

	All	Rural	Urban	Percent Difference (%)
Doctors	36.6	35.6	36.9	-3.7
CHWs	20.1	21.1	18.5	12.3**
Nurses and Midwives	24.7	21.9	26.6	-21.5**
Para-Professionals	17.0	16.5	17.7	-7.3

Note: *** p<0.01, ** p<0.05, * p<0.1

Table C 7. Adherence to all clinical guidelines (%) by facility type

	All	Rural	Urban	Percent Difference (%)
Health Posts	19.3	20.6	15.6	24.3***
Health Centers	20.7	20.7	20.7	0
First-level hospitals	33.3	30.2	34.4	-13.9

Note: *** p<0.01, ** p<0.05, * p<0.1

Table C 8. Diagnostic accuracy of all cases (%) by cadre type

	All	Rural	Urban	Percent Difference (%)
Doctors	68.5	66.0	69.4	-5.2
CHWs	30.9	31.9	29.2	8.5
Nurses & Midwives	51.9	48.1	54.5	-13.3**
Para-Professionals	22.4	20.0	25.8	-29.0

Note: *** p<0.01, ** p<0.05, * p<0.1

Table C 9. Diagnostic accuracy of all cases (%) by facility type

	All	Rural	Urban	Percent Difference (%)
All facilities	42.5	36.5	48.1	-31.8***
Health Posts	30.0	31.8	25.2	20.8**
Health Centers	34.4	33.2	36.0	-8.4
First-level hospitals	61.9	55.8	64.0	-14.7*

Note: *** p<0.01, ** p<0.05, * p<0.1

Figure C 1. Diagnostic accuracy (%) by questions asked: Diarrhea with severe dehydration

