



SERVICE DELIVERY INDICATORS

Education | Health



Education and Health Services in **UGANDA**

Data for Results and Accountability

NOVEMBER 2013

Launch edition

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THE WORLD BANK



AFRICAN ECONOMIC RESEARCH CONSORTIUM
Consortium pour la Recherche Economique en Afrique



Service Delivery Indicators: Data for Results and Accountability

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 citizens to identify gaps and track progress within and across countries over time. It is envisaged that the broad availability, high public awareness and persistent focus on the indicators will mobilize policymakers, citizens, service providers, donors and other stakeholders into action. Inspired by the *World Development Report 2004: Making Services Work for Poor People*, the ultimate goal is to sharply increase accountability for improved quality of services toward the ultimate end of improving human development outcomes.

The Service Delivery Indicators initiative is an Africa-wide program that collects facility-based data from schools and health facilities. The perspective it adopts is that of citizens accessing a service. The indicators can thus be viewed as a service delivery report card on education and health care. Complementing other sources that draw on citizens' perceptions to assess performance, the indicators assemble objective and quantitative information from a survey of schools and health facilities.

The SDI initiative is a partnership of the World Bank, the African Economic Research Consortium and the African Development Bank to develop and institutionalize a set of robust measures of service delivery. The measurement of these indicators is based on survey instruments underpinned by rigorous research and embraces the latest innovations in measuring provider competence and effort. The survey instruments were piloted in Tanzania and Senegal. Uganda is the second country where a full-fledged SDI has been implemented, following Kenya which was completed in July 2013. The SDI is now being rolled out in Mozambique, Nigeria, and Togo. More countries will follow in 2014.

The major funders of the SDI initiative are The William and Flora Hewlett Foundation and the World Bank.

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

November 2013

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Education and Health Services in UGANDA

SDI: Data for Results and Accountability

As stated in its Vision 2040 blueprint, Uganda aims to transform its society and provide citizens with a better standard of living by focusing on improving the quality of health and education services.

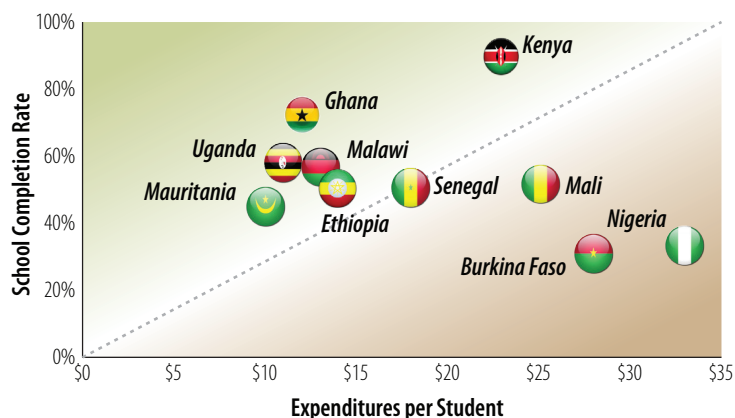
However, this is easier said than done. While Uganda has made significant progress in reducing poverty, enrolling more children in school, and raising the child survival rate, serious challenges remain. These include ensuring that children learn basic language and mathematics skills in primary school, and that mothers and infants have access to skilled health care, so that tragic and untimely losses of life are prevented. Achieving these goals is not only intrinsically important for all Ugandans, but also necessary for Uganda's structural transformation.

Service delivery outcomes are determined by the relationships of accountability between policymakers, service providers, and citizens.

The delivery of quality health care and education is contingent on what happens in clinics and in classrooms. A combination of several basic elements is required for quality services to be delivered at the frontline. Adequate financing, infrastructure, human resources, material, and equipment are all required, while institutions and governance structure must provide incentives for service providers to perform. The impact of financial and material resources is substantially reduced when frontline providers face a set of incentives that are not conducive to performance. Therefore, simply increasing the level of resources is not enough to address the quality deficit in education and health.

The Service Delivery Indicators (SDI) aim to construct a set of benchmarking metrics that captures critical dimensions of service delivery, including the knowledge and effort of providers. The indicators fall into three categories: (i) the availability of key infrastructure

FIGURE 1. Higher Spending on Services Doesn't Necessarily Improve Outcomes



Source: World Development Indicators

and inputs, (ii) the effort exerted by providers, and (iii) the knowledge of providers. As the surveys are being rolled out in more African countries, the SDI will soon provide a means to track service delivery performance in education and health across Sub-Saharan Africa and over time. The indicators are unique in that they provide countries with detailed and comparable data on important dimensions of service delivery.

Accessibility is another important feature of the SDI. The information is made publicly available, giving citizens a factual, objective, and rigorous basis on which to engage with governments and service providers on how to improve service delivery.

The SDI were published for Kenya for the first time in July 2013, following pilot surveys in Tanzania and Senegal. This Uganda brief draws from the SDI Uganda Technical Report which contains more detailed information on the survey methodology and results and is available online at www.SDIIndicators.org.

