

# How can education systems become equitable by 2030?

DFID think pieces – Learning and equity

August 2015

Pauline Rose and Benjamin Alcott

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## Series description

This think piece is part of a series commissioned by the UK's Department for International Development (DFID). The purpose of the think piece series is to stimulate international debate on the future direction of education development in low income countries; provide direction for future DFID research priorities; and provide evidence products that can inform policy and programming decisions.

The other documents in the series are available to download at the following web address:

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### About the authors

Pauline Rose is Professor of International Education at the University of Cambridge's Faculty of Education, and Director of the Research for Equitable Access and Learning (REAL) Centre, University of Cambridge. Pauline also holds a position as Senior Research Fellow in DFID.

Benjamin Alcott is a Research Fellow at the University of Cambridge's Faculty of Education.

## 1. Executive summary

The Sustainable Development Goals (SDGs) emphasise the importance of all children and young people learning the basics by 2030, along with a commitment to ensuring no one is left behind. This dual emphasis is needed. Enrolment has increased considerably in many low- and lower middle-income countries over the past 15 years, in line with global commitments made as part of the Millennium Development Goals (MDGs). However, this growth has been accompanied by an uncomfortable realisation: being in school does not necessarily equate to learning. Of the estimated 250 million children not learning the basics, around half have spent at least four years in school (UNESCO, 2014a). In order to change this situation, we need to know which children are not learning, at what stage learning gaps emerge, and whether the school system itself is responsible for holding back their learning – or, rather, can help to narrow learning gaps.

This paper identifies that learning inequalities start early in the primary school cycle, or even before children start school. It further shows that achieving a target central to the SDGs, namely ensuring all children, regardless of circumstance, are learning the basics by 2030, will require a step-change in progress over the next 15 years that will not be achieved by ‘business as usual’. Recognising the commitment that no target will be met unless met for all (UNESCO, 2015; World Education Forum, 2015), particular focus is needed on those who face disadvantages due to poverty, gender, where they live, and whether they have a disability.

To move from the current situation to achieving desired post-2015 goals by 2030, such that all children are learning the basics in mathematics and reading, this ‘think piece’ paper proposes five strategies that focus on supporting the learning of children from disadvantaged backgrounds.

### Key messages

- Learning inequalities begin from a young age, primarily driven by disparities in wealth. Wealth disparities interact with other forms of disadvantage, such as gender, where a child lives and whether they have a disability.
- To ensure no one is left behind by 2030, the learning of children within a selected age group should be tracked to include those both in and out of school. A necessary target should be that all children are able to achieve the basics in both mathematics and reading as a route to preparing them for further learning.
- Using this measure for tracking progress, stepping-stone targets should be adopted for sub-groups of the population within countries, in order to provide an early warning to show if disadvantaged groups are making sufficient progress in advance of the distant 2030 deadline.
- Five sets of interventions are needed to raise learning outcomes and eliminate the learning inequality gap:
  - Address disadvantage from early childhood.
  - Ensure teaching is at the right pace for the weakest learners.
  - Provide disadvantaged children with the support of the best teachers.
  - Provide learning resources that support children learning at an appropriate pace.

- Empower parents and communities to hold schools and policymakers to account for poor quality education.
- To keep track of learning inequalities, longitudinal household surveys are needed that include information on children's learning (whether in or out of school) together with information on their characteristics. In order to identify how to tackle inequalities, such household surveys should be established in a way that allows them to be combined with administrative data on school conditions.

## 2. Learning inequalities widen as children get older

Evidence from rich countries shows that learning inequalities are visible before children start school, and that these inequalities do not reduce during the school years (Cunha et al., 2010). In the UK, 5-year-olds from richer households are already on average 15 months ahead of those from poorer households in vocabulary development (Blanden and Machin, 2010). Cohort studies from the UK have detected socio-economic gaps in cognitive development by age 22 months, which then widen throughout the primary school years (Feinstein, 2003). Evidence from a more recent cohort study shows that 3-year-olds from high socio-economic status backgrounds are three times more likely than those from low socio-economic backgrounds to display ‘very advanced’ development (Jerrim and Vignoles, 2013). While research across the UK and US varies between identifying that learning disparities widen throughout schooling (Feinstein, 2003; Goodman et al., 2009) or are simply maintained (Duncan and Magnuson, 2011; Reardon, 2011), there is no contradictory evidence that these gaps narrow.

### Key messages

Learning inequalities begin from a young age, primarily driven by disparities in wealth.

Wealth disparities interact with other forms of disadvantage such as gender, where a child lives and whether they have a disability.

Evidence from rich countries relates to learning trajectories for children with disabilities. Data from the US show that the gap in mathematics achievement between the general population and students from all disability groups widens from ages 7 to 13 (Wei et al., 2012).

We know far less about the trajectory of learning inequalities in low-and lower middle-income countries. These countries have far fewer sources of longitudinal data, which would allow an analysis of changes in learning over a school cycle, or of children’s experiences before they start school. There is however, growing interest in identifying rigorous approaches to tracking progress in learning in these contexts (Das, 2013; Muralidharan and Zieleniak, 2013; Singh, 2014).

As with rich countries, the available data in poorer countries makes clear that learning inequalities are evident even when children start primary school, and these inequalities widen throughout the school years. The pattern is apparent across a range of sources of inequality, including poverty, gender, geographic location, disability, and ethnic and linguistic minority status, with these often interacting with one other to reinforce disadvantage. This highlights the importance of reforms to focus on tackling the difficulties that children from disadvantaged backgrounds face that hold back their learning.

### 2.1 Few children are learning at the level appropriate for their grade.

Available evidence shows that children are often far below the level expected for their grade, and once they fall behind, they often find it difficult to catch up. Data from a range of learning assessments in India indicate that only between 9 and 13% of those who lack a basic literacy or numeracy skill are able to gain this skill after an additional year of schooling (Bhattacharjea et al., 2011; Educational Initiatives, 2010; Pritchett and Beatty, 2015).

A longitudinal study in Andhra Pradesh, India, tracking a cohort of students over a school cycle finds that only 2.4% of Grade 1 students achieve the Grade 1 standard. Even by Grade 5, only 60% of these students have achieved the Grade 1 level, and only 8% achieve the Grade 5 level. The study further finds that the gap between the top-performing and bottom-performing students widens in later grades and that most learning happens in Grades 1 and 2. It is suggested that this could be attributed to instruction being better aligned in early grades and that, by Grade 3, children are expected to 'read to learn', meaning that those who are not yet able to read get left further behind. As such, the system caters mainly to the top 10% of students who are the only ones able to keep pace with the curriculum, while the bottom 10% could be spending several years in school with little benefit in terms of their learning (Muralidharan and Zieleniak, 2013).

## **2.2 Household wealth is a key determinant of widening learning inequalities.**

Longitudinal data from Young Lives<sup>1</sup> highlights the importance of household wealth in the early years for subsequent learning. In Peru, for example, a child's family wealth at age 1 explains 32% of the variability in children's performance in mathematics in Grade 4 (Cueto et al., 2014). Furthermore, in all four of the Young Lives countries (Ethiopia, Peru, Vietnam, and Andhra Pradesh, India), the richest quartile makes more progress than the poorest quartile in mathematics between ages 5 and 8. By age 8, there is a gap of 27 percentage points in the proportion of children able to read a sentence between richer (86%) and poorer (59%) children in Peru, and similar-sized gaps were apparent in Ethiopia, Vietnam, and Andhra Pradesh, India (Rolleston et al., 2014).<sup>2</sup>

Similarly, cross-sectional data in East Africa shows the learning of children from less-advantaged households is at least one year behind that of children of the same age from more-advantaged households (Jones and Schipper, 2012). In South Africa, by Grade 3 the poorest 60% are three grade levels behind the wealthiest quintile, and this increases to four grade levels by Grade 9. In this context, only 8% of Grade 3 students from the bottom four wealth quintiles were performing at the appropriate level, and only 35% of the richest quintile were reaching this level. While there is some improvement as students progress to higher grades, sizeable numbers are still unable to perform Grade 3 tasks in Grade 5. So, for example, 84% of the poorest quintile are not able to divide 24 by 3 in Grade 3, and 59% of this group are still not able to do so by Grade 9 (Spaull and Kotze, 2015).

## **2.3 In many contexts, being poor and female is a double disadvantage.**

More limited evidence is available that tracks progress in learning inequalities over a school cycle by gender, or that identifies how wealth and gender interact. From the information available, there is variation across subjects in terms of whether girls or boys perform better. Evidence from international and regional learning assessments at primary and secondary

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<sup>1</sup> Young Lives is one of the few surveys that provides longitudinal data in development contexts. Young Lives covers four countries: Ethiopia, India (Andhra Pradesh), Peru, and Vietnam. It is based on a household sample, and administers tests to children in a particular age group, regardless of whether they are in school.

<sup>2</sup> Related analysis finds that the gap in achievement between these four countries remains stable as children get older, with children in Vietnam performing best, followed by Peru, India and then Ethiopia. The gap remains wide, even once socio-economic status and other factors are taken into account (Singh, 2014).

school finds that girls perform better than boys in reading in all but one country (Tanzania). In mathematics, boys perform better in 38 countries, while girls perform better in 8 countries, and there is no significant difference in 28 countries (UNESCO, 2012).

When gender and wealth interact, it is most often poor girls who are least likely to be learning the basics. In Benin, just 20% of poor boys complete primary school with basic numeracy skills, but this drops to just 6% of poor girls (UNESCO, 2014a).

Available evidence that tracks changes in learning inequalities by gender and wealth indicates different patterns depending on context. In Peru, gender gaps amongst poor children are particularly stark: there is a larger gap between poor girls and poor boys than between poor boys and rich children in terms of progress made in vocabulary between ages 4 to 8. However, in Ethiopia, wealth effects are far more dominant than gender differences (Rolleston et al., 2014).

