SERVICE DELIVERY INDICATORS

Education | Health

KENYA

JULY 2013

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Contents

EXECUTIVE SUMMARY

The Service Delivery Indicators provide a set of metrics for benchmarking service delivery performance in education and health in Africa. The overall objective of the indicators is to gauge the quality of service delivery in primary education and basic health services. The indicators 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 mobilize policymakers, citizens, service providers, donors and other stakeholders for action to improve the quality of services and ultimately to improve development outcomes.

This report presents the findings from the implementation of the Service Delivery Indicators in the health and education sector in Kenya in 2012/13. Survey implementation was preceded by extensive consultation with Government and key stakeholders on survey design, sampling, and adaptation of survey instruments. Pre-testing of the survey instruments, enumerator training and field-work took place in the latter half of 2012. The surveys were implemented by the Kenya Institute of Public Policy Research and Analysis (KIPPRA) and Kimterica with support by the World Bank and the USAID-funded Health Policy Project. The World Bank's SDI Team provided quality assurance and oversight.

Information was collected from 294 public and non-profit private health facilities and 1,859 health providers. The results provide a representative snapshot of the quality of service delivery and the physical environment within which services are delivered in public and private (non-profit) health facilities at the three levels: dispensaries (health posts), health centers and first-level hospitals. The survey provides information on two levels of service delivery: (i) five measures of provider knowledge/ability and effort, and (ii) five measures of the availability of key inputs, such as drugs, equipment and infrastructure.

The results reveal that the country does better on the availability of inputs such as equipment, textbooks, and most types of infrastructure, than it does on provider knowledge and effort, which are relatively weak. Significantly, more investments are needed in "software" than "hardware".

What service providers have to work with

- Kenya public facilities do relatively well on the availability of inputs: 95% of health facilities have access to sanitation, 86% of schools have sufficient light for reading, and the average number of textbooks exceeds Kenya's target of 3 per pupil. The availability of important drugs for mothers remains a challenge: only 58% of tracer drugs for mothers was available in public facilities.

What service providers do

- In both education and health, the problem of low provider effort is largely a reflection of suboptimal management of human resources. This is evidenced by the findings that:

- Over 29% of public health providers were absent, with the highest absence rate in larger urban health centers. Eighty percent of this absence was approved absence, and hence within management's power to influence.
- In public and private schools teachers are roughly equally likely to show up at school. The main difference is that public teachers may be at school, but are 50% less likely to be in class teaching.
- A public school child receives 1 hour 9 minutes less teaching than her private school counterpart. The implication is that for every term, a child in a public school receives 20 days less of teaching time.

What service providers know

- While better than in many other countries, significant gaps in provider knowledge exist among both public and private providers in both sectors.
- Only 58% of public health providers could correctly diagnose at least 4 out of 5 very common conditions (like diarrhea with dehydration and malaria with anemia). Public providers followed less than half (44%) of the correct treatment actions needed for management of maternal and neonatal complications. Provider competence was correlated with level of training.
- Just a third (35%) of public school teachers showed mastery of the curriculum they teach. Seniority and years of training among teachers did not correlate with better teacher competence.

The combination of inputs is what matters—and that raises even more concerns.

A unique feature of the Service Delivery Indicator survey is that it looked at the production of services at the frontline. Successful service delivery requires that all the measures of service delivery need to be present at a facility in the same place and at the same time. While the average estimates of infrastructure availability are relatively positive, the picture is quite bleak when we assess availability of inputs at the same time in the same facility—only 49% of facilities had clean water and sanitation and electricity. Even more disconcerting is the finding that not a single health facility had all 10 tracer drugs for children or all 16 tracer drugs for mothers. Only 16% of providers were able to correctly diagnose all five of the tracer conditions, 13% of providers successfully adhered to the country's prescribed guidelines for the tracer conditions. More optimistically, 62% of providers followed the prescribed treatment actions to manage the two most common maternal and neonatal complications, and in the area of inputs, more than three quarters of public facilities met the minimum equipment requirements.

WHAT DOES THIS MEAN FOR KENYA?

Almost every report on Kenya's economic prospects calls for improvements in the effectiveness of Kenya's education expenditure. Today 10 million students are of primary school-going age and that cohort will account for half of the next decade's youth bulge. Whether that cohort is educated or not will determine whether Kenya will experience the education dividend required for Vision 2030, Kenya's blueprint for economic and human development. Education is one of the single most powerful predictors of social mobility. Quality of education will also determine if the promise of Vision 2030 will be shared by the third of the population who live on less than $2 a day.

Kenya has invested heavily in education—today the government spends more than any of its neighbors, both as a share of government spending and as a share of GDP. There is a disconnect between Kenya's spending on education and learning outcomes. More of the same is not good enough. The SDI results point to gaps in teacher knowledge, time spent teaching and absence from classroom that require urgent action.

Unlike education, government spending on health is modest in relation to its regional comparators.[1] That said, Kenya has made tangible progress towards the health Millennium Development Goals. Significant gaps remain—gaps which can only partly be explained by lack of resources. Fiscal headroom is facing competing demands. The fiscal headroom for a budget increase for any sector in the immediate future is potentially constrained by the past and the present: fiscal expansion over the past few years needed to bolster the economy[2] and likely budgetary pressure posed by the new constitution's county reforms. More than ever before is it true that quality improvements in Kenya's health sector will have to initially come from productivity and efficiency gains. Further, the success of the health sector in attracting a greater budget allocation will be strongly bolstered by demonstrating value for money and the effectiveness of existing health spending.

Kenya has made some phenomenal gains in recent years. For example, the infant mortality rate has fallen by 7.6% per year, the fastest rate of decline among 20 countries in the region. Arguably, the next set of gains will be more challenging—marginal women and children will become harder (and costlier) to reach, and addressing the performance gaps identified in the SDI survey at the frontline health facilities and service providers will be a critical determinant of progress.

The SDI results found that Kenya does relatively well on the availability of key inputs such as infrastructure, teaching and medical equipment, and textbooks. On measures of provider productivity and efficiency, the results were less positive. Regarding the availability of drugs, there are some important gaps: only two-thirds of the tracer drugs are available, and some gaps remain

[1] In 2012 government health spending was 8.5% of total government spending, and government health expenditure has remained at a constant 4.8% of GDP since 2001.

[2] Expansionary fiscal policy years has caused the Kenyan government's 2012 budget to be at about 30 percent of GDP. Kenya' public sector debt has doubled between 2007 and 2012. Debt as a proportion of GDP has now increased by about 4 percentage points from 39 percent in 2007 to 43 percent at the end of 2012 but it is still below the policy target of 45 percent (World Bank, Kenya Public Expenditure Review, 2013).

especially in the availability of tracer drugs for mothers.[3] The greatest challenge is in the area of provider effort (evidenced by the provider absence data), and provider ability (evidenced by the assessments of providers' knowledge and abilities). High provider absence and sub-optimal provider ability suggest room for improvement in the efficiency of spending on human development and reflect systemic problems.

The results should not be viewed narrowly as a criticism of teachers or health providers, but as a snapshot of the state of the education and health systems as a whole. Over time, as the impact of reforms is tracked through repeat surveys in each country, the indicators will allow for tracking of efforts to improve service delivery systems. Valuable cross-country insights will also emerge as the database grows and more country partners join the SDI initiative.

Finally, improvements in service quality in Kenya can be accelerated through focused investments on reforms to the incentive environments facing providers, and in the skills of providers to ensure that inputs and skills come together at the same time and at the same place. This will be critical to ensure that Kenya's gains in human development outcomes continue beyond 2015, bringing the country closer to achieving the promises set out in the Vision 2030.

[3] Expansionary fiscal policy years have caused the Kenyan government's 2012 budget to be at about 30% of GDP. Kenya' public sector debt has doubled between 2007 and 2012. Debt as a proportion of GDP has now increased by about 4 percentage points from 39% in 2007 to 43% at the end of 2012 but it is still below the policy target of 45%.

Table 1. Service Delivery Indicators at-a-Glance: Education

	All	Public	Private	Urban Public	Rural Public
School absence rate	15.5%	16.4%	13.7%	13.7%	17.2%
Classroom absence rate	42.2%	47.3%	30.7%	42.6%	48.8%
Classroom teaching time (also known as Time on Task)	2 h 40 min	2 h 19 min	3 h 28 min	2 h 37 min	2 h 13 min
Minimum knowledge among teachers	39.4%	35.2%	49.1%	32.9%	35.8%
Student-teacher ratio	32.0	37.1	20.8	40.8	35.9
Students per textbooks Textbooks per student	3.1	3.5	2.2	2.5	3.8
Teaching Equipment availability	95.0%	93.6%	98.2%	93.7%	93.5%
Infrastructure availability	58.8%	58.5%	59.3%	93.7%	93.5%

Table 2. Service Delivery Indicators at-a-Glance: Health

	All	Public	Private	Rural Public	Urban Public
Caseload	9.02	8.67	10.37	8.47	10.3
Absence from facility	28%	29%	21%	28%	38%
Diagnostic Accuracy	72%	74%	75%	73%	79%
Adherence to clinical Guidelines	44%	43%	48%	42%	52%
Management of maternal /neonatal complications	45%	44%	46%	43%	49%
Drug availability (all)	54%	52%	62%	53%	49%
Drug availability (children)	70%	69%	75%	71%	57%
Drug availability (mothers)	44%	41%	54%	41%	44%
Equipment availability	78%	77%	80%	76%	81%
Infrastructure availability	47%	39%	75%	37%	59%

INTRODUCTION

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

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

3. The perspective adopted by the Indicators is that of citizens accessing a service. The Indicators can thus be viewed as a service delivery report card on 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), Staff Absence Survey (SAS), as well as health facility surveys such as the Service Availability and Readiness Assessment (SARA).

4. The literature points to the importance of the functioning of health facilities, and more generally, the quality of service delivery. [4] Nurses and doctors are an invaluable resource in determining the quality of health services. While seemingly obvious, the literature has not always made the links between systems investments and the performance of providers, arguably the ultimate test of the effectiveness of investments in systems.[5] The service delivery literature is, however, clear that, conditional on providers being appropriately skilled and exerting the necessary effort, increased resource flows for health can indeed have beneficial education and health outcomes (see Box 1).[6]

5. This report presents the findings from the implementation of the first Service Delivery Indicator (SDI) survey in Kenya. A unique feature of the SDI surveys is that it looks at the production of health services at the frontline. The production of health services requires three dimensions of service delivery: (i) the availability of key inputs such as drugs, equipment and

[4] Spence and Lewis (2009).
[5] Swanson et al. (2012).
[6] Spence and Lewis (2009).

infrastructure; (ii) providers who are skilled; and (iii) providers who exert the necessary effort in applying their knowledge and skills. Successful service delivery requires that all these elements need to be present in the same facility and at the same time. While many data sources provide information on the average availability of these elements across the health sector, the SDI surveys allow for the assessment of how these elements come together to produce quality health services in the same place at the same time.

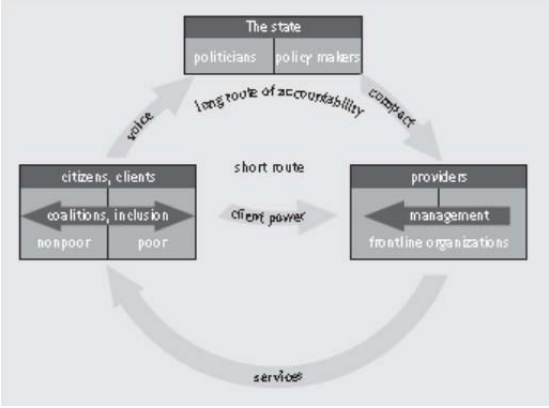
6. This paper is structured as follows: Section 2 outlines the analytical underpinnings of the indicators and how they are categorized. It also includes a detailed description of the indicators themselves. Section 3 presents the methodology of the Kenya SDI education and health surveys. The results are presented and analyzed in section 4 and Section 5. The report concludes with a summary of the overall findings and some implications for Kenya.

ANALYTICAL UNDERPINNINGS

Service Delivery Outcomes and Perspective of the Indicators

7. Service delivery outcomes are determined by the relationships of accountability between policymakers, service providers, and citizens (Figure 1). Health and education 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. While delivery of quality health care and education is contingent foremost on what happens in clinics and in classrooms, a combination of several basic elements have to be present in order for quality services to be accessible and produced by health personnel and teachers at the frontline, which depend on the overall service delivery system and supply chain. Adequate financing, infrastructure, human resources, material, and equipment need to be made available, while the institutions and governance structure provide incentives for the service providers to perform.

Figure 1. Relationships of accountability between citizens, service providers, and policymakers



Indicator Categories and the Selection Criteria

8. There are a host of data sets available in both education and health. 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 DHS/LSMS/WMS) cover only a sub-sample of countries and are, in many cases, outdated. (For instance, there have been five standard or interim DHS surveys completed in Africa since 2007). We therefore propose that all the data required for the Service Delivery Indicators be collected through one standard instrument administered in all countries.

9. Given the quantitative and micro focus, we have essentially two options for collecting the data necessary for the Indicators. We could either take beneficiaries or service providers as the unit of observation. We argue that the most cost-effective option is to focus on service providers.

Obviously, this choice will, to some extent, restrict what type of data we can collect and what indicators we can create.

Box 1. 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 type as the characteristic (knowledge) of the individuals who select into 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

$$y = f(x,e,\theta) + \varepsilon . \qquad (1)$$

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, 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.

10. Our proposed choice of indicators takes its starting point from the recent literature on the economics of education and health. Overall, this literature stresses the importance of provider behavior and competence in the delivery of health and education services. Conditional on service providers exerting effort, there is also some evidence that the provision of physical resources and infrastructure – especially in health – has important effects on the quality of service delivery.[7]

11. The somewhat weak relationship between resources and outcomes documented in the literature has been associated with deficiencies in the incentive structure of school and 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,[8] it is possible inputs are complementary to changes in incentives

[7] For an overview, see Hanushek (2003). Case and Deaton (1999) show, using a natural experiment in South Africa, that increases in school resources (as measured by the student-teacher ratio) raises academic achievement among black students. Duflo (2001) finds that a school construction policy in Indonesia was effective in increasing the quantity of education. Banerjee et al (2000) find, using a randomized evaluation in India, that provision of additional teachers in nonformal education centers increases school participation of girls. However, a series of randomized evaluations in Kenya indicate that the only effect of textbooks on outcomes was among the better students (Glewwe and Kremer, 2006; Glewwe, Kremer and Moulin, 2002).

[8] More recent evidence from natural experiments and randomized evaluations also indicate some potential positive effect of school resources on outcomes, but not uniformly positive (Duflo 2001; Glewwe and Kremer 2006).

and so coupling improvements in both may have large and significant impacts (see Hanushek, 2007). As noted by Duflo, Dupas, and Kremer (2009), the fact that budgets have not kept pace with enrollment, leading to large student-teacher ratios, overstretched physical infrastructure, and insufficient number of textbooks, etc., is problematic. However, simply increasing the level of resources might not address the quality deficit in education and health without also taking providers' incentives into account.

12. We propose three sets of indicators: The first attempts to measure availability of key infrastructure and inputs at the frontline service provider level. The second attempts to measure effort and knowledge of service providers at the frontline level. The third attempts to proxy for effort, broadly defined, higher up in the service delivery chain. 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.[2]

13. In addition, we wanted to select indicators that are (i) quantitative (to avoid problems of perception biases that limit both cross-country and longitudinal comparisons)[3], (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.

Table 3. Indicator categories and indicators

Education	Health
Provider Effort	
School absence rate	Absence rate
Classroom absence rate	Caseload per provider
Teaching time	
Provider Knowledge and Ability	
Knowledge in math, English, Pedagogy	Diagnostic accuracy
	Adherence to clinical guidelines
	Management of maternal and neonatal complications
Inputs	
Infrastructure availability	Drug availability
Teaching equipment availability	Medical equipment availability
Textbooks per teacher	Infrastructure availability
Pupils per teacher	

IMPLEMENTATION

Education

14. The Indicators draw information from a stratified random sample of 239 public and 67 private schools and provide a representative snapshot of the learning environment in both public and private schools. The details on the sampling procedure are in ANNEX A. The education Service Delivery Indicators in Kenya were implemented as part of the dialogue with the Government of Kenya on improving public expenditure management and spending for results. As a part of this process, the World Bank and other partners supported the Government of Kenya's efforts to undertake an education sector Public Expenditure Tracking and Service Delivery Survey. A validation process took place in Kenya that involved consultations with Government on survey design and process, pre-testing and adaptation of survey instruments. After consultations, the sample for Kenya was broadened to provide information on three levels: (i) public and private schools, (ii) urban and rural schools and (iii) case studies at the county level. Survey training and field work took place between May and July 2012. The survey was implemented by Kimetrica, with support and supervision by the World Bank.

15. Table 1 provides details of the sample for the Service Delivery Indicators. In total, 306 primary schools, of which 78 percent, or 239 schools, were public schools and the remaining 22 percent either private for-profit or private not-for-profit schools. The survey assessed the knowledge of 1,679 primary school teachers, surveyed 2960 teachers for an absenteeism study and observed 306 grade 4 lessons. In addition, learning outcomes were measured for almost 3000 grade four students.

Table 4. Education SDI sample in Kenya

Variable	Sample		Weighted Distribution
	Total	Share of Total	
Ownership	306		
Public			
Private			
Location			
Rural	207		
Urban	99		
Urban public	61		
Rural public	173		
Teachers	1,679		
Pupils	2,953		

Notes: a. Different weights were applied where the unit of analysis was facilities and where unit of analysis was health providers.

Health

16. 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 between September and December 2012. The survey was implemented by the Kenya Institute of Public Policy Research and Analysis (KIPPRA) with support by the World Bank and the USAID-funded Health Policy Project. The World Bank's Service Delivery Indicators (SDI) Team provided quality assurance and oversight.

17. In Kenya, as in most health systems, a significant majority of people encounter with the health services at health posts (also called dispensaries), health centers and the first level hospitals. In the 2012/13 SDI survey, information was collected from 294 such facilities and 1,859 health providers (see Table 5). The results provide a representative assessment of the quality of service delivery and the environment within which these services are delivered in rural and urban locations, in public and private (non-profit) health facilities. The private (non-profit facilities) include largely facilities owned by faith-based organization and also includes some non-government facilities.

18. The survey used a multi-stage, cluster sampling strategy which allowed for disaggregation by geographic location (rural and urban); by provider type (public and private non-profit) and facility type (dispensaries/health posts, health centers and first level hospitals) (see Table 5).[9] ANNEX A provides details of the methodology and sample for the Kenya Service Delivery Indicators survey. The modules of the survey instrument are shown in Table 29.

[9] Using the Kenya designation, levels 2, 3 and 4 were included in the sample (**Error! Reference source not found.** in ANNEX A).

Table 5. Health SDI sample in Kenya

Variable	Sample		Weighted Distribution
	Total	Share of Total	
Facilities	294	100%	100%
Health posts (dispensaries)	102	35%	79%
Health centers`	147	50%	15%
Hospitals (first level)	45	34%	6%
Ownership	292[b]		
Public	134	46%	79%
Private (non-profit)	158	54%	21%
Location	292[b]		
Rural	206	71%	85%
Urban	86	29%	15%
Urban public	46	34%	9%
Rural public	88	34%	70%
Healthcare workers	1,859	100%	100%
Nurses and midwives	1,016	55%	61%
Clinical officers	265	14%	10%
Doctors	47	3%	2%
Paraprofessionals	531	29%	27%

Notes: a. Different weights were applied where the unit of analysis was facilities and where unit of analysis was health providers.
b. The totals for location and ownership sum to 292 as they exclude two refusals.

Survey Instruments and Survey Implementation

19. The survey used a sector-specific questionnaire with several modules (see Table 3), 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. A pre-test of the instruments was done by the technical team, in collaboration with the in-country research partners, in the early part of 2010. The questionnaires were translated into Swahili for Tanzania.

Table 6. Linking the survey instrument and indicators

Sample		Questionnaire Modules	Indicators
Education	Nationally representative, disaggregated by rural/urban. 306 public and private (for- and non-profit) primary schools.	School information	**INPUTS** - Infrastructure availability - Teaching equipment availability - Textbooks per teacher - Pupils per teacher **PROVIDER EFFORT** - School absence rate - Classroom absence rate - Teaching time **PROVIDER ABILITY** - Knowledge in math, English, Pedagogy
	2,960 teachers	Teacher information (including attendance)	
	306 grade 4 classrooms	Classroom observation	
	1,669 teacher assessments (maths, English and pedagocical skills)	Teacher assessment	
Health	Nationally representative, disaggregated by rural/urban. 294 public and private (non-profit) 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
	1,859 health providers (nurses, clinical officers, doctors etc.)	Health provider information (including attendance)	
	Assessments of 1,859 health providers	Assessment of health provider knowledge and ability	

Box 2. Service Delivery Indicators Initiative

The Service Delivery Indicators initiative is a partnership of World Bank, the African Economic Research Consortium (AERC) and 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 tool for citizens, governments, and donors alike; toward the end 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.

RESULTS: Education

Teachers

20. The indicators relating to teacher effort and teacher knowledge; *Absence from school*, *Absence from class*, *Minimum knowledge*, and *Time spent teaching*, and the differences in outcomes between public and private, and urban and rural schools, respectively, are presented in Table 7. In the following, we discuss the indicators related to teacher effort (*Absence from school*, *Absence from classroom*, and *Time spent teaching*) first. Thereafter follows a discussion about the indicator related to teacher ability or knowledge (*Minimum knowledge*).

Absence from School

21. To measure absence, in each school, ten teachers were randomly selected from the list of all teachers during the first visit to the school. The whereabouts of these ten teachers was then verified in a second unannounced visit. [10] Absence from school is defined as the share (of a maximum of 10 teachers) who could not be found on the school premises during the unannounced visit.

22. As evident from Table 7, absence from school is *relatively* low and uniform across private and public and urban and rural schools. There is some variation across schools, however, as illustrated in Figure 2. While 70 percent of the schools have an absence rate between 0-20%, 20 percent have an absence rate between 20-40%, and 10% an absence rate above 40%.

Table 7. Teacher Effort

	All	Public	Private	Rural	Urban	Rural Public	Urban Public
Absence from school	15.5%	16.4%	13.7%	13.7%	17.2%	-3.5%	15.5%
Absence from class	42.2%	47.3%	30.7%	42.6%	48.8%	-6.1%	42.2%
Time spent teaching	2 h 40 min	2 h 19 min	3 h 28 min	2 h 38 min	2 h 14 min	24 min	2 h 40 min

Note: Weighted means using sampling weight. Results based on observations from 2,960 teachers in 306 schools. Data collapsed at the school level. See Table 34 for more detail on the differences in means between private and public (urban and rural) schools.

23. Table 33 reports simple correlations to explore how teacher absenteeism is related to teacher observables.[11] There are few observable characteristics that can account for differences in absenteeism from the school. Only seniority and whether the teacher is born in the same

[1010] The majority of the surprise visits took place during the morning with roughly 70% of the enumerators arriving before 12am (the mode of arrival is between 9-10 am). The surprise visit lasted 45 minutes on average. As one would expect, absenteeism increases gradually throughout the school day.

[11] The correlations are based on simple bivariate regressions of the absence indicators on each of the reported correlates and a constant.

district as the school he/she is working in have some predictive power; i.e., more senior teachers and teachers born in the same district as the school is situated in are significantly more likely to be absent.

Absence from Class

24. Even when in school, teachers may not necessarily be found in the classroom teaching. To take account of this, we define an indicator labeled *Absence from class*. Here a teacher is marked as absent either if they are not on the school premises or if they are present on the school premises, but not found inside a classroom.[12]

25. Comparing *absence from school* and *absence from class*, it is obvious that the main leakage in terms of teacher time actually takes place inside the school. While absenteeism from school is 16%, 4 in 10 teachers are absent from the classroom during the unannounced visit. There are small differences between urban and rural schools with respect to absence from class. There are, however, large differences in absenteeism between private and public schools. A public school teacher is 17 percentage points, or one third, more likely to be absent from the classroom than a private school teacher (Table 7).