Service Delivery Indicators for Uganda – Highlights

The Service Delivery Indicators for Uganda are based on surveys of about 400 primary schools and 400 health facilities, and nearly 5,300 teachers and health providers. The indicators provide evidence that basic inputs and infrastructure—with the notable exception of textbooks and drugs—are largely available at schools and health facilities. But they also show that attention needs to be paid to the level of knowledge and effort among providers. Importantly, they uncover large regional inequalities in service delivery.

What service providers know

- There are significant gaps in provider knowledge among both public and private providers in health as well as education.
 - Only 35% of public health providers could correctly diagnose at least 4 out of 5 very common conditions (like diarrhea with dehydration and malaria with anemia). In health centers that only offer outpatient services (HC2), half (49%) of the providers could not identify more than one of these conditions. Worryingly, public providers followed only 1 out of 5 (20%) of the correct actions needed to manage maternal and neonatal complications.
 - Less than 1 in 5 (19%) of public school teachers showed mastery of the curriculum they teach. Years of education and level of teacher training were positively correlated with higher teacher scores.
- The Northern region and rural areas consistently and significantly lagged behind the other regions and urban areas in measures of knowledge and competence of providers.

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:
 - More than half (52%) of public health providers were not present in the facility. Sixty percent of this absence was approved, and hence potentially within management's power to influence.
 - More than 1 out of 4 (27%) of teachers in public schools were not at work. Of those who were in school, about 1 in 3 (30%) were not teaching. The result is 40% of public school classrooms with no teacher teaching.
- By extrapolation, the average public Primary 4 student in the North received only 50 actual days of teaching time during the school year, about 90 days fewer than her Kampala counterpart.

What service providers have to work with

- Schools and health facilities have some of the basic inputs and equipment to function properly, but a few serious challenges remain. No textbooks were used by students in 86% of the classes in public schools, and only 44% of the public health facilities had all 6 of Uganda's essential drugs. The adequate availability of priority drugs for mothers and children remains a challenge with only 39% and 23% respectively available in public facilities.
 - While the observed use of textbooks by students in public schools was very low at 14%, public schools--contrary to expectations--actually fared better than private schools, where the use was virtually non-existent at 3%.
 - Within the public sector, rural health facilities had poorer equipment and infrastructure; however the availability of tracer drugs was higher in rural facilities.

SDI in Uganda: Implementation and Scope

The Uganda SDI surveys were implemented by the Economic Policy and Research Center (EPRC) a leading African think tank. Before implementation, there was an extensive consultation process involving key stakeholders in education and health (technical officers in ministries, non-governmental organizations, and private sector) in Uganda to contextualize the SDI instruments and discuss the survey design. Data collection in the field took place between June and August 2013, with simultaneous data entry.

The SDI is representative of Uganda's four regions and Kampala, covering 400 primary schools and 400 health facilities across the country. Both public and private (for profit and not-for-profit) providers were included. The enumerators noted the presence/absence of 3,783 teachers in the school (and also in the *classroom*) on an unannounced visit; and 2,214 teachers were assessed

for knowledge in English, mathematics and pedagogy. In the health sector, in addition to noting the presence/absence of 1,507 health providers, 736 providers were administered seven vignettes¹ (sometimes called 'patient case simulations'). Of the vignettes, five were on common tracer conditions² and two on the management of maternal and neonatal complications.

¹ 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 as it measures trainees' 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. For more information on the methodology, see www.SDIindicators.org.

² Malaria with anemia, diabetes mellitus, acute diarrhea, pneumonia, and pulmonary tuberculosis.

THE INDICATORS

The SDI indicators are grouped into three categories:

- (i) **What providers know** (knowledge and ability). Teachers need to have at least a minimum level of knowledge of the subjects they are teaching and skills to transform their knowledge into meaningful teaching. Similarly, health providers need to be skilled and competent to manage the conditions they are presented with.
- (ii) **What providers do** (provider effort). A minimum requirement for service delivery, for example, is that teachers and health providers are present in the facility and working.
- (iii) **What providers have to work with** (availability of key inputs). These indicators deal with the service delivery environment, including the availability of teaching and medical equipment and supplies and school and health facility infrastructure.

The annex provides a detailed description of the indicators.

TABLE 1: Uganda Service Delivery Indicators At-a-Glance

HEALTH	EDUCATION										
	Uganda	Public	Private	Rural Public	Urban Public		Uganda	Public	Private	Rural Public	Urban Public
What providers know (ability)											
Diagnostic Accuracy	58%	56%	61%	50%	70%	Minimum knowledge	20%	19%	20%	17%	25%
Adherence to clinical Guidelines	50%	48%	52%	43%	61%	Test score (English, Maths, & Pedagogy)	45%	46%	45%	45%	47%
Management of maternal / neonatal complications	19%	19%	20%	19%	18%						
What providers do (effort)											
Caseload	6	10	2	10	5	School absence rate	24%	27%	14%	31%	19%
Absence from facility	46%	52%	39%	52%	52%	Classroom absence rate	53%	57%	40%	60%	50%
						Time spent teaching per day	3 h 17 min	2 h 55 min	4 h 20 min	2 h 43 min	3 h 33 min
What providers have to work with (availability of inputs) ³											
Drug availability	48%	40%	55%	40%	46%	Students per textbook	14	12	100	17	7
Equipment availability	82%	78%	87%	78%	88%	Equipment availability	95%	94%	96%	94%	95%
Infrastructure availability	64%	48%	80%	45%	74%	Infrastructure availability	56%	60%	42%	57%	66%

Summary of the Findings

What do teachers and health workers know?