Similarly, while there are numerous instances of gender disparities globally, the mechanisms underlying these disparities vary greatly across contexts. For example, in Pakistan, learning disparities are primarily attributable to disparities in access to education: poor girls are three times as likely as poor boys to have never attended school, and low numeracy and literacy levels among these girls is the main reason for the gender learning disparity. By contrast, in India, enrolment rates among poor boys and poor girls are similar, and so other factors are likely to be more important in driving learning inequalities, such as household expenditure on tuition and other school costs or time spent on household chores (Alcott and Rose, 2015; Rose and Alcott, 2015). Policymakers must, therefore, be aware of the varied and interrelated nature of the ways in which gender and other forms of disadvantage interact across different contexts, and develop appropriate strategies to address them.

## **2.4 Where a child lives matters for their learning opportunities.**

In many poor countries, where a child lives matters for their learning opportunities, although limited information is available on how this affects learning trajectories over a school cycle. In Kenya, Tanzania and Uganda, learning inequalities between villages are particularly strong (Jones, 2014a). In South Africa, children from the wealthiest provinces are six times more likely to have basic mathematics skills than are children from its poorest provinces (Moloi and Chetty, 2010).

Another clear divide is between urban and rural environments. In Ethiopia, urban 8-year-olds are over five times more likely than rural 8-year-olds to be able to read sentences (Rolleston, 2014). Urban/rural inequalities are also apparent in El Salvador, Guatemala, India, Pakistan, Panama, Peru, Tanzania, Vietnam and Zambia (Altinok, 2013; Burger, 2011; UNESCO, 2014a; Rolleston et al., 2014; Tayabba, 2012).

There is evidence to suggest that rural/urban gaps widen through primary school: rural children make slower progress in reading between ages 4 and 8 than urban children in Ethiopia, Vietnam and Peru (Rolleston et al., 2014). Between third and sixth grades in Ghana, the urban/rural disparity in the proportion of children with basic reading skills increases from a factor of two to a factor of three (UNESCO, 2014a).

Countries marred by conflict are perhaps the most extreme example of how location matters. Besides the many other challenges that children in such regions face, their access to and

quality of schooling tend to be especially poor, with specific challenges faced by refugees and internally displaced people (UNESCO, 2011). Collecting data on conditions in such regions is especially problematic, as proven for example by the Beekungo household survey in Mali (Education Policy and Data Center, 2015). The absence of data on children from conflict regions increases the risk of overlooking the conditions that these children face and of underestimating the extent to which education systems must change in order to improve opportunities for all children.

## **2.5 Discrimination against ethnic and linguistic minorities is reflected in learning inequalities.**

Across countries, discrimination against ethnic and linguistic minorities is reflected in learning inequalities, although again, information on how these inequalities change over a school cycle is not readily available. The legacy of racial segregation in South Africa has led to the existence of two largely separate education systems, one for the richest quartile, another for the remaining 75% of children. This has serious implications for learning disparities between children from the two groups: innumeracy rates for sixth graders are 57%, 49%, and 45% across the three poorer quartiles, but just 8% for the richest quartile (Spaull, 2013).

Children whose household language is different to their language of instruction learn less in a range of countries, including Benin, Cameroon, Guatemala, Iran, and Turkey (Altinok, 2009; Fehrler and Michaelowa, 2009). In Peru, the average primary-school child whose mother tongue is Spanish outperforms 84% of children speaking an indigenous language in mathematics (Cueto et al., 2014). Pre-school test scores from Peru show that around 58% of ethnic-minority children were behind the average non-minority children in mathematics and reading, but over the primary school years this inequality grows by at least a further 2 percentage points (Glewwe et al., 2014).

## **2.6 More information is needed on learning of children with disabilities.**

Children with disabilities face far greater barriers than other children in terms of access to education. However, our knowledge of the extent of learning for those who make it to school, and how their learning changes over a school cycle, is far more limited.<sup>3</sup> In Uganda, literacy rates stand at 60% for children with no identified impairment, 47% for those with physical or hearing impairments, and 38% for those with mental impairments (UNESCO, 2014a). Among those aged 15 and above in Tanzania, literacy rates are 52% for those with disabilities and 75% for those without (Tanzania National Bureau of Statistics, 2010).

## **2.7 Tracking progress by age and grade: evidence from ASER and Uwezo surveys.**

Given the evidence on widening inequality over the school cycle, it is important to track progress throughout the system. Two key questions arise for the tracking of progress in learning. First, should assessments be curriculum-based in order to see whether children are achieving expected levels according to their grade? While this is an appropriate approach for assessing

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<sup>3</sup> ASER Pakistan has piloted collecting information on children with disabilities, which offers the potential for great advancements in our knowledge of the relationship between disability and learning inequalities.



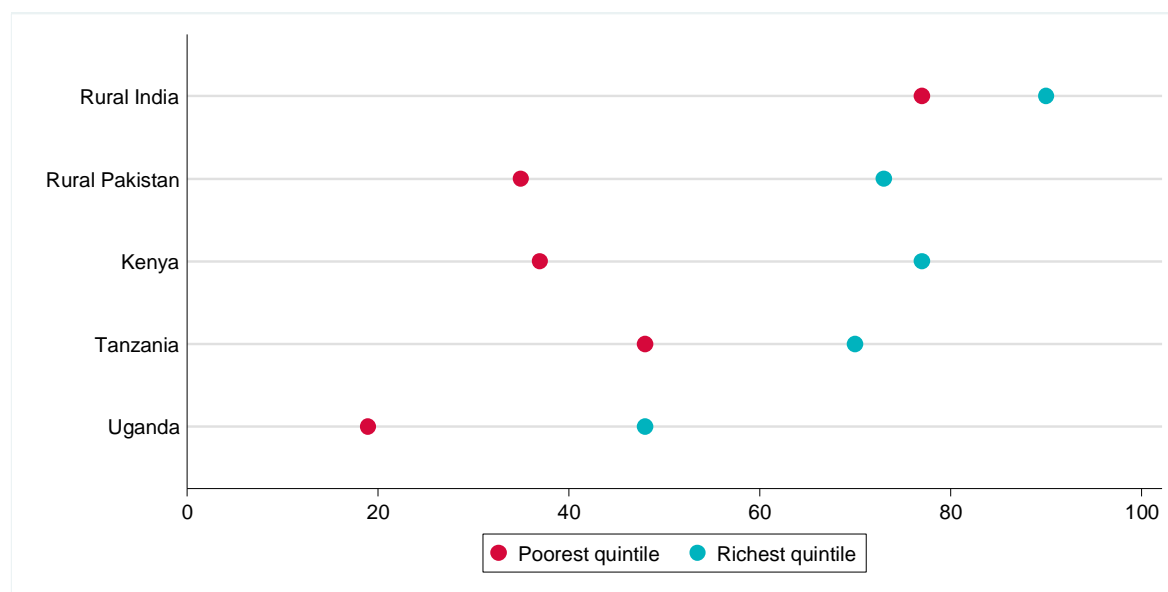
progress within a country, given the reality that so few are able to perform at the appropriate level for their grade, it is necessary to start by identifying the extent to which children are acquiring foundation skills in literacy and numeracy, that are needed as a springboard to further learning.

Second, how can we ensure that children's learning is captured, regardless of whether they are in school or not? Most existing learning assessments only test children attending school. This fails to capture the most marginalised, who are least likely to be in school. Some attempts have been made to combine data from learning assessments with enrolment data from administrative sources or household surveys to gain a fuller picture of the extent of learning inequalities (UNESCO, 2014a; Spaul and Taylor, 2015).

Assessments carried out within households are better able to identify which children are learning. ASER tools in rural India and rural Pakistan, and Uwezo ones in Kenya, Tanzania and Uganda, provide a good example of such an approach.<sup>4</sup> We draw on these data to provide new evidence to show the different patterns according to whether progress is measured by age or grade, once all children are accounted for (regardless of whether they are in school or not).

Our analysis of these surveys starts by showing that children from wealthy households are more likely to complete primary school by the expected age: while at least 70% of Grade 5-aged children from rich households have reached this grade in Kenya, rural Pakistan and Tanzania, fewer than 50% of the poorest have done so. Enrolment is higher for children from both rich and poor households in India, but considerably lower in Uganda, where only around 20% of poor children reach Grade 5 (Figure 1).

**Figure 1: Poor children are less likely to reach Grade 5 at the expected age**



Source: Authors' calculations based on ASER India 2012, ASER Pakistan 2012, and Uwezo 2012

<sup>4</sup> Each of these surveys uses two-stage stratified sampling, and this can be accounted for with sampling weights in order to draw estimates that are representative of the given country. In India though, this is only true for rural regions. In section 4 we provide a fuller discussion of the strengths and limitations of these data.

In order to identify the stage at which children are learning the basics, we use a combined indicator of the highest competencies in literacy and numeracy available in the ASER and Uwezo data: performing division and reading a story. In principle, children should have acquired these skills in Grade 2 of primary school, but many fail to do so. Our analysis tracks changes in learning for children of different ages (including children both in and out of school), as well as in different grades (providing information on learning for those within the school system). While policymakers require an assessment of performance in different subjects separately in order to identify shortcomings and where policy attention needs to be directed, the combined indicator is adopted as a stringent summary measure for assessing progress towards a post-2015 goal of learning basic skills for primary-school-aged children.<sup>5</sup>

For the purposes of comparability, we focus on a single dimension of inequality that is the most apparent and consistent source of inequality in all five countries: household wealth (measured by household possessions). Since ASER and Uwezo data are not longitudinal, we compare children of different ages and school grades within a particular survey year.<sup>6</sup> This has limitations as it does not allow tracking of the evolution of learning of the same group of children over time but still presents a useful snapshot of the extent to which children in different age groups and school grades are learning.