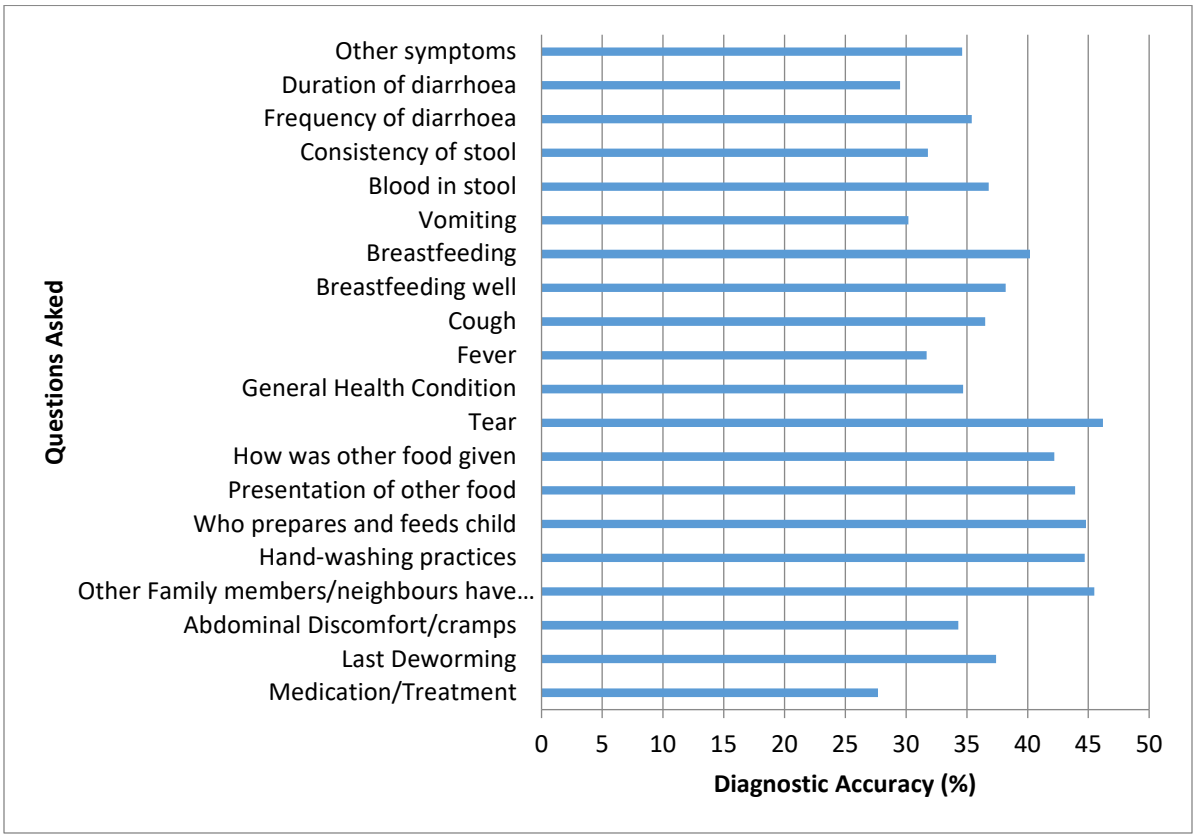


Figure C 2. Diagnostic accuracy (%) by questions asked: Malaria with anemia

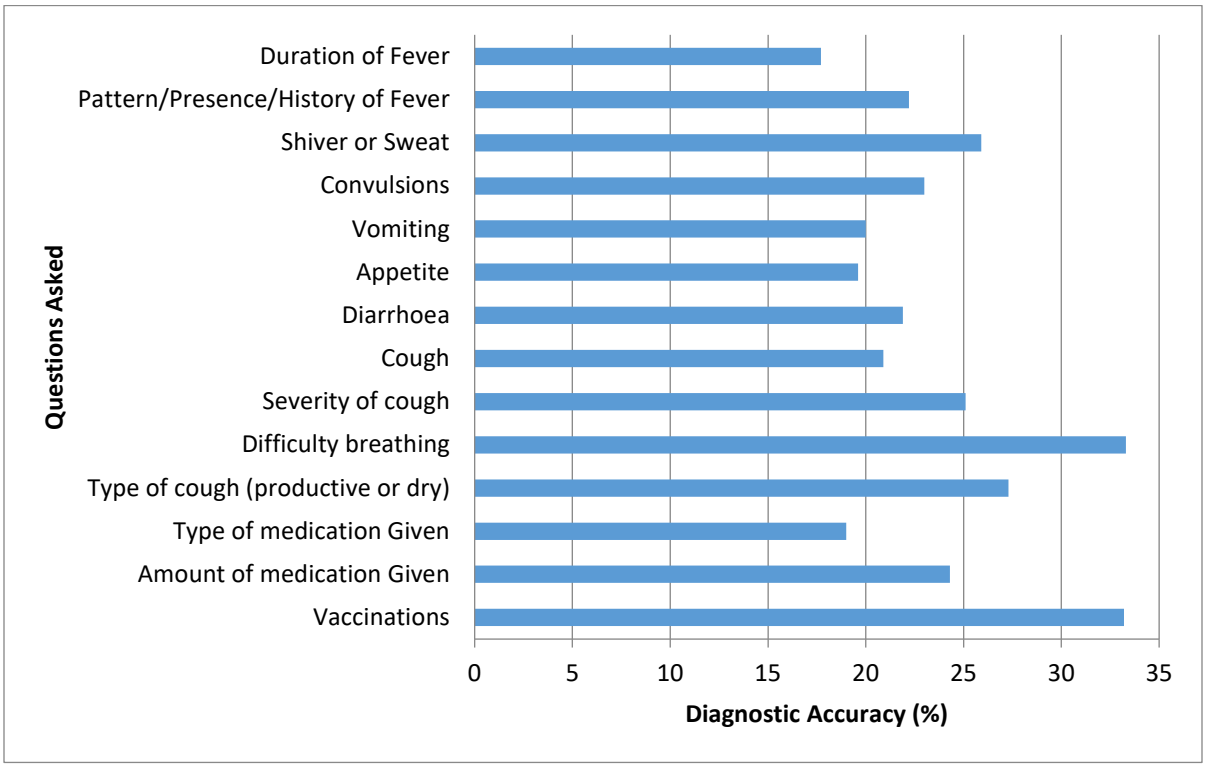