The share of teachers with minimum content knowledge reflects the results of a customized teacher test administered to Primary 4 mathematics and English teachers. The English test results were for teachers teaching English, and the mathematics test results were for teachers teaching mathematics. The tests were based on items from the curricula being taught in Uganda. The tests were also validated against the curricula from 13 African countries including Uganda⁴. In addition

to assessing content knowledge, teaching ability was assessed through a test of pedagogical knowledge.

Teachers' knowledge of the subjects they teach was very low, and the pedagogical skills to transform their knowledge into meaningful teaching were even lower. On average, teachers scored 65 percent and 58 percent on the mathematics and English tests (Figure 2), but only 1 in 5 public school teachers scored at least 80 percent on a test based on the curriculum they taught. Pedagogical skills were weak, as reflected in the average score of 26 percent on the pedagogy test, and only 7 percent of teachers scored above 50 percent. Teachers with a higher level of education and more teacher

Teachers and health workers had significant knowledge gaps. Only 1 in 5 English and mathematics teachers had mastery of the curriculum being taught. In health, only 1 in 10 providers diagnosed all five tracer conditions and half of providers in the lowest level health facilities correctly diagnosed only one condition (or none).

³ Availability of drugs, equipment, and infrastructure are defined in the annex.

⁴ See "Teaching Standards and Curriculum Review", a background paper prepared for the SDI by David Johnson, Andrew Cunningham, and Rachel Dowling.

training scored significantly better. Surprisingly, more experienced teachers and female teachers fared worse on the assessment. Head teachers performed better on the pedagogy assessment.

Quality in the health sector was assessed using two indicators of process (adherence to clinical guidelines in five tracer conditions and management of maternal and newborn complications—as measured in the vignette interviews); and one indicator of outcomes (diagnostic accuracy in the five tracer conditions at the end of the vignette interviews). Three of the tracer conditions were childhood conditions (malaria with anemia, acute diarrhea with severe dehydration, and pneumonia), and two were adult conditions (pulmonary tuberculosis and diabetes mellitus). Two other conditions were included: post-partum hemorrhage, the most common cause of maternal death during birth; and neonatal asphyxia, the most common cause of neonatal death during birth.

Public providers managed to correctly diagnose only slightly more than half (56 percent) of the tracer conditions. Further, only 3 in 10 public providers were able to correctly diagnose at least four out of five tracer conditions (see Figure 3). In public health centers providing only outpatient services, half of the providers diagnosed none or only one of the tracer conditions. Even when providers correctly diagnosed a condition, there was no guarantee they would recommend the full treatment. Indeed, the correct treatment was recommended in only 36 percent of the cases, reflecting weak provider knowledge. It is alarming to note that although almost 9 out of 10 (88 percent) providers were able to correctly diagnose pulmonary tuberculosis, nearly half (47 percent) did not prescribe the correct treatment required. Knowledge and treatment also varied across conditions, malaria with anemia was the least likely to be correctly diagnosed and less than 1 in 10 (8 percent) recommending the correct treatment (Figure 4). It is particularly worrying that so few health providers were able to even diagnose potentially deadly conditions such as malaria or diarrhea.

Public-private and regional comparisons

Teachers in private schools or health providers in private health facilities did not consistently outperform their counterparts in the public sector in measures of ability. Indeed none of the differences in the scores between these two groups was statistically significant, be it on diagnostic accuracy, minimum teacher knowledge, adherence to guidelines, or pedagogy assessment. However, there were large differences across regions. In particular, provider scores in the Northern region were significantly lower. Overall diagnostic accuracy was significantly higher in Kampala. In education, teachers

in Kampala and the Central region scored slightly better than those in the other three regions. Finally, teachers and health providers in rural areas fared significantly worse than those in urban areas when it comes to knowledge.

FIGURE 2. Teachers’ subject knowledge was low, and the capacity to transmit it (pedagogy) even lower.

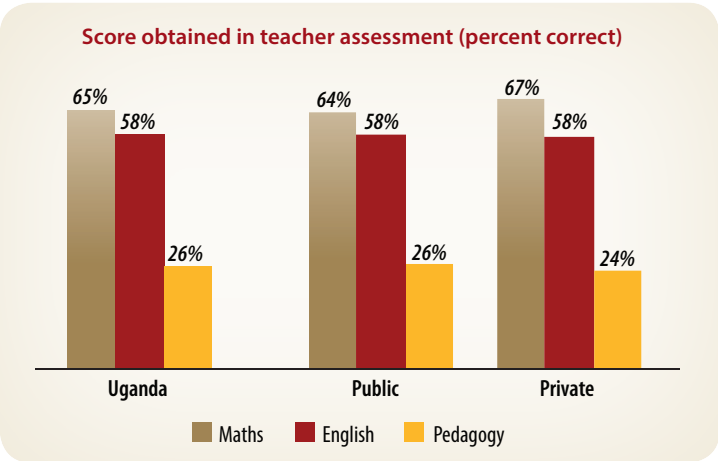


FIGURE 3. Share of health providers who could correctly diagnose...