A first point to note is that the chances of learning the basics is low in most countries regardless of age (solid lines) or grade (dotted lines) and that, in all countries, it is higher for those from rich backgrounds (Figure 2). Children from rich households in Kenya are the most likely to achieve the basics. Their learning advantage appears to start early, as 22% of those aged 7 are already able to perform division and read a story and, by Grade 5, 79% are able to do so. One potential reason for this is pre-school education. In Kenya, for example, around 30% of children enrol in pre-primary schools (Jones and Schipper, 2012), and pre-school enrolment is higher among richer children. At the other extreme, in rural Pakistan, even though rich children in Grade 5 have a higher chance of achieving the basics than poor children (26%), only 33% do so.

A second point is that, amongst poor children, a greater proportion are learning the basics by Grade 5, compared with the age group who should have reached this grade in each of the five countries. The gap between grade and age widens over the cycle. In the early grades, a similar (low) proportion of poor children are learning regardless of age or grade. In all countries except rural India, the proportion of poor children learning begins to increase from Grade 4 for those who are in school, while the proportion of those learning in the corresponding age group (i.e. including all those who should be in Grade 4, regardless of whether they are still in school or not and, for those who are in school, including those who have not yet reached Grade 4) does not increase as much. This is particularly marked in Uganda where only 11% of all 11-year-olds (whether or not they have reached Grade 4) are achieving the basics, hardly any change from 10-year-olds. By contrast, an improvement is noticeable for those who are in school: while only 11% of Grade 4 students are achieving the basics in Uganda, this increases to 35% by Grade 5.

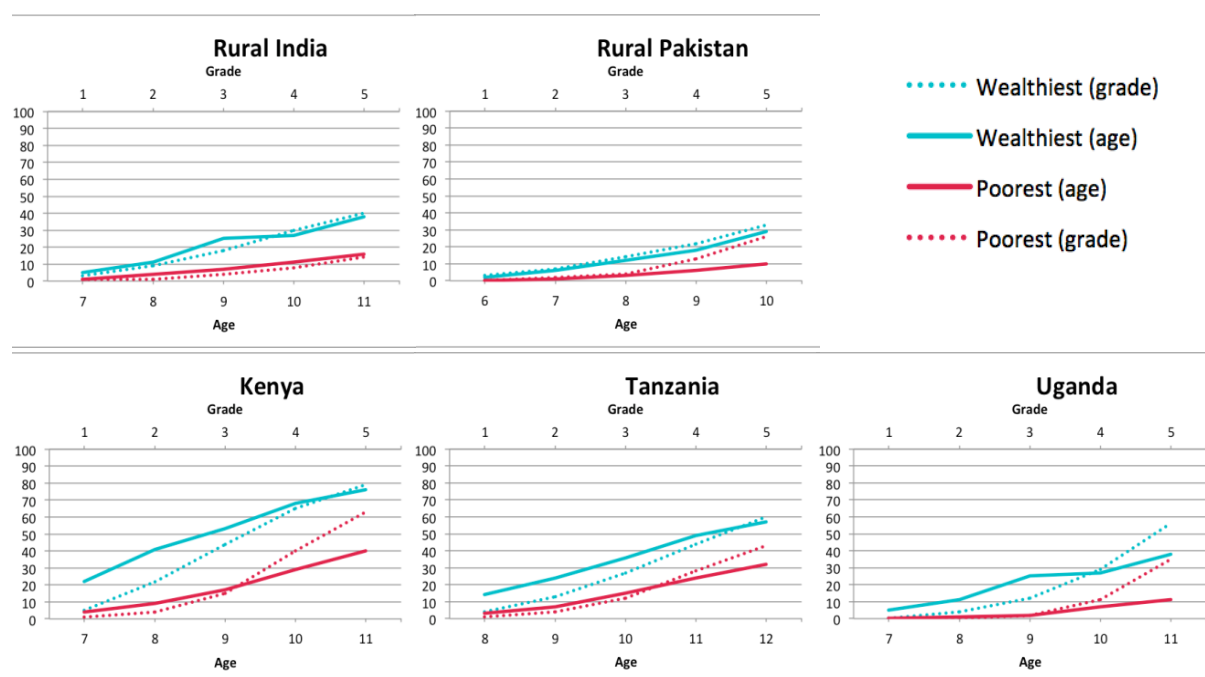
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<sup>5</sup> There is a strong relationship in children's ability to achieve the basics in both competencies: in these countries, around 80% of 12-year-olds who can divide are also able to read a story.

<sup>6</sup> The latest data available for the East African countries is 2012 so, for the sake of comparability, the same year has been used for all surveys. Only rural areas of India and Pakistan are included, as urban areas are not covered as systematically in the surveys in those countries.

The reason for the growing divergence between the age of children and their grade is likely to be due to a combination of two reasons: first, the age group includes children who are not in school; and, second, it also includes children who are in school but have not yet reached Grade 5 (whether because they started late or have repeated years of school). This also helps to explain why the disparity between learning outcomes by age group and learning outcomes by class grade amongst the poor is smallest in the two countries with the highest enrolment rates (India and Tanzania). For similar reasons, a gap between age and grade is not very noticeable amongst the rich, other than in Uganda where even the better off are not reaching Grade 5 at the appropriate age (see Figure 1). These patterns illustrate the importance to focus on age to assess the dynamic nature of learning inequalities and to show where the greatest challenges remain.

**Figure 2: Learning disparities are enforced during the primary school years**

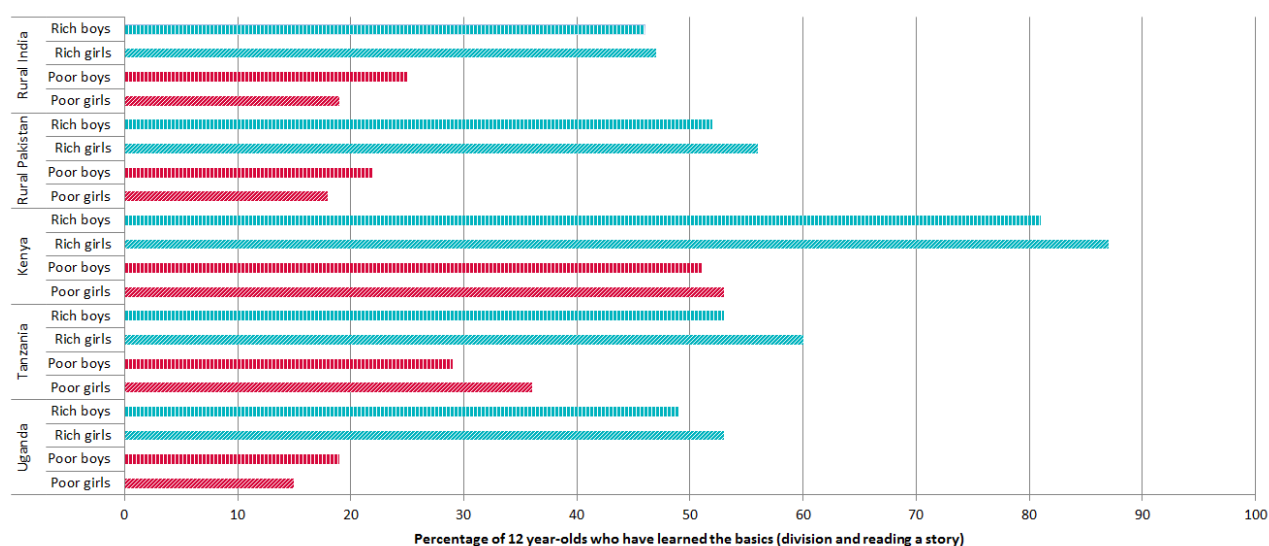


*Note:* The vertical axis shows the percentage of children who can both divide and read a story.

*Source:* Authors' calculations based on data from ASER India 2012, ASER Pakistan 2012, and Uwezo 2012

Poverty is just one dimension of disadvantage. Combining wealth and gender presents a variety of patterns (Figure 3). Focusing on 12-year-olds – the age by which children in all five countries should have reached the end of primary school – we find that, amongst the rich, girls are more likely to achieve the basics in mathematics and reading. In rural India, rural Pakistan and Uganda, this pattern is reversed amongst poor, with just 15% of poor girls in Uganda achieving the basics, compared with 19% of poor boys. These are also the three countries where learning levels are particularly low amongst poor children. By contrast, in Tanzania, not only is there a sizeable gap in favour of girls amongst the rich, but also poor girls are more likely to be learning the basics compared with poor boys.

**Figure 3: In some countries, poor girls are least likely to be learning by aged 12**



Source: Authors' calculations based on data from ASER India 2012, ASER Pakistan 2012, and Uwezo 2012

To provide a more detailed picture of the dynamic nature of sources of inequality over time and how they interact with each other, we present findings from an inferential model on household data from ASER India's 2008-2013 surveys.<sup>7</sup> Given the ASER India survey has been carried out over a number of years, we are able to construct a quasi-longitudinal dataset. Our analysis combines comparable data from ASER India over six years, enabling us to construct a cohort of 6-year-olds in 2008, 7-year-olds in 2009, and so forth. In addition, we construct multiple cohorts within the time span and use controls to account for the different conditions that the different cohorts may have faced, such as, for example, the fact that some began school before the automatic promotion policy was enforced nationally in 2009, while others began afterwards. Since these data provide us with cohort groups over time rather than cross-sectionally, we are able to make more robust claims about the role that different background characteristics are likely to have played in children's development in learning over time. We focus the analysis on the ability to subtract, which all children should have achieved by the age of 7.

