

Accountability from the grassroots: Children's foundational reading and arithmetic in Sitapur District, Uttar Pradesh

Research
and Policy
Paper 20/6

February 2020

Authors:

Dr Ricardo Sabates (REAL Centre, University of Cambridge), Dr Suman Bhattacharjea and Dr Wilima Wadhwa (ASER Centre India)

Acknowledgements:

Funding for this project comes from the UK Economic and Social Research Council and the Department for International Development (DFID) (ES/P005349/1), and from Mars Wrigley Company Foundation. Research partners include Pratham Education Foundation, the ASER Centre and the REAL Centre at the Faculty of Education, University of Cambridge.

All errors in this report are the responsibility of the authors.

© REAL Centre, University of Cambridge

Suggested citation:

Sabates. R., Bhattacharjea., S., Wadhwa. W (2020) *Accountability from the Grassroots: Children's foundational reading and arithmetic in Sitapur District, Uttar Pradesh*. REAL Centre, University of Cambridge. 10.5281/zenodo.3648334

Key Messages

1. The project Accountability from the Grassroots aims to investigate if Pratham's community-based interventions could be more effective at raising learning outcomes when they work in both schools and communities
2. As part of the study, the team assessed foundational literacy and numeracy levels using the ASER assessment test to establish the baseline learning levels of children.
3. The data from this assessment reinforce the findings that large proportions of children in rural Sitapur, as in much of the country, begin to fall behind curriculum expectations in their very first years of schooling.
4. Particularly, girls from Scheduled Tribe families, living in less affluent homes, with mothers who have never been to school face larger learning disadvantages compared with other children.

Introduction

There is a clear need to better understand how learning outcomes for all can be raised in India, with potential lessons for other contexts at a similar stage of educational development. Learning among school-going children has remained low over the past decade and, if anything, has declined as children from more marginalised backgrounds have entered classrooms for the first time (Rose & Alcott, 2015; Rose, Sabates, Alcott, & Ilie, 2016). Across rural India, just half of all students in primary school grade 5 can read a grade 2 level text and 27.8% can solve a three- by one-digit division problem. Both these numbers have declined over the past decade (ASER Centre, 2015 and 2019). Data from a range of assessments in India demonstrate the difficulty children face in improving their learning: just 9-13% of those who lack a basic literacy or numeracy skill are able to gain these skills after an additional year of schooling (Bhattacharjea, Wadhwa, & Banerji, 2011; Pritchett & Beatty, 2015).

This learning crisis is most acute among the most disadvantaged. Using data from the Young Lives study in Andhra Pradesh, India, Rolleston, James and Aurino (2014) found that wealthier children from this sample make more progress than poorer children in maths between ages 5 and 8 (that is between 2005/06 and 2009/10). Using data from the Annual Status of Education Reports from rural India between 2009 and 2013, Rose and Alcott (2015) found that by the primary-school completion age, those in the wealthiest quintile are more than twice as likely (44%) to have gained basic literacy and numeracy skills as those in the poorest quintile (19%). In addition, Rose and Alcott found that wealth inequalities are further reinforced by other forms of disadvantage, such as gender: by age 11, poor girls whose parents never went to school are only half as likely to be able to read a Grade 2 level text as poor boys in the same situation (7% compared to 13%).

For over a decade, results from the Annual Status of Education Report (ASER) survey have consistently shown that the gap between children's abilities and curriculum expectations emerges from the very first years of primary school, and widens over time. To stem this learning crisis, Pratham Educational Foundation, the largest NGO in Education in India, has worked both within and outside the school system to significantly improve children's foundational literacy and numeracy skills (Banerjee et al., 2006; Banerjee et al., 2007, Banerji et al., 2015). However, Pratham's previous

interventions within the community have not formally incorporated school actors. This project, entitled *Accountability from the Grassroots*, aims to investigate if Pratham's community-based interventions could be more effective at raising learning outcomes, if they could work in both schools and communities, if they raise awareness of the importance of learning for children's futures, and if they clarify relations of accountability between parents and teachers so that there is a clear message that a child's learning is everyone's responsibility.