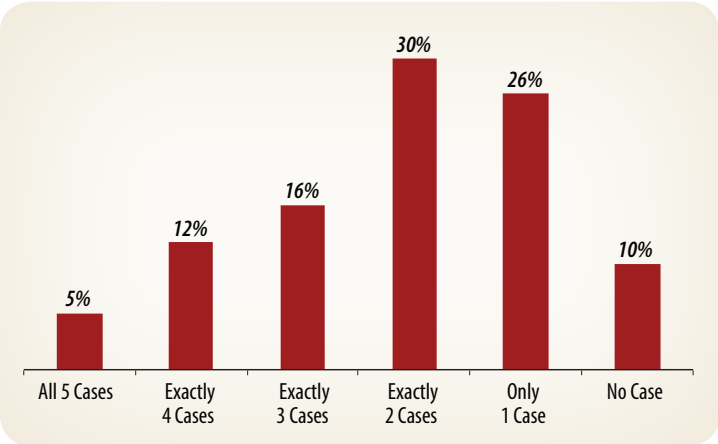
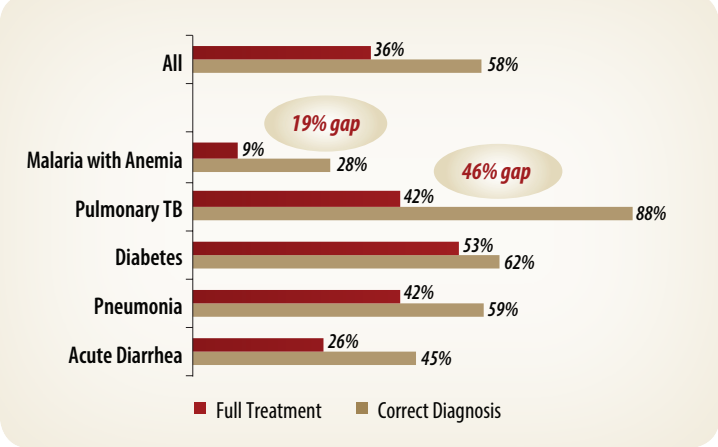


FIGURE 4. There is a significant knowledge gap between diagnosis and treatment.



What do providers do?

SDI uses a standardized, internationally benchmarked methodology⁵ to measure absenteeism, namely unannounced visits. SDI consists of two visits to each facility; the first is announced in advance so as to increase the likelihood of being able to collect the data underlying most of the indicators. The second visit, which happens during the 7 days following the first visit, is unannounced and its sole purpose is to ascertain the whereabouts of the providers. Providers who are not in

the facility because it is not their shift are not considered absent. Health workers who are not in the facility because they are carrying out outreach activities are likewise not considered absent.

Absenteeism is high for both teachers and health providers. On average, 1 in 4 (24 percent) teachers were not in school and about the same share of schools (26 percent) had absenteeism rates higher than 40 percent. However, even for teachers who were at school, the SDI shows that 1 in 3 were not in the classroom teaching and therefore absent from class. For every 100 teachers, only 39 teachers were in class teaching, 29 were at school but not in the classroom teaching, and 24 were nowhere to be found in the school (Figure 5). Putting together the data on absenteeism with data on time use within

classrooms suggests that out of the official teaching day of 7 hours 20 minutes, the average Primary 4 student experiences only 3 hours 17 minutes of teaching and learning time with her teacher.

Which teachers were most likely to be absent from class? It turns out that it was older teachers and those born in the district in which they teach. Female teachers were significantly less likely to be absent.

In the health sector almost half (46 percent) of the providers were not on the facility premises. Who was most likely to be absent among health providers? There seems to be no specific pattern. All cadres appeared equally likely to be absent, the same holds for female and male providers, as well as for older and younger

FIGURE 5: Absence from school and absence from class: Percent distribution of teachers by absenteeism status

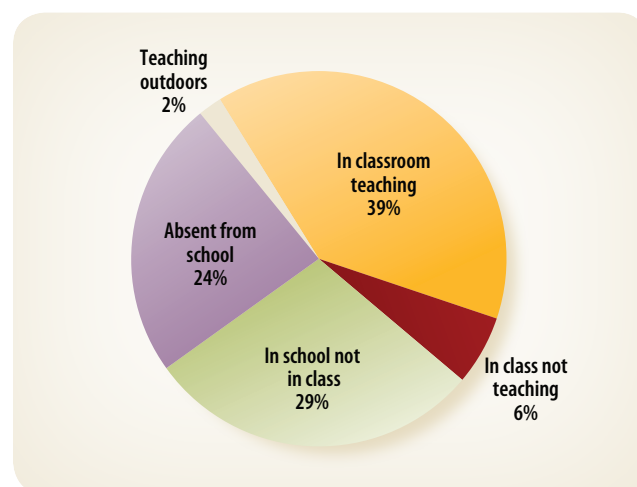
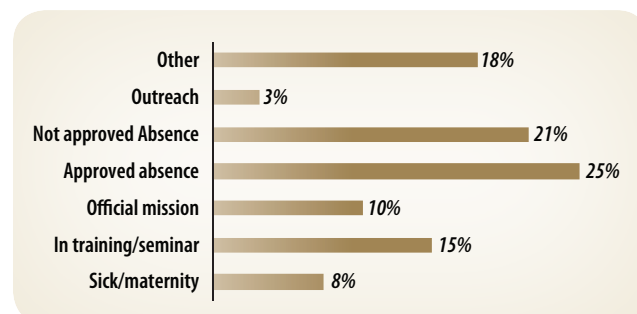