The predictive strength of socio-economic status, gender and parental education all increase with age over the primary school cycle (Figure 4). Comparing the poorest and wealthiest groups, socio-economic status is already the strongest predictor of learning inequality at age 7, taking other factors into account. Its strength increases substantially as children get older, such that, by age 11, taking other factors into account, there is a 19 percentage point gap between children from the poorest and wealthiest households.<sup>8</sup> To check whether the importance of socio-economic status holds in less extreme conditions, we also compare the wealthier half to the poorer half of the sample. The gap in learning for 11-year-olds remains wider than other

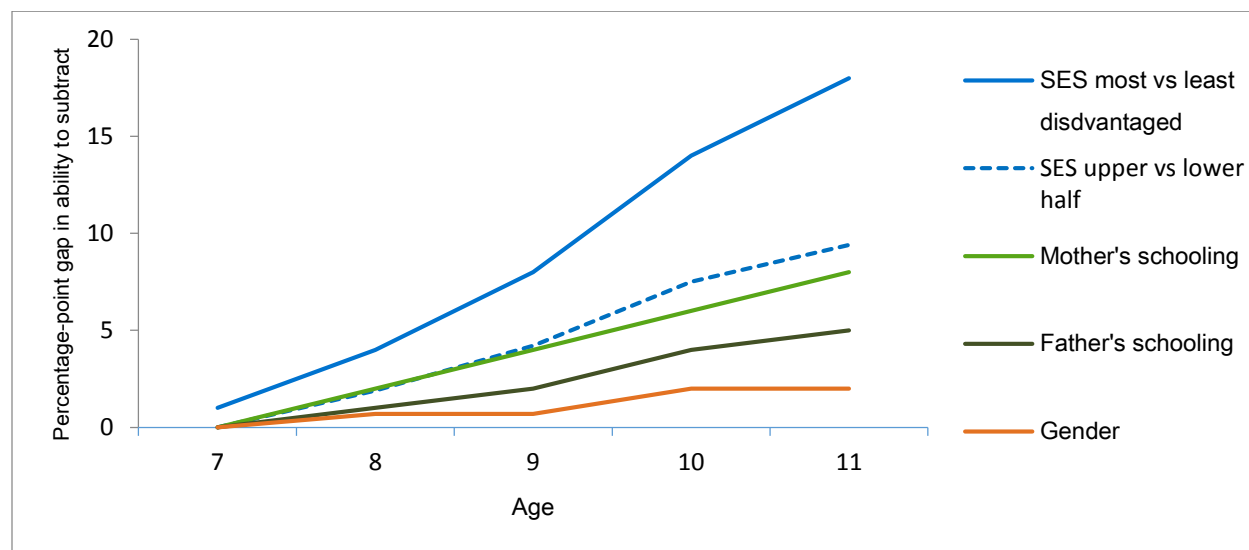
<sup>7</sup> See Appendix for an explanation of the model.

<sup>8</sup> This comparison is between those who own all assets included in the index (namely electricity, a mobile phone, a television, and whose houses are made from mud and cement) and those who own none (and whose houses are made from mud). The result is very similar to a comparison between the upper and lower quintiles of the wealth index, for which there is an 18 percentage point gap.

forms of disadvantage for which data are available, with a 9 percentage point gap between the two groups.

By age 11, although less powerful, the other characteristics are also significant predictors of inequality: even when accounting for the other predictors, the gap is eight percentage points for those whose mother did not attend school, six percentage points for those whose father did not attend school, and four percentage points for girls.

**Figure 4: In India, wealth is the most powerful predictor of learning inequalities across primary-school ages**

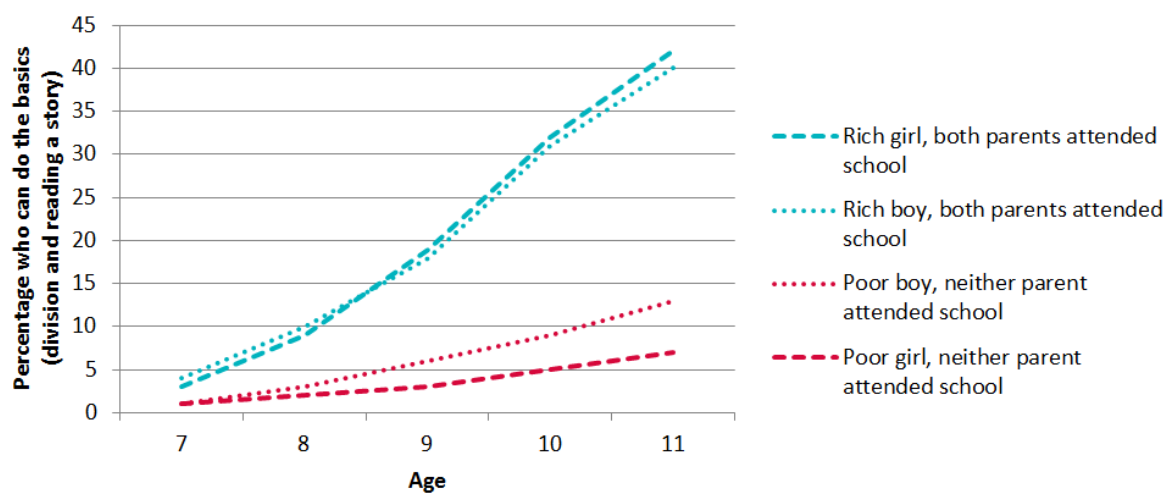


*Note:* SES refers to socio-economic status; each of the lines controls for other factors (see Appendix)

*Source:* Authors' calculations based on data from ASER India surveys 2008-2013

Recognising that factors such as socio-economic status, gender and being a first-generation learner are likely to interact with each other to reinforce disadvantage, Figure 5 identifies their combined impact. It finds that, in India, by age 7, there is already a gap between poorer children whose parents did not go to school and richer children whose parents did attend school. At this stage, the gap between boys and girls amongst the rich or poor is slight. However, by age 8, gender begins to interact with socio-economic status with a widening gap between poor girls whose parents have not been to school and their male counterparts. By age 11, poor boys whose parents have not been to school are almost twice as likely to be learning the basics as poor girls in this situation (although still only 13% are able to do so, compared with 7% of girls). The most advantaged girls and boys both show progress over the primary-school ages, with little gap between them, such that, by age 11, approximately 40% are learning the basics.

**Figure 5: In India, the importance of wealth grows across the grades**



Source: Authors' calculations based on data from ASER India surveys 2008–2013

### 3. Tracking progress to achieve learning for all by 2030

Given the extremely low proportions learning the basics by the age at which they should have completed primary school, learning needs to improve dramatically over the next 15 years if post-2015 goals are to be achieved. This is particularly true for the most disadvantaged. However, the reality in some of the poorest countries indicates that there has been little if any progress in recent years.

Projections of progress in learning, using international and regional learning assessments (SACMEQ, TIMSS and PISA), find that, in some countries, learning has in fact deteriorated over time. This implies that it would take forever to achieve learning goals on current rates of progress. Moreover, the analysis identifies that it will take some eastern and southern African countries 150 years to reach OECD reading levels on current trends. Even in OECD countries, the pace of improvement is found to be slow. The authors suggest using country-specific targets, taking each country's current circumstances, and targeting improvements in test scores by a few percentage points each year (Beatty and Pritchett, 2012).<sup>9</sup>

#### Key messages

To ensure no one is left behind by 2030, the learning of children within a selected age group should be tracked to include those both in and out of school.

A necessary target should be that all children are able to achieve the basics in both mathematics and reading as a route to preparing them for further learning.

Adopting this measure for tracking progress, stepping-stone targets should be adopted for sub-groups of the population within countries, in order to provide an early warning to show if disadvantaged groups are making sufficient progress in advance of the distant 2030 deadline.

Our projections build on this analysis in three ways:

1. We use a measure of whether children are learning the basics in mathematics and reading by age 12, that is an age by which children would be expected to have completed at least five grades of primary schooling in most countries. We take the basics to be the ability to perform division and to read a short story. Our approach has the advantage for tracking progress towards international targets of being straightforward to communicate, and also is a comparable measure for ensuring that children are achieving the foundations for further learning. This is a target that ought to be achievable for all children, regardless of where they live.
2. We use ASER and Uwezo household survey data, which allow the inclusion of all children, regardless of whether they are in school.
3. Our primary focus is on acknowledging that no target will be met unless met for all, and so we track the trajectory of gaps in learning within countries. For illustrative purposes, we focus on wealth groups within countries, which we have identified as a key driver of learning inequalities, and for which comparable measures are available across the countries. We thus provide separate projections for the poorest and wealthiest quintiles.

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<sup>9</sup> Drawing on SACMEQ learning assessment data combined with demographic and health survey data for children not in school, on current trends, only half of poor rural girls are estimated to reach minimum learning levels by 2030 in selected countries eastern and southern Africa. In Malawi, only around one in five of these girls is expected to do so (Rose, 2015).

In order to identify the progress needed by 2030, we adopt Watkins' (2015) proposal of 'stepping stone' targets, which set interim targets adjusted to specific countries, and take account of the different speed of progress needed for sub-groups of the population within countries. In our projections, we provide stepping stone targets at five-year intervals. This shorter-term focus is more informative for the reality of national planning imperatives, which tend to relate to political electoral cycles, and also enable identification of whether sufficient progress is being made for the most disadvantaged groups well before the more distant deadline year (Rose, 2015).

A key aspect of the setting of interim targets is whether the rate of change is expected to differ across sub-periods of time, i.e. between one stepping stone and another. For example, one possibility is that acceleration in progress might be anticipated or, alternatively, greater improvement in earlier years could be expected that then tapers off.<sup>10</sup> In their work on setting targets for the Millennium Development Goals, Klasen and Lange (2012) estimate S-shaped rates of progress, in which progress is slowest at the outset and close to completion of the target, whereas the greatest gains are made in the intermediate period. In their stepping-stone goals for child mortality, Save the Children (2014) recognises that such non-linear trends are likely, but uses linear projections for clarity.

