Girls' Schooling and Women's Literacy: Schooling Targets Alone Won't Reach Learning Goals

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Abstract

Using the Demographic and Health Survey (DHS) data on the ability of women at various levels of schooling attainment to read a simple sentence, we show that reaching universal completion of grade six among girls would not bring the world anywhere close to the goal of universal female literacy. These calculations are based on the empirical relationship between grades completed and ability to read, a descriptive 'learning profile.' The large literature on schooling and life outcomes suggests simple correlations are a reasonable guide to causal effects, and the typical concern is over-estimation of the true return to schooling—implying our calculations using a descriptive and not causal learning profile are a best-case scenario. This best case is often not at all good: the learning profile is so weak in Nigeria that even if all women had completed grade six, adult female illiteracy would only have fallen from 58 percent to 53 percent. In contrast, children in many other countries do learn to read in much higher numbers and enrolling out-of-school girls would dramatically reduce illiteracy. For instance, in Ethiopia the same calculations yield a reduction in illiteracy from 82 to 25 percent. But across nearly 50 developing countries with available data our calculations suggest 40 percent of women would be illiterate even if all women completed at least grade six. Achieving new Sustainable Development Goal targets of universal literacy and numeracy will require both achievement of universal schooling and dramatic improvements in the learning profile in most developing countries.

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Introduction

The Millennium Development Goals (MDGs) established goals in just eight domains. The target was modest and only mentions schooling[1] (Pritchett and Kenny 2013):

> *Target 2.A: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling.[2]*

The new Sustainable Development Goals (SDGs) shifted from low-bar goals to expressing millennium development ideals, covering more domains (17 versus 8) with more, higher, and broader goals in each domain. The education targets shifted from just schooling to schooling with "effective learning outcomes" and emphasize not just completion of school but universal literacy and numeracy being achieved for "all youth":

> *Target 4.1: By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes.*

> *Target 4.6: By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy.*

The implicit assumption in schooling targets was that there existed a tight link between "time served" in schooling and education—the acquisition of learning, skills, competencies, abilities, values, beliefs and dispositions and the general preparation for adult life that are the real purpose of education. People treat "schooling" and "education" as interchangeable synonyms on the implicit presumption that schooling nearly everywhere and for nearly everyone leads to education.

Tragically, the accumulation of national and international data on learning assessments and the direct estimates of learning profiles—the descriptive relationship between years of schooling and a measure of skills or learning—shows the assumption that schooling and learning are tightly linked is often false. In many countries today the largest fraction of the uneducated youth—functionally illiterate and innumerate—are schooled.

Spaull and Taylor (2015) use schooling attainment profiles and language and mathematics results from a cross-nationally comparable assessment in Southern Africa (SACMEQ) to show that in South Africa 26 percent of 12-year-olds were *both* functionally illiterate *and* enrolled in grade 6 while only 3 percent were illiterate but had not reached grade 6, so 90

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[1] Modest especially by comparison to earlier goals, such as the Jomtien Education for All Declaration adopted in March 1990, which is much more focused on learning. Article I reads: "Every person—child, youth and adult—shall be able to benefit from educational opportunities designed to meet their basic learning needs. These needs comprise both essential learning tools (such as literacy, oral expression, numeracy, and problem solving) and the basic learning content (such as knowledge, skills, values, and attitudes) required by human beings to be able to survive, to develop their full capacities, to live and work in dignity, to participate fully in development, to improve the quality of their lives, to make informed decisions, and to continue learning."

[2] http://www.un.org/millenniumgoals/education.shtml

percent of the cohort of 12-year-olds who were in school and illiterate had enrolled and persisted in school to grade 6. Eliminating the "unschooled" would reduce illiteracy by just 10 percent. In Uganda 45 percent of 12-year-olds were *both* functionally illiterate but in grade 6 (Spaull and Taylor 2015). The Education for All Global Monitoring Report (Rose 2014) reports that in Zambia more than three-quarters of primary school age children stay in school beyond grade 4 but only 44 percent of these children are able to read. Similarly, in Nigeria, approximately 80 percent of people aged 15 to 24 who left school after five to six years completed are unable to read a full sentence.[3] Asadullah and Chaudhury (2013) show that in rural Bangladesh knowing a child's school completion only very weakly predicts whether the child has even basic mastery of literacy and numeracy. The household sample based ASER assessments in India (and similar assessments in other countries like UWEZO) show similar results—that many children who have reached primary school completion have not mastered basic literacy and numeracy (ASER 2014).

We add to this literature on learning by using DHS data to construct learning profiles which link the ability to read a simple sentence and the year of schooling completed for women in 51 countries.[4] The latest waves of the DHS ask women to read a simple sentence (in their chosen language) in addition to recording women's self-reported schooling experience. We use this data to show that in many countries the learning profile is quite flat—literacy increases only weakly with more years of schooling. The (unweighted) average across 51 countries was that only about *half* of women who completed grade 6 (but no higher) could read a single sentence.

It is important to bear in mind that we estimate correlations between schooling and learning in the DHS data, not causal parameters. However, the large literature on the Mincerian earnings function—the empirical relationship between schooling and adult labor-market earnings—has shown that correlations of this type are a reasonable guide to the true causal relationship identified through natural experiments and instrument variables strategies (Card 2001). The typical concern is *upward* bias in the simple correlations of schooling and outcomes, due to the tendency for pupils of higher ability to get more schooling. If our descriptive learning profile is biased upward because the more adept are more likely to persist to higher levels of schooling this would imply the *causal* learning profile—the impact on a given individual of more schooling—is *less* steep than our descriptive profiles and hence our estimates here are too optimistic and a policy driven expansion of schooling would produce even *less* literacy than we suggest.[5]

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[3] http://unesdoc.unesco.org/images/0022/002256/225660e.pdf

[4] The DHS data on functional literacy have been used by the UNESCO Dakar+7 report and by the Population Council in assessing female education and these have generated evidence about literacy by level of schooling.