FIGURE 6: Reasons for absence in the health sector



providers. In contrast, health providers in rural areas were more likely to be absent than their urban counterparts.

In the majority of cases, respondents gave a legitimate reason for the absence of health workers—such as attending training or a seminar (15 percent), on official mission (10 percent), or other approved absence (25 percent). Like all other workers, teachers and health providers are sometimes absent for any number of reasons. A typical expected absence rate is about 5 to 10 percent authorized leave. The rates in Uganda are substantially higher. From the citizen's perspective, if almost half of staff is not teaching students or attending patients there is a legitimate reason for concern even if every single absence was sanctioned. Better management at the facility or higher administrative level could probably curb sanctioned absence by implementing tighter leave rules.

Another indicator for health provider's level of effort is patient caseload. The indicator is defined as the average number of outpatient visits a health provider attends to per working day. It is computed as the number of outpatient visits recorded in outpatient records in the three months prior to the survey, divided by the number

⁵ See Rogers and Koziol "Provider Absence Surveys in Education and Health. A Guidance Note". World Bank

of days the facility was open during the three month period and the number of health workers who conduct patient consultations (i.e. excluding any staff who do not see patients).

The average health provider consulted with 6.1 outpatients per day, a surprisingly low number. Smaller facilities staffed with one or two health providers had the largest caseload with 11 outpatients per provider per day, which is more than twice the load for facilities with 3 to 5 providers (5.3 outpatients). Very large facilities with more than 20 health providers recorded a caseload of only 2.1 outpatients.

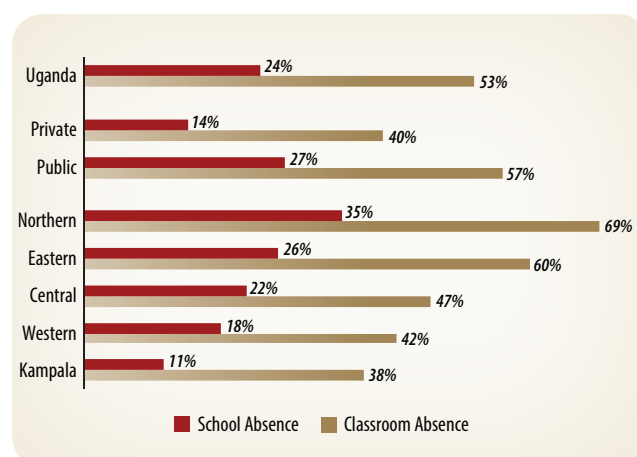
Public-private and regional comparisons

There is a lot of regional and public-private variation in providers' level of effort in both sectors. Starting with the caseload, public health providers' caseload (10 outpatients per provider per day) was almost five times that of private providers (2.2 outpatients). Within the public sector, rural providers' caseload was more than twice that of urban providers. Public health facilities with only 1 or 2 health providers were the busiest and received 18.6 outpatients on a daily basis. Western and Central regions had the highest absenteeism with roughly 6 out of 10 health providers absent. In education, teachers' absenteeism was especially prevalent in the Northern and Eastern regions with more than 70 percent and 60 percent respectively of the schools experiencing absenteeism from classroom of 60 percent or more. As a result, Primary 4 students in the Northern region only received 1 hour 52 minutes of teaching time per day out of a 6 hour 56 minute teaching day. At the end of the school year a student in Kampala would have had over three months' worth of education more than a student in the North.

What are the inputs that providers have to work with?

Schools and health facilities need basic infrastructure and equipment to function properly. The SDI collects information on a few critical inputs to measure the quality of the environment in which providers work and deliver services. In schools, the "availability of teaching resources" indicator measures (i) whether a Primary 4 classroom has a functioning blackboard and chalk; (ii) the share of students with pens; and (iii) the share of students with notebooks. The "infrastructure availability" indicator captures whether a school has (i) functioning toilets assessed as being clean, and private, and accessible; and (ii) sufficient light to read the blackboard from the back of the classroom. In addition, the student-teacher ratio and students per textbook were assessed. Both depend

FIGURE 7: Absenteeism across regions and differences between public and private schools



on classroom observation and in the case of students per textbook the students were asked to show their textbook and the enumerator counted the number of textbooks in use. The indicator is then simply the number of textbooks shown divided by the number of students attending the class.