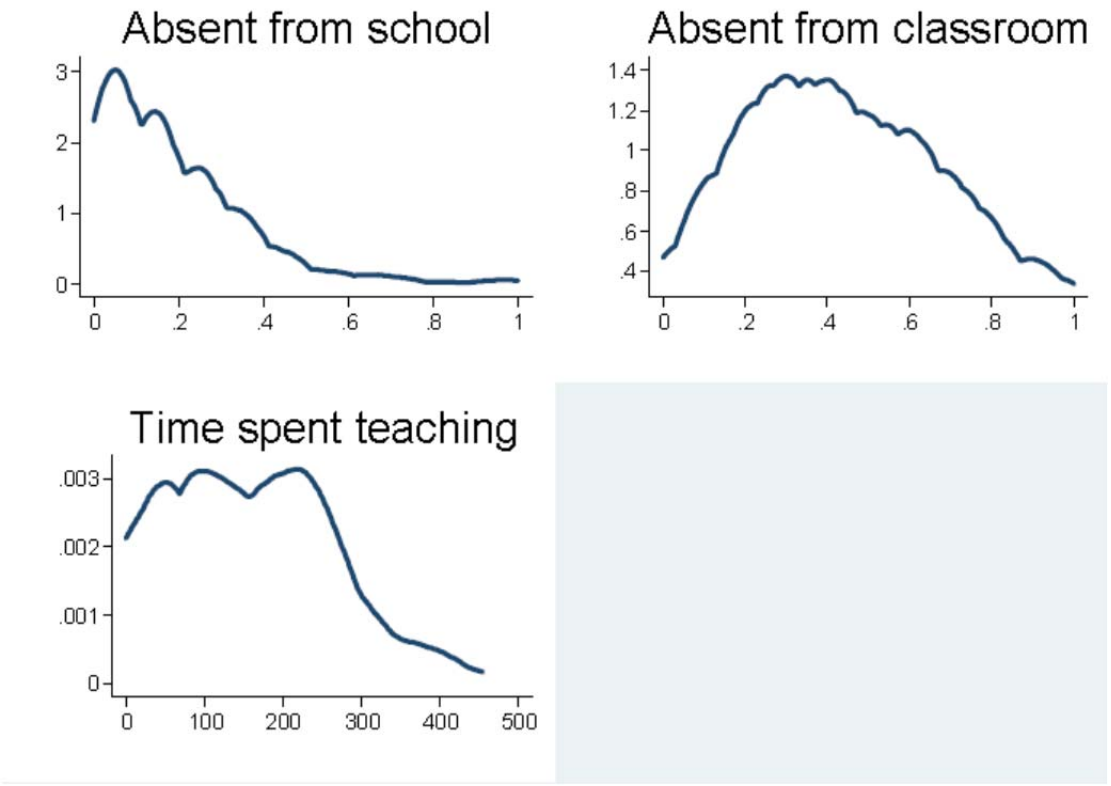
26. There is significant variation across schools in *Absence from the class*: Outcomes on the indicator range from all teachers being present in the classroom to all teachers being absent (figure 1). Specifically, for one third of the schools, less than 3 teachers (out of 10) are absent from the class, for one third, between 3 and 6 teachers (out of 10) are absent, and for the remaining third, 6 or more teachers (out of 10) are not found in the classroom.

27. Table 33, column 2, shows the correlates of *Absence from the class*. In sum, we find that older, male teachers with higher education, training and seniority are significantly more likely to be absent. Absenteeism is also more likely among teachers who teach higher grades, who are born in the same district as the school they are working in and who are on permanent contracts. To illustrate the effects, a male teacher with a permanent contract is 27 percentage points more likely to be absent from the classroom compared to a female teacher with no permanent contract.

28. As can be gleaned from Table 32, columns 2-3, this is also the profile of public school teachers, while private school teachers tend to be younger, female, and have less education and training. They are also more likely to come from outside the district. One might therefore infer that the correlations between teacher observables and absenteeism are in fact driven by the difference in the composition of the teacher staff in private versus public schools. This does not seem to be the case, however. Restricting the sample to public schools only results in coefficients of the same sign and roughly the same magnitude.

[12] A small number of teachers are found teaching outside, and these are marked as present for the purposes of the indicator.

Figure 2. Distributions of the Indicators Absent from school, Absent from class, and time spent teaching



Time spent teaching

29. This indicator measures the amount of time a teacher spends teaching in a school during a normal day, which on average is 2 hours and 40 minutes in Kenya (Table 31). That is, teachers teach only about half of the schedule time (the scheduled time for grade four students is 5 hours and 42 minutes after break times). To show how we arrive at this number, Table 34 reports some intermediate inputs used in the calculation of the indicator.

30. We begin by recording the scheduled time of a teaching day from school records, i.e., 5 hours and 42 minutes in Kenya after break times. We then multiply this number by the proportion of teachers absent from classroom. The idea being that if 10 teachers are supposed to teach 5 hours and 42 minutes per day, but 4 of them are absent from either the school or the class at any one time, then scheduled teaching time is reduced to 3 hours and 19 minutes (5 hours and 42 minutes x 0.58).

31. Even when in the class, however, teachers may not necessarily be teaching. The percentage of the lesson lost to non-teaching activities is measured through observation of a grade 4

lesson.[1313][1414] As reported in Table 34, roughly 82% of a typical lesson is devoted to teaching, the remainder to non-teaching activities.[5]

32. To take account of this, we therefore multiply our measure by the proportion of a typical lesson that is spent on teaching. In the example, the teaching time of 3 hours and 19 minutes is therefore reduced further to 2 hours and 40 minutes (3 hours and 19 minutes x 0.82). Again, there is large variation in this measure with some schools teaching almost as scheduled and 10% of the schools offering next to no teaching. In general, roughly one fifth of the schools teach less than an hour, one fifth between 1 and 2 hours, 1 fifth between 2-3 hours, 1 fifth between 3-4 hours and the remainder four hours or more (see Figure 2).

33. Table 34 also shows that there is a large difference between public and private schools. While the scheduled time teaching per day is similar across private and public schools, the actual time spent teaching is more than one hour longer per day in private schools. This is despite the fact that actual teaching in private schools is only about 60 percent of the scheduled teaching time.

34. Table 34 also provides information on a complementary measure of effort – the share of classrooms with pupils but no teacher; i.e. orphaned classrooms. This is measured by inspecting the school premises, counting the number of classrooms with students and recording whether a teacher is present in the classroom or not. The share of orphaned classrooms is then calculated by dividing the number of classrooms with students but no teacher by the total number of classrooms that contained students.

35. In total, about 30% of classrooms were orphaned (almost twice as many in public than in private schools). The difference between absence from classroom measured at the teacher level (50%) and orphaned classrooms measured at the classroom level (30%) is likely explained by the school adjusting for teacher absence by either cancelling classes or letting students whose teacher is absent join other classes.

36. To sum up, teachers spend less than half of the scheduled day actually teaching, and most of the leakage occurs on the school premises by teachers who are present, but not in the class.

Share of teachers with minimum knowledge

37. The share of teachers with minimum content knowledge is calculated on the basis of a custom-designed teacher test administered to the grade 4 mathematics and English teacher of the 2011 cohort and 2012 cohort.

[1313] This is most likely an upper bound on the time devoted to teaching during a lesson, since presumably a teacher is more likely to teach when under direct observation (i.e. Hawthorne effects will bias the estimate upward).

[1414] During the observation, enumerators first had to judge whether the teacher was teaching or not. If they judged the teacher to be teaching, they were supposed to indicate how much time the teacher spent on any of the following teaching activities: teacher interacts with all children as a group; teacher interacts with small group of children; teacher interacts with children one on one; teacher reads or lectures to the pupils; teacher supervises pupil(s) writing on the board; teacher leads kinesthetic group learning activity; teacher writing on blackboard; teacher listening to pupils recite/read; teacher waiting for pupils to complete task; teacher testing students in class; teacher maintaining discipline in class; teacher doing paperwork.

38. The objective of the teacher test is two-fold: to examine whether teachers have the basic reading, writing and arithmetic skills that lower primary students need to have in order to progress further with their education. This is interpreted as the *minimum* knowledge required for the teacher to be effective and is the basis for the "Share of Teachers with minimum knowledge indicator."

39. In addition, the test also examines the extent to which teachers demonstrate mastery of subject content skills that are above the level they are teaching at and mastery of pedagogic skills. Out of courtesy to teachers the test was designed as a marking exercise, in which teachers had to mark and correct a hypothetical student's exam. The English test was administered to teachers teaching English, or English and other subjects, and the mathematics test was administered to teacher teaching mathematics, or mathematics and other subjects. The test was validated against the Kenyan primary curriculum as well as 12 other Sub-Saharan curricula.[15]

40. The minimum knowledge indicator is calculated as the percentage of teachers who score more than 80% on the lower primary part of the English and mathematics test. The test also contains more advanced questions in both subjects as well as a pedagogy section.

41. Content knowledge among Kenyan teachers is low. In fact, overall, only 39% of teachers score more than 80% on the test (Table 8). While there is a large significant difference (14%) between private and public school teachers, levels of content knowledge are disappointingly low in both sectors.

42. Table 8 details the average score on the test and shows the sensitivity of the minimum knowledge indicator to different cut-offs (i.e. requiring a score of 100%, 90%, and 70%). The results appear fairly sensitive to the choice of threshold, with only 14% of the teachers viewed as having minimum knowledge when the minimum knowledge indicator is calculated as the percentage of teachers who score more than 90% on the lower primary part of the English and Mathematics test, and 66% of the teachers viewed as having minimum knowledge when the minimum knowledge indicator is calculated as the percentage of teachers who score at least 70% on the test. The average score on all three sections of the test (including lower and upper primary material) was 57%, the average score on content knowledge was 74% indicating that pedagogy among teachers is especially weak.

43. Table 36 sheds further light on why minimum knowledge is so low. In particular, the low scores on the English section -- only 10% of teachers are above the 80% cut-off -- account for the overall low scores, while 75% of the mathematics teachers are above the 80% cut-off. Figure 3 graphs the distributions of the test scores. There is wide variation, and one can see that especially pedagogical knowledge is low among teachers with the maximum score, collapsed at the school level, standing at 60%.

[15] See "Teaching Standards and Curriculum Review", prepared as background document for the SDI by David Johnson, Andrew Cunningham and Rachel Dowling.

Table 8. Teacher test

	All	Public	Private	Urban Public	Rural Public
Share of Teachers with minimum knowledge	39.4%	35.2%	49.1%	32.9%	35.8%
Average score on test					
Average score on test (English, Maths, Pedagogy)	57.2%	56.2%	59.6%	54.4%	56.7%
Average score on test (English and Maths)	74.1%	72.9%	76.4%	71.6%	73.3%
Difference in thresholds					
Minimum knowledge: 100 %	5.6%	5.9%	4.9%	5.7%	5.9%
Minimum knowledge: 90 %	13.6%	13.4%	14.0%	13.1%	13.5%
Minimum knowledge: 80 %	39.4%	35.2%	49.1%	32.9%	35.8%
Minimum knowledge: 70 %	65.7%	61.4%	75.6%	60.7%	61.6%

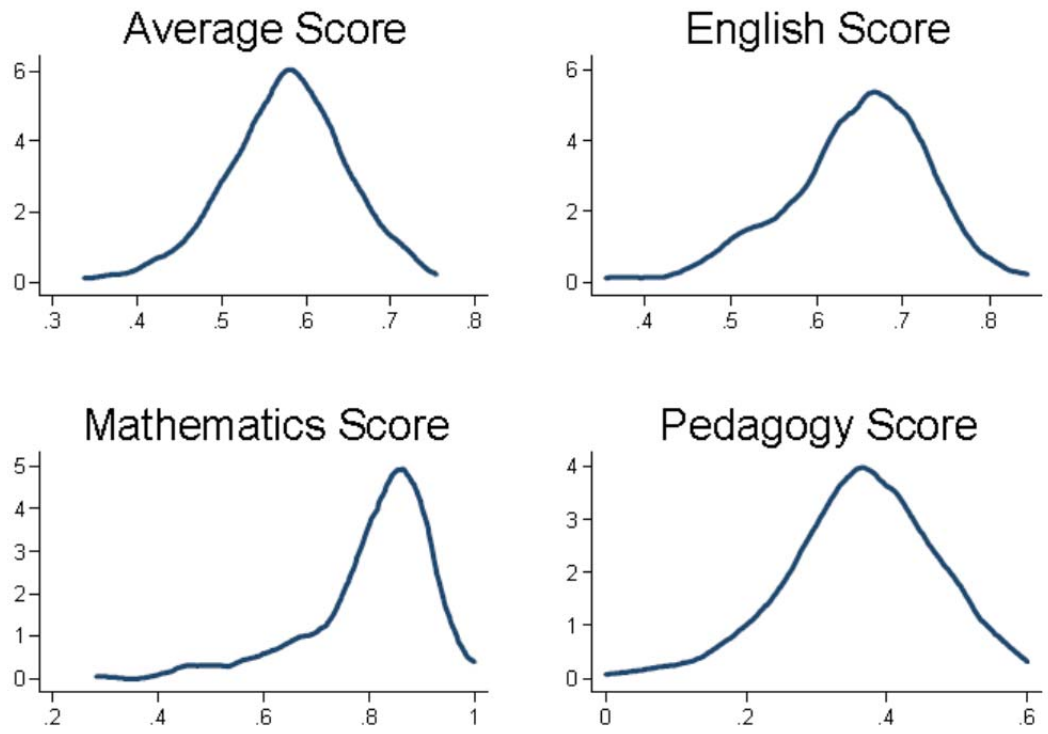
Note: Weighted means using sampling weight. Results based on observations from 2,960 teachers in 306 schools. 1,157 teachers either teach English or both English and Mathematics and1,174 teachers who teach either Mathematics or both English and Mathematics. Data collapsed at the school level. See Table 35 and Table 36 for more detailed breakdown and differences in means between private and public (urban and rural) schools.

English Section

44. Table 37 presents the average score on the English Section of the test, as well as a detailed analysis of particular questions. The average score on the English section was 65% correct answers indicating that teachers only master about 2/3 of the lower primary curriculum. Nevertheless, this gives a slightly more positive picture than the "Minimum knowledge indicator", calculated as share of teachers scoring above 80%, which measures 10% overall.

45. Teachers scored an average over 90% on the grammar assessment, which asked them to complete sentences with the correct conjunction, verb (active or passive voice and different tenses) or preposition. Four alternatives including the correct one were given for each sentence. Despite the high scores, there were some gaps though. For example, 30% of teachers were not able to correct the following sentence “If you tidy up your room, you won’t get candy.”, even though the correct alternative (Unless) was given (recall that teachers were asked to mark a hypothetical student’s exam).

Figure 3. Distributions of the teacher test scores



46. Teachers scored somewhat lower (70%) on a Cloze exercise, which assesses vocabulary and text comprehension. The exercise consisted of a short story with certain words removed, and the teachers had to fill the gaps in a meaningful way. Again, some weaknesses emerged. While teachers were able to confirm that students had answered correctly, they struggled to correct wrong answers or complete sentences that the student had left blank. For example, 60% of teachers could not correct the sentence "I want not go to school."

47. It is noticeable that private school teachers outperform public school teachers on every section of the test, however, the differences are very small (about 2-3%) when compared to the "Share of Minimum Knowledge Indicator", where the difference stands at 14%.

Table 9. English Section

	All	Public	Private	Urban Public	Rural Public
Fraction correct on English section	64.6%	63.7%	66.6%	63.4%	63.8%
Fraction correct on grammar task	92.9%	92.2%	94.6%	92.6%	92.1%
Fraction correct on Cloze task	68.6%	67.6%	70.9%	69.3%	67.0%
Fraction correct on composition task	50.9%	50.0%	53.0%	48.5%	50.5%

Mathematics Section

48. Table 36and Table 38present the average score on the Mathematics Section of the test, as well as a detailed analysis of particular questions. The average score on the Mathematics section was 80% correct answers and the difference between scores on the lower and upper primary curriculum was small. Again, private school teachers outperform public school teachers, both overall (a significant difference of 3% overall, Table 35) and on many single individual question. The difference in performance is small, however. Teachers in rural schools tend to perform better than teachers in urban schools, although most differences are small.

49. Looking at the details of the test (Table 10), between 12-14 percent of teachers cannot master fairly simple tasks (all part of the grade four students' curriculum), such as subtracting double digit numbers. For more complicated tasks, a larger fraction of mathematics teachers fail. For example, every other teacher cannot compare fractions with different denominators.

Table 10. Mathematics Section (selected examples)

	All	Public	Private	Urban Public	Rural Public
Fraction correct on Math	80.6%	79.7%	82.7%	77.8%	80.3%
Adding double digit numbers	97.2%	97.1%	97.3%	95.4%	97.6%
Subtracting double digits	88.0%	87.0%	90.2%	84.6%	87.7%
Adding triple digit numbers	87.5%	87.5%	87.5%	86.5%	87.7%
Multiplying two digit numbers	86.8%	86.5%	87.6%	85.3%	86.9%
Adding decimals	76.6%	72.5%	85.7%	72.2%	72.6%
Comparing fractions	47.9%	49.6%	44.1%	41.7%	52.0%
Time (reading a clock)	76.9%	76.2%	78.3%	71.6%	77.7%
Interpreting a Venn Diagram	72.8%	72.0%	74.4%	69.6%	72.8%
Interpreting Data on a Graph	66.7%	65.1%	70.3%	62.9%	65.7%
Square root (no remainder)	87.8%	85.9%	91.8%	82.9%	86.9%
Subtraction of decimal numbers	82.1%	78.9%	89.9%	73.0%	80.4%
Division of Fractions	69.0%	65.5%	76.7%	57.7%	67.6%
One Variable Algebra	72.3%	70.6%	76.3%	65.2%	72.2%

Pedagogy Section

50. The overall score on the pedagogy section was 36% with little difference between basic and more advanced questions (Table 11). That is, on average, teachers only managed about one-third of the tasks in the pedagogic test. Pedagogical skills, or more accurately lack of skills, appear to be similar in public and private schools, as well as schools located in urban and rural areas.

51. The pedagogy test consisted of three sections designed to capture all the skills teachers would routinely be asked to apply when teaching. The first section asked teachers to prepare a lesson plan about road accidents in Kenya based on a simple information-giving text they had read. The average score on this task was 40%. The second task asked teachers to assess children's writing on the basis of two sample letters (written by Kenyan grade 4 children). The average score on this task was 34%. The final task asked teachers to inspect test scores of 10 children, aggregate them and make some statements about patterns of learning. This task received the lowest score at 29%.

52. The low scores on the pedagogy section combined with the performance on the curriculum content imply that teachers know little more than their students and that the little they know, they cannot teach adequately.

Table 11. Pedagogy Section

	All	Public	Private	Urban Public	Rural Public
Fraction correct on Pedagogy Section	35.9%	35.1%	37.8%	33.6%	35.5%
Fraction correct on basic Pedagogy Section	37.0%	36.0%	39.3%	34.0%	36.6%
Fraction correct on advanced Pedagogy Section	35.1%	34.4%	36.7%	33.4%	34.7%
Preparing a lesson plan	40.4%	40.0%	41.3%	39.4%	40.2%
Assessing children's abilities	33.8%	32.5%	36.7%	31.3%	32.9%
Evaluating students' progress	29.4%	28.4%	31.6%	24.3%	29.7%

Correlates of teacher effort

53. Table 40 presents correlates between teacher knowledge and observables. In contrast to teacher effort, the relationship between teacher knowledge and teacher characteristics is weaker and does not always go in the same direction on all parts of the test. Nevertheless, similar, and fairly sensible, patterns emerge.

54. Teachers who are female, younger and less experienced on short-term contracts score better on the test. As one would expect, teachers who teach higher grades and have more

completed education score better. Strikingly, there is no significant relationship between teacher training and seniority and performance on the test.

Inputs at School

55. The indicators *Availability of teaching resources*, *Functioning school infrastructure*, *Student-teacher ratio*, and *Students per textbook* are all constructed using data collected through visual inspections of a grade 4 classroom and the school premises in each primary school. Below we discuss each indicator in some more detail. Table 12 summarizes the findings.

Availability of teaching resources

56. Of the four indicators, *Minimum teaching resources* appears less of constraint. *Minimum teaching resources* is a measure from 0-1 capturing (a) whether a grade 4 classroom has a functioning blackboard and chalk, (b) the share of students with pens, and (c) the share of students with notebooks, given equal weight to each of the three components. Specifically, in the classroom, the surveyor coded if there was a functioning blackboard in the classroom, measured as whether a text written on the blackboard could be read at the front and back of the classroom, and whether there was chalk available to write on the blackboard. If that was the case, the school received a score 1 on this sub-indicator. The surveyor then counted the number of students with pencils and notebooks, respectively, and by dividing each count by the number of students in the classroom one can then estimate the share of students with pencils and the share of students with notebooks. *Minimum teaching resources* is a simple average of these three sub-indicators.

57. As reported in Table 12, the mean outcome for each sub-indicator is high in both public and private school, and there is little variation (see figure 3). Some shortfalls appear though: 15% of public schools do not have a functioning blackboard. Private schools have better access to teaching resources compared to public schools, but the differences across the sub-indicators are small in magnitude. Thus, overall, lack of teaching equipment does not appear to be a binding constraint for providing high quality teaching in most schools.

Functioning school infrastructure

58. The indicator *Functioning school infrastructure* points to a more problematic area. The indicator is defined as the proportion of schools which had functioning toilets and sufficient light to read the blackboard at the back of the classroom. Whether the toilets were functioning (operationalized as being clean, private, and accessible) was verified by the surveyors. To check whether the light in the classroom is of minimum standard, the surveyor placed a printout on the board and checked whether it was possible to read the printout from the back of the classroom.

59. Table 12 reports the means for each sub-indicator. All schools (with the exception of one) have a toilet available, and the toilets are both accessible and private in almost all cases. Cleanliness is an issue, however. Less than three quarter of toilets are judged to be clean. It interesting to note that there is little correlation between the two sub-indicators. That is, the schools with sufficient light to read the blackboard at the back of the classroom are just as likely

to have functioning toilets as the schools where the light in the classroom was deemed insufficient.

Table 12. At the School, auxiliary information

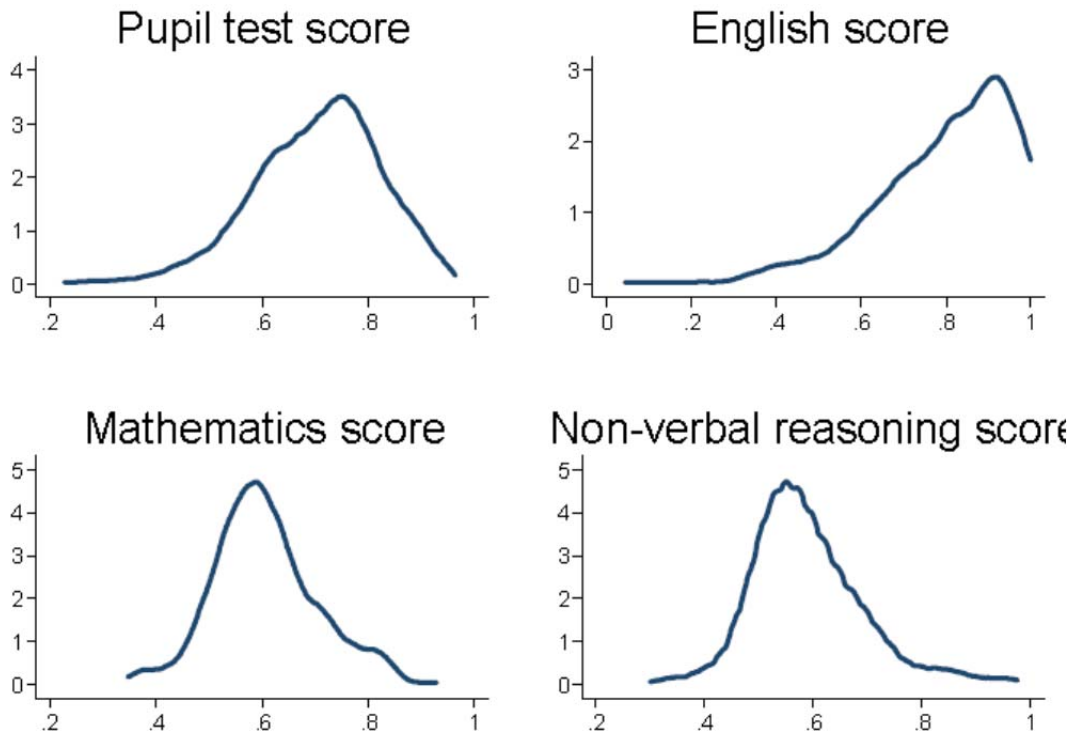
	All	Public	Private	Rural	Urban
Availability of teaching resources					
Share of students with pencils	97.9%	97.2%	99.2%	97.7%	97.1%
Share of student with paper	98.2%	97.5%	99.8%	99.9%	96.7%
Have black board	99.0%	98.5%	100.0%	100.0%	98.0%
Chalk	93.0%	91.6%	96.0%	90.7%	91.9%
Sufficient contrast to read board	95.1%	93.7%	98.1%	90.2%	94.8%
Functioning school infrastructure					
Visibility judged by enumerator	86.2%	85.5%	87.6%	84.8%	85.8%
Toilet clean	73.6%	75.3%	69.8%	74.2%	75.6%
Toilet private	95.3%	93.2%	100.0%	96.4%	92.3%
Toilet accessible	97.9%	96.9%	100.%	96.6%	97.0%
Student-teacher ratio					
Pupils per teacher	30.2	34.9	19.7	34.6	35.1
Textbooks per student					
Ratio of stud. with text book (English)	3.5	4.1	2.2	2.8	4.4
Ratio of stud. with text book (Math)	2.6	2.8	2.3	2.3	3.0

Students per textbook

60. Table 12 also reports students per textbook broken down by subject area (English and Mathematics). Overall, each mathematics and English textbook needs to be shared by 2.6 and 3.5 students, respectively. In public schools, there are 2.8 and 4.1 students per mathematics and English textbook, while in private schools, about 2 students share each textbook. There is also a significant difference between schools in urban areas (2.5 students per textbook) and rural areas (3.8 students per textbook).