[5] As a caveat, note that the opposite scenario is possible: as Card (2001) notes, out-of-school children may face a high marginal cost of schooling and thus a *higher* potential return, though more recent work contends that upward ability bias remains a key challenge, at least in the U.S. (Heckman et al. 2016).

Estimating the empirical relationship between schooling and learning allows us to address the question: how much would the achievement of schooling goals like universal completion of primary school for girls at the existing learning profiles contribute to a goal of universal female literacy? In 22 of 51 countries achievement of universal grade 6 completion would still have left over a third of adult women illiterate as the learning profiles were too flat. A population weighted average suggests that even if universal grade 6 completion been achieved 40 percent of women would have still remained illiterate. This is of course no argument against getting every girl in school but efforts to "Let Every Girl Learn" have to focus as much on girls' learning once in school as just getting them to attend a school.

1. A learning profile from DHS data

Demographic and Health Surveys (DHS) have been conducted in over 90 countries, with more than 300 surveys carried out since 1984. We made use of the Woman's Questionnaire, carried out with a nationally representative sample of women in each country (covering both rural and urban areas). We used DHS data from 51 countries, which includes 21 low-income, 24 lower-middle-income, and 5 upper middle-income countries according to World Bank classification. We use the latest available data for each country and 80 percent of the countries have data from 2010 or later.

Because we are interested in women who have already completed their schooling but also want to be a recent as possible and have an adequate sample size for each grade of school completed we use data from just the cohort of women aged 25-34. This implies that although the data are the most recent they reflect schooling conditions of some time ago. So, for instance, the data from Nigeria are from 2014. Women who turned 30 (the middle of the 25-34 age range) in 2014 were born around 1984 and if they started school at age 6 they started school in 1990. Some form of this lag is inevitable in using data about adults with complete schooling and unfortunately there is very little evidence about the evolution of learning profiles over time that would allow us to say how our estimates compared to current learning profiles. In the case of ASER in India which has maintained a consistent set of data on learning profiles over almost a decade the learning profiles appear to have gotten *worse* rather than better (ASER 2014), so, while we don't want to extrapolate from this evidence to other countries, we also stress that, while enrollments have certainly expanded, there can be no general presumption that learning profiles have improved over time.

1.1 Schooling and reading data from DHS

DHS recorded whether a woman attended school or not and if they attended, the highest level (*primary, secondary, tertiary*). They also asked women what was the highest grade they attended within that level.[6] Only women who reported their highest level of education was primary or less were asked the reading question.

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[6] A typical questionnaire for DHS Phase 6 is at http://dhsprogram.com/pubs/pdf/DHSQ6/DHS6_Questionnaires_5Nov2012_DHSQ6.pdf. These are

The number of years of schooling corresponding to complete primary varies across countries. According to the ISCED 2011 (UNESCO 2012) the primary level "typically lasts six years, although its duration can range between four and seven years." Since the actual years vary from country to country our calculations are not strictly speaking about "universal primary completion" as defined by each individual country but rather are about universal completion of grade 6 (UPC(6)).

The DHS survey respondents who report not having attended secondary school are asked to read a card with sentences such as:

> *Parents love their children.*
> *Farming is hard work.*
> *The child is reading a book.*
> *Children work hard at school.*

The surveyors had cards in different languages that were intended to span the array of possible languages a woman in the sample area could read. Women can choose the language to read. Women for whom there was no language appropriate card do not have a reading result and are not in our results, but this was usually less than one percent of women. This is not a test of reading English or even of reading in the dominant national language but of reading in the language the respondents chose.

Surveyors indicated whether women (a) could not read at all, (b) were only able to read parts of the sentence or (c) could read all of the test sentence.[7] We treat women as literate if they were able to read the complete sentence *or* if they attended secondary school or more, even though this has the obvious bias of assuming every woman with secondary school could read.

As with any binary categorization this line divides through a reality of a continuous variation across individuals and reading and literacy proficiency. Ours is a very low bar for the definition of functional literacy and does not measure any degree of comprehension or any of the other complex skills that constitute literacy proficiency. For instance, the OECD's Survey of Adult Skills (PIAAC) "*defines literacy as the ability to understand, evaluate, use and engage with written texts in order to participate in society, achieve one's goals, and develop one's knowledge and potential.*" They define literacy as broader than "reading" as it "encompass(es) the range of cognitive strategies (including decoding) that adults must bring into play to respond appropriately to a variety of texts of different formats and types in the range of situations or contexts in which they read." By this standard the DHS measure of ability to read a single simple sentence is a very rudimentary assessment of "reading" which is itself just one element of literacy.

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questions 105 and 106 and 107 instructs the enumerator to ask the reading question only of women whose highest level of attendance (not completion) was primary so that people who attended but did not complete secondary are not asked to read.

[7] The question is 108 and includes the instruction that if the woman cannot read the whole sentence to ask whether she can read part of the sentence. So "part" might mean the woman could recognize as little as one word after prompting. We think this does not meet a reasonable standard of "literate." The UNESCO Institute of Statistics (2013) adopts this same definition for the primary schooled when using the DHS data.

In the PIAAC data literacy is grouped into levels 1 to 5 and those "below level 1." The description of those "below level 1" is: "Individuals at this level can read brief texts on familiar topics and locate a single piece of specific information identical in form to information in the question or directive. They are not required to understand the structure of sentences or paragraphs and only basic vocabulary knowledge is required." This is clearly much harder than reading a single sentence as in the DHS assessment. Only 3.3 percent of adults in the OECD scored below level 1.

One point of comparison between the DHS measure and the PIAAC data on literacy proficiency is that PIAAC included just the city of Jakarta, which one assumes is likely to score substantially higher than the Indonesian national average. In Jakarta's PIAAC assessment 56.6 percent of adults 25-65 with "less than upper secondary complete" were classified as "below level 1" in literacy proficiency. In contrast in our estimates 89 percent of those with only Grade 8 complete were classified as literate and hence only 11 percent illiterate. Hence many fewer people are illiterate by our standard than even the lowest category ("below level 1") of OECD literacy proficiency, which again emphasizes that the measure we use is a very low bar for literacy.