Uganda does very well when it comes to the availability of minimum teaching resources, with nearly universal availability. Virtually all the classrooms had blackboards and students had pencil and paper to work with. But in more than 90 percent of the Primary 4 classrooms observed there was no student with a textbook, and nationwide there were about 14.4 students per textbook—a high number by any standard. Schools also did less well in terms of infrastructure: for example only 70 percent of them had clean toilets. The student-teacher ratio was high at 45:1, signaling overcrowded classrooms.

The medical equipment indicator focuses on the availability of minimum equipment expected at a facility i.e. (i) a weighing scale (adult, child or infant), (ii) a stethoscope, (iii) a blood pressure machine and (iv) a thermometer. In each case the equipment needed to be observed by the enumerator and assessed as functioning. More than 4 out of 5 (82 percent) health facilities had all the basic equipment required. In terms of health facility

In nearly 90 percent of Primary 4 English and mathematics classes surveyed, there was no textbook available. The average Primary 4 class in the Eastern and Northern regions had 2.5 and 3 times more students than its counterpart in Kampala.

infrastructure, ninety percent of facilities had access to sanitation, more than ninety percent had access to clean water, and close to three quarters (74 percent) had a source of electricity. This translates into an indicator of “infrastructure availability” of 64 percent.

Drug availability is defined as the number of drugs of which a facility has one or more available, as a proportion of all the drugs on a list of 26 tracer medicines for children and mothers identified by the World Health Organization (WHO). Enumerators needed to observe the drugs and the drugs were considered available only if at there was at least one unexpired box/vial available. On average only 47 percent of this long list were available. However, the picture looks brighter if one looks at the six major tracer drugs⁶ on Uganda’s essential medicines and health supplies (EMHS) list. Indeed, on average, 79 percent of the six tracer drugs were available at the facilities. However, less than half (49 percent) of the priority drugs for children and close to 1 out of 3 (35 percent) priority drugs for mothers were available.

Public-private and regional comparisons

There is a lot of regional as well as public-private variation for the availability of inputs. Perhaps surprisingly, public schools did better than private schools on availability of textbooks. In private schools, virtually none (3 percent) had textbooks observed in use by students compared to 14 percent in public schools—still a very low rate. Public schools did better than private schools on infrastructure, mostly because of the greater accessibility and cleanliness of toilets. The student-teacher ratio was significantly larger in public schools (50:1) compared to private (28:1) schools. Within the public sector, urban schools had a much larger Primary 4 class size than rural schools: 58 students per teacher in urban areas versus 46 students per teacher in rural areas. Primary 4 teachers in Northern region had classes twice as large as those of their colleagues in the Central region (62:1 vs 31:1).

Although public health facilities fared better on the availability of the six tracer drugs with 85 percent compared to 72 percent for the private facilities, the private sector did better when it came to mothers’ and children drugs. Private health facilities were also better equipped and had better infrastructure especially—mostly because of electricity availability which stood at 90 percent in private facilities and only 73 percent in public facilities. Within the public sector, rural health facilities had poorer equipment and infrastructure; however the availability of tracer drugs was higher in

FIGURE 8: There is considerable variation in number of students per Primary 4 class across regions

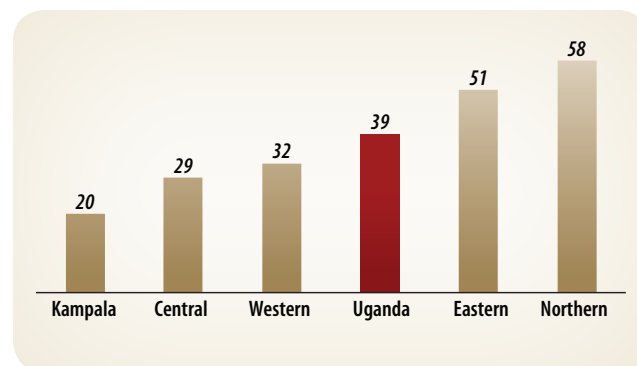
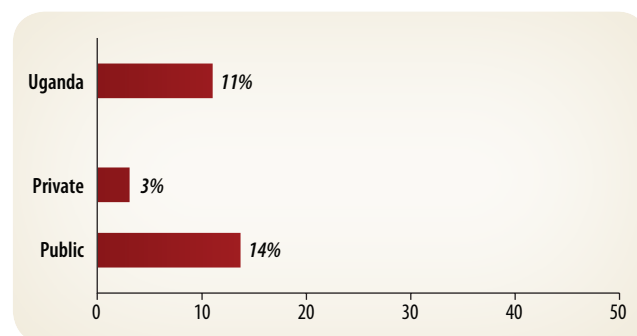


FIGURE 9: Percent of Primary 4 classes where students use textbooks during English and Maths classes



rural facilities. Finally, the Northern and Eastern regions were worse off in almost all dimensions except for tracer drugs, which were available in more than ninety percent of Northern health facilities.

How does Uganda fare relative to other countries?