61. Figure 4 shows that there is large variation in the indicator. In only 10% of the schools, students do not have to share textbooks. At the other extreme, less than one in five students has a textbook (roughly 5% of schools).

Figure 4. Distributions of the Indicators Minimum teaching resources, Students per textbooks, Student-teacher ratio



Student-teacher ratio

62. The average student-teacher ratios stand at 34, which is below the Kenyan target of 40 students per classroom.

63. There are large and significant differences between private and public schools, with public school classes almost twice as large (at 37) than private school classes (at 21). Crowding is also more severe in urban schools with average class sizes of 41 as compared to rural schools with 36 students per teacher.

64. Importantly, there is large variation in the student-teacher ratio across Kenya, with one teacher having to teach 50 students or more in 20% of the schools (see Figure 4).

Correlations between teacher effort and infrastructure and resources

65. One might expect that better infrastructure would be associated with more teacher effort – at least poor quality infrastructure is often named by teachers as a reason for low motivation. Looking at the SDI data, however, there is little evidence that school resources are correlated with teacher effort. Examining the correlations between Absence *from school* and *Absence from classroom* and the various infrastructure indicators, no consistent picture emerges. While absence

is negatively correlated with minimum teaching equipment and pupils per classroom, it is positively correlated with minimum infrastructure and textbooks per student. Looking at *Time spent teaching*, the correlations are reversed. In sum, there does not appear to be a clear relationship between the physical resources at the school and teacher effort.

Assessment of Student Learning

66. It is instructive to think of the Service Delivery Indicators as measuring key inputs, with a focus on what teachers do and know, in an education production function. These inputs are actionable and they are collected using objective and observational methods at the school level. The outcome in such an education production function is student learning achievement. While learning outcomes capture both school- specific inputs (for instance the quality and effort exerted by the teachers) and various child (for instance innate ability) and household (for instance the demand for education) specific factors, and thus provide, at best, reduced form evidence on service provision, it is a still an important measure to identify gaps and to track progress in the sector. Moreover, while the Service Delivery Indicators measure inputs -- and learning outcomes are not part of the Indicators -- in the final instance we should be interested in inputs not in and of themselves, but only in as far as they deliver the outcomes we care about. Therefore, as part of the collection of the Service Delivery Indicators in Kenya, learning outcomes were measured for grade 4 students. This section reports on the findings.

67. The objective of the student assessment was to assess basic reading, writing, and arithmetic skills, the "three Rs". The test was designed by experts in international pedagogy and based on a review of primary curriculum materials from 13 African countries, including Kenya[16] The student assessment also measured nonverbal reasoning skills on the basis of Raven's matrices, a standard IQ measure that is designed to be valid across different cultures. This measure complements the student test scores in English and Maths and can be used as a rough measure to control for innate student ability when comparing outcomes across different schools. Thus, the student assessment consisted of three parts: Mathematics, English, and non-verbal reasoning (NVR).

68. The test, using material up to the grade three level, was administered to grade four students. The reason for the choice of grade four students is threefold. First, there is scant information on achievement in lower grades. SACMEQ, for example, tests students in grades 6. Uwezo is a recent initiative that aims to provide information on students' learning irrespective of whether they are enrolled in school or not and tests all children under the age of 16 on grade 2 material. While this initiative has provided very interesting results, it is not possible to link student achievement to school level data, since the survey is done at the household level.

69. Second, the sample of children in school becomes more and more self-selective as one goes higher up due to high drop-out rates. Finally, there is growing evidence that cognitive

[16] For details on the design of the test, see Johnson, Cunningham and Dowling (2012) "Draft Final Report, Teaching Standards and Curriculum Review".

ability is most malleable at younger ages. It is therefore especially important to get a snapshot of student's learning and the quality of teaching provided at younger ages.

70. The test was designed as a one-on-one test with enumerators reading out instructions to students in their mother tongue. This was done so as to build up a differentiated picture of students' cognitive skills; i.e. oral one-to-one testing allows us to test whether a child can solve a mathematics problem even when his reading ability is so low that he/she would not be able to attempt the problem independently. The English test consisted of a number of different tasks ranging from a simple task testing knowledge of the alphabet, to word recognition, to more challenging reading comprehension test. Altogether, the test included 6 tasks. The mathematics test also consisted of a number of different tasks ranging from identifying and sequencing numbers, to addition of one- to three-digit numbers, to one- and two-digit subtraction, to single digit multiplication and divisions. The mathematics test included 6 tasks and a total of 17 questions.

71. The overall results for the English and Mathematics scores are reported in Table 42. Overall, students answered 71% of questions on the test correctly.[17] The average score in English was 78% and the average score in mathematics was 62%. The average score on the non-verbal reasoning part was 60%.

72. Scores in private schools were significantly higher both in English and Mathematics (17% and 11%). Non-verbal reasoning ability was also 9% higher, given some indication that there may be some selection on ability into private schools (though these results have to be interpreted with caution as non-verbal reasoning may not necessarily be immutable by schooling). While the mean score is an important statistic, it is also an estimate that by itself is not easy to interpret. Table 43and Table 44 depict a breakdown of the results. Roughly nine out of ten students manage the simplest tasks; i.e. can identify a letter and can recognize a simple word. However, only 80% can read all ten words of a sentence correctly and only 42% can read all 58 words in a simple paragraph. Given this, it is not surprising that only around half the students could answer a factual question about the text and even fewer could answer a question about the meaning of the passage.

73. On the mathematics side, scores were somewhat lower, and again, some important gaps are revealed. While students were largely comfortable with single digit number operations, they struggled when it came to double and triple digit operations. Only 12% could multiply double digits and only 40% could divide double digits. In case of the former five times as many private school students as public schools students could complete the task (26% compared to 5.6%). In case of the latter, the difference was 22 percentage points. It is also notable that students struggled with questions that required number operations as part of a problem-solving task. 70% or more of students could not complete the tasks that required any analytical reasoning of them.

[17] The total score is calculated by weighting the English and Mathematics section equally.

74. Overall, while average scores on the student test were high, the scores also reveal important areas of the lower primary curriculum that students in grade 4 have not yet mastered. For example, the complete 9x9 multiplication table is intended to be taught by grade 3; simple division is also clearly in the curriculum. It does not speak well of the match between curriculum goals and student achievement that only 56% (50% in public schools) and 64% (59% in public school) of the pupils in the sample, respectively, are able to accomplish these grade 3 tasks when tested halfway through grade 4.

75. It is also worth noting that the summary statistics from the Service Delivery Indicator student data are in close agreement with those tabulated by Uwezo (for the same cohort of children), though the testing standards differed slightly. The general agreement between survey results is a comforting fact from a data quality point of view.

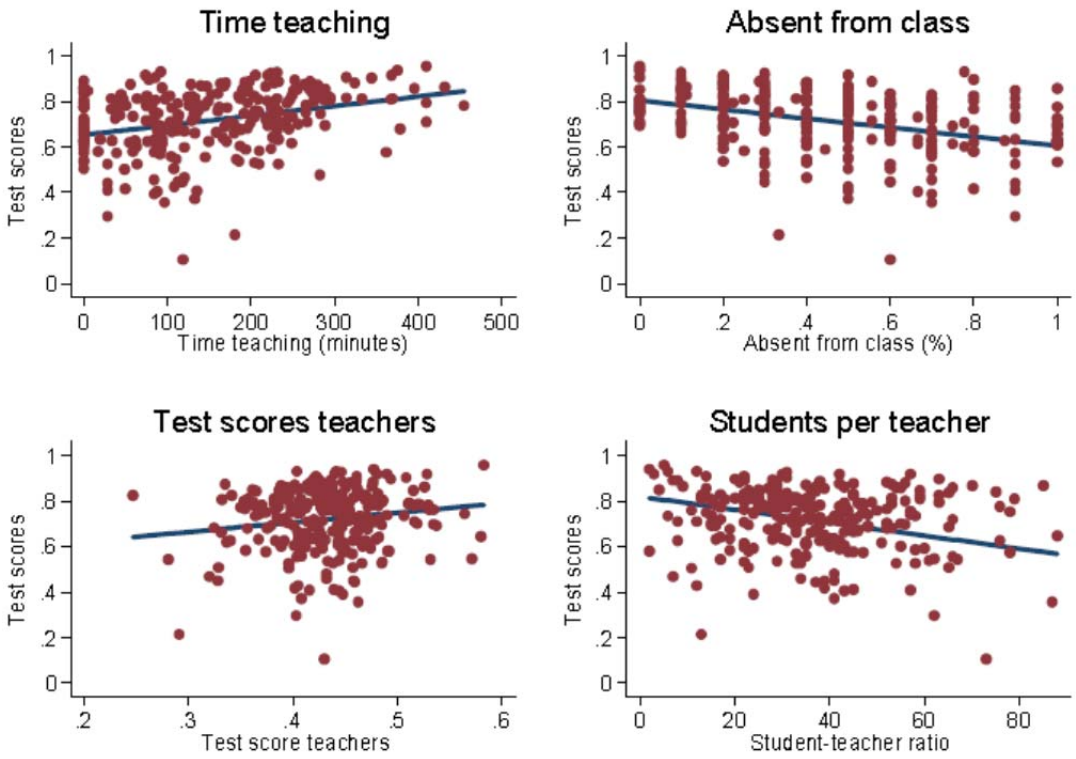
Correlations between indicators and outcomes

76. With outcome data in education, we can also check whether our input measures are in some ways related to outcomes. Of course, these are mere correlations that cannot be interpreted causally. Nevertheless, the focus on Service Delivery Indicators only makes sense if they speak to the question of how to improve outcomes. Therefore it is interesting to examine how the Service Delivery Indicators correlate with educational achievement.

77. Table 45 depicts unconditional correlations between student achievement and the education indicators. Panel A pool data from all schools, while Panel B uses data from public schools only and control for difference between urban and rural schools. Interestingly – and across the board – there are fairly strong relationships between the indicators and student knowledge in Panel A, with all the correlations having the expected sign. The correlations are also significant for all indicators except "*Availability of teaching resources*" and "*Functioning school infrastructure*".

78. Panel B depicts the correlations in the sample of public schools: The patterns in the data remain broadly the same. Higher absence rates and higher student-teacher ratio are significantly negatively correlated with test scores. Time spent teaching and teacher test scores (including pedagogy) is significantly positively correlated with test scores. Figure 5 provides a graphical illustration of these correlations.

Figure 5. Correlations between indicators and learning (student test scores)



Note: The graphs show the scatter plots (red dots) and the predicted OLS relationship (blue solid line) for various indicators and student test scores in public schools. The regression coefficients are reported in table 19, panel B.

RESULTS: Health

Health Providers

Caseload

79. 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 doing 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 coming to a health facility, caseload—while not the only measure of workload—is arguably a critically important measure.

80. The average caseload in the public sector was relatively low at 8.7 patients per provider per day (Table 13). The distribution of this variable was quite skewed, and the median caseload in public facilities was even lower—the caseload for 50 percent of health providers was 7 patients per day or less. The average caseload among private (non-profit) providers was 10.4 patients per provider per day, slightly higher than the average in public facilities, although the differences were not statistically significant. Case mix across facility types may vary, so it is worth looking at comparisons by level of facility. In the public sector, the highest caseload was found in urban health facilities: 15.4 per provider for health centers and 15.3 per provider for urban hospitals, significantly higher than rural public facilities[18]. Figure 6 shows the caseload by size of facility. Health centers with between 3 and 20 workers account for 86% of all health centers and just under half (47%) of all facilities. These facilities were also the ones with the lowest caseload levels—between 6.4 and 6.6 patients per provider per day.

81. Caseload is usually of concern because a shortage of health workers may cause caseload to rise and potentially compromise service quality. The data for Kenya suggests that a large share of health providers, especially those in moderately sized facilities, have very low caseload levels. It is worth noting that the caseload indicator did not take into account the staff absence rates. This may explain why health staff members who are present at work feel that their true workload is higher than these numbers suggest.

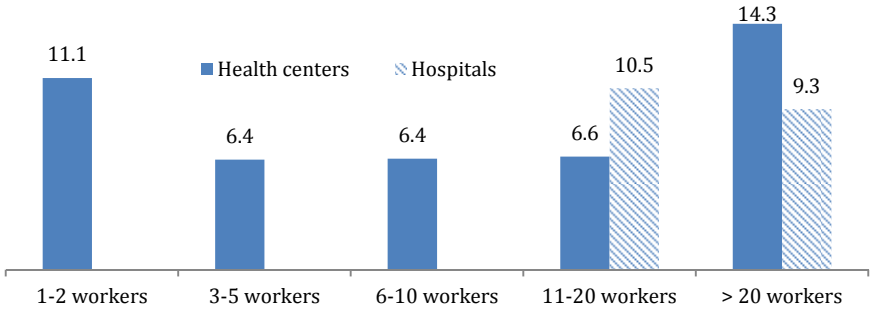
[18] The rural-urban difference in caseload for public health centers, p= 0.015; and for public hospitals, p=0.069.

Table 13. Caseload per clinician by level of facility

	All	Public	Private (non-profit)	Rural	Urban	Rural Public	Urban Public
All facilities	9.0	8.7	10.4	8.8	10.2	8.5	10.3
Dispensaries	9.3	8.7	11.4	9.3	8.8	8.9	7.3
Health Centers	7.3	7.7	6.0	6.3	11.8	6.4	15.4
First level hospitals	10.1	10.5	9.0	7.6	14.0	7.8	15.3

Notes: See Table 50 in
for more details (including standard errors).

Figure 6. Caseload per clinician by facility size



Absence rate

82. 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.[19] 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.

83. Close to a third (29.2%) of providers in public facilities was found to be absent, compared to a fifth (20.9%) among private (non-profit) providers but the difference was not statistically significant(p=0.254) (Table 14). Absence was particularly high in urban public facilities where just under four in ten health providers (37.6%) were absent; 9.3% points higher than in rural public facilities (p=0.177).[20]

84. In any workplace setting, absence may be sanctioned or not sanctioned. The survey found that the overwhelming share (88%) of absence was indeed sanctioned absence (Figure 8). But, from the consumer's perspective, these providers are not available to deliver services—whether

[19] Rogers, H. and Koziol M. (2012).
[20] Dropping the hospital observations from the absence rate variable reduces the number of observations, but when included, the p=0.06.

sanctioned 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.

85. The caseload of health workers is to some degree influenced by service utilization and demand-side factors, and may be a contributor to lower caseload in rural areas. But we also see that absence in some rural facilities, especially rural health centers, is quite high (41.9%) (Figure 9). Taken together the findings on absence and caseload are suggests there is some room for improvement in the levels of productivity in health service delivery.

86. In sum, who are most likely to be absent? The multivariate analysis presented in Table 52 in confirmed these findings: (i) Absence rates were similar across cadre-types; (ii) Absence was more likely among health providers in rural facilities; (iii) Absence in facilities with staff in excess of six workers relative to facilities with 1-2 workers were found to have higher absence rates; and (iv) While absence in private (non-profit) facilities was 40% lower than public facilities, this was not statistically significant after controlling for other factors.

Table 14. Absence by level of facility

	All	Public	Private (non-profit)	Rural	Urban	Rural Public	Urban Public
All facilities	27.5%	29.2%	20.9%	26.9%	31.2%	28.3%	37.6%
Dispensaries	25.5%	26.9%	20.1%	24.8%	31.5%	25.9%	38.1%
Health Centers	37.5%	41.1%	24.8%	39.2%	30.4%	41.9%	36.1%

Figure 7. Absence by cadre type

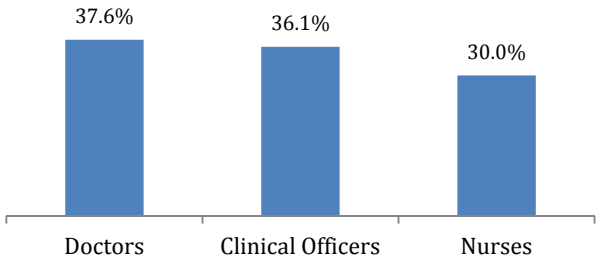


Figure 8. Reasons for absence

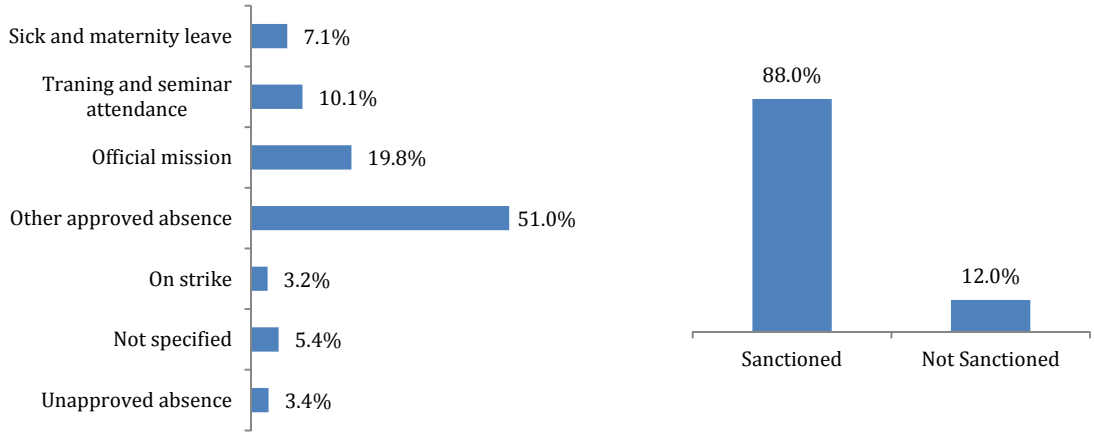
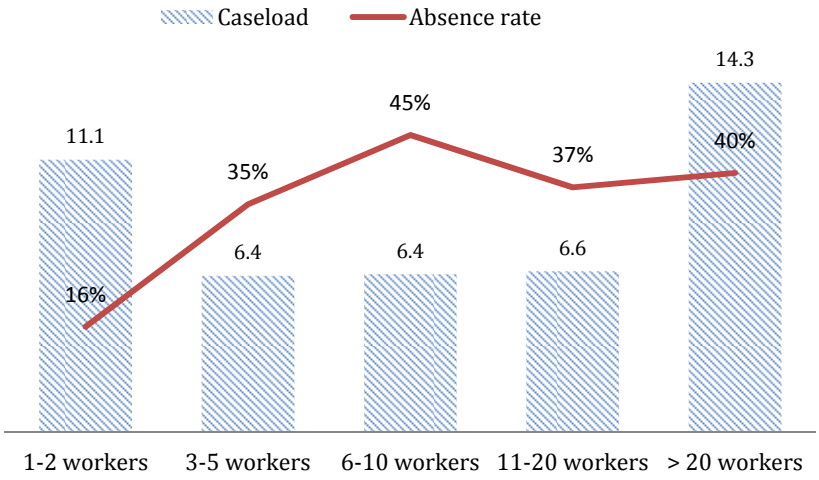


Figure 9. Absence rate and caseload by facility size (health centers only)



87. Having health professionals present in facilities is a necessary but not sufficient condition for delivering quality health services. For this reason, quality was also assessed using two process quality indicators (the adherence to clinical guidelines in seven tracer conditions and the management of maternal and newborn complications) and an outcome quality indicator, diagnostic accuracy in five tracer conditions.

88. 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 where included: post-partum hemorrhage and neonatal asphyxia. The former is the most common cause of maternal death during birth, and neonatal asphyxia is the most common cause of neonatal death during birth. The successful diagnosis and management of these seven conditions can avert a large share of child an adult morbidity and mortality.

89. 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.[21]

90. The results of the measures used to assess provider knowledge and ability are presented below. There were similar trends observed across the various measures of provider knowledge and ability. First, there was little variation in measures of provider knowledge and ability across public and private (non-profit) providers. Second, provider ability scores progressively declined among the three cadre types: doctors, clinical officers and nurses. Finally, these performance measures were generally the worst among rural public nurses.

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

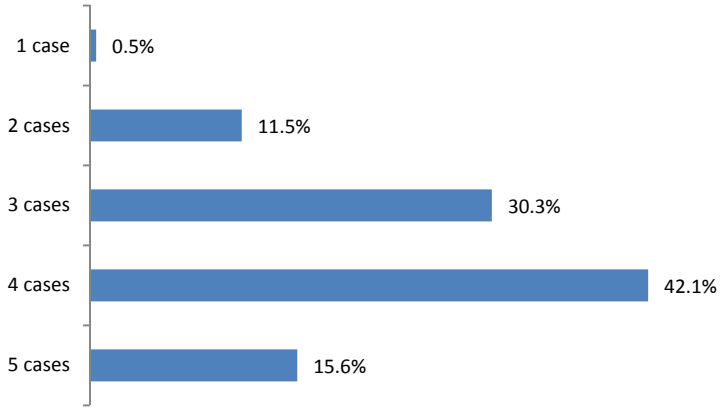
Diagnostic Accuracy

91. Diagnostic accuracy was measured as the unweighted average of the number of cases correctly diagnosed, as a proportion of all five cases diagnosed. Table 15 shows that providers arrived at the correct diagnosis in three quarters (72.2%) of the tracer conditions.[22] As with process quality, there was little variation across public-private (non-profit) providers, and the highest scores were among doctors and among clinical officers. Only 15.6% of providers were able to correctly diagnose all five of the tracer conditions, and only 42.1% could diagnose four out of the five cases (Figure 10).

Table 15. Diagnostic accuracy by cadre

	All	Public	Private (non-profit)	Rural	Urban	Rural Public	Urban Public
All cadres	72.2%	71.6%	74.2%	70.8%	77.7%	74.8%	71.1%
Doctors	85.4%	88.3%	78.4%	88.9%	82.6%	83.9%	92.9%
Clinical officers	80.2%	79.6%	81.1%	80.1%	80.3%	75.9%	82.6%
Nurses	69.8%	70.1%	68.7%	69.3%	74.0%	72.3%	69.9%

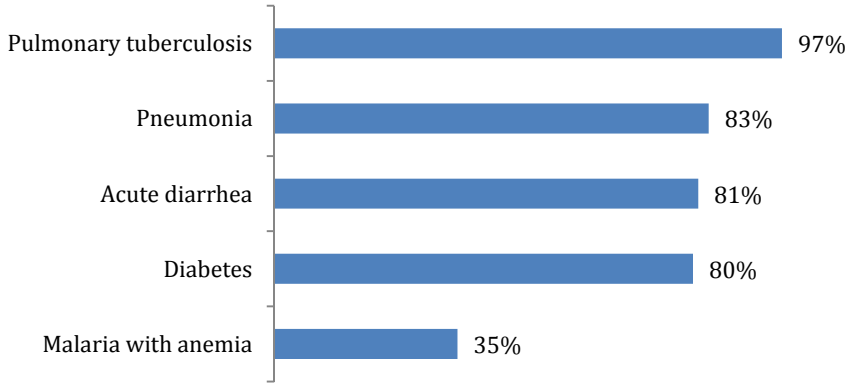
Figure 10. Diagnostic accuracy by number of cases correctly diagnosed



92. The diagnostic accuracy rate varied across case conditions, ranging from 35% for low for malaria with anemia to 97% for pulmonary tuberculosis. Two in every ten clinicians were not able to offer correct diagnosis of relatively common conditions such as acute diarrhea, pneumonia and diabetes. For malaria with anemia only three in every ten clinical officers were able to give correct diagnosis. Due to the significance of malaria in Kenya's burden of disease a closer look was taken at the malaria case. The diagnosis of malaria with anemia was least accurate at 27%, although a relatively larger share (59%) of providers arrived at the diagnosis of malaria (without specifying the additional diagnosis of anemia).