For combatting learning inequalities, we can see logical reasons for including a range of non-linear projections. For example, one could envisage early acceleration as policymakers target the 'low-hanging fruit' of relatively easy-to-reach children, followed by deceleration in progress when attention then turns to the most marginalised and difficult to reach children. Conversely, progress might be slow initially as policymakers take time to implement system-wide changes, followed by acceleration, as these changes bring about improvement.

Recognising arguments for different approaches, we adopt a linear function in our projections of how inequalities must improve. While it is unlikely that any country would progress in such a neat fashion, this provides clarity, and strikes a balance across alternative projections.

To chart current rates of progress, we focus on rural India, where we have data over a number of years. In Figure 6, the solid lines show that the proportion of 12-year-olds learning the basics in reading and mathematics has declined overall between 2008 and 2013 for both the poorest and the richest quintiles. If recent trends were to continue,<sup>11</sup> by 2030, only around 20% of the poorest would be learning the basics and this would still reach just 40% of the richest. Clearly, this is a far cry from the progress necessary to ensure that all children are learning the basics.

Using a stepping stone target every five years to chart progress to that target, the proportion of rich children who have learned the basics would need to increase by 18 percentage points between each five-year period. The challenge is even greater for poor children: we would need to see an increase of 26 percentage points between each stepping stone – a massive increase given the limited progress that has been made in recent years.

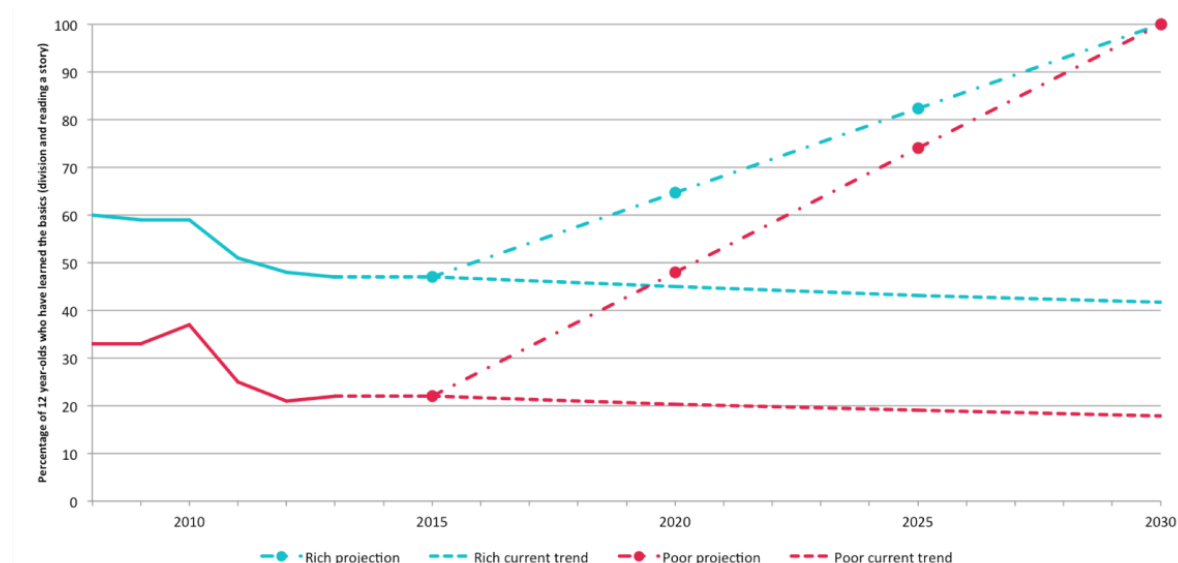
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<sup>10</sup> This could be estimated by a positive or negative quadratic function, respectively.

<sup>11</sup> Based on a line of best fit across the prior years.



**Figure 6: Current trends in learning versus necessary progress for all 12-year-olds to be learning the basics in rural India by 2030**



Source: Authors' calculations based on data from ASER India surveys 2008-2013

Data from Kenya, rural Pakistan, Tanzania and Uganda are available for fewer years than India, but similarly show limited, if any, progress in learning in recent years. Uwezo (2013) reports no change from 2012 to 2013, and ASER Pakistan (2015) reports a mixture of modest improvement and decline depending on the learning outcome. Consequently, we assume that current learning has remained static since 2012. On this basis, Figure 7 shows the stepping stone targets that these countries would need to meet in order to ensure that all children are learning the basics by 2030. These illustrate the steep improvements needed for all children. This is especially true of the poorest children: in each country, those learning the basics would need to increase by at least 20 percentage points in each five-year period in order to meet the goal of children learning the basics by age 12. Given how far removed this is from the 'business as usual' state of no change in recent years, these targets should send a stark message about the extent of improvement needed in the coming years.

**Figure 7: Stepping stone targets to ensuring all 12-year-olds are learning the basics in reading and mathematics by 2030**



Source: Authors' calculations based on data from ASER India 2012, ASER Pakistan 2012, and Uwezo 2012

## 4. Strategies to overcome barriers in learning

The vast progress that is needed in raising learning outcomes, particularly for the disadvantaged, should be a wake-up call for policymakers. While much needs to be done, the extent of the challenge should not be seen as an excuse for complacency, but rather should inspire urgency.

Past research suggests that schooling may have a greater impact on learning inequalities than family background in poor countries compared with rich countries (Heyneman and Loxley, 1983). Moreover, schools are an environment in which policymakers can intervene. It is important to unpack the school-based factors that have a greater impact on learning, in particular for the most disadvantaged.

Some researchers have tested interventions associated with a range of policy measures aimed at improving learning outcomes. A number of recent systematic reviews have analysed these to identify policies that are anticipated to improve learning levels (Conn, 2014; Glewwe et al., 2014; Kremer et al., 2013; Krishnaratne et al., 2013; McEwan, 2014; Murnane and Ganimian, 2014).<sup>12</sup> However, these reviews have tended not to separate out effects according to differing levels of disadvantage among children.<sup>13</sup> In order to move from the status quo to ensuring all children, regardless of circumstance, are learning by 2030, it is essential that policy measures be identified that have the greatest impact on the most disadvantaged children.

Drawing on the available evidence, this section identifies five areas that need to be the basis of policy reform if learning levels are to improve along with a narrowing of learning inequalities:

1. addressing disadvantage from early childhood;
2. ensuring teaching is at the right pace for the weakest learners;
3. providing disadvantaged children with the support of the best teachers;
4. providing learning resources that support children learning at an appropriate pace; and
5. empowering parents and communities to hold schools and policymakers to account.

### 4.1 Address disadvantage from early childhood.

Learning inequalities are apparent even before children start primary schooling, and children who encounter difficulties with learning early on face an uphill struggle to catch up with higher achieving children who tend to be from more advantaged backgrounds. It is, therefore, vital that

#### Key messages

Five sets of interventions are needed to raise learning outcomes and eliminate the learning inequality gap:

1. Address disadvantage from early childhood.
2. Ensure teaching is at the right pace for the weakest learners.
3. Provide disadvantaged children with the support of the best teachers.
4. Provide learning resources that support children learning at an appropriate pace.
5. Empower parents and communities to hold schools and policymakers to account for poor quality education.

<sup>12</sup> Evans (2015) provides a comparative analysis of these reviews, emphasising the ways in which they differ from one another. These reviews had different objectives and areas of focus from one another which is one of the reasons for the identified differences.

<sup>13</sup> Although not explicitly part of the design, Murnane and Ganimian (2014) draw out implications of the impacts for low-income families where possible, although the information on this is limited.

reforms start by targeting disadvantaged children before they even start school, and ensure that they are able to start school on time.

### **Early childhood interventions narrow learning inequalities in primary school**

Early childhood education is an important place to focus policy efforts. There is evidence that both parental interventions and centre-based programmes improve children's cognitive development, and that improvements are greatest for children from more disadvantaged populations.

Cross-country comparisons using PISA data identify that 15-year-old students who attended at least one year of pre-school performed better than those who had not, even once socio-economic status is taken into account: the average benefit for learning outcomes of attending pre-school is equivalent to at least one year of schooling in Argentina, Australia, Brazil and Germany (OECD, 2010).

Although most findings on the impact of early childhood education come from high-income countries (for a review, see Burger, 2010), there is a growing body of research from low- and lower-middle income countries. Early childhood education interventions aimed at poorer children in Bangladesh, Bolivia and Colombia demonstrate improvements in cognitive development as a result of childcare programmes (Aboud and Hossain, 2011; Aguilar and Tansini, 2012; Behrman et al., 2009). In Argentina, a one year increase in pre-primary school increases the average child's test scores to exceed the scores of 59% of other children. Effects were twice as large for students from poor backgrounds compared with those from non-poor backgrounds (Berlinski et al., 2009). A longitudinal study in Jamaica on weekly play sessions showed improvements in educational attainment through to adulthood (Walker et al., 2011). In 2008, the Indonesian Government launched an early childhood education programme specifically aimed at poorer villages, which included playgroups, kindergartens and day-care centres. Among a range of positive outcomes, the programme reduced the gap between rich and poor in language and cognitive development by 8%, and in communication and general knowledge by 12% (Jung and Hasan, 2014). While there are clear benefits to early childhood interventions, quality of implementation can vary in large-scale programmes, which can affect poorer communities in particular. Preliminary research from South Africa presents a concern of whether its national pre-school programme has led to learning improvements in primary school only for children from more advantaged households and regions (van der Berg et al., 2013). The authors of this research suggest that the disparity may be attributable to capacity constraints, such as teacher training and support in facilities in poorer neighbourhoods.