Figure C 3. Diagnostic accuracy (%) by questions asked: Pneumonia

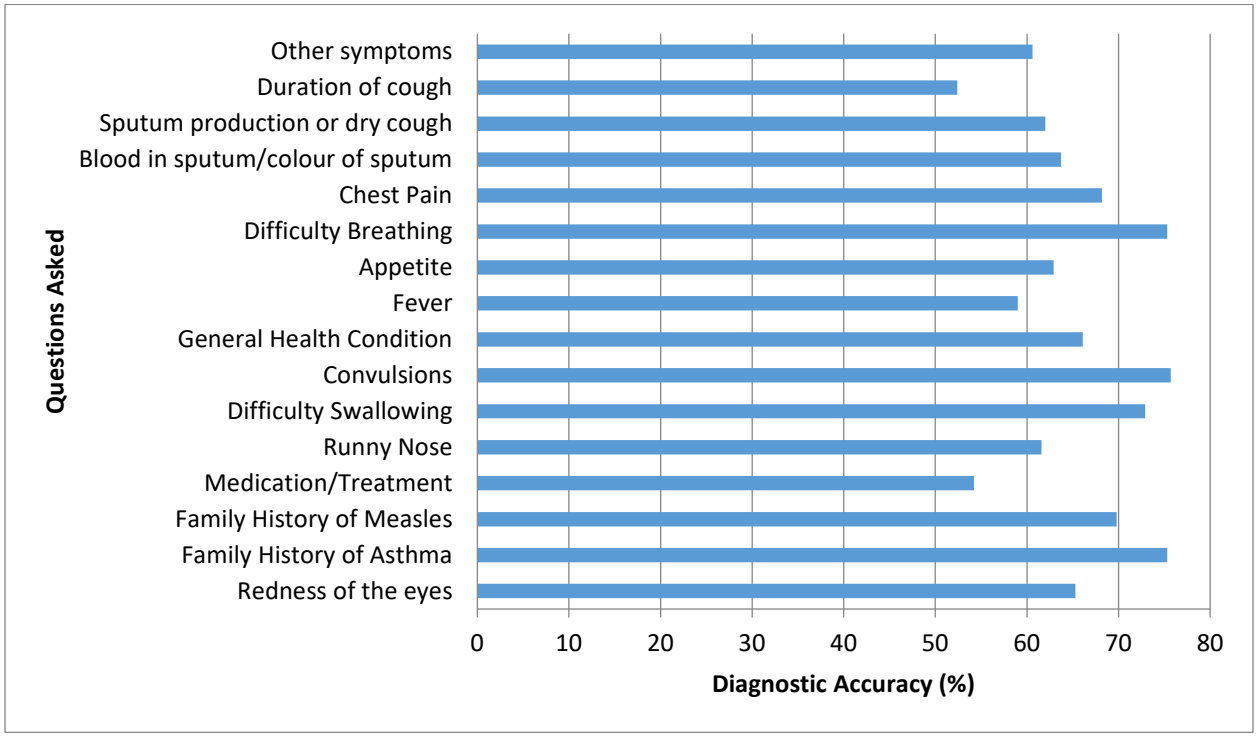


Figure C 4. Diagnostic