[22] Figure 18 to Figure 19 in
shows the history taking and examination questions providers asked who provided the correct diagnosis.

Figure 11. Diagnostic accuracy by condition



Process Quality: Adherence to clinical guidelines

93. 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) and the Kenya National Guidelines for the tracer conditions.

94. Public providers in Kenya were found to adhere to under half (42.7%) of the clinical guidelines in the management of the five tracer conditions. This relatively modest performance was not significantly different between private (non-profit) and public providers (Table 16). This measure of process quality progressively declined by cadre type, being highest doctors, followed by clinical officers and nurses (Table 16).[23] It is notable that the highest process quality scores were found among rural doctors where roughly three quarters of clinical guidelines were adhered to. The lowest scores were among rural nurses at 39.4% for adherence to clinical guidelines. This implies that when a child or adult receives treatment from a rural nurse only about two fifths of the country's clinical guidelines are followed, yet nurses constitute the larger proportion (75%) of health workers who regularly conduct outpatient consultations in rural areas.

[23] The disaggregation of the two process quality indicators by facility type is shown in Table 54 and Table 56 in
)

Table 16. Adherence to clinical guidelines by cadre

	All	Public	Private (non-profit)	Rural	Urban	Rural Public	Urban Public
All cadres	43.7%	42.7%	47.6%	41.7%	52.0%	41.1%	51.2%
Doctors	61.2%	60.9%	61.7%	69.2%	54.6%	72.5%	49.7%
Clinical officers	54.3%	52.4%	57.2%	53.9%	54.8%	51.7%	53.3%
Nurses	40.3%	40.4%	39.6%	39.4%	47.9%	39.7%	48.9%

95. How many providers adhered to all the guidelines for the five tracer cases? Figure 12a shows that less than 1% of providers adhered to at least 75% of the guidelines for every tracer condition. Using a lower threshold of 50%, Figure 12a shows that only 13% of providers adhered to at least half of the guidelines for each tracer condition.

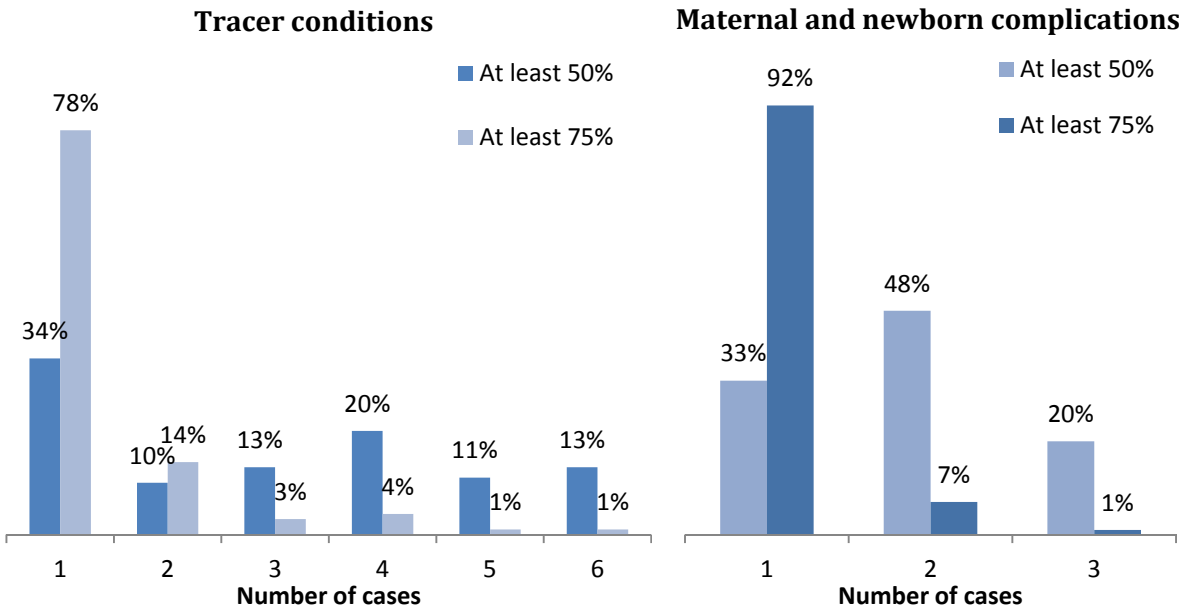
Process Quality: Management of maternal and neonatal complications

96. The second process quality indicator is clinicians' ability to manage maternal and neonatal complications. This indicator reflects the unweighted share of relevant treatment actions proposed by the clinician. The set of questions is restricted to core or important questions as expressed in the Integrated Management of Childhood Illnesses (IMCI). Public providers adhered to only 44.2% of the clinical guidelines for managing maternal and newborn complications, was not significantly different between private (non-profit) and public providers. This process quality was also found to progressively decline by cadre type (Table 17) and by facility level (Table 56in
97.).

Table 17. Management of maternal and neonatal complications by cadre

	All	Public	Private (non-profit)	Rural	Urban	Rural Public	Urban Public
All cadres	44.6%	44.2%	45.8%	43.6%	48.3%	43.4%	48.7%
Doctors	57.4%	57.1%	58.1%	72.0%	45.4%	75.3%	39.4%
Clinical officers	46.4%	45.6%	47.7%	45.4%	47.5%	43.1%	48.6%
Nurses	44.5%	44.5%	44.3%	43.8%	49.9%	44.0%	50.9%

Figure 12. Share of providers who attained a minimum share of adherence to the clinical guidelines by number of tracer conditions



98. It is disturbing that less than 1% of providers adhered to at least 75% of the guidelines for the two maternal and neonatal complications (Figure 12b). Using a lower threshold of 50%, Figure 12b shows that only 20% of providers adhered to at least half of the treatment actions for each of the two complications.

Inputs in Health Facilities

Drug Availability

99. 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 had to be unexpired and had 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.[24] The 10 tracer drugs for children and 16 tracer drugs for women are listed in Table 61[25] Some drugs are not dispensed at the lowest level facilities (dispensaries) and the

[24] WHO (2011). Priority medicines for mothers and children 20122. Geneva World Health Organization. www.who.int/medicinces/publications/A4prioritymedicines.pdf.

[25] Note, the two lists overlap by three drugs, so a total of 21 drugs are in the SARA list. Three additional drugs were added to the list of tracer drugs for women in the adaptation of the instrument for the Kenyan clinical guidelines. See Table 61 in

.

estimates of drug availability adjusted for level of facility are presented in Table 18 and Table 19.[26]

100. On average, public facilities had two thirds (66.8%) of the essential drugs available. The availability of essential drugs for children was relatively high (77.9%). Given the national concern about maternal mortality and efforts to improve maternal health outcomes, the availability of essential drugs for women was quite low at 58.4%. It is commonly reported that rural facilities suffer severe drug shortages compared to their urban counterparts. In Kenya, there was no evidence to support this. In fact, rural public facilities had 13% more (p=0.01) of essential drugs for children compared to urban public facilities. However, not a single health facility—including first level hospitals—had all the essential drugs for children and women.

Table 18. Drug availability (adjusted for facility type)

	All	Public	Private (non-profit)	Rural	Urban	Rural Public	Urban Public
All essential drugs	67.2%	66.8%	68.9%	67.3%	66.4%	67.2%	63.2%
Essential drugs for mothers	59.2%	58.4%	62.1%	58.7%	62.5%	58.4%	58.9%
Essential drugs for children	77.9%	77.9%	77.9%	78.9%	72.3%	79.0%	69.8%

Table 19. Drug availability by level of facility (adjusted for level of facility)

	All	Public	Private (non-profit)	Rural	Urban	Rural Public	Urban Public
Dispensaries	66.9%	66.9%	66.7%	67.1%	65.4%	67.3%	62.8%
Health centers	69.1%	67.6%	74.4%	70.0%	65.5%	68.7%	61.3%
First level hospitals	66.9%	62.9%	79.8%	63.9%	71.1%	60.5%	66.2%

Equipment availability

101. 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 sphygmonometer and a thermometer. In addition, it is expected that the following pieces of equipment be available at health centers and hospitals: sterilizing equipment and a refrigerator. Table 21 shows the

[26] The unadjusted estimates are shown in **Error! Reference source not found.** and **Error! Reference source not found.** in
.

availability of each of these types of equipment and Table 20 presents availability of minimum equipment adjusted by level of facility.[27]

102. More than three quarters (77.0%) of public facilities met the above mentioned requirements that make up the equipment indicator (Table 20). The public-private differences were especially large for dispensaries: private (non-profit) facilities exceeded public facilities by a third (31 percent; p=0.146) on the availability of equipment. Similarly, the public rural-urban differences were pronounced at the dispensary level (p=0.2538), but not at other levels of facility.

Table 20. Medical equipment availability (adjusted for level of facility)[28]

	All	Public	Private (non-profit)	Rural	Urban	Rural Public	Urban Public
All facilities	76.5%	72.4%	91.6%	74.5%	87.9%	70.5%	87.2%
Dispensaries	76.1%	71.2%	94.9%	74.0%	92.3%	69.4%	91.2%
Health centers	75.9%	75.2%	78.0%	73.4%	86.0%	73.1%	88.1%
First level hospitals	82.5%	81.4%	86.5%	88.4%	74.9%	85.5%	75.6%

Table 21. Availability of specific types of medical equipment

	All	Public	Private (non-profit)	Rural	Urban	Rural Public	Urban Public
Any scale (adult, child, infant)	98.7%	98.4%	99.6%	98.5%	99.4%	98.2%	100.0%
Thermometer	92.0%	90.8%	96.5%	91.2%	96.8%	90.1%	96.2%
Stethoscope	94.3%	92.9%	99.4%	93.8%	97.5%	92.4%	97.3%
Sphygmonometer	86.3%	83.1%	98.1%	84.5%	96.8%	81.6%	94.8%
Refrigerator (Health centers and First level hospitals only)	98.0%	98.2%	97.3%	99.2%	94.6%	100.0%	91.8%
Sterilization equipment (Health centers and First level hospitals only)	84.8%	85.3%	83.3%	83.0%	90.1%	83.2%	92.5%

103. There was no significant difference in the aggregate equipment indicator between public and private (non-profit) facilities (p=XXX). The availability of sphygmonometers and sterilization equipment is the most constraining pieces of equipment comprising the aggregate equipment indicator (Table 21). It is an important achievement that refrigeration is available in more than 98.2% of public health centers and first level hospitals, and in 100% of public rural health centers and hospitals.

[27] Table 65 shows the equipment indicator using only the following equipment: weighing scale (adult, child or infant), a stethoscope, a sphygmonometer and a thermometer.

[28] See Table 67 in
for availability of individual pieces of equipment across the various facility levels.

Infrastructure availability

104. The infrastructure indicator captures the availability of three inputs: water, sanitation and electricity. The indicator is an unweighted average of these three components.

105. In the public sector, more than three quarters of health centers (77.5%%) and nearly all first level hospitals (95.8%%) meet the minimum infrastructure requirements (Table 22). While the average estimates of individual components of infrastructure availability are relatively positive (80.0% have clean water, 73.0% have access to electricity and 95.3% have an improved toilets), when we assess the availability of *all* of the three inputs at the same time in the same facility, we find that only 56.9 percent of facilities have clean water and sanitation and electricity.In the public sector, electricity is an important infrastructure constraint: only 68.4% of public facilities had access to electricity. As shown in Table 23,the difference between public urban public was substantial (90.1% versus 68.4%; $p<0.005$).

Table 22. Infrastructure availability

	All	Public	Private	Rural	Urban	Rural Public	Urban Public
All facilities	56.9%	49.2%	85.6%	54.8%	68.7%	48.0%	58.1%
Dispensaries	49.8%	40.4%	85.9%	48.3%	61.2%	40.3%	41.1%
Health centers	77.5%	77.4%	78.0%	80.3%	65.8%	79.1%	67.0%
First level hospitals	95.8%	94.5%	100.0%	94.5%	97.7%	92.8%	96.9%

Table 23. Availability of specific types of infrastructure

	All	Public	Private (non-profit)	Rural	Urban	Rural Public	Urban Public
Clean water	80.0%	75.4%	97.3%	77.1%	97.1%	72.5%	97.6%
Toilet	95.3%	94.8%	97.2%	98.9%	73.9%	98.7%	64.3%
Electricity	73.0%	68.4%	90.1%	69.2%	95.4%	65.2%	93.7%

106. The breakdown of the source of water, electricity and sanitation reveals that under half of public facilities (42.7%) and 80.7% of private (non-profit) facilities were on the power grid. Urban facilities were also more likely to be on the power grid (94.6% compared to 43.2% of rural facilities). Other most common source of electricity is solar power, accounting for a quarter (25.2%) of public facilities and a much smaller share of private (non-profit) facilities (7.4%). It is notable that private (non-profit) facilities are most likely to suffer power outages (11.9%) compared to public facilities (8.9%) (see Figure 27 in

107.).

WHAT DOES THIS MEAN FOR KENYA?

108. **Kenya has invested heavily in education but less so in health**. Today the government spends more on education than any of its neighbors, both as a share as a share of government spending and as a share of GDP. Conversely, government spending on health is modest in relation to its regional comparators.[29] That said, Kenya has made tangible progress towards the health MDGs. Significant gaps remain—gaps which can only partly be explained by lack of resources.

109. **Fiscal headroom is facing competing demands.** The fiscal headroom for a budget increase for any sector in the immediate future is potentially constrained by the past and the present: fiscal expansion over the past few years needed to bolster the economy[30] and likely budgetary pressure posed by the new constitution's county reforms. More than ever before is it true that quality improvements in Kenya's health sector will have to initially come from productivity and efficiency gains. Furthermore, the success of the health sector in attracting a greater budget allocation will strongly bolstered by demonstrating value for money and the effectiveness of existing health spending.

110. **Some impressive past gains, but what next?** Kenya has made some phenomenal gains in recent years. For example, the infant mortality rate has fallen by 7.6% per year, the fastest rate of decline among 20 countries in the region. Arguably, the next set of gains will be more challenging—marginal women and children will become harder (and costlier) to reach, and addressing the performance gaps identified in the SDI survey at the frontline health facilities and service providers will be a critical determinant of progress.

111. The SDI results found that Kenya does relatively well on the availability of key inputs such as infrastructure, teaching and medical equipment, and textbooks. On measures of provider productivity and efficiency, the results were less positive. Regarding the availability of drugs, there are some important gaps: only two-thirds of the tracer drugs are available, and some gaps remain especially in the availability of tracer drugs for mothers. The greatest challenge is in the area of provider effort (evidenced by the provider absence data), and provider ability (evidenced by the assessments of providers' knowledge and abilities). High provider absence and sub-optimal provider ability suggest room for improvement in the efficiency of spending on human development and reflect systemic problems.

112. The results should not be viewed narrowly as a criticism of teachers or health providers, but as a snapshot of the state of the education and health systems as a whole. Over time, as the impact of reforms is tracked through repeat surveys in each country, the indicators will allow for

[29] In 2012 government health spending was 8.5% of total government spending, and government health expenditure has remained at a constant 4.8% of GDP since 2001.

[30] Expansionary fiscal policy years has caused the Kenyan government's 2012 budget to be at about 30 percent of GDP. Kenya' public sector debt has doubled between 2007 and 2012. Debt as a proportion of GDP has now increased by about 4 percentage points from 39 percent in 2007 to 43 percent at the end of 2012 but it is still below the policy target of 45 percent (World Bank, Kenya Public Expenditure Review, 2013).

tracking of efforts to improve service delivery systems. Valuable cross-country insights will also emerge as the database grows and more country partners join the SDI initiative.

113. Finally, improvements in service quality in Kenya can be accelerated through focused investments on reforms to the incentive environments facing providers, and in the skills of providers to ensure that inputs and skills come together at the same time and at the same place. This will be critical to ensure that Kenya's gains in human development outcomes continue beyond 2015, bringing the country closer to achieving the promises set out in the Vision 2030.

ANNEX A. Methodology

Education Survey

Sampling Strategy

1. Four data sources were used in developing the sampling frame for Kenya.
   - The 2007 School Facility Database was used to draw both the private and public samples, as it was the most complete listing available, providing GPS coordinates for contained both public and private schools.
   - 2006-2010 Kenya National Examination Council data provide pass rates on the national primary school leaving examination (the KCPE), which were used to stratify counties on examination performance.
   - The Kenya Private Schools Association database was used to confirm that the number of private schools in the 2007 database was close to a current figure.
   - Location-specific data on the fraction of the local population living in poverty, and the fraction living in urban areas, were based on 1999 data.

2. There are some concerns about the accuracy of the now five-year-old 2007 school list, which are intended to be handled during the preparations for field data collection.

Stratification

3. In general, the school list is to be disaggregated by sub-national strata (regions, provinces or districts) and urban/rural location. In the case of Kenya, 47 newly- formed counties are now the most salient administrative unit. We categorize counties as rural or urban based on county-level 1999 urbanization; relatively rich or poor based on county-level 1999 poverty rates; and high- or low-performing based on county-level 2010 KCPE passing rates. These three binary distinctions yield eight strata within which to sample schools. Within each stratum, counties are selected randomly; within each county, locations are selected randomly; and within a location, primary schools are selected randomly. In the cases of both counties and locations, the probability of selecting a county or a location is proportional to the population within it.

Scenarios

4. The sampling strategy represents a tradeoff: for a fixed sample size, the quality of between-county comparisons is most easily increased by sampling more schools from each of fewer counties, effectively decreasing the quality of the overall national measurement. Assuming data are collected on 240 public and 60 private schools (which is roughly in proportion to the numbers of schools of each type in Kenya), the resulting estimation standard errors are shown in Table 1 below for public and private schools under multiple scenarios.

5. Scenarios 1B and 2B represent extremes; scenarios 3B and 4B are more plausible. To manage the tradeoff between county-specific and national estimates, we can oversample schools in a small number of counties to measure regional differences precisely, then randomly sample

additional counties to form the rest of the national sample. This option is shown in Scenarios 5B and 6B.

Sample size and level of power

To anticipate the statistical properties of the sample, we use an intra-cluster correlation of 11.7 percent for teacher absenteeism, and 9.4 percent for pupil literacy, both derived from the Tanzania SDI pilot data. Of the six different public school scenarios illustrated below, we chose Scenario 6B. It is only slightly less precise at the national level than other plausible scenarios, and gives us four counties to oversample. Since this requires data collection in a total of 20 counties, we then chose Scenario 2C for the private schools.

6. At the national level, this gives us an anticipated standard error of 1.6 percentage points for absenteeism, and 4.4 percentage points for pupil literacy. At the county level, we anticipate a standard error of 3.1 percent for absenteeism and 9.0 percent for literacy. In any county-county comparison of absenteeism, for example, this means a county-level minimum detectable effect of 12.3 percentage points, with power !Z=0.8 and confidence level 95% (!Z=0.05).

Selecting counties

7. Four counties were hand-picked for oversampling based on their characteristics. They are:

- Nairobi - As the capital, it is exceptional in every way.
- Nyandarua - Another urban area, but with relatively poor KCPE performance
- considering its low poverty rate.
- Nyamira and Siaya - Both relatively rural, in Nyanza province, and with high poverty rates, these two counties have very different performances on the KCPE.

8. After choosing these four counties, there are 40 counties remaining, excluding three counties of North Eastern province due to current security concerns. Of these 40, sixteen were chosen at random - two from each of eight strata, as outlined above. In the four oversampled counties, the 28 schools per county were drawn from potentially all administrative locations within the county; in the other sixteen counties, the eight schools per county were drawn from two randomly chosen locations within the county. Though there may be a small statistical cost, sampling from two locations rather than all locations is done in order to make the actual collection of data more logistically straightforward. Finally, backup schools were drawn from each location in case the 2007 list is proven to include schools which no longer exist.

9. For private schools, three schools were chosen completely at random from each of the twenty sampled counties, with backups selected at the county level in case the sampling frame included non-existent schools.

Survey Instrument

Table 24. Health SDI/PETS+ survey instrument

Module	Description
Module 1: Facility Questionnaire Section A: General Information Section B: General Information Section C: Infrastructure	Administered to the head of the school to collect information about school type, facilities, school governance, pupil numbers and school hours. Includes direct observations of school infrastructure by enumerators.
Module 2: Staff Roster Section F: Facility First Visit Section G: Facility Second Visit	Administered to head teacher and individual teachers to obtain a list of all school teachers, to measure teacher absence and to collect information about teacher characteristics.
Module 3: School Finances	Administered to the head teacher to collect information about school finances.
Module 4: Classroom observation Time on task Classroom environment Teaching activities	An observation module to assess teaching activities and classroom conditions.
Module 5: Pupil Assessment	
Module 5: Teacher Assessment	

Definition of Indicators

Table 25. Nomenclature and definition of Education Service Delivery Indicators

School absence rate	
Share of a maximum of 10 randomly selected teachers absent from school during an unannounced visit.	During the first announced visit, a maximum of ten teachers are randomly selected from the list of all teachers who are on the school roster. The whereabouts of these ten teachers are then verified in the second, unannounced, visit. Teachers found anywhere on the school premises are marked as present.
Classroom absence rate	
Share of teachers who are present in the classroom out of those teachers present at school during scheduled teaching hours as observed during an unannounced visit.	The indicator is constructed in the same way as School Absence Rate indicator, with the exception that the numerator now is the number of teachers who are both at school and in the classroom. The denominator is the number of teachers who are present at the school. A small number of teachers are found teaching outside, and these are marked as present for the purposes of the indicator.
Classroom teaching time (also known as Time on Task)	
Amount of time a teacher spends teaching during a school day.	This indicator combines data from the Staff Roster Module (used to measure absence rate), the Classroom Observation Module, and reported teaching hours. The teaching time is adjusted for the time teachers are absent from the classroom, on average, and for the time the teacher remains in classrooms based on classroom observations recorded every 5 minutes in a teaching lesson. Distinction is made between teaching and non-teaching activities based on classroom observation done inside the classroom. Teaching is defined very broadly, including actively interacting with students, correcting or grading student's work, asking questions, testing, using the blackboard or having students working on a specific task, drilling or memorization, and maintaining discipline in class. Non-teaching activities is defined as work that is not related to teaching, including working on private matters, doing nothing and thus leaving students not paying attention, or leaving the classroom altogether.
Minimum knowledge among teachers	
Share of teachers with minimum knowledge	This indicator measures teacher's knowledge and is based mathematics and language tests covering the primary curriculum administered at the school level to all teachers of Grade 4.
Textbooks per student	
Number of mathematics and language books used in a grade 4 classroom divided by the number of students present in the classroom	The indicator is measured as the number of mathematics and language books that students use in a grade 4 classroom divided by the number of students present in the classroom. The data will be collected as part of the classroom observation schedule.
Student/teacher ratio	

Average number of grade 4 pupils per grade 4 teacher.	The indicator of teachers' availability is measured as the number of students per teacher based on the Classroom Observation Module, where the number of students are counted per teacher teaching.
Teaching Equipment availability	
Unweighted average of the proportion of schools with the following available: functioning blackboard with chalk, pencils and notebooks.	Minimum teaching resources is assigned 0-1 capturing availability of (i) whether a grade 4 classroom has a functioning blackboard and chalk, (ii) the share of students with pens, and (iii) the share of students with notebooks, giving equal weight to each of the three components. Functioning blackboard and chalk: The enumerator assesses if there was a functioning blackboard in the classroom, measured as whether a text written on the blackboard could be read at the front and back of the classroom, and whether there was chalk available to write on the blackboard. Pencils and notebooks: The enumerator counts the number of students with pencils and notebooks, respectively, and by dividing each count by the number of students in the classroom one can then estimate the share of students with pencils and the share of students with notebooks.
Infrastructure availability	
Unweighted average of the proportion of schools with the following available: functioning electricity and sanitation.	Minimum infrastructure resources is assigned 0-1 capturing availability of: (i) functioning toilets operationalized as being clean, private, and accessible; and (ii) sufficient light to read the blackboard from the back of the classroom, giving equal weight to each of the two components. Functioning toilets: Whether the toilets were functioning was verified by the enumerators as being accessible, clean and private (enclosed and with gender separation). Electricity: Functional availability of electricity is assessed by checking whether the light in the classroom works gives minimum light quality. The enumerator places a printout on the board and checks (assisted by a mobile light meter) whether it was possible to read the printout from the back of the classroom given the slight source.
Education expenditure reaching primary school	
Education expenditure reaching primary school	The indicator of availability of resources at the primary school level assesses the amount of resources available for services to students at the school. It is measured as the recurrent expenditure (wage and non-wage) reaching the primary schools per primary school age student in US dollars at Purchasing Power Parity (PPP). Unlike the other indicators, this indicator is not a school-specific indicator and is calculated as the amount of resources reached per surveyed school, and then sample weights are used to estimate value for the population (of all schools) in aggregate. Quantities and values of in kind items were collected as part of the survey and when values of in kind items were missing, average unit costs were inferred using information from other surveyed schools. Sources for the number of primary school age children, broken down by rural and urban location, are the Ministry of Education and Vocational Training (2010) for Tanzania and ANSD (2008) for Senegal.