A second point of comparison is the PISA assessment of reading, which defines reading as having three elements: *retrieving information, interpreting texts, reflection and evaluation.* The criteria for achieving even the lowest assessed level of *interpreting texts* is that a student should: *Recognize the main theme or author's purpose in a text about a familiar topic, when the required information in the text is prominent.* In the 2000 PISA assessment of the reading ability of 15-year-olds, who would have been 28 in the 2013 DHS, 80 percent were at level 1 or below whereas in the DHS estimates 89 percent of those reporting completing grade 8 could read the sentence. Again this confirms our definition of literacy with the DHS is a very low bar.

1.2 A learning profile from DHS data

A descriptive learning profile is the relationship between years (or levels) of schooling completed and a measure of learning/skills/capabilities. Learning profiles are relatively scarce and quite recent as most national or international assessments are school based samples which assess only children in a given year of schooling (e.g. all students in grade 4) or of a certain age (e.g. all children in grade 15). Recent survey instruments like ASER (and its offspring like UWEZO) survey all school age children in a village and hence can produce learning profiles showing reading proficiency at each grade of schooling completed (Oye, Sandefur and Pritchett 2016). Also surveys which ask respondents their highest grade completed and include some measure of learning can construct a retrospective learning profile (Kaffenberger and Pritchett 2016). The MICS (Multiple Indicator Clusters Survey) and DHS have also been used for learning profile analysis in Africa (UNESCO 2014). We estimate the learning profile for the youngest cohort of women with their schooling completed, those aged 25 to 34. In order to construct a learning profile we compute a local polynomial regression of literacy on years of schooling for each of the 51 countries. A regression was used to report the proportion at a given grade who can read. We use this instead of using raw cell averages to smooth across grades as even though DHS samples are large, the cell sizes can be quite small and hence estimates quite variable.

Figure 1a shows the DHS estimated learning profile of "ability to read a sentence" and grade completed up to grade 6 for five countries and the average across all countries. This figure illustrates two important facts.

First, the *variation* across countries in the percent of adult women who completed grade 6 can read a sentence ranges almost from zero to 100 percent. While in Nigeria it is only 11 percent (and there are five countries where learning is even worse than Nigeria) in Rwanda 97 percent of women who completed grade 6 can read. There is also nearly everything in between. In Bangladesh it is 33 percent and in Ethiopia it is 73 percent.

Second, the *average* learning profile is surprisingly shallow. Only *half* of young adult women (aged 25-34) in the 51 DHS countries who had completed grade 6 could read all of a single simple sentence.

Given the common conflation of "illiteracy" with "unschooled" these high levels of adult female illiteracy among those who report attending school—roughly half those with grade 6 completed cannot read—are perhaps stunningly (and to the sceptic perhaps unbelievably) high. The recent learning profiles of current youth from ASER in India and Pakistan and UWEZO in Southern Africa show similarly flat learning profiles across grades and similar lack of reading skills at grade 6 completion. A recent set of nationally representative surveys about financial inclusion in 10 developing countries also included a question about whether the respondent (in this case both men and women aged 25-65) could read a sentence (Kaffenberger and Pritchett 2016). Table 1 shows the comparison between the DHS and Financial Inclusion Insights (FII) surveys for the overlapping countries. These two entirely independent sources on the same concept of "ability to read a sentence" show striking similarities—the average across the common countries is 51.4 percent for DHS and 48.8 percent in the FII data—and a high correlation across countries (.77) but some striking differences (e.g. Ghana). The broad pattern of our results is unlikely an artefact of the DHS approach to assessing reading.

Figure 1a: The learning profile varies widely across countries—in Rwanda all women with Grade 6 can read while in Nigeria only 12 percent can
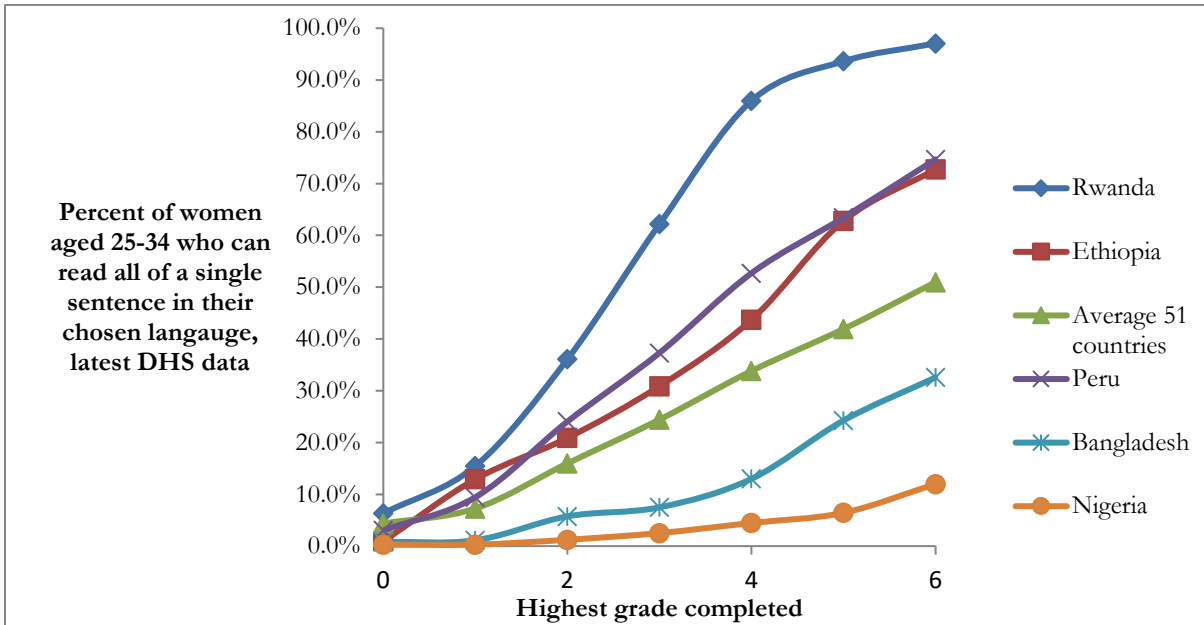
Source: Oye, Pritchett and Sandefur (2016) based on DHS data.