accuracy (%) by questions asked: Diabetes mellitus

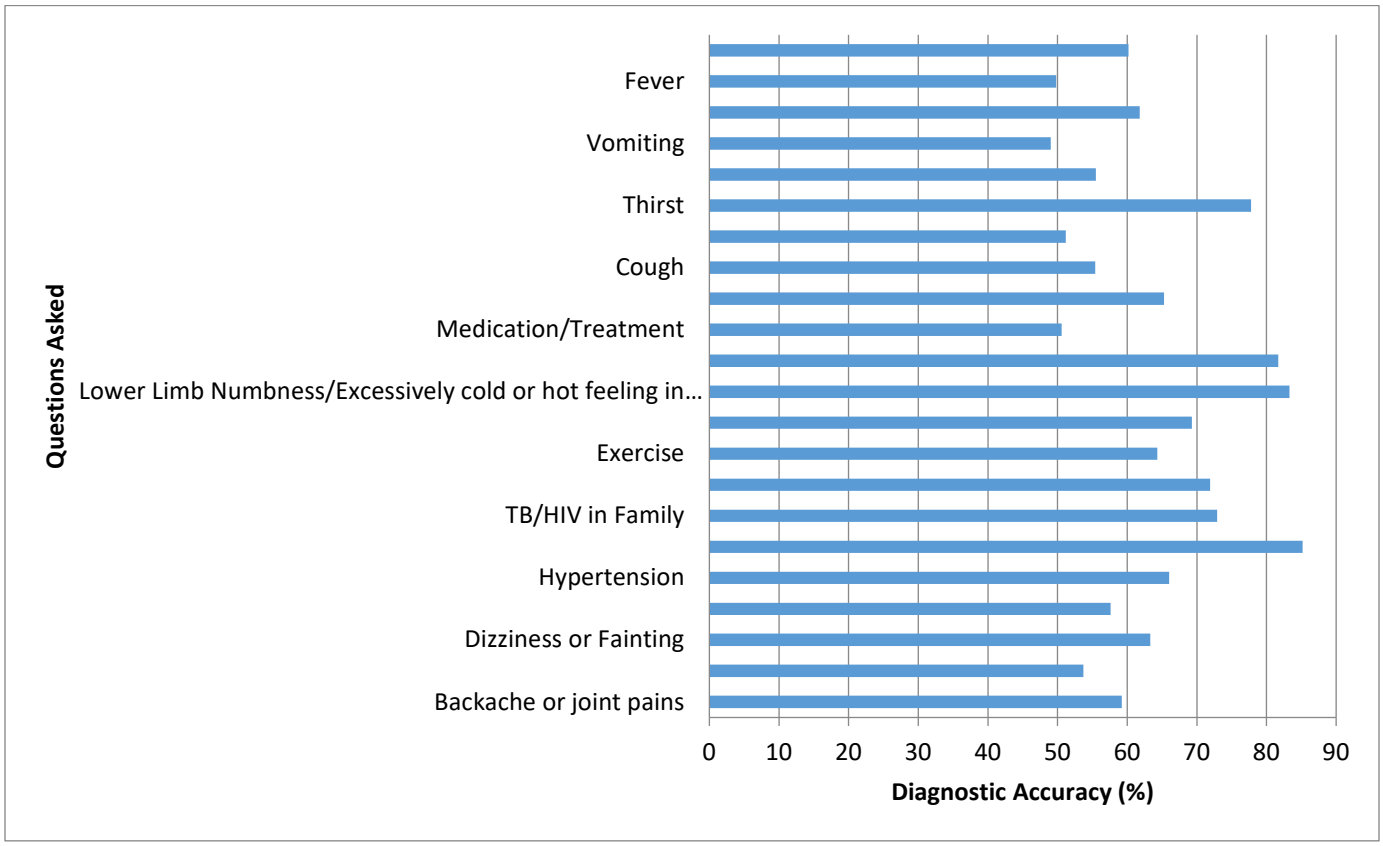


Figure C 5. Diagnostic accuracy (%) by questions asked: Pulmonary tuberculosis