SDI Uganda used the same instruments and is fully comparable to SDI Kenya. Teachers and students were assessed with the exact same questions on the assessments. The same questions were also put to heads of school across the two countries. Tanzania and Senegal instruments also overlap a great deal with the ones for Uganda and Kenya although there are a few indicators which are not comparable.

In health, Uganda performed better than Kenya on input indicators and adherence to guidelines. However, Kenyan health providers were 20 percent more likely to get the diagnosis right and were twice as likely to correctly manage maternal and neonatal complications. Despite a slightly higher caseload in Uganda (10 vs 9) Kenya’s public providers seemed to exert a higher level of effort because of the very high absenteeism rate observed in

⁶ These are ACT, cotrimoxazole, measles vaccine, oral rehydration salt, Depo-Provera and Sulphadoxine pyramethamine.

TABLE 2: Comparative SDI At-a-Glance for Uganda, Kenya, Tanzania, and Senegal⁸⁹

HEALTH	EDUCATION					EDUCATION			
	Uganda	Kenya	Tanzania	Senegal		Uganda	Kenya	Tanzania	Senegal
Diagnostic Accuracy	56%	72%	57%	34%	Minimum knowledge	19%	39%	Not comparable	
Adherence to clinical Guidelines	48%	44%	34%	22%	Test score (English, Maths, & Pedagogy)	45%	57%	Not comparable	
Management of maternal / neonatal complications	19%	45%	Not available						
Caseload	10	9	Not available		School absence rate	27%	15%	23%	18%
Absence from facility	52%	27%	21%	20%	Classroom absence rate	56%	42%	53%	29%
					Time spent teaching per day	2 h 55 min	2 h 40 min	2 h 04 min	3 h 15 min
					Scheduled teaching time	7 h 20 min	5 h 40 min	5 h 12 min	4 h 36 min
					Student-teacher ratio	50	32	74	34
Drug availability	40%	67%	Not comparable		Students per textbook	12.4	3.1	Not comparable	
Equipment availability ^a	78%	76%	78%	53%	Equipment availability	94%	95%	Not available	
Infrastructure availability	48%	57%	19%	39%	Infrastructure availability	60%	59%	Not comparable	

a In the pilot for Senegal and Tanzania the presence of a weighing scale, a thermometer, and a stethoscope was used to compute the equipment availability indicator. Kenya and Uganda added a blood pressure machine on top of the three. Note also that in the pilot the availability was self-reported whereas in the full-fledged SDI availability and functioning status were physically assessed and verified. The indicator for the pilot is therefore biased upwards.

Kenya significantly outperformed Uganda in both education and health. Doctors in Uganda performed at about the same level as Kenyan nurses on both diagnostic accuracy and the capability to provide full treatment. The proportion of Kenyan teachers who reached the minimum knowledge threshold was more than double that of Uganda's teachers.

Uganda. Except for absenteeism, providers in Senegal and Tanzania performed poorly when compared to Uganda and Kenya on diagnostic accuracy, adherence to guidelines, and input indicators.

The quality of education of a country's workforce as captured by cognitive skills (proxied using scores on international tests) has been shown to be a strong determinant of long-term growth, even more so than educational attainment.⁷ Countries with a better educated workforce are more likely to be able to compete in an ever more globalized world. The quality of schools and teachers is also strongly positively correlated with students learning outcomes. Kenyan public teachers largely outperformed their Ugandan counterparts. The share of teachers with minimum knowledge was twice as large in Kenya compared to Uganda. Kenyan

teachers performed better in every component of the assessment: English, mathematics, and pedagogy. They were also less likely to be absent both from school and classroom. Interestingly, because of a much longer official scheduled teaching time, the average Ugandan Primary 4 student had 15 minutes more contact time per day with her teacher than the Kenyan student. Kenyan students, however, outperformed Ugandan students on the SDI English and mathematics tests.

Do the SDI really matter?

While SDI measures knowledge, effort, and inputs, at the end of the day these matter only so far as they deliver the learning outcomes policy-makers and citizens care about. To test the usefulness of the SDI, learning outcomes for Primary 4 students are also measured

7 See Hanushek and Woessman's "Do better schools lead to more growth? Cognitive skills, economic outcomes and causation" Journal of Economic Growth (2012), 17: 267-321.

8 For the sake of comparability, results for public sector providers only are reported.

9 Note that for diagnostic accuracy vignettes for Senegal and Tanzania included pelvic inflammatory disease which has been replaced by diabetes mellitus in the Kenya and Uganda vignettes. The other four tracer conditions remained the same. The adherence to guidelines is computed similarly although in the case of Kenya and Uganda more questions were introduced.

during the survey. The relationship between the SDI and students' performance is very strong. School and classroom absenteeism as well as student-teacher ratio are, as expected, strongly negatively correlated with student test scores. Teachers' performance on English and mathematics, the share of teachers with minimum knowledge, and availability of teaching resources all are positively correlated with student performance. The only variable which seems uncorrelated with students test scores is school infrastructure.

For the health sector there are several outcome measures at the national level that can be used to assess whether they are correlated with SDI, such as under-five mortality rates or the maternal mortality ratio, but unfortunately there is no indicator that can be linked directly to the service quality of individual facilities. However, one can reasonably assume that the higher the prevalence of misdiagnosis the worse the health outcomes. Also low capacity to manage maternal and neonatal complications could be reasonably assumed to be negatively correlated with child and maternal health outcomes.