This evidence highlights the importance of targeting support and oversight of large scale programmes to the most disadvantaged areas if pre-schools are to have equalising effects. In their meta-analysis of research on early childhood, Engle et al. (2011) note the importance of the quality of implementation: the impact of programmes on learning outcomes increases directly with more systematic curricula, greater training opportunities for staff, and more active strategies to support parents with their own caregiving behaviour.

### **Begin school on time**

Another aspect of tackling inequalities in learning early is making sure that children enter school on time. Since poorer children enter school overage at disproportionately high rates, any detrimental effects are likely to exacerbate inequality (Lewin and Sabates, 2012). In countries

including Congo, Democratic Republic of Congo, Ghana, Madagascar, Namibia, Nigeria and Zambia, at least twice as many children from poor families start primary school overage, as do children from rich families (UNESCO, 2012). In ASER and Uwezo countries, children from poor households are more likely to be at least two years older than the official starting age. The gap in overage enrolment between the rich and poor ranges from four percentage points in rural India to 11 percentage points in Kenya and Uganda (authors' calculations based on ASER and Uwezo surveys).

If children start school late, this leads to them being overage throughout the school cycle. In francophone Africa, this concern is exacerbated by the common practice of grade repetition (20% of primary school children repeat grades on average), which is found to be detrimental to learning outcomes and occurs primarily among poorer children, thus deepening socio-economic inequalities in learning (Glick and Sahn, 2010). Some other countries, such as India and countries in east and southern Africa, have adopted policies for automatic promotion, although these are not always fully implemented (Bhattacharjea et al., 2013; Hungi et al., 2014).

Research on being in the right grade for age is found to be particularly important in sub-Saharan African countries where the extent of overage enrolment is found to be widespread. In eastern and southern African countries, learning is lower among children in classes with more overage children, although this does not disproportionately hinder the poorest (Hungu and Thuku, 2010; Jones, 2014b). Overage children perform worse in the later primary school grades in Kenya, even after controlling for pupil background factors, and school characteristics, and grade repetition (Hungu et al., 2014).

There is contrasting evidence on the impact of overage enrolment on learning outcomes in India to the available findings from sub-Saharan Africa. In India, overage children outperform their peers from the early grades. The gap is especially wide for wealthier children, for whom being overage is linked to a 10 percentage-point increase in the likelihood of being able to subtract (Rose and Alcott, 2015).

The stark difference in the effects of overage enrolment on learning between India and east and southern African countries could be related to variations in the magnitude of overage enrolment, as well as differences in the factors that determine why some children are overage for their grade in the respective countries – for example, in some contexts, it could be because children are attending pre-school before entering school. This highlights the importance of understanding the impact that overage enrolment has on learning, and tackling the problems associated with it.

## **4.2 Ensure teaching is at the right pace for the weakest learners.**

One reason why children are spending time in school without progressing in their learning is associated with overly ambitious and inflexible curricular. In addition, the focus of such curricula on the most able learners makes their pace especially detrimental to disadvantaged children, who already have to catch up even in the first years of primary schooling. Curricular reform is therefore needed to make teaching more inclusive and responsive to students' current abilities, offering a key means to closing the learning gap.

The lack of accounting for weaker learners has been attributed to elite groups developing education systems, instructional materials and language of instruction targeted toward their children. For example, Kenya's curriculum continues to use English, most students' third language, as its language of instruction (Glewwe et al., 2009). A key consequence of elite

dominance is suggested to be a disinterest amongst curriculum developers in teaching basic skills beyond the first years of schooling (Chavan, 2015). This elite focus further exacerbates inequalities as children progress to more advanced grades and curricular levels without any additional support, making classes increasingly irrelevant to a growing number of students who have yet to master the basics and so do not have the foundations for further learning (Mukerji and Walton, 2012; Pritchett and Beatty, 2015).

Education interventions aimed at basic literacy and numeracy skills for children who have fallen behind curricular expectations show that it is possible for them to improve rapidly with the right support. A programme that trained village volunteers in rural India to give supplementary tuition to the weakest learners made participants 23% more likely to be able to read a word or paragraph (Banerjee et al., 2010). In another programme, teachers worked in a summer camp for four hours a day with low-performing children. After a month, on average half of the children gained a reading level (Banerjee et al., 2011).<sup>14</sup> In a separate intervention, community teachers spent half of each school day working on basic skills with the lowest achieving children in Grades 3 and 4. A year later, the average child in the intervention group still had better learning than 54% of children in the comparison group (Banerjee et al., 2007). Clearly, the problem is not that students are unable to learn. Rather, these successes demonstrate that teaching pitched at the right level can be effective. A key policy focus should now be to incorporate these approaches into the school system.

School systems that take account of children's different paces of learning are more effective for narrowing inequalities. Vietnam's superior performance compared with Ethiopia, India and Peru is found to be as much to do with children's learning after they start school as much as inherited disadvantage and early childhood support (Singh, 2014). While learning in Indian schools appears to stagnate over the school grades, in Vietnam, children's learning improves. Comparing the two countries drawing on data from the Young Lives study, Rolleston et al. (2014) find that mathematics learning in Vietnam 'keeps pace' with the curriculum, whereas this is not the case in Andhra Pradesh, India. In Vietnam, teachers were also able to assess students' levels accurately. This, combined with the fact that 10-year-olds in Vietnam who did not correctly answer the target questions made progress through the school year, suggests that teachers were both aware of and responsive to their students' learning levels, providing evidence for the importance of appropriately-paced curriculum, combined with support to teachers to use it effectively.

While teaching at the right level is likely to be crucial to reducing learning inequalities, there is mixed evidence in relation to one possible policy response: ability streaming. A programme in Kenya compared learning when students were assigned to their Grade 1 class on either the basis of initial preparedness or random assignment. Tracking by initial level of achievement increased test scores for those both in higher and lower tracks (Kremer et al., 2013). In a similar study, lower-performing pupils acquired more basic skills when grouped by ability (Duflo et al., 2011). However, the authors of this study also note that streaming practices raise concerns about equity depending on the quality of their implementation: for example, higher ability streams may receive more able teachers or other resources. This concern is justified, given that education systems with ability streams are associated with larger gender gaps in mathematics and science at both primary and secondary level (Bedard and Cho, 2010). In OECD countries,

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<sup>14</sup> The reading levels were: (1) a letter, (2) a word, (3) a short paragraph, and (4) a story.

where streaming is more prevalent, the practice is often found to exacerbate inequalities (OECD, 2007; Schütz et al., 2008).

### **4.3 Provide disadvantaged children with the support of the best teachers.**

Quality teaching is vital to improving learning for the most disadvantaged. Currently, many education systems struggle to provide teachers in sufficient numbers with appropriate preparation to deal with the range of challenges they face, which may be exacerbated by the large numbers of first-generation learners entering the classroom from a wider diversity of backgrounds.

To reverse gaps in learning for children from disadvantaged backgrounds, governments need to alter their approaches to teacher recruitment, training and deployment. These reforms need to be accompanied by ones that strengthen incentives and promote accountability, such that measures ensure not only that the quality of teaching rises but that it is targeted at the children with greatest need.

Recruiting enough teachers of sufficient capability is crucial. Estimates suggest that a further 27.3 million teachers will be needed by 2030 to ensure universal primary enrolment (UNESCO, 2014b). The pace of growth in recruitment for the highest-need countries is considerable: both Rwanda and Uganda would need to double current recruitment rates, and this challenge is made all the greater, given the low proportion of adults in such countries with a secondary-school-level education (UNESCO, 2014a). As a result, in some contexts, teachers are unable to perform the type of numeracy and literacy tasks for which they are meant to be preparing their students. For example, in Kenya, Grade 6 teachers scored only 61% on tests of Grade 6 mathematics material (Ngware et al., 2010).

But teacher recruitment is just one aspect of teacher reforms needed. Teaching needs to be recognised as a profession that attracts qualified, motivated applicants. Once they have been recruited, teachers need to be given appropriate training incorporating practical classroom experience, which includes support for children to learn the basics and to progress at the right pace. However, teachers in sub-Saharan African countries are rarely provided with the skills for teaching children in the early grades. In Mali, where nearly half of pupils are unable to read a word in their own language by the end of Grade 2, teachers were not adequately prepared to teach their pupils how to read (Varly, 2010). In Senegal, where attempts are being made to introduce local languages in schools, training is only given in French and only 8% of teachers expressed any confidence about teaching reading in local languages (Akyeampong et al., 2013).

The lack of appropriate training is a lost opportunity: a meta-analysis of randomised experiments estimates that teacher training is one of the interventions with the greatest impact on learning (McEwan, 2014). In Mali and Niger, introducing pedagogical training for teachers led to major improvements in early-grade reading: while no students could read at least 21 letters, 49% could after four months of instruction, compared to just 2% in comparison schools (Mitton, 2008). In one Kenyan district, teachers received some training on a set of carefully designed lessons to teach effective reading skills to Grade 2 students; as a result, reading speeds improved by 80% on average (Crouch et al., 2009). In Liberia, an intervention that included providing in-service training to teachers in using formative and diagnostic assessment to identify

and support weak learners resulted in 130% increase in children's reading comprehension scores, with a higher impact on girls, such that it brought them up to boys' higher level (Davidson and Hobbs, 2013).

Once qualified, the most experienced teachers need to be deployed to the most disadvantaged areas. One example of a country that has been successful in an equitable deployment of teachers is Vietnam. Teachers of more disadvantaged children were absent less often, provided feedback more regularly, and were slightly more likely to have received 'excellent teacher' status (Rolleston and Krutikova, 2014). Financial or in-kind incentives (such as teacher housing) can help to keep teachers working in rural areas, such as adopted in Cambodia, Gambia and Malawi (UNESCO, 2014a). An alternative approach that has been found to be successful in some contexts is to recruit teachers from within their own communities, which can both reduce teacher attrition and also mean that they are sensitive to the cultural setting within which they are working. This is an approach being adopted in Afghanistan, where female teachers are particularly needed, and in Lesotho. However, this can come with challenges: in Lesotho only half of teachers in mountainous areas are trained compared with three quarters in other parts of the country (UNESCO, 2014a).