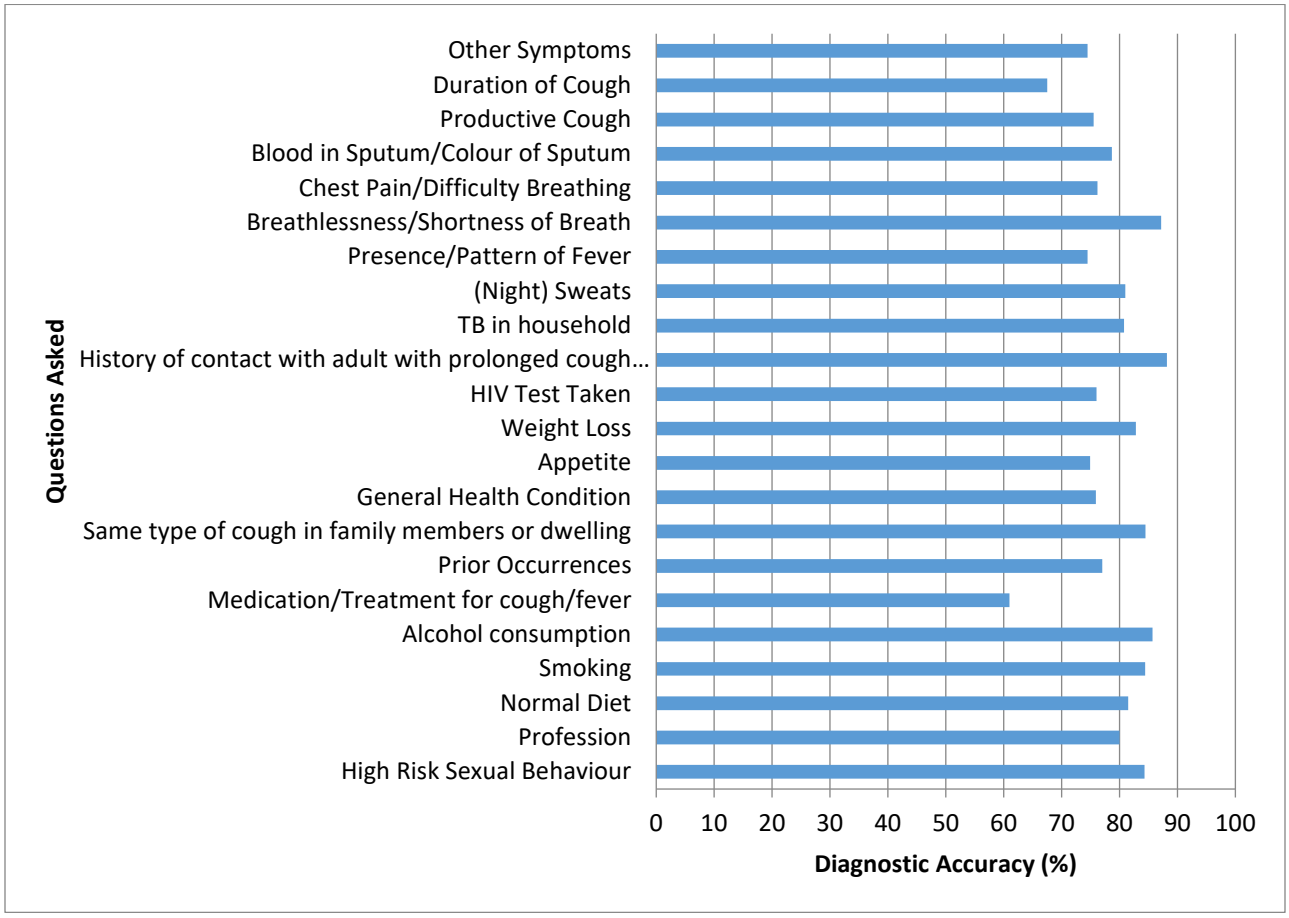


Figure C 6. Correct Treatment Actions (%) by questions asked: Post-partum hemorrhage