Figure 1b: The grade attainment profile also varies widely across countries
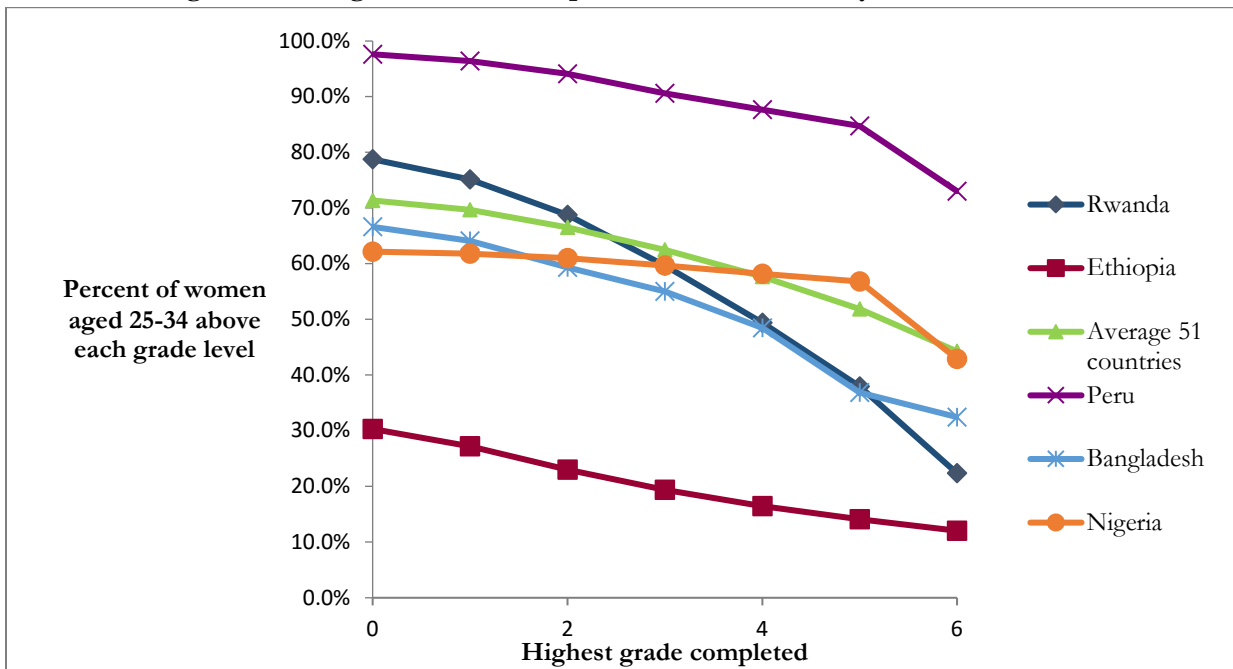
Source: Authors' calculations based on DHS data.

Table 1: Assessed ability of women with just primary education to read a simple sentence or passage is similar between the DHS and FII data		
Country	DHS, women aged 25-34, highest grade was 6th, percent able to read all of a sentence	FII survey, women aged 18-37, completed primary, able to read a sentence
Nigeria	12.0%	15.4%
Uganda	54.4%	23.2%
Bangladesh	32.6%	29.5%
Pakistan	50.7%	44.2%
India	34.6%	49.0%
Kenya	65.3%	69.7%
Indonesia	75.2%	76.7%
Tanzania	86.2%	82.5%
Ghana	7.7%	47.9%
Rwanda	97.1%	77.7%
Average	51.4%	48.8%
Source: Kaffenberger and Pritchett (2017) based on FII data.		

2. How much would reaching UPC(6) help reach an SDG of universal literacy?

The implicit assumption behind the targets aiming for universal primary completion was that all, or at least most, countries had learning profiles like Rwanda's so that if the country reached universal primary schooling completion then nearly every child would also have reached at least a minimal standard of universal literacy as in the SDG goal 4.6. But Rwanda is rather the exception than the rule. Of the 51 countries only 51 percent of women who had completed grade 6 could read a single sentence. Hence, nearly half of those meeting an MDG-like schooling target (based on grade 6 as "primary") would not meet the new SDG on literacy.

We can do a simple counter-factual calculation. Suppose in the cohort 25-34 all women who did not reach grade 6 had instead completed grade 6. At the observed learning profile how much would that have reduced the fraction of women who were illiterate?

2.1 Scenario of UPC(6) explained and illustrated

The arithmetic behind this calculation is simple. The actual literacy is just the schooling level attainment weighted sum of the likelihood a woman at each level of schooling is literate (equation 1) assuming women with higher grade completion are literate (even though this assumption is almost certainly wrong as there is no particular reason to suppose there is a discrete jump from grade 8 levels of literacy, which are well less than 100 percent, to exactly 100 percent at grade 9 and above). Hence all of the reported "literacy" rates are overstated by this amount, but this doesn't affect our estimates of changes across scenarios within a country.

$$1) \ Literacy = \sum_{g=0}^{8} \alpha_g * s_g + \alpha_{g>8}$$

Where α_g is the share of women 25-34 with grade g as their highest grade attained (and no schooling is g=0) and s_g is the share of women with grade g who can read a complete sentence.