Health Survey

Sampling Strategy

10. The unit of analysis in this survey is the health facility - for indicators measuring inputs and resources at the health facility level and the health workers for those indicators measuring provider effort and competency. Because of its focus on the provider experience of the average Kenyan, the survey covers only government and private (non- profit) (i.e. faith-based and NGOs) facilities. The Health SDI/PETS+ sample used in Kenya is summarized in Table 5, and the sampling strategy used to arrive at this sample is described below.

11. The sampling strategy represents a tradeoff: for a fixed sample size, the quality of between-county comparisons is most easily increased by sampling more facilities from each of fewer counties, effectively decreasing the quality of the overall national measurement. 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 counties (versus facilities) in order to manage the geographic spread of the sample.

Sampling Frame

12. The target population is the population of Kenya, with the counties of the Northeast Province being excluded because of inaccessibility for security reasons. Four data sources were used in developing the sampling frame: (i) Public facilities: Ministries of Health; (ii) Private (non-profit) facilities: [state source]; (iii) Location-specific data on the fraction of the local population living in poverty was obtained from the Kenya National Bureau of Statistics; and (iv) 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 and private (non-profit) organization (NGOs)/Faith-based organizations (FBOs) is complete, and that the poverty data are the latest available. Population estimates were obtained from the latest population projections for 2009 provided by the Kenya National Bureau of Statistics, using the latest census (2009) data.

13. In any country there are numerous types of facilities. The facility list was restricted to three major categories: Dispensaries; Health centers (including medical clinics); District hospitals (including sub-district hospitals). Taking ownership into account, the facilities were then aggregated into six categories (the assumptions and definitions used are shown in **Error! Reference source not found.**).

Stratification

14. In general, the facilities list is to be disaggregated by sub-national strata (regions, provinces or districts) and urban/rural location. In the case of Kenya, 47 newly-formed counties are now the most salient administrative unit. Based on the most recent available from national statistical authority, the counties were categorize as rural or urban and poor on non-poor. These two binary distinctions yield four strata within which to sample facilities. Within each stratum, counties are selected randomly; within each county, locations are selected randomly; and within a location, facilities are selected randomly. In the cases of both counties and locations, the probability of selecting a county or a location is proportional to the population within it.

Table 26. Service delivery activities and staffing norms by level of facility

Level of facility	Service delivery activities
Level 1 – Community Health Unit: population of 5,000 ▪ 50 CORPS ▪ No support staff	Consists of households, communities, and villages. Activities encourage healthy behaviors and assist community members to identify symptoms of conditions that need to be managed at other levels of care.
Level 2 – Dispensaries and/or Clinics: population 10,000 (rural) - 15,000 (urban). ▪ 4 nurses and community health workers ▪ 4 support staff	Interface between the community and health system facilities. Responsible for engaging the community and its structures through curative, promotive, preventive, and rehabilitative care at the most basic levels, as well as participating in the census, keeping health records, and micro-planning to contribute to the AOP and ensure that all communities are receiving care.
Level 3 – Health Centers, Maternities, Nursing Homes: population 30,000 – 40,000 ▪ 35 health workers ▪ 9 support staff	Provides Level 2 services for its immediate catchment population (10,000-15,000), and additional support services for Level 2 facilities including: higher level health activities; recognizing and facilitating referral services; providing logistical support to level 2 facilities (e.g., cold chain support for KEPI); and coordinating information flow. This level's additional health activities include: additional outpatient care (limited to minor out-patient surgery); limited emergency inpatient services (emergency inpatients, awaiting referral, 12-hour observation, etc.); limited oral health services; individual health education; maternal care for normal deliveries; specific laboratory tests (routine lab, including malaria; smear test for TB; HIV testing).
Level 4 – Primary Hospitals (District and sub-District hospitals): population 100,000 (rural) – 200,000 (urban). ▪ 167 health workers ▪ 22 support staff	Principal referral level for all KEPH interventions from levels 1-3 and includes management functions supported by the DMOH and district partners. Its focus is appropriate curative care through primary hospitals which provide Levels 2 and 3 functions for their surrounding areas, but the hospitals also provide: clinical supportive supervision to levels 2-3, higher level health activities, recognizing and facilitating referrals, providing logistical support, and coordinating information flow from facilities in the catchment. Additional health activities added at this level include: referral level outpatient care, inpatient services, emergency obstetric care, oral health services, surgery on inpatient basis, client health education, more specialized laboratory tests, and radiology services.

<u>County and Facility Selection</u>

15. Nairobi was pre-selected because as the capital it is exceptional. Similarly, Mombasa was pre-selected. After pre-selecting Nairobi and Mombasa, along with three other "case study" counties, the remaining ten counties were selected randomly with the exclusion of three counties of North Eastern province due to security concerns. Of these counties, ten were chosen at random—two or three from each of four strata, as outlined above.

16. 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 easereplacement facilities were selected in keeping with the probability sampling approach.

17. For private (non-profit) facilities, the facilities were chosen completely at random from each of the twenty sampled counties, with backups selected at the county level in case the sampling frame included non-existent facilities.

Table 27. Selected counties

	Province	County		Province	County
1	Western	Bungoma	9	Rift Valley	Nakuru
2	Nyanza	Homa Bay	10	Nyanza	Nyamira
3	Coast	Kilifi	11	Central	Nyandarua
4	Central	Kirinyaga	12	Nyanza	Siaya
5	Eastern	Kitui	13	Rift Valley	Trans Nzoia
6	Eastern	Makueni	14	Rift Valley	Uasin Gishu
7	Coast	Mombasa	15	Rift Valley	West Pokot
8	Nairobi	Nairobi			

Notes: [1.] Nairobi and Mombasa, as the two most populous cities, and the capital (in the case for Nairobi), were pre-selected for their specific importance.

Sample size and level of power

18. To anticipate the statistical properties of the sample, an intra-cluster correlation of selected service delivery indicators from the Tanzania SDI pilot data were used. This was used to generate various scenarios (showing number of counties, number of facilities per county, statistical properties associated with selected indicators for national-level and health center-level comparisons). Th estatistical propoerties). The minimum detectable effect (in terms of percetage points) shwon in the scenarios is what can be detected with power □=0.8 and confidence level 95% (□=0.05).]

Table 28. Precision of estimates for selected SDI/PETS+ variable

Number of Counties sampled	15
Resulting Health Center Confidence Interval (+/-):	**11.875%**
Resulting National Confidence Interval (+/-):	**4.421%**
Facilities per county[1]	
Public Hospital	2
Public Health Centre	6
Public Dispensary	2
FB/NGO Hospital	1
FB/NGO Health Centre	6
FB/NGO Dispensary	2
Average facilities per county	19
Total facility count	302

Notes: [1.] In Nairobi, twice as many facilities of each facility-type (other than hospital) was sampled.

Survey Instrument

The survey instrument consists of the six modules composed as follows:

Table 29. 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 F: Facility First Visit Section G: Facility Second Visit	Administered to the in-charge or the most senior medical staff at the facility. Administered to (a maximum of) ten medical staff randomly selected from the list of all medical staff. Second visit is administered to the same ten medical staff as in module 4. An unannounced visit about a week after the initial survey to measure the absence rates.
Module 3: Clinical Knowledge Assessment Section H: Preliminary Information Section I: Introduction Section J: Illustration Section K: Case Study Simulations Malaria with anemia Diarrhea with severe dehydration; Pneumonia Pulmonary tuberculosis Diabetes Post-partum hemorrhage Neonatal asphyxia	Administered to medical staff in facility to assess clinical performance.
Module 4: Public Expenditure Tracking Section Q: General Section R: User fees Section S: HSSF/HMSF Section T: Medicines and Medical Supplies Distribution	Administered to the in- charge or the most senior medical staff at the facility.

Definition of Indicators

Table 30. Nomenclature and definition of Health Service Delivery Indicators

Student/teacher ratio	
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 workers who conduct patient consultations (i.e. excluding cadre-types such as public health nurses and out-reach workers).
Absence rate	
Average share of staff not in the facilities as observed during one unannounced visit.	Number of health workers that are not off duty who are absent from the facility on an announced visit as a share of ten randomly sampled workers. 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 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 case study patients: (i) malaria with anemia; (ii) diarrhea with severe dehydration; (iii) pneumonia; (iv) pulmonary tuberculosis; and (v) diabetes. History Taking Questions: Assign a score of one if a relevant history raking question is asked. The number of relevant history taking questions asked by the clinician during consultation is expressed as a percentage of the total number of relevant history questions included in the questionnaire. Relevant Examination Questions: Assign a score of one if a relevant examination question is asked. The number of relevant examination taking questions asked by the clinician during consultation is expressed as a percentage of the total number of relevant examination questions included in the questionnaire. For each case study patient: 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 Kenya 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 case study patients: (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 case studies.	For each of the following five case study patients: (i) malaria with anemia; (ii) diarrhea with severe dehydration; (iii) pneumonia; (iv) pulmonary tuberculosis; (v) diabetes. For each case study patient, assign a score of one as correct diagnosis for each case study patient if case is mentioned as diagnosis. Sum the total number of correct diagnoses identified. Divide by the total number of case study patients. 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 facility 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, sphygmonometers 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. Sphygmonometer: Assign score of one if facility reports and enumerator confirms facility has one or more functioning sphygmonometers. 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, harvested rainwater. Sanitation: Assign score of one if facility reports and enumerator confirms facility has one or more functioning flush toilets or VIP latrines, overed pit latrine (with slab, composting toilet..

ANNEX B. Additional and More Detailed Results: Education

Table 31. Teacher effort and knowledge

	All	Public	Private	Diff.	Urban Public	Rural Public	Diff.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Absence from school	15.5%	16.4%	13.7%	-2.7%	13.7%	17.2%	-3.5%
Absence from classroom	42.2%	47.3%	30.7%	-16.7%***	42.6%	48.8%	-6.1%
Share of teachers with minimum [illegible]	39.4%	35.2%	49.1%	14.0%***	32.9%	35.8%	-2.9%
Time spent teaching in the [illegible]	2 h 40 min	2 h 19 min	3 h 28 min	1 h 9 min***	2 h 37 min	2 h 13 min	24 min
Minimum teaching resources (% [illegible]	95.0%	93.6%	98.2%	4.6%***	93.7%	93.5%	0.0%
Minimum school infrastructure [illegible]	58.8%	58.5%	59.3%	0.8%	58.0%	58.7%	0.7%
Student-teacher ratio	32.0	37.1	20.8	-16.0***	40.8	35.9	4.9***
Students per textbook	3.1	3.5	2.2	-1.25***	2.5	3.8	-1.26***
Obs.	306	239	67		66	173	

Note: Weighted means using sampling weight. Results based on observations from 2960 teachers in 306 schools. Data collapsed at the school level. Diff. in column 4 (7) is differences in means between private and public (urban and rural) schools. Superscript (*) denotes that the difference in means, using standard errors clustered at the school level, is significant at the *** 1% , ** 5% , * 10% significance level.

Table 32. Teacher characteristics

	All	Public	Private	Diff.
	(1)	(2)	(3)	(4)
Age	36.7	40.1	28.8	-11.3***
Female	54.2%	51.9%	59.6%	7.8%***
Experience	12.5	15.6	5.5	-10.1***
Highest Grade	5.4	5.7	4.8	-0.9***
Education completed	2.8	2.8	2.6	-0.2***
Teacher training	2.0	2.3	1.4	-0.8***
Permanent contract	64.4	81.6	23.4	-58.1***
Seniority	4.9	4.7	5.3	0.6***
Born in District	62.6%	69.2%	47.3%	-22.0%***
Obs.	2,960	2,333	627	

Note: Weighted means using sampling weight. Results based on observations from 2960 teachers in 306 schools. Data collapsed at the school level. Diff. is differences in means between private and public schools.

Definition of regressors:

- "Experience" denotes the number of years the teacher has been teaching.
- "Highest Grade" denotes the highest grade in which the teacher is teaching in the school.
- “Education completed” is an ordinal variable coded as 0 if the teacher has no education, 1 if the teacher has completed primary education, 2 if the teacher has completed secondary education, 3 if the teacher has a diploma/certificate, 4 if the teacher has a university bachelor degree and 5 if the teacher has a masters’ degree.
- "Teacher training" is an ordinal variable coded as 0 if the teacher has no training, 1 if the teacher has an Early Childhood Education certificate, 2 if the teacher has a primary 1 certificate, 3 if the teacher has a primary 2 certificate, 4 if the teacher has a diploma in teaching and5 if the teacher has a university degree in education. Other categories such as special needs education are excluded.
- “Seniority” is an ordinal variable coded as 1 if the teacher is a volunteer, 2 if the teacher is a paid contract teacher, 3 if the teacher is a permanent (government teacher), 4 if the teacher is senior teacher, 5 if the teacher is the deputy head teacher, 6 if the teacher is the head teacher/principal and 7 if the teacher is the owner/director of the school.
- “Permanent contract” is set to 1 if the teacher has a permanent contract and zero otherwise. "Born in the district" is a dummy set to 1 if the teacher is born in the same district as the school where he/she works and zero otherwise.
- Superscript (*) denotes that the difference, using standard errors clustered at the school level, is significant at the *** 1% , ** 5% , * 10% significance level.

Table 33. Correlates of Teacher Effort

	Corr. with absence from school	Corr. with absence from class
Age	0.001	0.006***
	(0.0009)	(0.001)
Female	-0.015	-0.163***
	(0.017)	(0.024)
Experience (years taught)	0.000	0.005***
	(0.0009)	(0.001)
Highest Grade taught	-0.001	0.026***
	(0.003)	(0.004)
Education completed	0.009	0.087***
	(0.015)	(0.022)
Teacher Training	0.002	0.037***
	(0.008)	(0.01)
Permanent contract	0.023	0.139***
	(0.022)	-0.029
Seniority	0.016**	0.075***
	(0.008)	(0.01)
Born in District	0.042**	0.133***
	(0.02)	(0.029)
Obs.	2,960	2,960

The correlations are based on a regression of absence from school or classroom separately on each of the reported correlates and a constant. The regression uses sampling weights. For definitions of the regressors, see Table 32. Robust standard errors in parentheses, clustered at the village level. *** 1% , ** 5% , * 10% significance.

Table 34. Teacher Effort, Auxiliary Information

	All	Public	Private	Diff (% point)	Urban Public	Rural Public	Diff (% point)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Absence from school	15.5%	16.4%	13.7%	-2.7%	13.7%	17.2%	-3.5%
Absence from classroom	42.2%	47.3%	30.7%	-16.7%***	42.6%	48.8%	-6.1%
Time spent Teaching	2 h 40 min	2 h 19 min	3 h 28 min	1 h 9 min	2 h 38 min	2 h 14 min	24 min
Auxiliary information							
Proportion of lesson spent teaching	81.4%	77.9%	89.3%	11.4%	82.1%	76.6%	5.6%
Scheduled teaching day	5 h 42 min	5 h 35 min	5 h 54 min	18 mins	5 h 33 min	5 h 37 min	-4 min
Classrooms with pupils but no teacher	30.8%	36.0%	19.2%	-16.8%***	35.9%	36.4%	-0.6%
Obs.	306	239	67		66	173	

Note: Weighted means using sampling weight. Results based on observations from 2,960 teachers in 306 schools. Data collapsed at the school level. Diff. in column 4 (7) is differences in means between private and public (urban and rural) schools. Superscript (*) denotes that the difference, using standard errors clustered at the school level, is significant at the ***1% , ** 5% , * 10% significance level.

Table 35. Teacher Assessment

	All	Public	Private	Diff (% point)	Urban Public	Rural Public	Diff (% point)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Share of Teachers with minimum knowledge	39.4%	35.2%	49.1%	14.0%***	32.9%	35.8%	-2.9%
Average score on test							
Average score on test (English, Maths and Pedagogy)	57.2%	56.2%	59.6%	3.5%***	54.4%	56.7%	-2.2%*
Average score on test (English and Maths)	74.1%	72.9%	76.4%	3.5%***	71.6%	73.3%	-1.7%
Difference in thresholds							
Minimum knowledge: 100 %	5.6%	5.9%	4.9%	-1.0%	5.7%	5.9%	0.3%
Minimum knowledge: 90 %	13.6%	13.4%	14.0%	0.6%	13.1%	13.5%	-0.3%
Minimum knowledge: 80 %	39.4%	35.2%	49.1%	14.0%***	32.9%	35.8%	-2.9%
Minimum knowledge: 70 %	65.7%	61.4%	75.6%	14.2%***	60.7%	61.6%	-0.9%
Obs.	306	239	67		66	173	

Note: Weighted means using sampling weight. Results based on observations from 2,960 teachers in 306 schools. 1,157 teachers either teach English or both English and Mathematics and1174 teachers who teach either Mathematics or both English and Mathematics. Data collapsed at the school level. Diff. in column 4 (7) is differences in means between private and public (urban and rural) schools. Superscript (*) denotes that the difference, using standard errors clustered at the school level, is significant at the *** 1% , ** 5% , * 10% significance level.

Table 36. Teacher Assessment: Disaggregation

	All	Public	Private	Diff (% point)	Urban Public	Rural Public	Diff (% point)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fraction correct on English Section	64.6%	63.7%	66.6%	2.9%*	63.4%	63.8%	-0.4%
Fraction correct on Maths Section	80.6%	79.7%	82.7%	3%*	77.8%	80.3%	-2.4%
Fraction correct on Pedagogy Section	35.9%	35.1%	37.8%	2.8%	33.6%	35.5%	-1.9%
English							
Minimum knowledge: 100 % correct	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Minimum knowledge: 90 % correct	0.1%	0.2%	0.0%	-0.2%	0.0%	0.3%	-0.3%
Minimum knowledge: 80 % correct	10.1%	8.7%	13.2%	4.5%	9.1%	8.6%	0.5%
Minimum knowledge: 70 % correct	37.0%	33.2%	45.6%	12.5%**	36.0%	32.3%	3.7%
Mathematics							
Minimum knowledge: 100 % correct	13.3%	14.3%	11.0%	-3.3%	12.8%	15.1%	-2.4%
Minimum knowledge: 90 % correct	33.8%	34.2%	32.9%	-1.2%	27.5%	36.2%	-8.7%*
Minimum knowledge: 80 % correct	75.3%	72.3%	82.0%	9.7%**	71.0%	72.6%	-1.6%
Minimum knowledge: 70 % correct	84.9%	82.8%	89.7%	6.9%*	79.8%	83.7%	-4.0%
Pedagogy							
Minimum knowledge: 100 % correct	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Minimum knowledge: 90 % correct	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Minimum knowledge: 80 % correct	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Minimum knowledge: 70 % correct	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Obs.	306	239	67		66	173	

Note: Weighted means using sampling weight. Results based on observations from 2,960 teachers in 306 schools. Data collapsed at the school level. Diff. in column 4 (7) is differences in means between private and public (urban and rural) schools. Superscript (*) denotes that the difference, using standard errors clustered at the school level, is significant at the *** 1% , ** 5% , * 10% significance level.

Table 37. English Section

	All	Public	Private	Diff (% point)	Urban Public	Rural Public	Diff (% point)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fraction correct on English section	64.6%	63.7%	66.6%	2.9%*	63.4%	63.8%	-0.4%
Fraction correct on grammar task	92.9%	92.2%	94.6%	2.4%***	92.6%	92.1%	0.5%
Fraction correct on Cloze task	68.6%	67.6%	70.9%	3.3%	69.3%	67.0%	2.3%
Fraction correct on composition task	50.9%	50.0%	53.0%	3.0%	48.5%	50.5%	-1.9%
Obs.	306	239	67		66	173	

Note: Weighted means using sampling weight. Results based on observations from 2,960 teachers in 306 schools. 1,157 teachers either teach English or both English and Mathematics and1174 teachers who teach either Mathematics or both English and Mathematics. Data collapsed at the school level. Diff. in column 4 (7) is differences in means between private and public (urban and rural) schools. Superscript (*) denotes that the difference, using standard errors clustered at the school level, is significant at the *** 1% , ** 5% , * 10% significance level.

Table 38. Mathematics Section

	All	Public	Private	Diff (% point)	Urban Public	Rural Public	Diff (% point)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fraction correct on Math	80.6%	79.7%	82.7%	3.0%*	77.8%	80.3%	2.5%
Fraction correct on Lower Primary	82.2%	81.5%	83.9%	2.4%	79.4%	82.1%	-2.8%
Fraction correct on Upper Primary	77.7%	76.4%	80.6%	4.2%*	75.0%	76.8%	-1.8%
Adding double digit numbers	97.2%	97.1%	97.3%	0.2%	95.4%	97.6%	-2.3%
Substracting double digit numbers	88.0%	87.0%	90.2%	3.2%	84.6%	87.7%	-3.1%
Adding triple digit numbers	87.5%	87.5%	87.5%	0.1%	86.5%	87.7%	-1.2%
Dividing double by single	88.0%	86.6%	91.2%	4.6%*	82.1%	88.0%	-5.9%
Multiplying two digit numbers	86.8%	86.5%	87.6%	1.1%	85.3%	86.9%	-1.5%
Adding decimals	76.6%	72.5%	85.7%	13.2%***	72.2%	72.6%	-0.4%
Division of two digit numbers - Conceptual understanding	89.9%	88.3%	93.7%	5.4%**	85.9%	89.0%	-3.1%
Comparing fractions with different denominators	47.9%	49.6%	44.1%	-5.5%	41.7%	52.0%	-10.2%**
Monetary units - Multiplication	82.8%	82.6%	83.3%	0.7%	78.4%	83.9%	-5.5%*
Geometry - 2D Shapes	94.0%	94.3%	93.2%	-1.1%	90.0%	95.6%	-5.6%*
Geometry - types of lines	93.6%	93.2%	94.5%	1.3%	88.3%	94.7%	-6.4%**
Time (reading a clock) - Problem Solving	76.9%	76.2%	78.3%	2.0%	71.6%	77.7%	6.1%
Interpreting Data on a Venn Diagram	72.8%	72.0%	74.4%	2.3%	69.6%	72.8%	3.2%
Interpreting Data on a Graph	66.7%	65.1%	70.3%	5.2%	62.9%	65.7%	-2.8%
Square root (no remainder)	87.8%	85.9%	91.8%	5.9%**	82.9%	86.9%	-3.9%
Subtraction of numbers with decimals	82.1%	78.9%	89.9%	11.2%***	73.0%	80.4%	-7.5%
Division of Fractions	69.0%	65.5%	76.7%	11.2%	57.7%	67.6%	-8.9%*
One Variable Algebra	72.3%	70.6%	76.3%	5.8%	65.2%	72.2%	-7.0%
Geometry - computing perimeter of a rectangle	80.3%	78.2%	85.0%	6.8%*	73.6%	79.6%	-6.0%
Geometry - computing area of a rectangle	73.8%	71.6%	78.8%	7.2%*	69.8%	72.2%	-2.4%
Obs.	304	237	67		65	172	

Note: Weighted means using sampling weight. Results based on observations from 1,174 teachers in 304 schools that who either teach Mathematics or both English and Mathematics. Data collapsed at the school level. Diff. in column 4 (7) is differences in means between private and public (urban and rural) schools. Superscript (*) denotes that the difference, using standard errors clustered at the school level, is significant at the *** 1% , ** 5% , * 10% significance level.