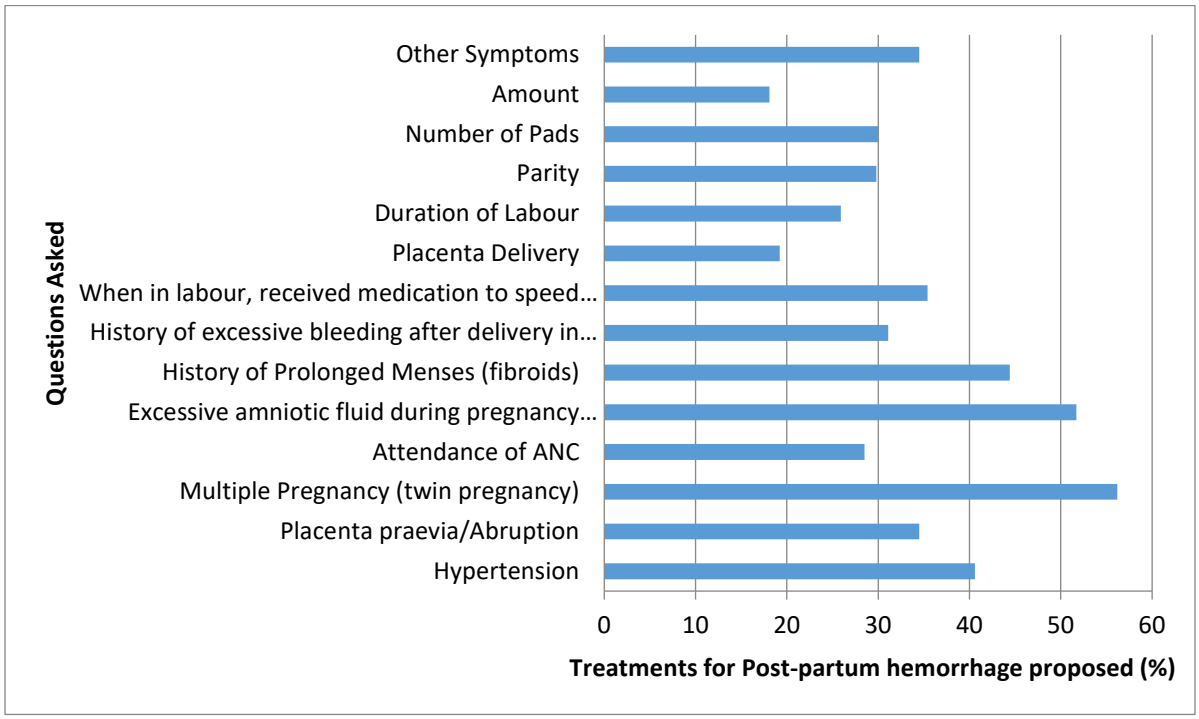


Figure C 7. Correct Treatment Actions (%) by physical examination and clinical management: Neonatal Asphyxia