What does all this mean for Uganda?

Uganda has one of the youngest populations in the world and has made great progress in expanding access to education. As of 2012, more than 8.4 million students were enrolled in its primary schools. However, increased access to education was not accompanied by improvement in learning outcomes. As several recent studies show, too many school-going children still cannot properly read and count. Recent evidence shows that cognitive skills are much more important in promoting economic growth than number of years of schooling. This puts the spotlight on the quality of schooling.

The same picture holds in the health sector with steady progress noted in under-five mortality, which fell by half

from 180 to 90 deaths per 1,000 live births between 1989 and 2011. This improvement is largely credited to vertical programs but system-related indicators such as maternal mortality rate stagnated or slightly deteriorated. These disappointing results are most likely related to the quality of service delivery.

To achieve its ambitious but attainable Vision 2040, Uganda needs to accelerate economic growth. Building a healthy and educated labor force is critically important. The SDI shows that although teachers and health workers function in a relatively decent working environment, a number of challenges must be urgently addressed. Almost half of the providers were missing in action and not found in the classroom teaching students or in the consultation rooms attending to patients. The SDI also uncovered significant knowledge gaps for both teachers and health workers. If not addressed, these service delivery failures will hamper Uganda's effort to build a healthy and educated workforce.

The SDI also showed serious regional inequalities, which will also likely feed into greater income and welfare inequality in the future. This again hampers the shared growth agenda and undermines the effort to build a cohesive and prosperous Uganda.

Over the past two decades, Uganda has made tremendous progress on economic growth, poverty reduction, as well as on some human development indicators. The results of the SDI, however, show that to sustain or accelerate this progress, Uganda will need to focus on raising quality and efficiency in health and education. The discovery of oil could be transformational for Uganda in terms of its vision for 2040, but only if the quality agenda is addressed in health and education. Only then can natural resources revenues be translated into long-term economic growth that benefits all Ugandans.

Annex 1. The Service Delivery Indicators defined

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.	<p>This indicators 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.</p> <p>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.</p>
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 Primary 4.
Textbooks per student	
Number of mathematics and language books used in a Primary 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 Primary 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 Primary 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.
Equipment availability	
Proportion of schools with the following available: functioning blackboard with chalk, pencils and notebooks. All three components are equally weighted.	<p>Minimum teaching resources is assigned 0-1 capturing availability of (i) whether a Primary 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.</p> <p>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.</p> <p>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.</p>

Infrastructure availability

Proportion of the proportion of schools with the following available: functioning electricity and sanitation. Each component has the same weight.

Minimum infrastructure resources is assigned 0-1 capturing availability of: (i) functioning toilets operationalized as being clean, and 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.

Delays in wages

Delays in wages

The indicator captures the share of teachers who have wages due in excess of two months. The indicator measures whether or not teachers have received the totality of their expected wage from two months prior.

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 taking question is asked. The number of relevant history taking questions asked by the clinician during consultation is expressed as a percentage of the total number of relevant history questions included in the questionnaire.

Relevant Examination Questions: Assign a score of one if a relevant examination question is asked. The number of relevant examination taking questions asked by the clinician during consultation is expressed as a percentage of the total number of relevant examination questions included in the questionnaire.

For each 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, sphygmomanometers and a weighing scale (adult or child or infant weighing scale) as defined below. Health centers and first level hospitals are expected to include two additional pieces of equipment: a refrigerator and sterilization device/equipment.

Thermometer: Assign score of one if facility reports and enumerator observes facility has one or more functioning thermometers.

Stethoscope: Assign score of one if facility reports and enumerator confirms facility has one or more functioning stethoscopes.

Sphygmomanometer: Assign score of one if facility reports and enumerator confirms facility has one or more functioning sphygmomanometers.

Weighing Scale: Assign score of one if facility reports and enumerator confirms facility has one or more functioning Adult, or Child or Infant weighing scale.

Refrigerator: Assign score of one if facility reports and enumerator confirms facility has one or more functioning refrigerator.

Sterilization equipment: Assign score of one if facility reports and enumerator confirms facility has one or more functioning Sterilization device/equipment.

Infrastructure availability

Share of facilities with electricity, clean water and improved sanitation.

Infrastructure aggregate: Assign score of one if facility reports and enumerator confirms facility has electricity and water and sanitation as defined.

Electricity: Assign score of one if facility reports having the electric power grid, a fuel operated generator, a battery operated generator or a solar powered system as their main source of electricity.

Water: Assign score of one if facility reports their main source of water is piped into the facility, piped onto facility grounds or comes from a public tap/standpipe, tubewell/borehole, a protected dug well, a protected spring, bottled water or a tanker truck.

Sanitation: Assign score of one if facility reports and enumerator confirms facility has one or more functioning flush toilets or VIP latrines, or covered pit latrine (with slab).



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NOVEMBER 2013



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With support from The William and Flora Hewlett Foundation