The arithmetic of the counter-factual of universal completion of grade 6 at a fixed learning profile is easy, just assumed that all women with attainment less than grade 6 had grade six literacy levels.

$$2) \ Hypothetical \ Literacy = \sum_{g=0}^{5} \alpha_g * s_6 + \sum_{g=6}^{8} \alpha_g * s_g + \alpha_{g>8}$$

The gain in literacy is the simple difference between the two.

$$3) \ Gain \ Literacy = \sum_{g=0}^{5} \alpha_g * (s_6 - s_g)$$

Equation 3 is very intuitive. The gain in literacy from the counter-factual of all women having completed grade 6 is bigger: (a) the larger the shares of women who did not complete grade 6 (if all women had completed grade 6 then there would be no gain at all), and (b) the steeper the learning profile and hence the larger the gap in literacy between women who completed grade 6 and those who completed less than no schooling (if the learning profile were completely flat then there would be no gain at all).

The learning and grade attainment profiles in Figure 1a and 1b use four countries to illustrate graphically the simple intuition of how this calculation works.

Ethiopia illustrates the case of a country where schooling expansion significantly reduces illiteracy. In Ethiopia 85.9 percent of women aged 25-34 in 2011 had completed less than grade 6, with 69.7 percent having attended no schooling at all. In Ethiopia the learning profile is quite steep (Figure 1a above) and 72.7 percent of those who did complete grade 6 could read. This combination means that the potential gains in reducing illiteracy from expanding schooling at a constant learning profile are massive. Actual female illiteracy in 2011 was 81.6 percent, but had all women achieved grade 6 and achieved the observed grade 6 level of literacy of 72.7 percent then illiteracy would have fallen by 56.7 percentage points. Ethiopia represented the scenario that we believe many people promoting universal primary completion have in mind—since schooling in fact appears to be reliably producing literacy (we are still bracketing the question of causality and whether the learning profile can remain unchanged at massive changes of scale of enrollment) the universalization of schooling eliminates most illiteracy.

Nigeria illustrates a different case. In Nigeria in 2014 43.2 of women aged 25-34 had not completed grade 6 (37.8 percent with no schooling at all), less than Ethiopia but still very high and far from universal primary completion. However, of women who had completed grade 6 in Nigeria only 12 percent were literate. This implies that the gap in predicted literacy between women with no schooling and those with grade 6 was only 12 percent (s_6-s_0=.12) so that even though there was a large share of women with no schooling the gain in literacy from expansion of schooling completion would be small. Moving all the women from no schooling to grade 6 would have only reduced illiteracy by about 4.5 percentage points (.045≈.378*.12).

The hypothetical calculations in Nigeria illustrate the danger of a shallow learning curve. Even if Nigeria had achieved universal completion of grade 6—compared to the actual large out-of-school population—illiteracy would have fallen from 58 percent to only 53 percent. Achieving the UPC(6) in Nigeria would have still left half of all women short of the SDG for literacy.

Peru illustrates the situation for many lower-middle and middle income countries. In Peru in 2013 only 2.4 percent of women had never enrolled in school and only 15.3 percent did not finish grade 6. In this case even though the learning profile is the same as Ethiopia the absolute magnitude of the gains are small simply because the scope for raising the share with at least grade 6 complete is small—because those gains in schooling attainment have already been made. In Peru this means the elimination of non-enrollment and drop-out before grade 6 would have reduced illiteracy by only 5.9 percent—but from an already small base of 13.5 percent.

A fourth country, Bangladesh in 2015, illustrates an intermediate case. There were fewer women who had no schooling than Ethiopia or Nigeria but more than Peru (33 percent) but higher drop-out so 63 percent of women had less than grade 6 complete. Bangladesh's learning profile was steeper than Nigeria's but much shallower than Ethiopia or Peru with only 32.6 percent of women able to read after completing grade 6. This means the gains were bigger than Nigeria or Peru but much smaller than Ethiopia, as universal completion of grade 6 would have reduced illiteracy by 16 percent. But again, in Bangladesh universal completion of grade 6 would still have left half of all women illiterate.

There are two obvious limitations of these calculations. First, it assumes that the *descriptive* learning profile represents a *causal* relationship that is relevant to the incremental student. This assumes that the difference between those who can read and who completed grade 4 versus grade 3 is something like a Local Average Treatment Effect (LATE) and if a child who dropped out in grade 3 instead had persisted to grade 4 their likelihood of learning to read in that year was equal to the average gain. This assumption is almost certainly false and almost certainly leads to the *descriptive* profile being steeper than the *causal* profile. This is because of the positive self-selection of students into further enrollment. The drop-out of students in early grades is almost certainly associated with students who are weaker students, both in the sense of lower cumulative achievement and less likely to learn in the coming year. This positive self-selection of students implies that at least some of the gain of the

descriptive learning profile does not reflect causal learning but just that those who could read (or were about to read) persisted in school. Hence, all of our counter-factual simulations below are *optimistic* and overstate the likely gains for this reason.

The second obvious limitation is that our simulations are not just over marginal or incremental expansions of the schooling system but often imply massive increases in student populations. Our assumption of a constant learning profile implies that the massive expansion would not have caused the learning profile to deteriorate. Certainly this is a possible outcome but by no means a foregone conclusion. Again this almost certainly makes our calculations *optimistic* in that they overstate the likely gains.

2.2 Results for all countries

We break the reporting of the results of our simulations into three groups based on their initial level of illiteracy: high illiteracy (above 60 percent), medium illiteracy (between 40 and 60 percent), and low illiteracy (below 40 percent) as these countries represent very different conditions and, as we will see, produce strikingly different results.

2.2.1 Initially high illiteracy countries

There are 16 countries where initial illiteracy was over 60 percent. In most of these countries a large fraction (typically more than 2/3) of women in this cohort never attended school. Hence one of the conditions for a large impact on literacy of expanding primary schooling is met. What Table 2a illustrates is that the impact of getting these under-schooled into and completing school depends heavily on the steepness of the learning profile.

In 12 of the 16 countries (including a number of large countries like India, Bangladesh, and DR Congo) less than half of women who completed grade 6 could read—ranging from shockingly low levels of 20 percent or less in DRC, Chad, Liberia to only around a third in India, Bangladesh and Benin. In all 12 of these countries even after UPC(6) illiteracy would still afflict over *half* of all women.