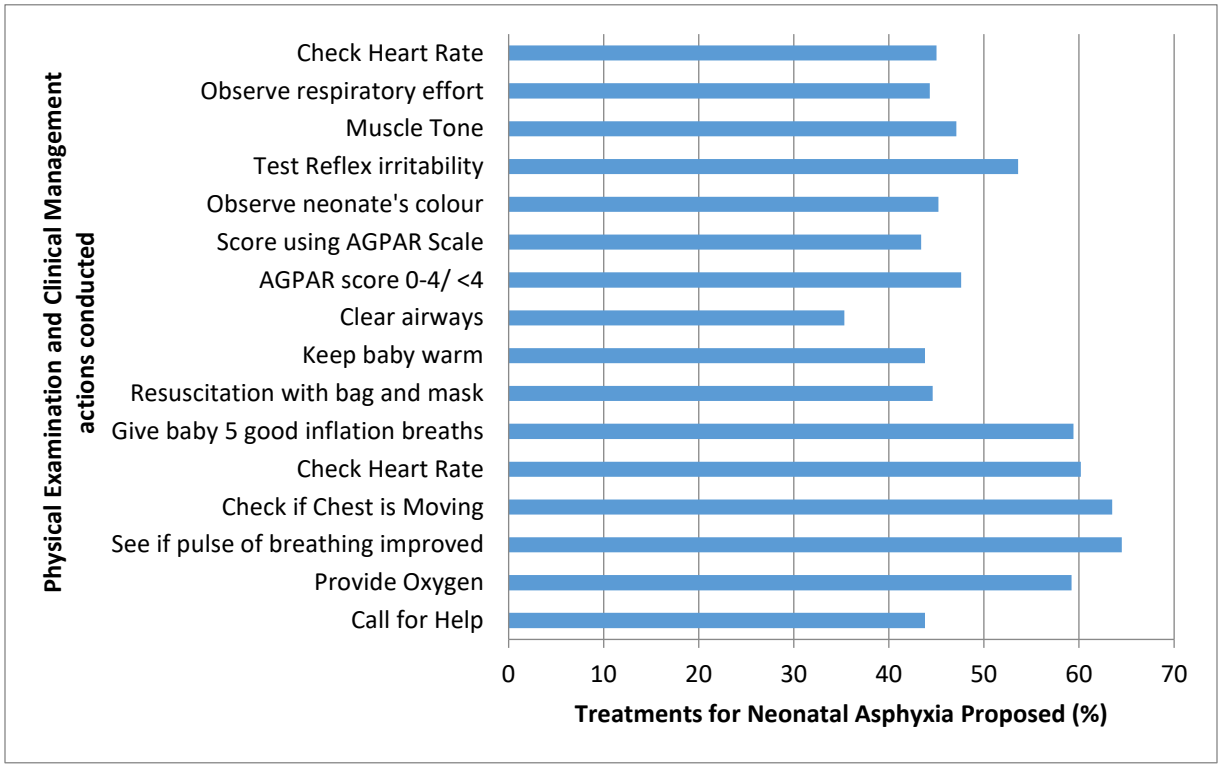


Figure C 8. Availability of drugs by facility type

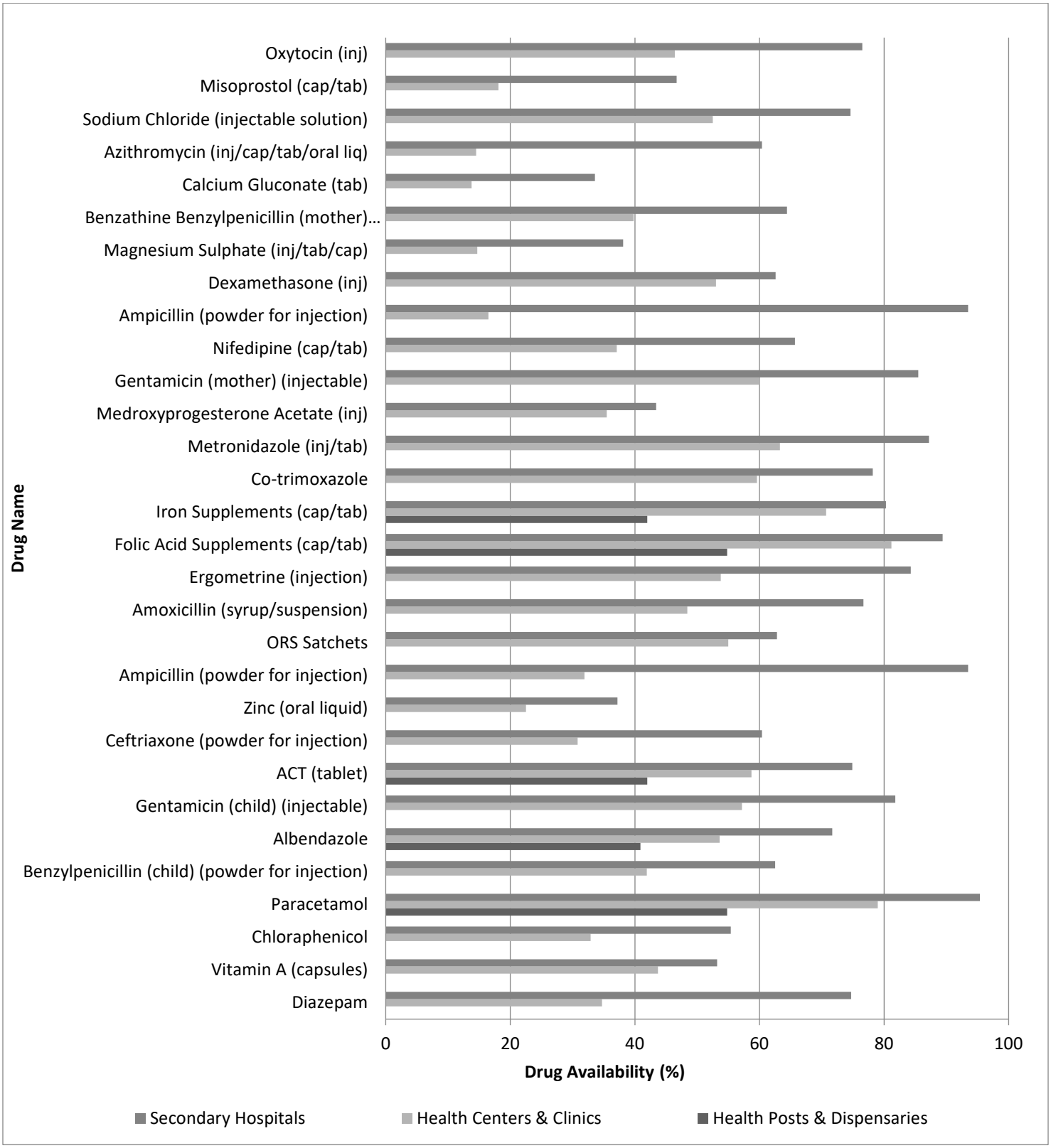


Table C 10. Equipment availability (%) (unadjusted for level of facility)

	All	Rural	Urban	Percent Difference (%)
All facilities	17.9	9.7	32.1	-230.9***
Health Posts	0.5	0.3	0.9	-200.0
Health centers	17.0	9.9	30.0	-203.0***
First-level hospitals	56.4	44.5	62.5	-40.4*

Note: *** p<0.01, ** p<0.05, * p<0.1

Table C 11. Availability of individual types of equipment (%)