One potential knock-on effect of increasing the number of teachers is the opportunity to reduce class sizes. While teacher quality is more important than class size in OECD countries (OECD, 2009), the fact that classes can be far larger in low- and middle-income countries suggests that this may contribute to learning inequalities. The limited evidence available on the impact of reducing class sizes indicates that it has little effect on average: experimental trials in India (Banerjee et al., 2007) and Kenya (Duflo et al., 2015) found little to no benefit to student learning on average. Yet, there is some evidence that suggests larger class sizes are especially detrimental to poorer children in Kenya and Uganda – in Kenya the impact is four times greater for ultra-poor than for non-poor children (Jones, 2014b). Class size also matters more for disadvantaged children in South Africa, where it has little impact on learning among white children but does among black children (Case and Deaton, 1999). One associated reform is the need to support teachers in managing large classes, for example through group work (Michaelowa, 2001; O'Sullivan, 2006).

Teachers need to be given incentives that encourage them to support disadvantaged learners. There is experimental evidence that monetary incentives for teachers can improve student performance, although there are concerns that they can distort teaching practices. For example, an incentive programme in Kenya improved test performance among students, but also created the unintended consequence of teachers spending more class time on exam preparation. Improvements did not extend to subjects that were not being covered by the incentive programme and dissipated in the longer run (Glewwe et al., 2010). Evidence from Andhra Pradesh, India, found teacher incentives to improve student learning both in targeted and non-targeted subjects, and sustained into the study's second year. However, teacher incentives seem to have a greater effect on wealthier children (although did not make a difference according to caste, gender or parental education), suggesting they could, if anything, widen inequalities (Muralidharan and Sundararaman, 2011).

Although some quantitative studies on teacher reforms investigate whether a given intervention has a discernible impact on learning outcomes, there is a relative lack of research that aims to identify the implications for different groups of children according to the disadvantages they



face. In addition, few consider more sustained impacts of such reforms, for example on teacher retention.

#### **4.4 Provide learning resources that support children learning at an appropriate pace.**

The efficacy of learning materials depends largely on the ability level to which they are pitched and whether teachers are trained to utilise them. Inferential research identifies positive impacts of the provision of materials on learning outcomes across a range of countries. Textbooks are linked to improved outcomes in Ghana (White, 2004) and francophone Africa (Michaelowa, 2001). Resources are linked to better learning outcomes in Botswana, Malawi, Namibia and Uganda, even after controlling for schools' prior academic and social composition (Lee and Zuze, 2011).

These impacts are also found in some studies to have particular benefits for disadvantaged learners. In India, additional teaching resources (including flash-cards and games) helped the average child exceed 62% of children in the comparison group in English, with impacts proportionally larger for low-performing children (He et al., 2007). In Mexico, the use of textbooks in indigenous languages has been associated with narrowed learning inequalities in primary school (Vegas and Petrow, 2008).

However, experimental and quasi-experimental approaches do not find that textbooks reduce inequalities. One study of sub-Saharan African primary schools found little impact of textbooks on learning, and that any benefits were restricted to children from more advantaged backgrounds (Kuecken and Valfort, 2013). This is corroborated by research from Kenya on textbooks (Glewwe et al., 2009) and flipcharts (Glewwe et al., 2004). This lack of impact is likely to be interrelated with the challenge of teaching at the right level. As with curricular design more generally, materials may only support learning of the most advanced students. Glewwe et al.'s (2009) study on textbooks in Kenya found that textbooks did improve learning among students in the upper quintile of prior achievement.

Further evidence for the importance of ensuring learning resources are at the right level can also be seen in a programme in India using computer-based learning tools. The programme tailored learning materials according to children's current learning levels, and experimental evidence suggests that this approach increased test scores in mathematics for the average child, to exceed 69% of children in the comparison group (Banerjee et al., 2007). By contrast, computer-based programmes in Peru and Colombia that were not responsive to children's prior learning levels did not have the same success (Kremer et al., 2013).

These findings suggest that learning resources are most likely to be effective for addressing learning inequalities if they are designed at the right level for students from diverse backgrounds and are accompanied by teachers who are trained in their use with weaker learners.

#### **4.5 Empower parents and communities to hold schools and policymakers to account.**

To implement measures aimed at raising learning outcomes and overcoming inequalities, households and communities need to be empowered to hold policymakers and school leaders to account. While potentially powerful, it is important to remain aware that, given the link

between disadvantage and power within one's community, empowering families may be more beneficial to relatively wealthy children than to those from disadvantaged backgrounds unless special measures are taken. Research on such an intervention in Mali, for example, found that increasing the power of local governance empowered some groups, but further isolated nomadic groups (Laugharn, 2007). Comparable patterns are found for lower-status groups in India (Ramachandran, 2004).

One accountability approach is to provide parents and communities with information on their children's progress in school. In Uganda, a community monitoring scheme improved student learning outcomes, as long as communities could independently choose how to judge school performance (Zeitlin et al., 2011). Similarly, a project in Andhra Pradesh, India, supported women to demand improvements in local primary school quality, which led in turn to improved learning outcomes (Galab et al., 2013). However, it is worth noting that some research on community information campaigns have not found them to have significant impacts (Glewwe et al., 2013; Pandey et al., 2008). An intervention in Madagascar, focused more generally on informing children and parents about the potential benefits of education, found that the test score of the average child in this group exceeded those of 58% of children in the comparison group, benefiting both poorer and richer families (Nguyen, 2008).

There is some evidence that greater community oversight in school management improves learning outcomes. In India, the Accountability Initiative has worked with ASER India to draw attention among communities on the extent to which government allocations are actually reaching their local schools (PAISA, 2014). Where communities have access to information on low levels of learning, as provided by ASER and Uwezo surveys for example, this provides the opportunity for enhancing accountability of schools to their citizens. However, more attention is needed to identify how this can translate into improved learning outcomes for the most disadvantaged (Bangay, 2015; Lieberman et al., 2012).

Compared to information campaigns, interventions that devolve political power offer more promising results (Fox, 2014). In Indonesia, interventions aimed at increasing school committees' authority and introducing elections of committee members lifted the average child's learning in Indonesian language (Pradhan et al., 2014). Another programme found that improving the power of parent-teacher associations helped reduce nepotism in the appointment of teachers (Duflo et al., 2015). However, while methodologically robust, it is worth noting though that neither of these studies disaggregates effects according to students' backgrounds, leaving unclear the extent to which such practices can reduce socio-economic inequalities. With regard to gender inequalities, one study in rural India found that increasing the number of women in leadership positions led to an improvement in girls' reading ability (Beaman et al., 2012).

## 5. Improving data systems for monitoring progress in learning

Available evidence suggests that learning inequalities in low- and lower middle-income countries are apparent from the first year of schooling, and even before children start school and learning gaps then widen through the primary school years. Those least likely to be learning live in households affected by poverty, with disadvantage reinforced by where a child lives, their gender and whether they have a disability. These factors should not determine a child's learning potential. Given uneven progress through primary schooling, and that this progress often depends on sources of inequality associated with inherited disadvantage, there is a need to track progress in learning of children from before they start school to identify where interventions can have the greatest impact.

### Key messages

To keep track of learning inequalities, longitudinal household surveys are needed that include information on children's learning (whether in or out of school) together with information on their characteristics.

In order to identify how to tackle inequalities, such household surveys should be established in a way that allows them to be combined with administrative data on school conditions.

Based on the analysis in this 'think piece' paper, we recommend that a post-2015 learning target assesses whether children have achieved a combined measure of 'readiness to learn' in mathematics and literacy by the age at which they would have spent at least five years in school in most systems (for example, age 12).<sup>15</sup> Tracking by age rather than grade has the benefits of including all children, regardless of whether they are in school.<sup>16</sup> The measure also ensures children have acquired the skills needed to support their further learning – otherwise there is a high risk that those who have not achieved these foundations will continue to be left behind.

Such tracking of progress could be achieved by adopting a sample-based household survey of the kind adopted by ASER and Uwezo surveys, which also has the benefits of enabling the collection of data related to the background characteristics of the children and their households. These surveys randomly select villages and households within districts, and provide survey weights to account for the different sizes of different districts. The robust nature of this sampling approach provides nationally representative data without a need to visit all households, as in a census. In addition, a sample-based approach that assesses children in households has the dual benefit of providing information on out-of-school children, and avoiding unintended consequences of school-based assessments, such as schools putting forward their most able children and 'teaching to the test'.

ASER and Uwezo tools analysed in this paper further show how data using a test that is simple to adopt, straightforward to analyse, and whose results are easy to communicate, can allow national citizens and the global community to hold policymakers to account. ASER and Uwezo surveys have been grounded in local realities, with a key benefit of enabling them to work with

<sup>15</sup> Evidence suggests that if children spend no more than four years in school, they are unlikely to sustain these basic skills, even if they had acquired them while in school (UNESCO, 2014a).

<sup>16</sup> As ASER and Uwezo surveys capture children of different ages within households, this allows analysis of children's learning before they start school and over the school cycle.

local communities to identify solutions. Their simplicity also has benefits in terms of the data potentially being collected at relatively low cost.