In contrast, as we saw above with Ethiopia, a combination of high initial out-of-school population combined with a reasonably steep learning profile implies UPC(6) would lead to enormous reductions in illiteracy. In Mozambique, for instance, illiteracy would have fallen in 74 percent to 30 percent in the UPC(6) scenario.

2.2.2 Initially medium illiteracy countries

The countries with moderate levels of illiteracy (between 40 and 60 percent) show the same feature—the gains in reducing illiteracy depend heavily on the learning profile and the learning profiles vary widely across countries.

In Egypt the fraction of women who never attended school is 36 percent—high, but much lower than in the high illiteracy group—but the learning profile is strikingly flat as only 18 percent of women completing grade 6 were able to read. This implies the gains from

additional enrollment are limited both because the "out-of-school" population is modest and because the learning profile is shallow. Hence UPC(6) would reduce illiteracy by only 5 percentage points.

In contrast, in Morocco 70 percent of those completing grade 6 can read but 70 percent of women in this cohort never attended school leading to illiteracy of 57.6 percent. But if all women had completed grade 6, illiteracy would have fallen from 57.6 to only 10.2 percent.

Table 2a: Among high illiteracy countries (over 60 percent) universal primary completion would have left female illiteracy over 50 percent in the 12 countries with a flat learning profile—but produces massive gains in steep learning profile countries						
		Data on young women (25-34) from the most recent DHS			Scenario: Assuming that all women who never enrolled instead completed grade 6 and had the average literacy of women who completed grade 6	
Country	Year	Percent who cannot read (illiteracy)	Percent of cohort who never attended school	Percent who completed grade 6 who can read a simple sentence	Percent who cannot read (illiteracy) even in UPC(6) scenario	Percentage point reduction in illiteracy relative to base case in UPC	Percent of illiteracy eliminated relative to base case by UPC (sorted)
Flatter learning profile countries (Percent grade 6 completers who can read<50 percent)							
Sierra Leone	2014	87.7%	79.5%	3.5%	85.0%	2.7%	**3.0%**
Gambia	2013	69.3%	60.7%	4.1%	67.1%	2.3%	**3.2%**
Guinea	2013	91.6%	88.2%	4.5%	87.9%	3.6%	**4.0%**
Liberia	2014	74.6%	63.9%	7.4%	70.2%	4.4%	**5.9%**
Togo	2014	75.6%	61.2%	14.9%	68.2%	7.4%	**9.8%**
DRC	2014	64.4%	49.9%	20.0%	56.7%	7.7%	**12.0%**
Chad	2005	95.4%	93.8%	16.5%	80.6%	14.8%	**15.5%**
Bangladesh	2015	66.7%	63.1%	32.6%	50.7%	16.0%	**24.0%**
Niger	2013	95.0%	93.4%	25.2%	72.1%	22.9%	**24.1%**
India	2007	66.9%	62.7%	34.6%	48.3%	18.6%	**27.9%**
Benin	2012	87.4%	85.2%	32.3%	61.4%	26.0%	**29.7%**
Senegal	2015	82.0%	81.8%	40.9%	51.6%	30.5%	**37.1%**
Steep(er) learning profile countries (percent grade 6 completers who can read>50 percent)							
Pakistan	2013	65.7%	70.0%	50.7%	37.3%	28.4%	**43.3%**
Cote d'Ivoire	2012	73.3%	73.2%	57.3%	36.0%	37.3%	**50.9%**
Mozambique	2012	74.2%	79.9%	66.3%	29.6%	44.5%	**60.0%**
Ethiopia	2011	81.4%	85.9%	72.7%	24.8%	56.7%	**69.6%**
Source: Authors calculations with DHS data.							

Table 2b: Among moderate illiteracy countries (40 to 60 percent) where the learning profile is flat (<50 percent of grade 6 completers can read) the gains from UPC(6) are small to moderate while in steeper learning profile countries UPC(6) nearly eliminates illiteracy						
		Data on young women (25-34) from the most recent DHS			Scenario: Assuming that all women who never enrolled instead completed grade 6 and had the average literacy of women who completed grade 6	
Country	Year	Percent who cannot read (illiteracy)	Percent of cohort who never attended school	Percent who completed grade 6 who can read a simple sentence	Percent who cannot read (illiteracy) even in UPC scenario	Percentage point reduction in illiteracy relative to base case in UPC	Percent of illiteracy eliminated relative to base case by UPC (sorted)
Flatter learning profile countries (Percent grade 6 completers who can read<50 percent)						
Congo	2012	49.8%	24.0%	10.3%	47.9%	1.9%	**3.7%**
Ghana	2015	50.1%	38.8%	7.7%	47.6%	2.5%	**5.1%**
Nigeria	2014	58.0%	43.2%	12.0%	53.1%	4.9%	**8.4%**
Egypt	2014	42.0%	36.2%	18.3%	36.8%	5.2%	**12.4%**
Zambia	2014	54.0%	36.8%	26.5%	47.0%	7.0%	**12.9%**
Comoros	2013	56.1%	50.2%	26.8%	44.7%	11.4%	**20.3%**
Sao Tome Principe	2009	52.2%	57.7%	49.1%	40.8%	11.5%	**22.0%**
Timor-Leste	2010	46.8%	40.6%	42.6%	32.6%	14.2%	**30.4%**
Cameroon	2012	51.8%	42.2%	49.8%	34.4%	17.3%	**33.5%**
Steep(er) learning profile countries (percent grade 6 completers who can read>50 percent)						
Uganda	2012	58.0%	57.0%	54.4%	35.6%	22.4%	**38.7%**
Haiti	2012	49.1%	50.1%	55.6%	28.0%	21.1%	**42.9%**
Cambodia	2015	55.0%	64.8%	65.4%	27.0%	28.0%	**50.9%**
Madagascar	2010	53.1%	73.2%	76.9%	19.0%	34.1%	**64.2%**
Malawi	2011	47.0%	58.1%	79.9%	15.4%	31.6%	**67.1%**
Nepal	2011	59.4%	73.4%	76.9%	18.4%	41.0%	**69.1%**
Burundi	2011	47.9%	72.6%	90.2%	8.8%	39.0%	**81.5%**
Morocco	2004	57.6%	70.4%	86.5%	10.2%	47.3%	**82.2%**
Source: Authors' calculations with DHS data.						