	All	Rural	Urban	Diff (% point)
Stethoscope	76.7	73.0	83.3	-14.1***
Thermometer	71.1	66.9	78.4	-17.0***
Adult scale	67.9	61.2	79.9	-30.6***
Child scale	39.8	35.8	46.6	-30.2***
Infant scale	44.3	37.1	56.9	-53.4***
Sphygmomanometer	67.6	63.2	75.3	-19.1***
Autoclave	67.5	58.1	73.0	-25.6**
Electric boiler	72.8	63.3	77.7	-22.7**
Electric sterilizer	63.5	53.4	69.6	-30.3*
Non-Electric pot	87.1	83.8	90.3	-7.8**
Incinerator	56.0	63.5	46.0	27.6

Note: *** p<0.01, ** p<0.05, * p<0.1

Table C 12. Availability of individual types of equipment by facility type

	All	Health Posts & Dispensaries	Health Centers & Clinics	First-level Hospitals
Stethoscope	76.7	55.1	80.2	95.4
Thermometer	71.1	49.0	74.3	92.6
Adult scale	67.9	36.6	74.2	86.9
Child scale	39.8	17.1	42.2	67.2
Infant scale	44.3	19.6	47.1	72.9
Sphygmomanometer	67.6	41.9	70.8	95.6
Autoclave	67.5	8.8	60.1	80.5
Electric boiler	72.8	45.8	67.5	83.9
Electric sterilizer	63.5	0.0	60.2	71.7
Non-Electric pot	87.1	72.2	87.2	93.4
Incinerator	56.0	0.0	42.9	78.9

VI. REFERENCES

Amin, S. J. Das and M. Goldstein (eds). 2009. Are You Being Served? New Tools for Measuring Service Delivery. World Bank. Washington D.C.

Barro, Robert. 1991. "Economic Growth in a Cross-Section of Countries," Quarterly Journal of Economics, 106(2): 407-443.

Filmer, D. and L. H. Pritchett. 1999. "The Impact of Public Spending on Health: Does Money Matter?" Social Science and Medicine, 58: 247-258.

Holla, A. 2012. Measuring the Quality of Health Care in Clinics. World Bank. Washington DC.

Levine, R. and D. Renalt. 1992. "A Sensitivity Analysis of Cross-Country Growth Regressions," American Economic Review, 82(4): 942-963.

Lucas, Robert. 1988. "On the Mechanics of Economic Development," Journal of Monetary Economics, 22: 3-42.

Rogers, H. and Koziol M. 2012. Provider Absence Surveys in Education and Health - A Guidance Note. World Bank, Washington D.C.

Spence M. and M. Lewis. (Eds) 2009. Health and Growth. Washington, D.C. World Bank, c2009. ISBN 9780821376591

Swanson, C.R., A. Cattaneo, E. Bradley, S. Chunharas, R. Atun, K. M. Abbas, K. Katsaliaki, N. Mustafee, B. M. Meier and A. Best. 2012. Rethinking health systems strengthening: key systems thinking tools and strategies for transformational change. Health Policy and Planning 2012;27: iv54–iv61.

UNICEF, 2015. At a Glance: Ghana. UNICEF. New York. http://www.unicef.org/infobycountry/ghana_statistics.html

UNICEF, 2015. At a Glance: Nigeria. UNICEF. New York. http://www.unicef.org/infobycountry/nigeria_statistics.html

Wagstaff, A., M. Lindelow, S. Wang and S. Zhang. 2009. *Reforming China's Rural Health System.* World Bank. Washington, D.C.

World Bank. 2003. World Development Report 2004: Making Services Work for Poor People. World Bank. Washington, DC.

World Health Organization, 2015. WHO Africa Region: Ghana. World Health Organization. Geneva. http://www.who.int/countries/gha/en/

World Health Organization, 2015. WHO Africa Region: Nigeria. World Health Organization. Geneva. http://www.who.int/countries/nga/en/

[i] Data presented here are from the World Development Indicators database maintained by the World Bank.
[ii] WHO, 2015
[iii] UNICEF, 2015
[iv] Spence and Lewis (2009).
[v] Swanson et al. (2012).
[vi] Spence and Lewis (2009).

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With support from The William and Flora Hewlett Foundation