It is, of course, also important that the data are reliable and valid. Recent work comparing ASER India data with the country's national achievement survey data shows that they do indeed meet the necessary standards, including strong test-retest reliability, satisfactory inter-rater reliability, and high comparability to USAID's Fluency Battery, which is a test of reading aptitude (ASER, 2013). Similarly, Uwezo's literacy and numeracy tests are found to be reliable across the three countries to an extent that is comparable with the PISA and EGRA assessments, and its findings are also consistent with those of the SACMEQ assessments in the same countries (Jones et al., 2014).

Given that ASER and Uwezo data are publicly available, they open themselves to scrutiny. It is also notable that such scrutiny has resulted in a publicly-available external evaluation (Results for Development Institute, 2015). It has been identified that improvements can be made to these learning tools as currently implemented. Specifically, the comparability of reading tests across languages has yet to be established, and the current administration and scoring methods do not allow for analysis using item response theory. A central focus of item response theory is the extent to which questions pitched at a certain skill level are actually of identical difficulty. Since the ASER and Uwezo surveys do not record which exact number-identification question, for example, each child attempts, it is not possible to check whether some children are receiving easier questions testing this skill than others. It is important though, that identifying potential shortcomings is used to strengthen data for open use, rather than endangering making data publicly available which is vital for ensuring that they are used to hold policymakers and schools to account.

Identifying who is and is not learning is just the first step. In principle, schools should be institutions that help to rectify inequalities. Too often though, they have the opposite effect, resulting in a widening of gaps over a school cycle. We therefore need to understand better what schools need to do to address learning inequalities. One problem with adopting a household survey approach could be that it does not link with information within schools, which is needed for such an analysis. Surveys such as ASER and Uwezo are in principle able to overcome this by collecting information on a sub-sample of schools that can, in turn, be linked with children who have been surveyed in households. Another approach is to code schools that allow data collected from households to be linked with administrative data collected on schools, such as on class size, facilities, teacher preparation, and teaching practices.

The ASER and Uwezo approaches also have the potential to provide panel data, allowing an assessment of the trajectories of learning for different groups of children over time (although they are not currently available as a panel dataset). In low- and lower-middle income countries, Young Lives is currently the main publicly available source of data of this kind (although with a longer time lag than ASER and Uwezo). These data, as well as those of APREST<sup>17</sup> (Muralidharan and Zieleniak, 2013), have the potential benefit of offering information on a wider range of competencies than ASER and Uwezo.

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<sup>17</sup> The Andhra Pradesh Randomized Evaluation Studies (APREST) hold data from a range of policy evaluations that have used random allocation. These data are not currently publicly available.

While Young Lives data are richer than ASER and Uwezo in terms of the broader information collected (for example on health, employment, etc.) and these and APRESt are more comprehensive in terms of the competencies tested, their depth means that they have been collected on a narrower geographical scale and, as such, are not representative of the countries as a whole. This potential trade-off between depth and scale is an issue that deserves further consideration, depending on the purpose of the data being collected.

Lessons can be also learned from England's experience with the use of data for policy-related research. English administrative and survey data could be considered a gold standard in terms of information available for assessing learning trajectories. An important feature of the data available is that administrative and survey data from different sources are combined to allow analysis across census data, birth cohort studies and international and national learning assessments. These comprehensive data enable researchers and policymakers alike to track the academic progress of the entire population of school children throughout their schooling. The data also permit analysis of the progress of children from different socio-economic backgrounds, and particularly enable researchers to measure the correlation between children's socio-economic background, health status and academic achievement – information that can inform policymaking, and, ultimately, teaching practices in the classroom. Replicating such an approach in low- and lower-middle income countries is likely to be difficult both in terms of cost as well as the stringent need for data protection policies to be enforced to ensure anonymity of individuals and schools. However, lessons can be learned for these countries in terms of the type of data collected and cost-effective approaches to combining available data from different sources (Vignoles, 2014).

A further lesson that can be learned from the UK experience is the importance of being mindful of unintended consequences where learning assessments are used for the purposes of accountability, such as the danger of incentivising teaching to the test. To avoid unduly influencing teacher and school behaviour in this way it is important that accountability systems use multiple measures to assess pupils. Indeed one approach, for example, has been to triangulate data from international surveys with national assessments (Vignoles, 2014).

Overall, a focus on tracking progress in learning inequalities does not imply the need for a global system of international large-scale assessment using the same approach across all countries. Rather, national systems should be adopted and adjusted to be appropriate to each country's realities and needs.<sup>18</sup>

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<sup>18</sup> The ongoing work by Australian Council for Educational Research (ACER) and the UNESCO Institute for Statistics is already providing invaluable insights to showing how such information from different sources can be aligned for global comparisons (ACER et al., 2014).

## 6. Conclusion

The Sustainable Development Goals are providing a much-needed focus on the importance of raising learning outcomes, ensuring that no one is left behind. This paper has shown that, to be successful, it will be vital for interventions to focus on children before they even enter school and in the early years, as this is where inequalities begin. Inequalities then widen over the school cycle, making it even more difficult to tackle as children get older.

Interventions are needed to ensure teaching is at the right pace for those who face the greatest difficulties with their learning, and that these children are provided with the best teachers. Learning materials are also important, but only likely to be effective if teachers are appropriately trained in their use and are pitched at the right level. For reforms to be implemented, parents and communities need to be empowered to advocate for reforms needed to support their children's learning, with special measures needed to promote the participation of marginalised groups in society.

Finally, this 'think piece' paper calls for better data to track progress to assess whether all children are learning, regardless of their circumstances. Given the large numbers of children not learning the basics in reading and mathematics, this needs to be a starting point for tracking progress, recognising that strong foundations in the basics are needed for children's further learning. Putting in place 'stepping-stone' targets for sub-groups of the population within countries, and so tracking progress of the most marginalised groups, will act as an early warning signal on whether progress is rapid enough to ensure all children are learning by 2030.

## Acknowledgments

We are grateful to the following for comments on earlier versions of this paper: Stuart Cameron, Sonia Ilie and John Mugo, and anonymous reviewers and seminar participants at DFID.

## Appendix: details of model used for Figures 4 and 5

We use ordinary least-squares (OLS) regression to estimate the inferential model on which Figure 4 and Figure 5 are based. OLS regression analyses the impact of an independent variable on the probability of a categorical outcome whilst holding constant the impact of the other independent variables included in the model. The data for the model come from ASER India's household surveys from 2008 to 2013. Our outcome of interest is whether a child has learned the basics in numeracy and literacy, which we define as the ability both to divide and to read a story. The background characteristics that we use to predict this outcome are gender, socio-economic status, and parental education.

It is important to note though that this model identifies associations rather than causal relationships. We try to control for a range of characteristics, but omitted variable bias is likely to exist in this model. For example, we control for children's current type of school, but have no additional information on the quality of schooling, or on previous education, including pre-school.

### Data

The ASER survey is conducted in every rural district in India. For its household surveys, ASER uses a stratified random-sampling survey design: every district in the country is surveyed, and then, within each district, 20 villages from the previous two years are re-surveyed and 10 more are selected at random. Within each of these 30 villages, the ASER team members selected and surveyed 20 households. We account for this survey design in our inferential model by using the appropriate population weights and clustering standard errors with Stata's 'svyset' command.

### Model predictors and controls

Our model predictors are gender, socio-economic status, and parental education. To assess socio-economic status, for each household we calculate a wealth index. Following the example of Saeed and Zia (2014) in relation to ASER Pakistan, we generate this index through a factor analysis of the following characteristics of the child's household: type of house (mud, brick and mud, or mud and cement), whether the house has electricity, a mobile phone, and a television.<sup>19</sup> We assess parental education according to two dichotomous variables: whether the child's mother attended school and whether the child's father attended school, each of which is based on the given parent's self-report.

In addition, we control for whether each child attends a government or private school, whether they receive private tutoring, the year in which they took part in the survey, and the state and district in which they live.

### Model specification

Our dependent variable, whether a child has learned the basics, is dichotomous, and, in recent years, the convention in many social science fields has been to estimate logistic regression models for outcomes of this nature (Hellevik, 2009; Mood, 2010). However, we prefer to use

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<sup>19</sup> The sole difference between our index and that of Saeed and Zia is that we do not also consider home ownership, since this information was not collected in the 2009–2013 ASER India surveys.

OLS regression for this model, as countervailing evidence suggests that OLS is comparable to logistic regression in terms of the accuracy of model predictions and preferable in terms of the intuitiveness with which one can interpret each model's estimated coefficients (Angrist and Pischke, 2008; Hellevik, 2009).

In addition, we use interaction terms between our predictor variables and child age. We do this to assess whether the power of our predictors varies by children's age. Whereas the interpretation of interaction effects in OLS is relatively straightforward, in logistic regression models it is more precarious (Ai and Norton, 2003; Norton et al., 2004). Given that interaction terms are an essential component of our strategy, this provides further grounds for us to prefer OLS in this study.

Letting  $Y_i$  denote whether child  $i$  has learned the basics, we estimate the following model:

$$Y_i = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 (X_{1i} X_{2i}) + \beta_4 X_{3i} + \beta_5 (X_{1i} X_{3i}) + \dots + \beta_k X_{ki} + \varepsilon_i.$$

Where  $X_1$  refers to the age of child  $i$ , and  $X_2$  to  $X_k$  refer to the other predictor and control variables above. We interact the predictor variables with child age, but we do not interact the control variables with child age. Each  $\beta$  parameter represents the average change in  $Y$  associated with a one-unit increase in the given explanatory variable, and the error term  $\varepsilon_i$  is normally distributed with a mean of zero.

On the basis of this model, for Figure 4 we chart the estimated coefficient for each predictor (including the interaction term) to show these coefficients change over child ages. For Figure 5, we use Stata's 'margins' command to plot model estimates of the predicted outcome for a child with the given characteristics when holding constant all other variables in the model.



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For any further enquiry, please contact [info@heart-resources.org](mailto:info@heart-resources.org)

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