Table 39. Pedagogy Section

	All	Public	Private	Diff (% point)	Urban Public	Rural Public	Diff (% point)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fraction correct on Pedagogy Section	35.9%	35.1%	37.8%	2.8%	33.6%	35.5%	-1.9%
Fraction correct on basic Pedagogy Section	37.0%	36.0%	39.3%	3.3%	34.0%	36.6%	-2.6%
Fraction correct on advanced Pedagogy Section	35.1%	34.4%	36.7%	2.3%	33.4%	34.7%	-1.3%
Preparing a lesson plan	40.4%	40.0%	41.3%	1.3%	39.4%	40.2%	-0.8%
Assessing children's abilities	33.8%	32.5%	36.7%	4.1%*	31.3%	32.9%	-1.6%
Evaluating students' progress	29.4%	28.4%	31.6%	3.2%	24.3%	29.7%	-5.4%
Obs.	306	239	67		66	173	

Note: Weighted means using sampling weight. Results based on observations from 1,174 teachers in 304 schools that who either teach Mathematics or both English and Mathematics. Data collapsed at the school level. Diff. in column 4 (7) is differences in means between private and public (urban and rural) schools. Superscript (*) denotes that the difference, using standard errors clustered at the school level, is significant at the *** 1% , ** 5% , * 10% significance level.

Table 40. Correlation of Teacher Knowledge

	Corr. with Total score	Corr. with English Score	Corr. with English (80%)	Corr. with Math Score	Corr. with Math (80%)	Corr. with Pedagogy score
	(1)	(2)	(3)	(4)	(5)	(6)
Age	-0.001*	-0.002***	-0.003***	-0.001	-0.004*	-0.001**
	(0.0001)	(0.0005)	(0.0009)	(0.0008)	(0.002)	(0.0007)
Female	0.015**	-0.001	-0.012	0.03**	0.121***	0.005
	(0.007)	(0.009)	(0.021)	-0.013	-0.033	-0.01
Experience	-0.003***	-0.001***	-0.002***	-0.004***	-0.010***	-0.003***
	(0.0004)	(0.0005)	(0.0009)	(0.0006)	(0.002)	(0.0005)
Highest Grade taught	0.01***	0.011***	0.009*	0.02***	0.053***	0.013***
	(0.002)	(0.002)	(0.005)	(0.003)	(0.009)	(0.003)
Education completed	0.018***	0.028***	0.045***	0.027***	0.037	0.027***
	(0.005)	(0.007)	(0.013)	(0.01)	(0.025)	(0.008)
Teacher Training	0.001	0.004	0.013	0.005	-0.003	0.007
	(0.003)	(0.004)	(0.008)	(0.005)	(0.013)	(0.004)
Permanent Contract	-0.017*	-0.016	-0.020	-0.028	-0.034	-0.006
	(0.01)	(0.011)	(0.022)	(0.017)	(0.02)	(0.015)
Seniority	-0.001	-0.002	-0.001	-0.008	-0.002	0.006
	(0.004)	(0.004)	(0.012)	(0.007)	(0.022)	(0.005)
Obs.	1,678	1,157	1,157	1,174	1,174	1,678

The correlations are based on regressions of each dependent variable (top row) separately on each of the reported correlates and a constant. The regression uses sampling weights. For definitions of the regressors, see Table 32. Robust standard errors in parentheses, clustered at the village level. *** 1% , ** 5% , * 10% significance.

Table 41. At the School, auxiliary information

	All	Public	Private	Diff (% point)	Urban Public	Rural Public	Diff (% point)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Availability of teaching resources							
Share of stud. with pencils	97.9%	97.2%	99.2%	2.0%**	97.7%	97.1%	0.6%
Share of stud. with paper	98.2%	97.5%	99.8%	2.4%**	99.9%	96.7%	3.2%**
Have black board	99.0%	98.5%	100.0%	1.5%	100.0%	98.0%	2.0%
Chalk	93.0%	91.6%	96.0%	4.4%	90.7%	91.9%	-1.3%
Sufficient contrast to read board	95.1%	93.7%	98.1%	4.4%*	90.2%	94.8%	-4.6%
Functioning school infrastructure							
Visibility judged by enumerator	86.2%	85.5%	87.6%	2.1%	84.8%	85.8%	-1.0%
Toilet clean	73.6%	75.3%	69.8%	-5.5%	74.2%	75.6%	-1.4%
Toilet private	95.3%	93.2%	100.0%	6.8%***	96.4%	92.3%	4.2%
Toilet accessible	97.9%	96.9%	100.%	3.1%**	96.6%	97.0%	-0.5%
Student-teacher ratio							
Pupils per teacher	30.2	34.9	19.7	-15.2***	34.6	35.1	-0.5
Textbooks per student							
Share of stud. With text book (English)	3.5	4.1	2.2	-1.91***	2.8	4.4	-1.6**
Share of stud. With text book (Math)	2.6	2.8	2.3	-0.59	2.3	3.0	-0.8***
Obs.	306	239	67		66	173	

Note: Weighted means using sampling weight. Results based on observations from 2960 teachers in 306 schools. Data collapsed at the school level. Diff. in column 4 (7) is differences in means between private and public (urban and rural) schools. Superscript (*) denotes that the difference, using standard errors clustered at the school level, is significant at the *** 1% , ** 5% , * 10% significance level.

Table 42. Student performance

	All	Public	Private	Diff (% point)	Urban Public	Rural Public	Diff (% point)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Avg. Score (English&Maths)	71.0%	66.7%	80.6%	13.9%***	70.1%	65.6%	4.4%**
Avg. Score (English)	80.4%	75.2%	92.1%	16.9%***	80.5%	73.5%	7.0%**
Avg. Score (Maths)	61.6%	58.2%	69.0%	10.8%***	59.7%	57.8%	1.9%
Avg. Score non-verbal reasoning	60.0%	57.2%	66.4%	9.2%***	58.6%	56.7%	1.9%
Obs.	306	239	67		66	173	

Note: Weighted means using sampling weight. Results based on observations from 2,953 students in 306 schools (2,378 students in public and 575 students in private school). Data collapsed at the school level. Diff. in column 4 (7) is differences in means between private and public (urban and rural) schools. Superscript (*) denotes that the difference, using standard errors clustered at the school level, is significant at the *** 1% , ** 5% , * 10% significance level.

Table 43. Student Performance on the English Section

	All	Public	Private	Diff (% point)	Urban Public	Rural Public	Diff (% point)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Can read a letter (average score)	96.5%	95.2%	99.4%	4.2%***	96.9%	94.7%	2.2%*
Can read a word (average score)	93.6%	91.3%	98.9%	7.6%***	93.7%	90.6%	3.1%
Has basic vocabulary (average score)	85.0%	80.0%	96.3%	16.4%***	86.6%	77.9%	8.7%***
Can read a sentence	80.8%	74.9%	94.2%	19.3%***	82.2%	72.6%	9.6%**
Can read a paragraph	41.8%	27.5%	73.8%	46.3%***	36.2%	24.9%	11.3%**
Comprehension (factual)	56.3%	44.2%	83.3%	39%***	53.7%	41.3%	12.5%***
Comprehension (analytic)	47.6%	36.3%	72.7%	36.4%***	44.6%	33.8%	10.8%***
Obs.	306	239	67		66	173	

Note: Weighted means using sampling weight. Results based on observations from 2,953 students in 306 schools (2,378 students in public and 575 students in private school). Data collapsed at the school level. Diff. in column 4 (7) is differences in means between private and public (urban and rural) schools. Superscript (*) denotes that the difference, using standard errors clustered at the school level, is significant at the *** 1% , ** 5% , * 10% significance level.

Table 44. Student Performance on Mathematics Section

	All	Public	Private	Diff (% point)	Urban Public	Rural Public	Diff (% point)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Number recognition	98.7%	98.5%	99.0%	0.5%	98.8%	98.4%	0.3%
Ordering numbers	73.7%	71.7%	78.2%	6.5%**	73.1%	71.2%	1.9%
Addition (single digits)	92.5%	91.7%	94.5%	2.8%**	93.4%	91.2%	2.2%
Addition (double digits)	86.0%	83.2%	92.4%	9.2%***	86.3%	82.2%	4.1%*
Addition (triple digits)	88.6%	86.0%	94.4%	8.4%***	89.3%	85.0%	4.4%**
Subtraction (single digits)	89.0%	87.3%	92.8%	5.4%***	90.1%	86.5%	3.6%*
Subtraction (double digits)	66.8%	60.6%	80.5%	19.9%***	61.0%	60.5%	0.5%
Multiplication (single digits)	55.6%	49.9%	68.3%	18.4%***	51.8%	49.3%	2.5%
Multiplication (double digits)	12.0%	5.6%	26.4%	20.8%***	7.8%	4.9%	2.9%
Multiplication (triple digits)	5.5%	1.7%	14.2%	12.6%***	1.7%	1.7%	0.0%
Division (single digits)	64.1%	58.9%	75.5%	16.6%***	59.6%	58.7%	0.9%
Division (double digits)	40.7%	34.1%	55.6%	21.5%***	35.1%	33.8%	1.3%
Division (analytical)	29.5%	26.9%	35.5%	8.6%***	26.9%	26.9%	0.1%
Multiplication (problem solving)	19.2%	11.7%	35.9%	24.2%***	13.0%	11.3%	1.7%
Complete sequence	27.5%	25.3%	32.4%	7.1%**	29.0%	24.1%	4.8%
Obs.	306	239	67		66	173	

Note: Weighted means using sampling weight. Results based on observations from 2,953 students in 306 schools (2,378 students in public and 575 students in private school). Data collapsed at the school level. Diff. in column 4 (7) is differences in means between private and public (urban and rural) schools. Superscript (*) denotes that the difference, using standard errors clustered at the school level, is significant at the *** 1% , ** 5% , * 10% significance level.

Table 45. Correlations between the Service Delivery Indicators and Test Scores

	Absence from school	Absence from class	Time spent teaching	Share of teachers with minimum knowledge	Teacher test score (English and Math)	Teacher test score (English, Math, Pedagogy)	Minimum teaching resources	Minimum school infra-structure	Student-teacher ratio	Students per textbook
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A										
All	-0.15**	-0.16***	0.021***	0.08*	0.30***	0.47***	0.10	0.02	-0.003***	-0.01*
	(.06)	(.03)	(.004)	(.04)	(.11)	(.13)	(.07)	(.02)	(.001)	(.003)
Observations	306	306	306	306	306	306	301	306	306	284
Panel B										
Public Schools	-0.16***	-0.13***	0.016***	-0.03	0.10	0.33**	0.03	-0.01	-0.002***	-0.001
	(.06)	(.03)	(.004)	(.04)	(0.12)	(.14)	(.07)	(.002)	(.001)	(.003)
Observations	239	239	239	239	239	239	236	239	239	220

Notes: Each cell represent a regression where test score is regressed on the indicator noted in the column and a constant. The regression uses sampling weights. Panel A is all schools. Panel B is public schools, controlling for rural-urban location. Weighted robust standard errors in parenthesis. Time spent teaching is measured in hours. * (**) [***] denote significance at the 10%, (5%), [1%] level.

Figure 13. Distributions of the Indicators Absent from school, Absent from class, and time spent teaching

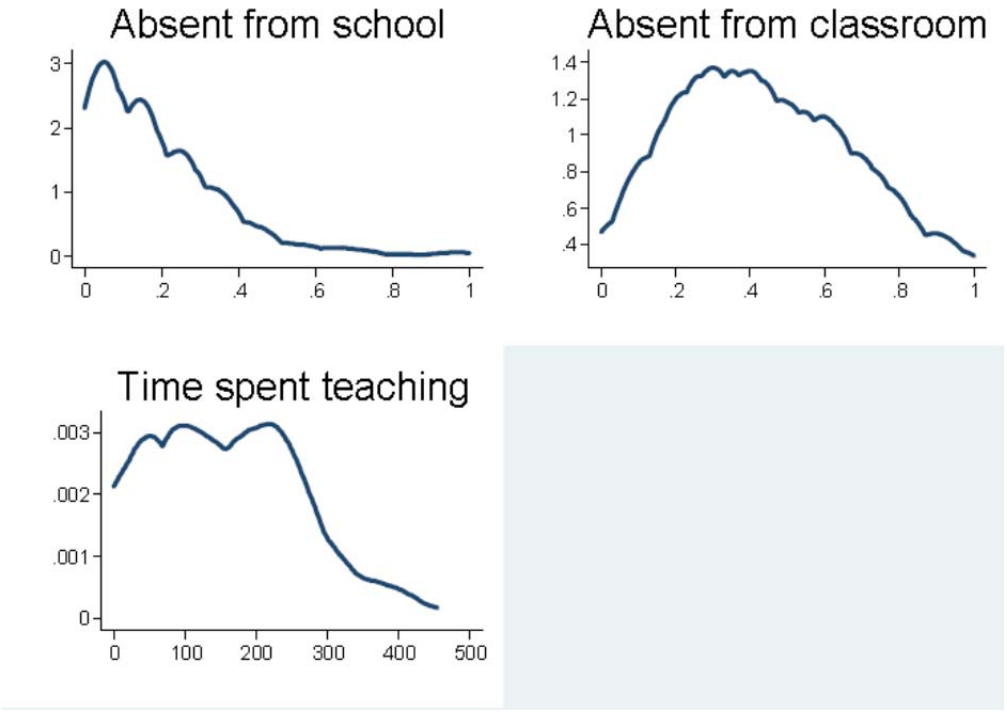


Figure 14. Distributions of the teacher test scores

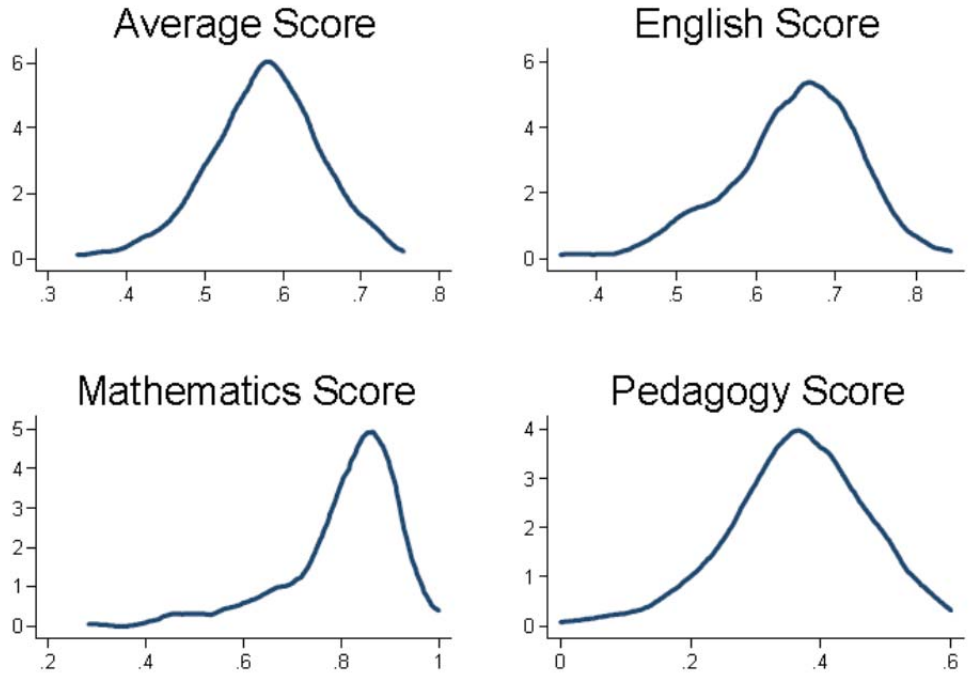


Figure 15. Distributions of the Indicators Minimum teaching resources, Students per textbooks, Student-teacher ratio

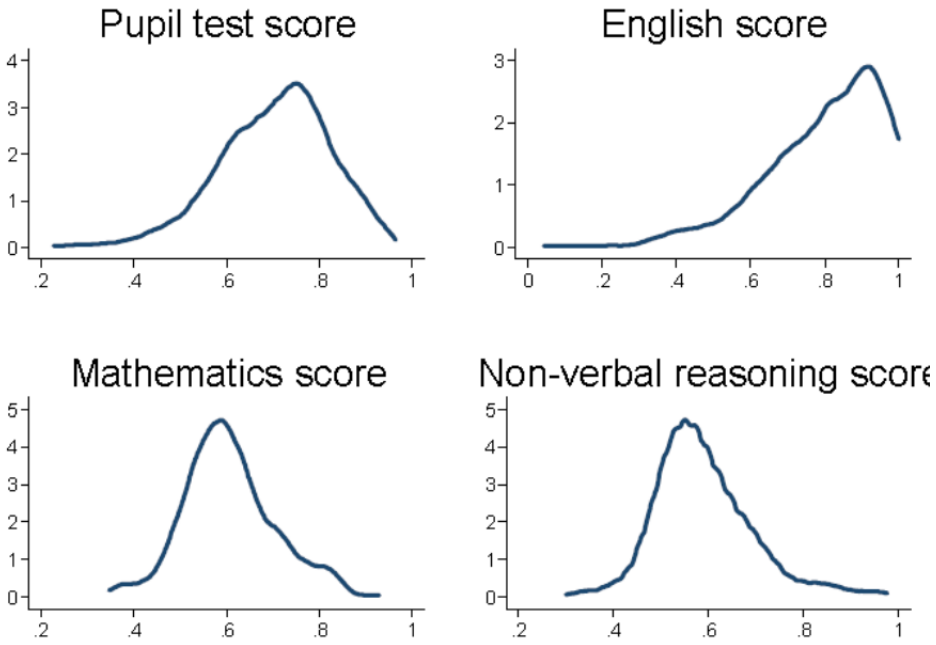
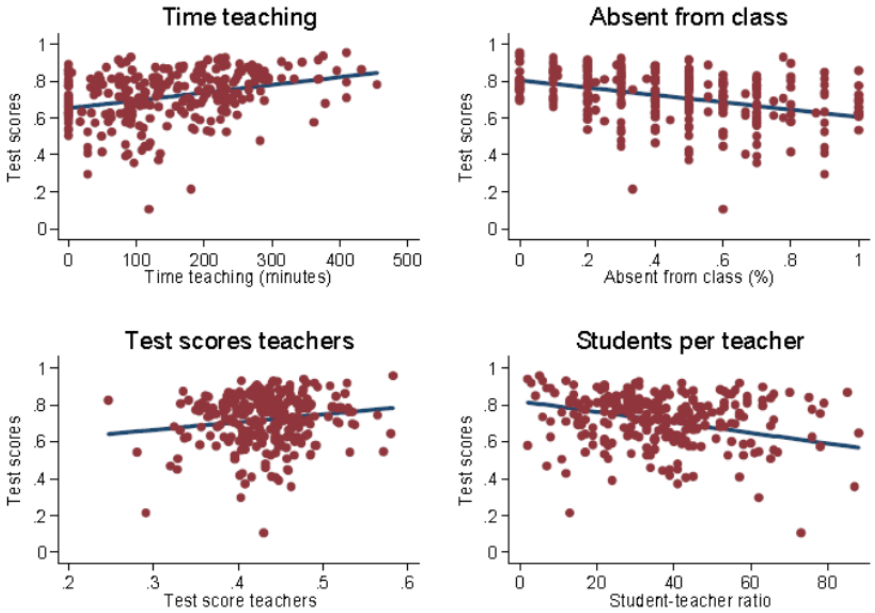


Figure 16. Correlations between indicators and learning (student test scores)



Note: The graphs show the scatter plots (red dots) and the predicted OLS relationship (blue solid line) for various indicators and student test scores in public schools. The regression coefficients are reported in table 19, panel B.

Table 46. Tanzania and Senegal Service Delivery Indicators

	Tanzania	Senegal
Teachers		
Absence from school	23%	18%
Absence from classroom	-	-
Share of teachers with minimum knowledge (language)	9%	29%
Share of teachers with minimum knowledge	73%	75%
Time spent teaching in the classroom	2 h 40 min	3 h 15 min
Schools:		
Minimum teaching resources (% of schools)	-	-
Functioning school infrastructure	-	-
Student-teacher ratio	74	34
Textbooks per student	1	2.5

Note: The indicator "E2: Absence from class" was not reported in the pilots in Tanzania and Senegal. The data for the indicator "E5: Availability of teaching resources" and "E6: Functioning school infrastructure" was not collected in the pilots in Tanzania and Senegal. The indicator "E8: Textbooks per student" is defined as textbooks per students while indicator E8 in the report is defined as students per textbook. The data collection methods used to derive these indicators differ slightly from the pilots and the Kenya SDI.

ANNEX C. Additional and More Detailed Results: Health

Table 47. Distribution of health personnel by provider type

	All	Public	Private (non-profit)	Rural	Urban	Rural Public	Urban Public
Doctors	4.1	4.6	2.5	2.1	7.9		
Clinical Officer	12.7	11.9	15.4	9.4	19.1		
Nurses	55.9	59.1	45.5	59.2	49.6		
Midwives	1.7	1.6	2.0	2.0	1.2		
Para-professionals	19.2	18.2	22.2	22.0	14.0		
BSc. Nurses	0.5	0.2	1.4	0.4	0.6		
Nurse Aides	1.9	0.6	6.1	1.5	2.7		
Pharmacists	3.9	3.6	4.9	3.5	4.8		
Totals	100.0	100.0	100.0	100.0	100.0		

n=3,161
Note: UG: university graduate; PG: post-graduate; and MTC: medical training college

Table 48. Distribution of health personnel by facility type

	All	Dispensaries	Health centers	Hospitals
Doctors	4.1	0.2	1.4	11.7
Clinical Officer	12.7	6.8	12.9	21.0
Nurses	55.9	61.4	56.9	47.2
Midwives	1.7	3.2	0.5	0.6
Para-professionals	19.2	22.6	21.3	12.8
BSc. Nurses	0.5	0.1	0.3	1.2
Nurse Aides	1.9	2.5	1.8	1.3
Pharmacists	3.9	3.2	4.9	4.2
Totals	100.0	100.0	100.0	100.0

Table 49. Distribution of health personnel by gender

	All	Female	Male
Doctors	4.1	3.6	5.0
Clinical Officers	12.7	12.0	13.9
Nurses	55.9	55.2	57.1
Midwives	1.7	2.4	0.6
Para-professionals	19.2	20.2	17.5
BSc. Nurses	0.5	0.5	0.5
Nurse Aides	1.9	2.0	1.8
Pharmacists	3.9	4.1	3.7
Totals	100.0	100.0	100.0

Table 50. Caseload per clinician by level of facility

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
All facilities	9.0	8.7	10.4	1.7	8.8	10.2	1.4	8.5	10.3	1.8
	(0.9)	(0.9)	(1.7)	(1.4)	(1.0)	(2.5)	(2.6)	(1.0)	(2.7)	(2.8)
Dispensaries	9.3	8.7	11.4	2.6	9.3	8.8	(0.5)	8.9	7.3	(1.6)
	(1.1)	(1.1)	(2.0)	(1.9)	(1.1)	(3.8)	(3.8)	(1.1)	(5.0)	(3.9)
Health Centers	7.3	7.7	6.0	(1.7)	6.3	11.8	5.5	6.4	15.4	9.0
	(1.0)	(1.1)	(1.0)	(1.1)	(0.8)	(2.3)	(2.2)	(0.8)	(3.4)	(3.3)
First level	10.1	10.5	9.0	(1.5)	7.6	14.0	6.5	7.8	15.3	7.5
hospitals	(1.3)	(1.6)	(4.1)	(4.7)	(0.9)	(2.7)	(2.9)	(1.2)	(3.5)	(3.8)

Table 51. Absence by level of facility

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
All facilities	0.275	0.292	0.209	-0.083	0.269	0.312	0.043	0.283	0.376	0.093
	(0.05)	(0.06)	(0.04)	(0.07)	(0.05)	(0.021)	(0.04)	(0.06)	(0.03)	(0.07)
Dispensaries	0.255	0.269	0.201	-0.068	0.248	0.315	0.067	0.259	0.381	0.123
	(0.05)	(0.07)	(0.04)	(0.08)	(0.06)	(0.026)	(0.05)	(0.07)	(0.04)	(0.08)
Health Centers	0.375	0.411	0.248	-0.163	0.392	0.304	-0.087	0.419	0.361	-0.058
	(0.04)	(0.04)	(0.05)	(0.05)	(0.04)	(0.040)	(0.04)	(0.04)	(0.05)	(0.05)

Table 52. Correlates of Absence

Dependent var.: Absence rate	unweighted regression		weighted regression	
	Normal SE	With clustered SE	Normal SE	With clustered SE
Public owned (d)	0.169***	0.169**	0.095	0.095
	(0.037)	(0.060)	(0.073)	(0.065)
Rural facility (d)	0.037	0.037	0.123*	0.123**
	(0.034)	(0.033)	(0.063)	(0.045)
Dispensary or health post (d)	0.044	0.044	0.039	0.039
	(0.037)	(0.055)	(0.059)	(0.066)
Has minimum infrastructure (d)	-0.012	-0.012	-0.007	-0.007
	(0.034)	(0.045)	(0.074)	(0.075)
Has minimum medical equipment (d)	0.02	0.02	0.103	0.103
	(0.054)	(0.069)	(0.098)	(0.093)
Proportion of priority drugs available	0.065	0.065	-0.131	-0.131
	(0.118)	(0.180)	(0.235)	(0.233)
Number of health workers (One to two is reference category)				
Three to Five workers (d)	0.172**	0.172**	0.163	0.163
	(0.070)	(0.085)	(0.139)	(0.099)
Six to ten workers (d)	0.233***	0.233**	0.339**	0.339**
	(0.069)	(0.104)	(0.134)	(0.123)
Eleven to twenty workers (d)	0.236**	0.236**	0.356**	0.356**
	(0.077)	(0.110)	(0.128)	(0.114)
More than twenty workers (d)	0.233**	0.233**	0.306**	0.306**
	(0.084)	(0.104)	(0.145)	(0.115)
Cadre type (Nurse is reference category)				
Medical doctor (d)	0.15	0.15	0.028	0.028
	(0.163)	(0.157)	(0.185)	(0.194)
Midwife (d)	0.046	0.046	-0.114	-0.114
	(0.129)	(0.085)	(0.201)	(0.201)
Clinical officer (d)	-0.043	-0.043	-0.074	-0.074
	(0.041)	(0.034)	(0.063)	(0.055)
Medical Paraprofessional (d)	-0.076**	-0.076**	-0.078	-0.078
	(0.031)	(0.031)	(0.070)	(0.070)
N	1214	1214	1214	1214
r2_p	0.037	0.037	0.059	0.059

Note: (d) for discrete change of dummy variable from 0 to 1; * p<0.1, ** p<0.05, *** p<0.001; standard errors in parentheses
Caseload was excluded as an explanatory variable because of potential endogeneity.