2.2.3 Initially low illiteracy countries

In the initially low illiteracy countries there are two features that play an important role in whether illiteracy is reduced by expansion in schooling. As in the other groups of countries the steepness of the learning profile matters. But in this group there are a number of countries for which the out-of-school population is so low that there just isn't much gain left to be made—which is good news.

In the Philippines, for example, illiteracy is already less than 10 percent and only 8.5 percent of women attended no schooling. Therefore, even though the learning profile is steep (69 percent can read at grade 6) the gain from UPC(6) is only 2.5 percentage points (but which is 25.6 percent of initial illiteracy).

In Rwanda in spite of a steep observed learning profile (97 of grade 6 completers can read) there is substantial illiteracy (33 percent) because a large fraction of the cohort did not attend school (62 percent). This is a case where UPC(6) effectively eliminates illiteracy, reducing it to only 2.6 percent.

Table 2c: The gains in low illiteracy countries are those with both significant out-of-school populations and steep learning profile						
		Data on young women (25-34) from the most recent DHS			Scenario: Assuming that all women who never enrolled instead completed grade 6 and had the average literacy of women who completed grade 6		
Country	Year	Percent who cannot read (illiteracy)	Percent of cohort who never attended school	Percent who completed grade 6 who can read a simple sentence	Percent who cannot read (illiteracy) even in UPC scenario	Percentage point reduction in illiteracy relative to base case in UPC	Percent of illiteracy eliminated relative to base case by UPC (sorted)
Moldova	2006	2.6%	1.2%	57.9%	2.4%	0.2%	**7.0%**
Zimbabwe	*2011*	19.4%	8.7%	49.4%	17.2%	2.2%	**11.5%**
Guyana	2010	15.6%	12.5%	54.6%	13.3%	2.4%	**15.1%**
Gabon	2012	33.9%	24.7%	44.5%	28.1%	5.9%	**17.3%**
Philippines	2009	9.8%	8.5%	69.5%	7.3%	2.5%	**25.6%**
Indonesia	2013	16.2%	12.7%	75.2%	11.0%	5.2%	**31.9%**
Lesotho	2010	10.7%	13.6%	86.2%	7.2%	3.5%	**32.8%**
Kenya	2015	22.2%	16.9%	65.3%	14.3%	7.9%	**35.6%**
Namibia	2014	16.3%	16.6%	70.6%	10.0%	6.3%	**38.7%**
Swaziland	2007	15.4%	17.5%	74.7%	8.8%	6.6%	**42.7%**
Peru	2013	13.5%	15.3%	74.7%	7.5%	5.9%	**44.1%**
Dominican Republic	2014	13.4%	19.7%	84.5%	5.7%	7.7%	**57.3%**
Tanzania	2010	32.8%	30.9%	86.2%	11.4%	21.4%	**65.3%**
Nicaragua	2002	21.2%	41.0%	93.5%	3.8%	17.4%	**82.3%**
Rwanda	2011	33.4%	62.1%	97.1%	2.6%	30.8%	**92.3%**
Bolivia	2008	9.8%	37.2%	100.0%	0.0%	9.8%	**100.0%**
Honduras	2013	12.7%	31.5%	100.0%	0.0%	12.7%	**100.0%**
Source: Authors' calculations with DHS data.							

2.3 Aggregate calculations

We cannot do "global" calculations as the DHS data are neither comprehensive across all countries nor a random sample of developing countries nor are the data all in the same year. But we can do a population weighted average of the countries we have, which include 62 percent of the UN's "less developed countries, excluding China" population. We use the population in 2010 of females aged 25 to 34.[8] Population weights are important because a simple average of these countries would give equal weight to India with 95,407 thousand women aged 25-34 in 2010 and Sao Tome and Principe with just 13 thousand.

Table 3 shows that even had UPC(6) been reached at the observed learning profiles there would have remained a massive issue of women's illiteracy. The three basic results are that in the data there is a tremendous challenge of female illiteracy—57 percent of women could not read a single sentence. This is the result of two big facts. First, in this age group 54 percent of women did not complete grade 6. Second, 44 percent of those who had completed grade 6 (but no higher) could not read all of a single sentence.

| Table 3: Even with universal completion of grade 6 female adult illiteracy would have been 39 percent—reaching the SDG of universal literacy requires much more than just getting all girls in school						
		Data on young women (25-34) from the most recent DHS			Scenario: Assuming that all women who never enrolled instead completed grade 6 and had the average literacy of women who completed grade 6		
Country	Year	Percent who cannot read (illiteracy)	Percent of cohort with less than grade 6	Percent who completed grade 6 who can read a simple sentence	Percent who cannot read (illiteracy) even in UPC scenario	Percentage point reduction in illiteracy relative to base case in UPC	Percent of illiteracy eliminated relative to base case by UPC (sorted)
Average across all 51 countries, population weighted	Various	56.7%	53.8%	43.9%	39.0%	17.7%	31.9%
Average across all 51 countries, unweighted	Various	48.0%	48.1%	51.3%	32.1%	15.9%	36.5%
Source: Authors' calculations with DHS data.							

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[8] https://esa.un.org/unpd/wpp/

These simple facts imply that reaching a goal for universal literacy (like the SDG target 4.6) will require making it possible for all girls to get into school and stay there. But, there is more to "letting girls learn" than just "letting girls get to school." Even had all girls completed grade 6 at the observed learning profiles women's illiteracy would have still been 39 percent. Eliminating the deficit form grade 6 completion (the result of both never enrollment and early drop-out entirely) would have a substantial impact on illiteracy—it would be reduced by almost a third (32 percent). However, a one-third reduction is far from elimination.