Table 53. Adherence to clinical guidelines by cadre

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
All cadres	0.437	0.427	0.476	0.049	0.417	0.520	0.103	0.411	0.512	0.101
	(0.032)	(0.034)	(0.040)	(0.039)	(0.035)	(0.015)	(0.028)	(0.037)	(0.015)	(0.031)
Doctors	0.612	0.609	0.617	0.008	0.692	0.546	(0.146)	0.725	0.497	(0.227)
	(0.052)	(0.073)	(0.031)	(0.080)	(0.030)	(0.065)	(0.068)	(0.038)	(0.074)	(0.076)
Clinical Officers	0.543	0.524	0.572	0.048	0.539	0.548	0.009	0.517	0.533	0.016
	(0.022)	(0.019)	(0.046)	(0.047)	(0.033)	(0.022)	(0.034)	(0.028)	(0.011)	(0.024)
Nurses	0.403	0.404	0.396	(0.008)	0.394	0.479	0.086	0.397	0.489	0.092
	(0.031)	(0.034)	(0.033)	(0.039)	(0.034)	(0.011)	(0.029)	(0.037)	(0.024)	(0.043)

Table 54. Adherence to clinical guidelines by facility type

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
Dispensaries	0.434	0.422	0.473	0.051	0.418	0.519	0.101	0.409	0.528	0.119
	(0.037)	(0.041)	(0.041)	(0.046)	(0.041)	(0.016)	(0.039)	(0.044)	(0.001)	(0.045)
Health centers	0.503	0.499	0.526	0.027	0.489	0.572	0.083	0.489	0.564	0.075
	(0.024)	(0.024)	(0.042)	(0.037)	(0.026)	(0.014)	(0.021)	(0.026)	(0.023)	(0.034)
Hospitals	0.573	0.548	0.662	0.113	0.555	0.591	0.036	0.549	0.547	(0.002)
	(0.030)	(0.032)	(0.056)	(0.067)	(0.041)	(0.032)	(0.044)	(0.043)	(0.036)	(0.047)

Table 55. Management of maternal and neonatal complications by cadre

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
All cadres	0.446	0.442	0.458	0.016	0.436	0.483	0.047	0.434	0.487	0.053
	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)
Doctors	0.574	0.571	0.581	0.011	0.720	0.454	-0.266	0.753	0.394	-0.359
	(0.07)	(0.10)	(0.08)	(0.13)	(0.03)	(0.08)	(0.09)	(0.03)	(0.08)	(0.09)
Clinical officers	0.464	0.456	0.477	0.021	0.454	0.475	0.021	0.431	0.486	0.055
	(0.03)	(0.02)	(0.05)	(0.05)	(0.03)	(0.04)	(0.05)	(0.02)	(0.02)	(0.02)
Nurses	0.445	0.445	0.443	-0.003	0.438	0.499	0.061	0.440	0.509	0.069
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)	(0.01)	(0.03)

Table 56. Management of maternal and neonatal complications by facility type

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
Dispensaries	0.433	0.430	0.444	0.014	0.423	0.488	0.065	0.419	0.525	0.106
	(0.031)	(0.034)	(0.036)	(0.033)	(0.034)	(0.042)	(0.050)	(0.035)	(0.019)	(0.037)
Health centers	0.460	0.457	0.475	0.017	0.455	0.482	0.027	0.456	0.466	0.010
	(0.017)	(0.015)	(0.036)	(0.031)	(0.017)	(0.018)	(0.015)	(0.016)	(0.020)	(0.019)
Hospitals	0.490	0.484	0.514	0.031	0.507	0.475	(0.032)	0.511	0.452	(0.059)
	(0.025)	(0.031)	(0.067)	(0.080)	(0.026)	(0.038)	(0.040)	(0.028)	(0.044)	(0.045)

Table 57. Diagnostic accuracy cadre

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
All cadres	0.722	0.716	0.742	0.026	0.708	0.777	0.069	0.711	0.748	0.037
	(0.018)	(0.023)	(0.025)	(0.036)	(0.022)	(0.018)	(0.027)	(0.027)	(0.026)	(0.038)
Doctors	0.854	0.883	0.784	(0.100)	0.889	0.826	(0.064)	0.929	0.839	(0.090)
	(0.032)	(0.039)	(0.035)	(0.048)	(0.054)	(0.029)	(0.062)	(0.046)	(0.046)	(0.067)
Clinical officers	0.802	0.796	0.811	0.015	0.801	0.803	0.003	0.826	0.759	(0.067)
	(0.012)	(0.024)	(0.028)	(0.046)	(0.019)	(0.015)	(0.024)	(0.022)	(0.023)	(0.026)
Nurses	0.698	0.701	0.687	(0.013)	0.693	0.740	0.046	0.699	0.723	0.025
	(0.026)	(0.033)	(0.030)	(0.053)	(0.030)	(0.028)	(0.041)	(0.036)	(0.036)	(0.049)

Figure 17. Treatment actions prescribed by cadre

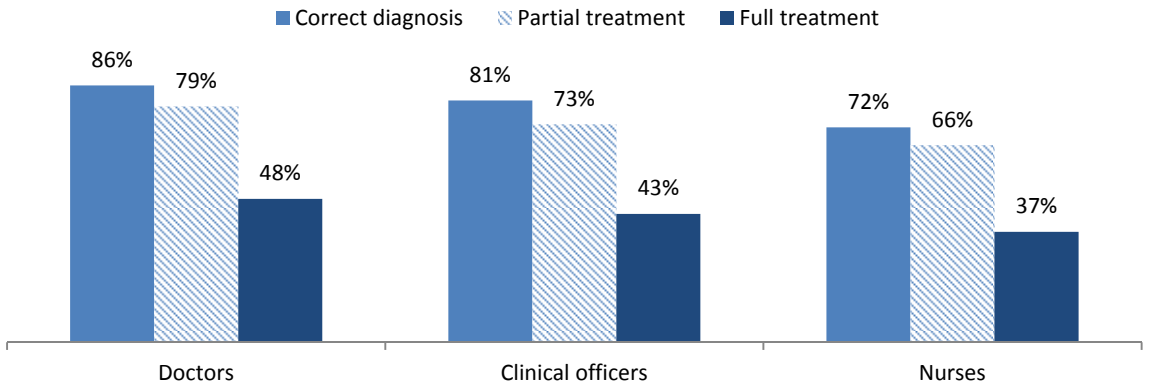


Figure 18. Diagnostic accuracy by questions asked: Acute diarrhea with severe dehydration

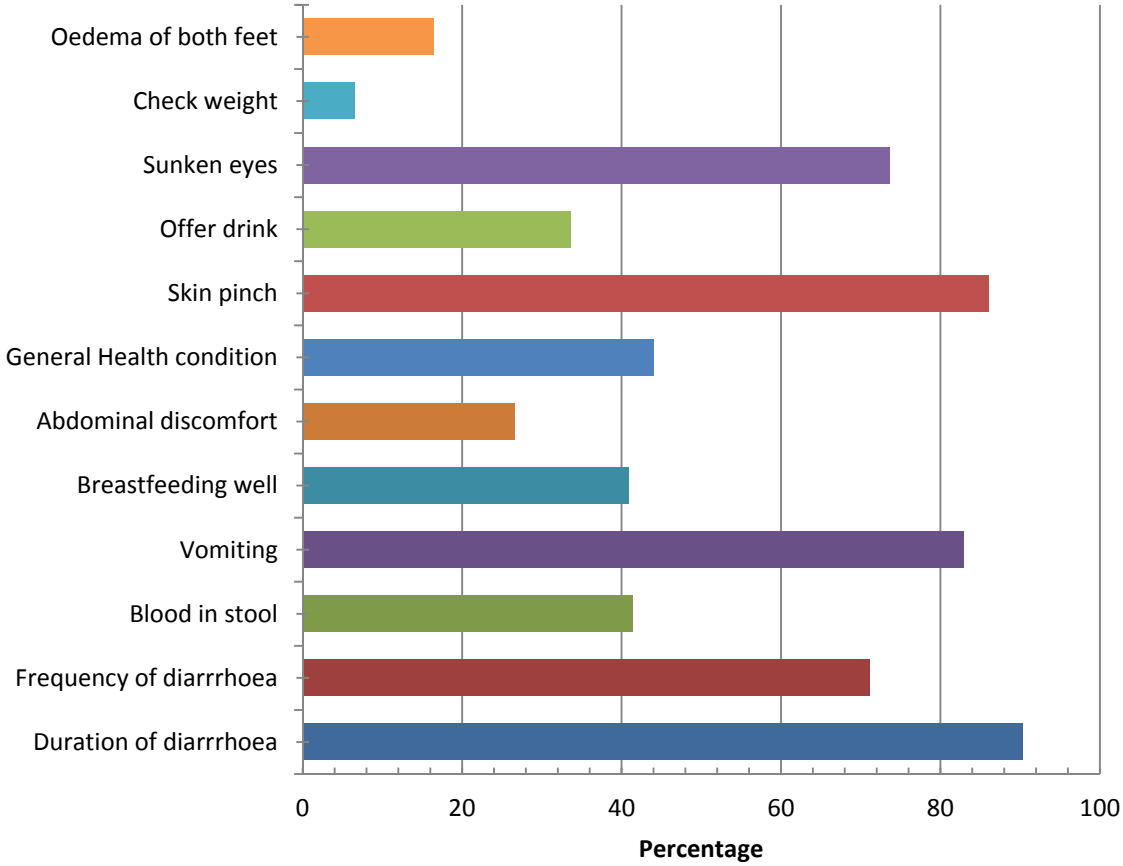


Figure 19. Diagnostic accuracy by questions asked: Malaria with anemia

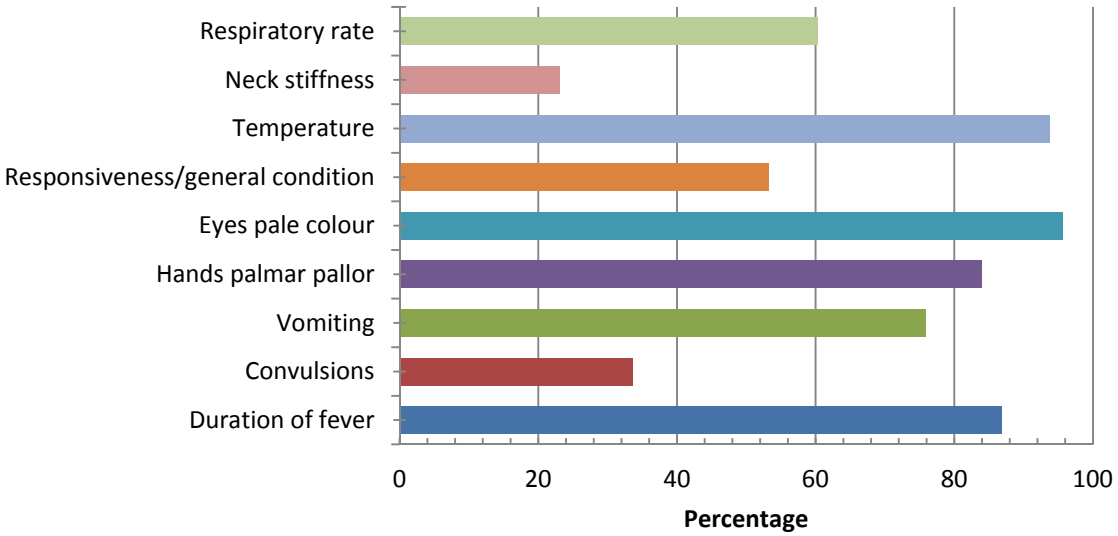


Figure 20. Diagnostic accuracy by questions asked: Pneumonia

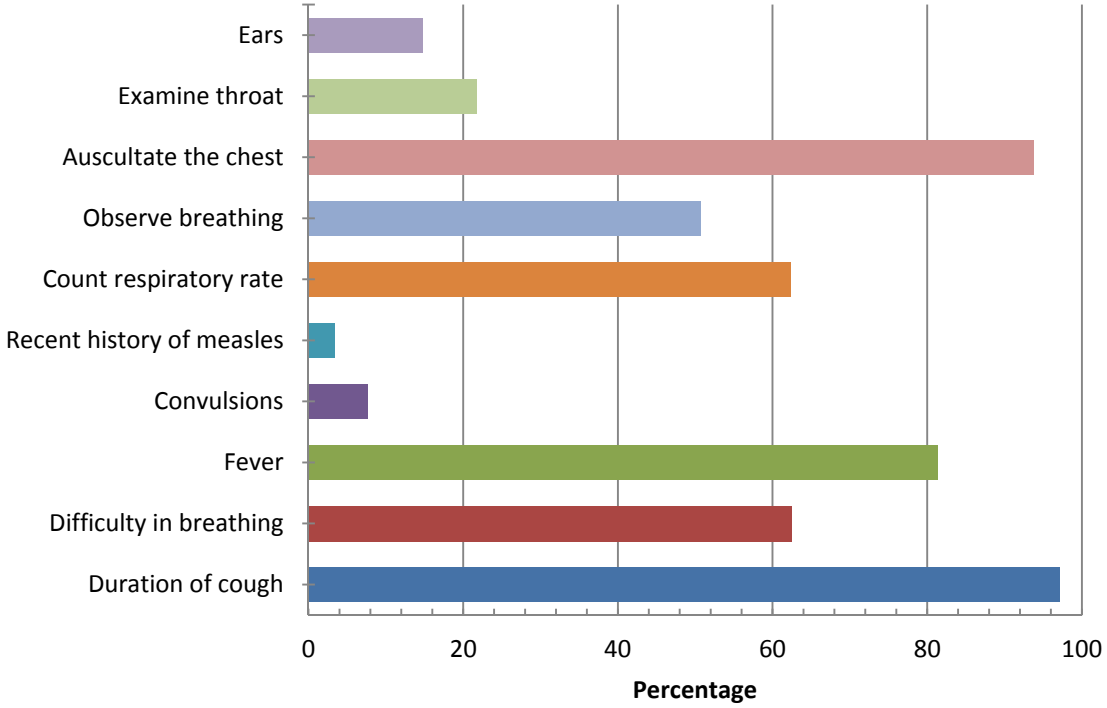


Figure 21. Diagnostic accuracy by questions asked: Diabetes mellitus

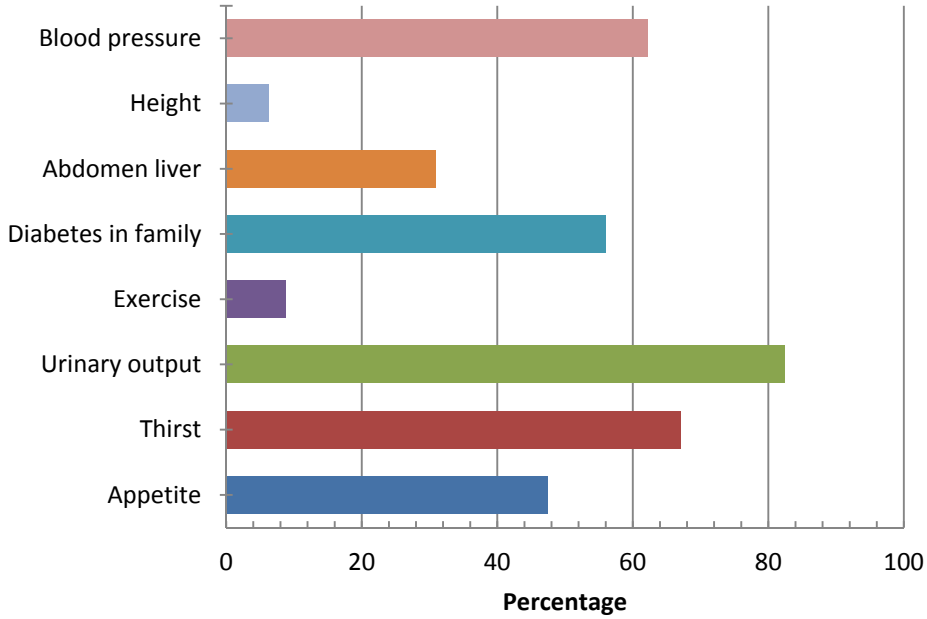


Figure 22. Diagnostic accuracy by questions asked: Pulmonary tuberculosis

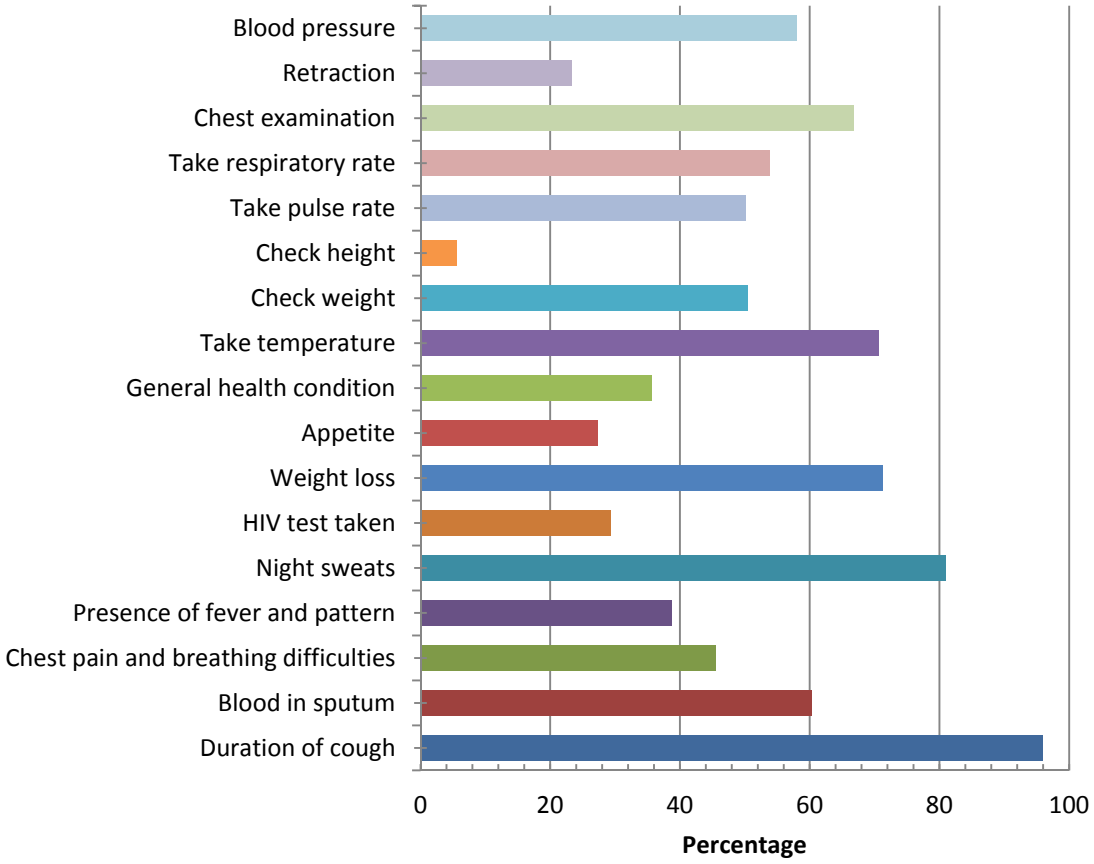


Figure 23. Correct Treatment Actions: Post-partum hemorrhage

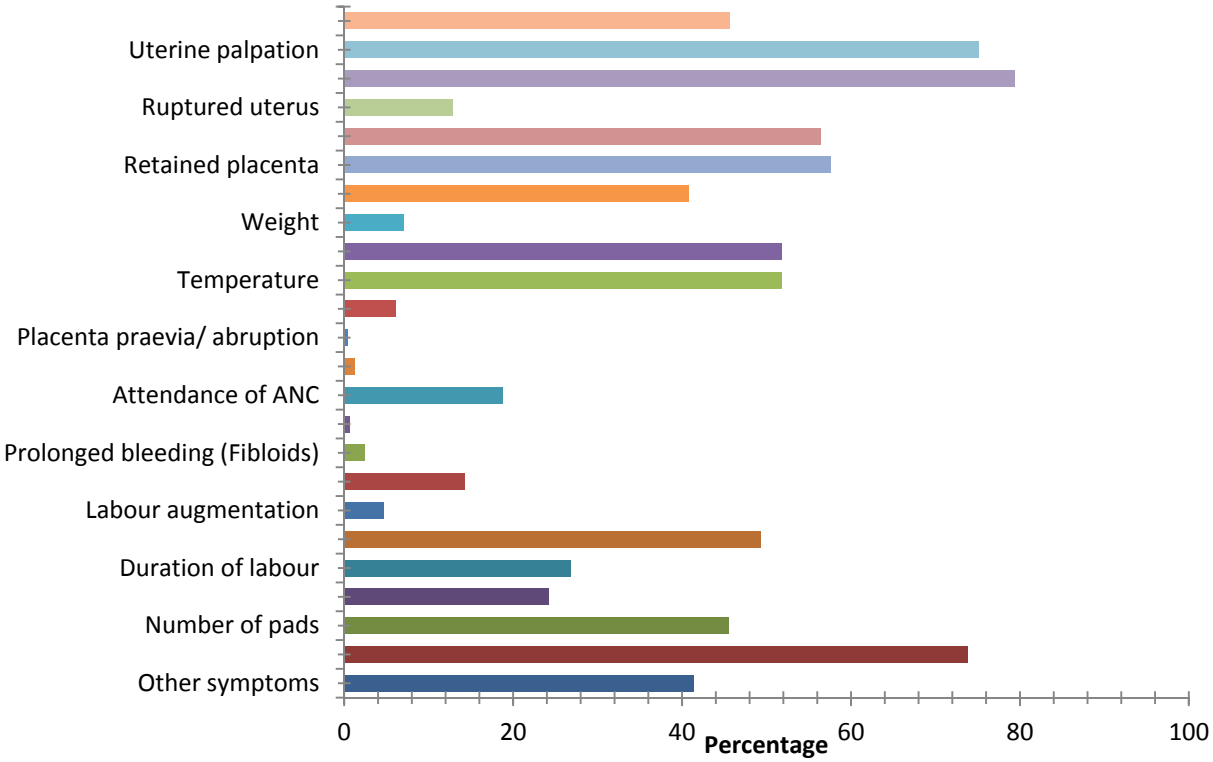


Figure 24. Correct Treatment Actions: Neonatal asphyxia

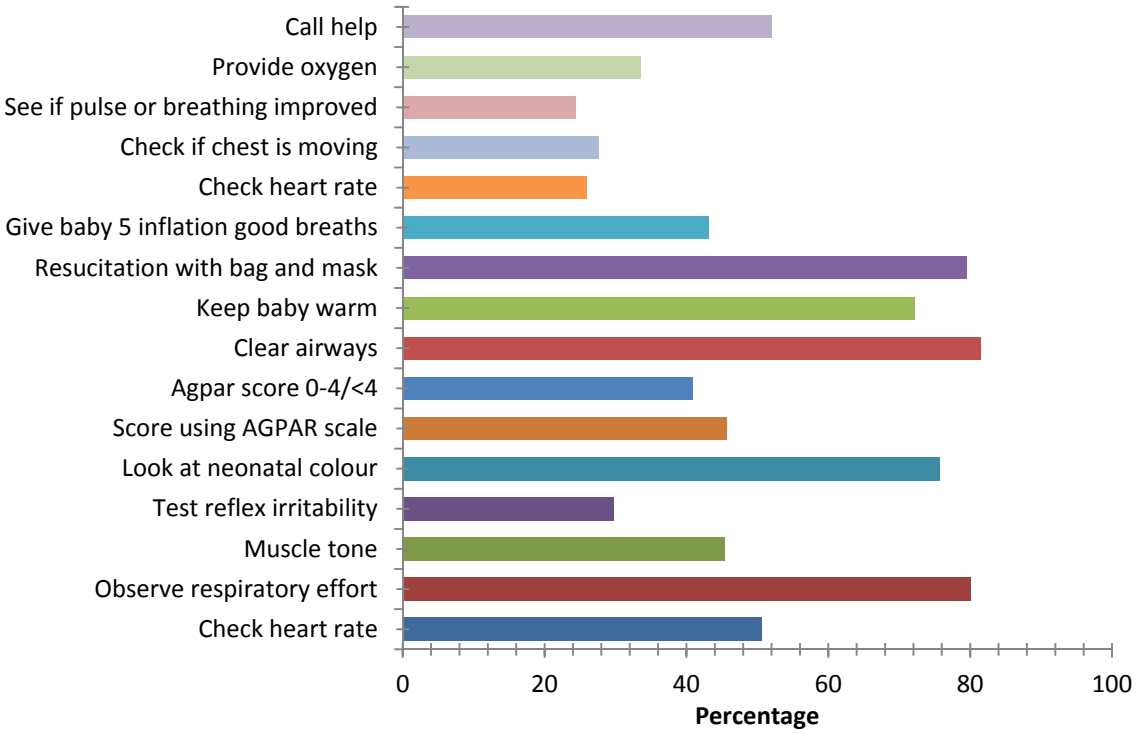


Table 58. Availability of specific types of equipment used in the equipment indicator

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
Any scale (adult, child, infant)	0.987	0.984	0.996	0.012	0.985	0.994	0.009	0.982	1.000	0.018
	(0.01)	(0.02)	(0.00)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.00)	(0.02)
Thermometer	0.920	0.908	0.965	0.057	0.912	0.968	0.056	0.901	0.962	0.062
	(0.03)	(0.04)	(0.03)	(0.05)	(0.04)	(0.02)	(0.04)	(0.04)	(0.03)	(0.06)
Stethoscope	0.943	0.929	0.994	0.065	0.938	0.975	0.037	0.924	0.973	0.049
	(0.05)	(0.06)	(0.01)	(0.06)	(0.06)	(0.01)	(0.06)	(0.07)	(0.03)	(0.07)
Sphygmonometer	0.863	0.831	0.981	0.150	0.845	0.968	0.123	0.816	0.948	0.132
	(0.09)	(0.120)	(0.019)	(0.124)	(0.110)	(0.03)	(0.115)	(0.134)	(0.057)	(0.146)
Health centers and First level hospitals only										
Refrigerator	0.980	0.982	0.973	(0.009)	0.992	0.946	(0.047)	1.000	0.918	(0.082)
	(0.01)	(0.02)	(0.03)	(0.03)	(0.01)	(0.06)	(0.06)	(0.00)	(0.09)	(0.08)
Sterilization equipment	0.848	0.853	0.833	(0.019)	0.830	0.901	0.071	0.832	0.925	0.092
	(0.05)	(0.06)	(0.07)	(0.05)	(0.07)	(0.06)	(0.09)	(0.07)	(0.04)	(0.09)

Table 59. Drug availability (adjusted for facility type)

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
All essential drugs (adjusted)	67.2%	66.8%	68.9%	2.1%	67.3%	66.4%	-0.9%	67.2%	63.2%	(0.040)
	(0.018)	(0.021)	(0.017)	(0.021)	(0.021)	(0.027)	(0.037)	(0.023)	(0.045)	(0.049)
Essential drugs for mothers (adjusted)	59.2%	58.4%	62.1%	3.7%	58.7%	62.5%	3.8%	58.4%	58.9%	0.005
	(0.025)	(0.032)	(0.019)	(0.037)	(0.030)	(0.029)	(0.045)	(0.035)	(0.047)	(0.057)
Essential drugs for children (adjusted)	77.9%	77.9%	77.9%	0.0%	78.9%	72.3%	-6.6%	79.0%	69.8%	(0.092)
	(0.022)	(0.025)	(0.018)	(0.017)	(0.025)	(0.024)	(0.033)	(0.026)	(0.044)	(0.046)

Table 60. Drug availability by level of facility (adjusted for level of facility)

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
Dispensaries	66.9%	66.9%	66.7%	-0.2%	67.1%	65.4%	-1.6%	67.3%	62.8%	(0.045)
	(0.023)	(0.025)	(0.021)	(0.023)	(0.026)	(0.034)	(0.045)	(0.027)	(0.083)	(0.067)
Health centers	69.1%	67.6%	74.4%	6.8%	70.0%	65.5%	-4.5%	68.7%	61.3%	(0.073)
	(0.014)	(0.019)	(0.019)	(0.028)	(0.015)	(0.024)	(0.027)	(0.019)	(0.035)	(0.034)
First level hospitals	66.9%	62.9%	79.8%	17.0%	63.9%	71.1%	7.2%	60.5%	66.2%	0.057
	(0.024)	(0.024)	(0.030)	(0.040)	(0.025)	(0.033)	(0.038)	(0.024)	(0.041)	(0.044)

Table 61. Drugs identified in the Service Availability and Readiness Assessment and drugs assessed in the Kenya SDI/PETS+ survey

Drug	Kenya SDI/PETS+ (all)	Kenya SDI/PETS+ (mothers)	Kenya SDI/PETS+ (children)	SARA (all)	SARA (mothers)	SARA (children)
Amoxicillin syrup/suspension	x		x	x		x
Ampicillin powder for injection	x	x	x	x	x	x
Artemisinin combination therapy	x		x	x		x
Artusunate (rectal or injectable forms)	x		x	x		x
Azithromycin cap/tab or oral liquid	x	x			x	
Procaine benzylpenicillin powder (injection)	x	x	x	x	x	x
Betamethasone/Dexamethasone injectable	x	x			x	
Calcium gluconate injectable	x	x			x	
Cefixime cap/tab	x	x			x	
Ceftriaxone powder for injection	x		x	x		x
Gentamycin injectable	x	x	x	x	x	x
Magnesium sulfate injectable	x	x			x	
Metronidazole injectable	x	x			x	
Misoprostol cap/tab	x	x			x	
Morphine granule, injectable or cap/tab						x
Nifedipine cap/tab	x	x			x	
Oral rehydratation salt	x		x	x		x
Oxytocin injectable	x	x			x	
Paracetamol syrup/suspension				x		x
Sodium chloride injectable solution	x	x			x	
Zinc tablets	x		x	x		x
Vitamin A	x		x	x		x
Folic acid supplements	x	x				
Iron supplements	x	x				
Medroxyprogesterone	x	x				

Figure 25. Availability of drugs by facility type

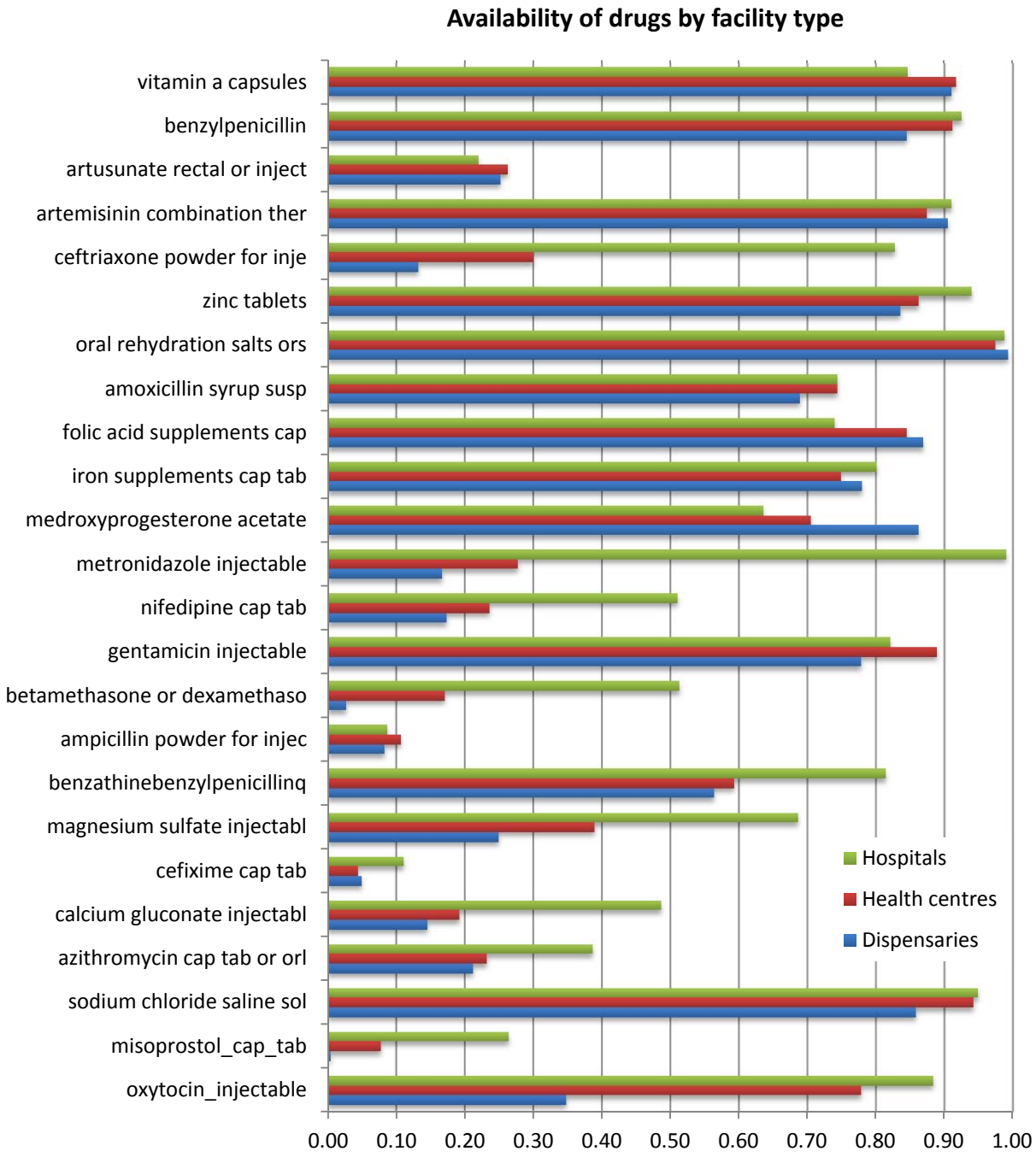


Table 62. Vaccines availability by level of facility

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
All facilities	0.808	0.834	0.717		0.799	0.859		0.834	0.840	
	(0.043)	(0.051)	(0.060)		(0.049)	(0.047)		(0.057)	(0.072)	
Dispensaries/Health posts	0.769	0.793	0.686		0.772	0.733		0.803	0.580	
	(0.059)	(0.071)	(0.077)		(0.064)	(0.091)		(0.074)	(0.167)	
Health Centers	0.909	0.937	0.779		0.896	0.945		0.933	0.948	
	(0.025)	(0.020)	(0.080)		(0.031)	(0.032)		(0.021)	(0.040)	
First level hospitals	0.928	0.950	0.865		0.903	0.959		0.938	0.966	
	(0.023)	(0.017)	(0.076)		(0.038)	(0.020)		(0.024)	(0.024)	

Table 63. Availability of specific types of equipment used in the equipment indicator

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
Any scale (adult, child, infant)	0.987	0.984	0.996	0.012	0.985	0.994	0.009	0.982	1.000	0.018
	(0.01)	(0.02)	(0.00)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.00)	(0.02)
Thermometer	0.920	0.908	0.965	0.057	0.912	0.968	0.056	0.901	0.962	0.062
	(0.03)	(0.04)	(0.03)	(0.05)	(0.04)	(0.02)	(0.04)	(0.04)	(0.03)	(0.06)
Stethoscope	0.943	0.929	0.994	0.065	0.938	0.975	0.037	0.924	0.973	0.049
	(0.05)	(0.06)	(0.01)	(0.06)	(0.06)	(0.01)	(0.06)	(0.07)	(0.03)	(0.07)
Sphygmonometer	0.863	0.831	0.981	0.150	0.845	0.968	0.123	0.816	0.948	0.132
	(0.09)	(0.120)	(0.019)	(0.124)	(0.110)	(0.03)	(0.115)	(0.134)	(0.057)	(0.146)
Refrigerator	0.980	0.982	0.973	(0.009)	0.992	0.946	(0.047)	1.000	0.918	(0.082)
	(0.01)	(0.02)	(0.03)	(0.03)	(0.01)	(0.06)	(0.06)	(0.00)	(0.09)	(0.08)
Sterilization equipment	0.848	0.853	0.833	(0.019)	0.830	0.901	0.071	0.832	0.925	0.092
	(0.05)	(0.06)	(0.07)	(0.05)	(0.07)	(0.06)	(0.09)	(0.07)	(0.04)	(0.09)

Table 64. Equipment availability (adjusted for level of facility)

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
All facilities	0.765	0.724	0.916	0.192	0.745	0.879	0.134	0.705	0.872	0.167
	(0.096)	(0.121)	(0.035)	(0.131)	(0.108)	(0.052)	(0.106)	(0.130)	(0.080)	(0.125)
Dispensaries	0.761	0.712	0.949	0.236	0.740	0.923	0.183	0.694	0.912	0.219
	(0.11)	(0.14)	(0.04)	(0.15)	(0.13)	(0.05)	(0.14)	(0.15)	(0.14)	(0.19)
Health centers	0.759	0.752	0.780	0.027	0.734	0.860	0.126	0.731	0.881	0.150
	(0.07)	(0.07)	(0.09)	(0.06)	(0.08)	(0.07)	(0.10)	(0.07)	(0.08)	(0.10)
First level hospitals	0.825	0.814	0.865	0.051	0.884	0.749	(0.135)	0.855	0.756	(0.099)
	(0.09)	(0.12)	(0.13)	(0.19)	(0.08)	(0.11)	(0.07)	(0.11)	(0.15)	(0.10)

Table 65. Equipment availability (unadjusted for level of facility)

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
All facilities	0.797	0.756	0.951	0.195	0.774	0.937	0.163	0.733	0.935	0.202
	(0.09)	(0.12)	(0.04)	(0.13)	(0.11)	(0.03)	(0.11)	(0.13)	(0.06)	(0.14)
Dispensaries	0.761	0.712	0.949	0.236	0.740	0.923	0.183	0.694	0.912	0.219
	(0.11)	(0.14)	(0.04)	(0.15)	(0.13)	(0.05)	(0.14)	(0.15)	(0.14)	(0.19)
Health centers	0.909	0.900	0.940	0.041	0.906	0.922	0.017	0.894	0.933	0.039
	(0.02)	(0.03)	(0.03)	(0.05)	(0.03)	(0.05)	(0.06)	(0.03)	(0.07)	(0.08)
First level hospitals	0.983	0.978	1.000	0.022	0.970	1.000	0.030	0.962	1.000	0.038
	(0.02)	(0.02)	999.00	(0.02)	(0.03)	(0.00)	(0.03)	(0.04)	(0.00)	(0.04)

Table 66. Availability of individual types of equipment

	All	Public	Private (non-profit)	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
Stethoscope	100.0	100.0	100.0		100.0	100.0				
Thermometer	99.6	100.0	98.0		99.6	99.3				
Adult scale	94.9	94.1	97.7		94.3	98.2				
Child scale	99.4	99.3	99.7		99.2	100.0				
Infant scale	98.4	99.2	95.5		99.0	94.1				
Sphygmonometer	93.7	92.0	99.6		92.8	98.5				
Autoclave	77.8	73.5	92.2		78.4	75.2				
Electric boiler	90.8	87.0	100.0		100.0	71.8				
Electric sterilizer	55.2	41.2	98.5		48.4	82.4				
Electric pot	98.0	97.5	100.0		100.0	64.6				
Incinerator	86.4	82.1	97.0		95.0	62.8				
Averages	90.4	87.8	98.0		91.5	86.1				

Table 67. Availability of individual types of equipment by facility type

	All	Dispensary	Health Center	Hospital
Stethoscope	100.0	100.0	100.0	100.0
Thermometer	99.6	99.4	100.0	100.0
Adult scale	94.9	93.6	99.2	100.0
Child scale	99.4	99.9	96.1	99.4
Infant scale	98.4	98.1	98.9	100.0
Sphygmonometer	93.7	92.3	97.5	100.0
Autoclave	77.8	71.8	91.3	95.1
Electric boiler	90.8	91.2	100.0	68.6
Electric sterilizer	55.2	30.9	87.8	100.0
Electric pot	98.0	97.4	100.0	100.0
Incinerator	86.4	83.7	89.7	89.9
Averages	90.4	87.1	96.4	95.7

Figure 26. Access to various forms of electronic communication

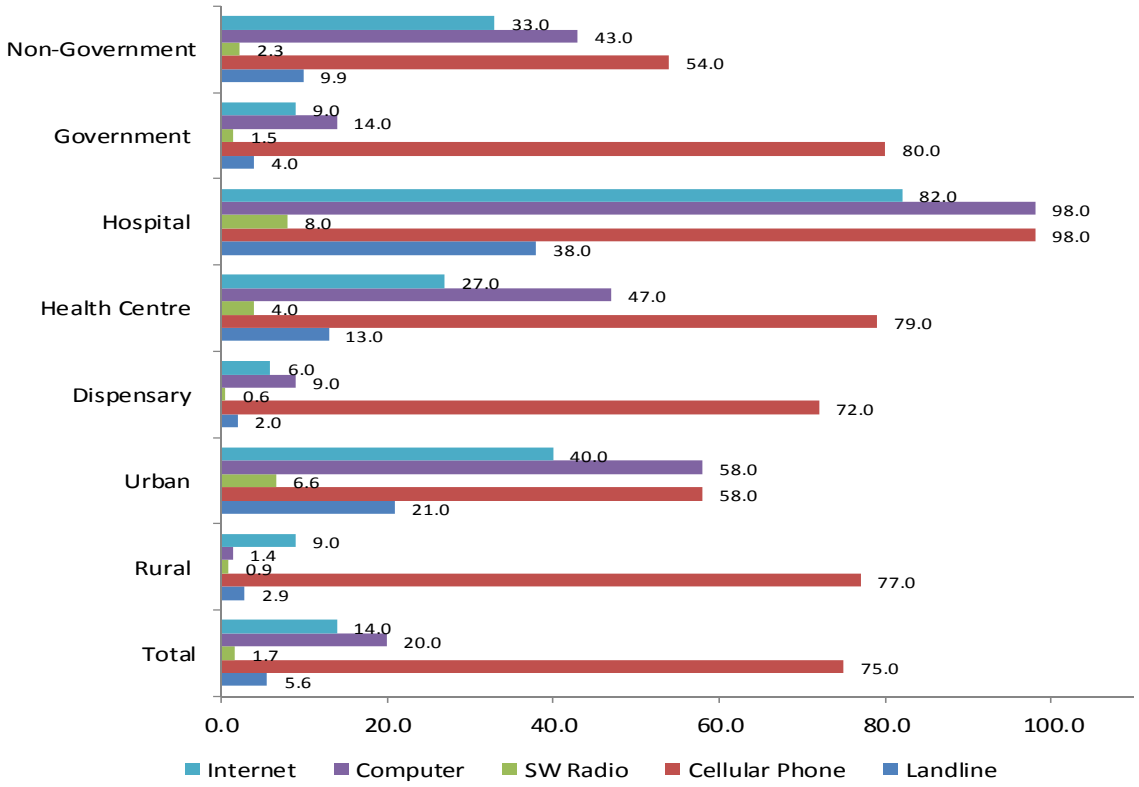


Table 68. Purpose of last trip that vehicle or ambulance made by facility level

	All	Public	Private (non-profit)	Rural	Urban	Rural Public	Urban Public
Transporting patients	64.5%	78.4%	50.0%	63.7%	65.7%		
Collecting medicines and supplies	12.9%	8.0%	18.2%	39.1%	26.1%		
Transporting personnel	14.5%	8.0%	21.3%	19.3%	7.5%		
Other	8.0%	5.6%	10.5%	13.1%	0.6%		

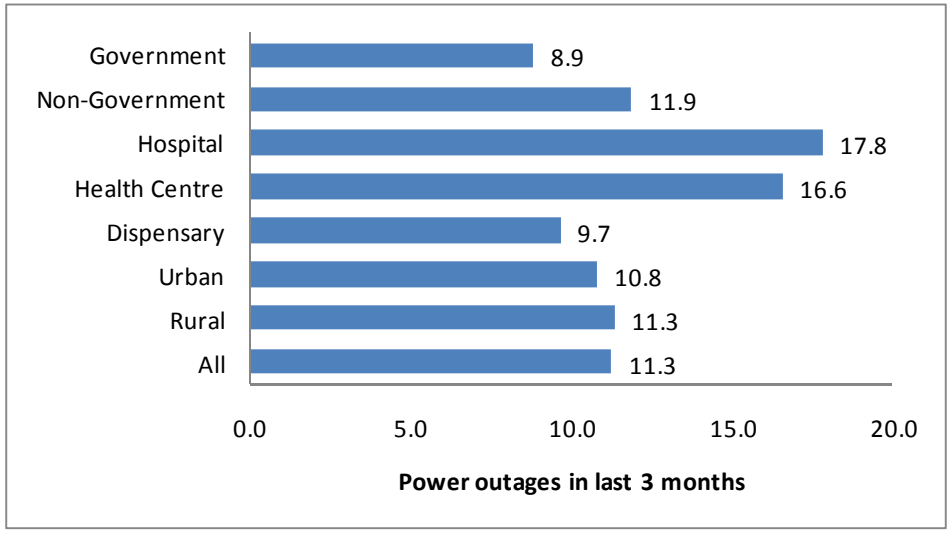
Table 69. Availability of specific types of infrastructure used in the infrastructure indicator

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
Clean water	0.567	0.493	0.845	0.352	0.500	0.959	0.459	0.429	0.987	0.558
Toilet	0.953	0.948	0.972	0.024	0.989	0.739	-0.250	0.987	0.643	-0.343
Electricity	0.730	0.684	0.901	0.217	0.692	0.739	0.262	0.652	0.937	0.285

Table 70. Infrastructure availability

	All	Public	Private	Diff (% point)	Rural	Urban	Diff (% point)	Rural Public	Urban Public	Diff (% point)
All facilities	0.468	0.393	0.749	0.356	0.434	0.669	0.235	0.367	0.593	0.225
	(0.078)	(0.083)	(0.063)	(0.057)	(0.090)	(0.09)	(0.120)	(0.093)	(0.103)	(0.135)
Dispensaries	0.388	0.296	0.740	0.444	0.363	0.574	0.211	0.285	0.411	0.126
	(0.093)	(0.100)	(0.081)	(0.079)	(0.106)	(0.10)	(0.147)	(0.109)	(0.039)	(0.114)
Health centers	0.681	0.681	0.683	0.002	0.680	0.686	0.006	0.672	0.733	0.062
	(0.057)	(0.064)	(0.075)	(0.083)	(0.067)	(0.07)	(0.085)	(0.074)	(0.098)	(0.124)
First level hospitals	0.970	0.961	1.000	0.039	0.966	0.977	0.011	0.955	0.969	0.013
	(0.023)	(0.031)	(0.00)	(0.031)	(0.036)	(0.02)	(0.042)	(0.047)	(0.034)	(0.057)

Figure 27. Power outages over last 3 months



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