Figure 2 shows the basic result. Using a population weighted aggregate of the 51 countries with DHS data an achievement of universal grade 6 completion at existing learning profiles would have still left 39 percent of women in the world without even the most basic measure of literacy.

Figure 2: Reaching universal completion of grade 6 at existing learning profiles would reduce illiteracy by about 17 percentage points—but leave 39 percent of women illiterate
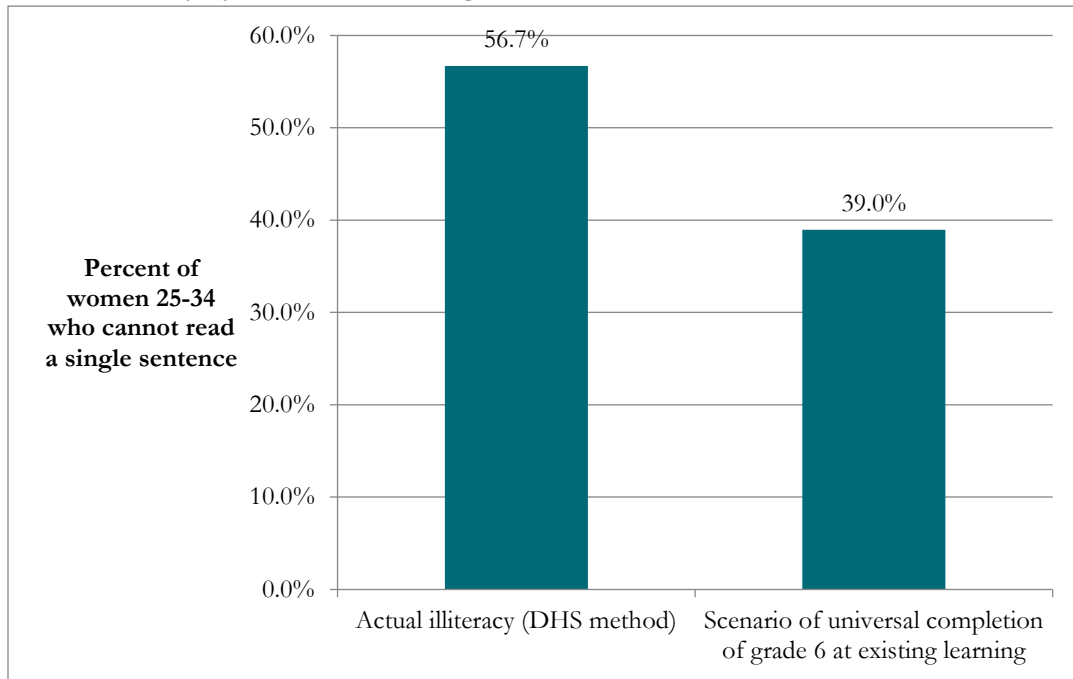
Source: Authors' calculations with DHS data (Table 3).

Figure 3 shows the impact of universal grade 6 completion on illiteracy in four countries we used as illustrative above. Clearly the available gains from just "letting girls go to school" vary massively by whether or not most girls already complete primary school (Peru) and by how well girls on average learn once in school (e.g. contrast Ethiopia and Nigeria).

Figure 3: Reduction in total illiteracy (%) from universal grade 6 attainment with existing learning profiles would still leave wide gaps in illiteracy among countries
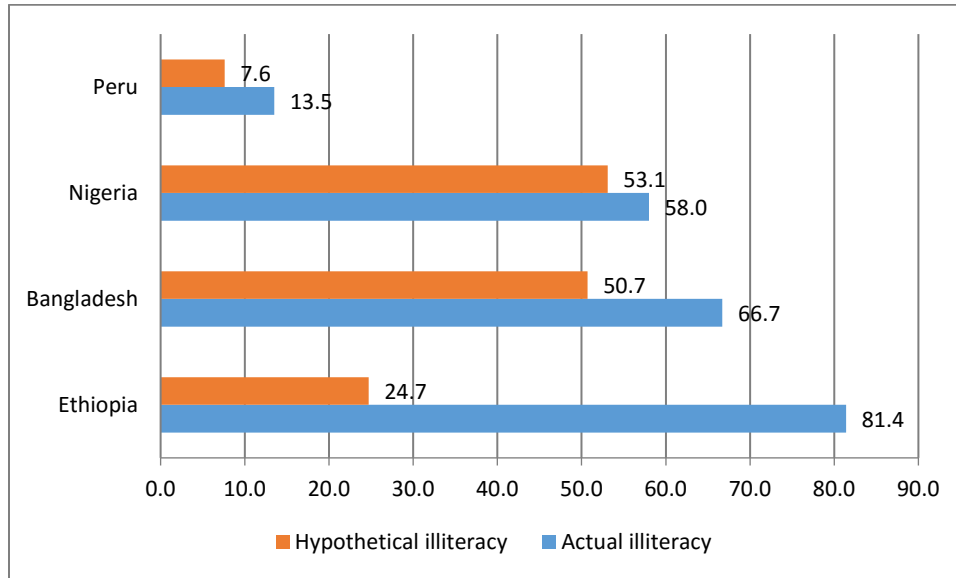
Source: Authors' calculations with DHS data.

Conclusion

Many of the global statements about global goals have conflated "schooling" and "education" by treating them as synonyms or equating them by definition so that someone who attended school is, by definition, educated. The Universal Declaration of Human Rights, article 26(1) spoke only of education:

> *Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit.*

The MDG targets spoke only of schooling (and within that, only of primary schooling). The SDG has targets directly for "relevant and effective learning outcomes" (target 4.1) and that all youth have literacy and numeracy (Target 4.6).

This paper uses DHS data on a very simple and very low standard of literacy—the ability to read all of a simple, short, and concrete sentence—and shows that reaching the SDG will require much more than simply reaching the MDG of all children completing primary schooling. It will require a very sharp steepening of the learning profile—children with need to learn much more in each year of schooling. This is necessary so that children will emerge from schooling not just schooled but truly educated.

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