In order to evaluate the impact of the intervention on learning outcomes, we designed a mixed methods impact evaluation in rural villages of Uttar Pradesh (Onwuegbuzie & Hitchcock, 2017). 400 villages which have at least two government schools were randomly selected from the District Information On School Education (DISE) frame for 2016-17, and randomly assigned to: i) villages where Pratham's interventions work with schools and communities (200 villages); ii) villages where Pratham's interventions are only with the communities (100 villages); and iii) villages where no intervention is taking place (100 villages). Since measuring learning is a key part of the project, this paper describes the assessment tool and summarises reading and arithmetic achievement data from the baseline measurement of a sample of 23,970 children studying in grades 2, 3 and 4 across all 400 villages of Sitapur district in Uttar Pradesh, India.¹ Additionally, we describe how children were sampled; how they were assessed on basic reading and arithmetic ability; the results of this baseline assessment; and the main covariates related to assessments in terms of child's gender, school grade, caste as well as family wealth and maternal education.

The ASER Assessment Tool

The ASER assessment tests children's foundational reading and arithmetic abilities. First developed almost 20 years ago for internal use by Pratham's teams who were working on scale to build these skills among children, the tool became the core of the nationwide ASER survey, which has generated estimates of schooling and foundational learning status for children in the 5-16 age group across rural India since 2005.²

The ASER assessment is a "floor" level test that is designed to be easy to administer and understand by non-specialists. The reading assessment features four simple tasks. The easiest asks children to read letters of the alphabet. The second involves reading simple common words. The third comprises a paragraph with four short sentences of the kind found in textbooks for grade 1 of primary school. And the most difficult task involves reading a slightly longer, more complex text at the grade 2 level of difficulty (see Table 1 for an example of the ASER reading tool). Children who are unable to read even letters are marked at "Beginner" level.

Similarly, the mathematics test has four tasks: single-digit number recognition, double-digit number recognition, a two digit by two digit subtraction problem with borrowing, and a three digit by one digit division problem with remainder (see Table 2 for an example of the ASER arithmetic tool). Children are marked at "Beginner" level if they are unable to recognise single digit numbers. In both reading and arithmetic, children are assessed one on one and marked at the highest level that they can

comfortably achieve. The ASER assessment is conducted in the household in order to capture all children. However, since the focus of this study was learning levels in government schools, children were tested in school, and those who were absent from school were found and tested at home.

Sampling and Selection

The intervention being evaluated aims to improve foundational literacy and numeracy for children currently enrolled in government schools and attending primary grades 3, 4, and 5. Since the intervention targets children who have not yet achieved a specific level of foundational ability, the research likewise focuses on children who have not yet achieved this level of literacy.

In order to identify these children, we undertook the following steps for sampling within government schools in the selected villages: First, we reviewed the school enrolment registers for grades 2, 3 and 4 (since by the time the intervention was scheduled to begin children would have been promoted to the targeted grades 3, 4 and 5). If there were 20 children or less enrolled in the sampled class, all children on the register were selected. If there were 21 children or more enrolled in the sampled class, the field staff selected a random number between 1 and the total number of children enrolled in the class and they were the first sample child on the list. After that, every fifth child was selected until a total of 20 children were selected.

Once these 20 children (or less if it was a smaller class) were identified, we tested them using the ASER tool for measuring foundational reading and arithmetic abilities (see Results section below). If children selected from the register were absent from school, they were tracked down and tested at home, so as to reduce any self-selection bias related to irregular attendance in school. From the 20 tested children in each grade, the first 10 who were below the grade 2 “story” level comprised the final sample of children who would be tracked in each grade.³

This final sample is therefore a random selection of children attending government schools who had not yet reached the highest level (a grade 2 level “story”) in the reading assessment.

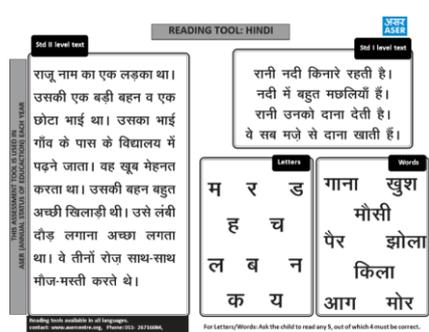
Results

We report learning outcomes for the sample of 23,959 children for whom we have information on both reading and arithmetic ASER tests, about one third from each of the grades 2, 3 and 4. Of the sample, 47% were boys and 53% girls. Children ranged in age from 4 to 14 years, but 85% of the children were between 7 and 9 years old which policy prescribes as the appropriate age range for these grades.

Even accounting for the fact that the sampling strategy was to target children with low learning levels, reading ability among children in this sample is very poor: even in grade 4, barely a quarter of all children can read more than individual letters. Although there are more girls than boys in the sample (reflective of enrolment patterns in government schools in India), girls are slightly more likely than boys to be at beginner level in reading. Results show that 37.2% of girls and 35.5% of boys are at

beginner level (Table 1). With respect to current school grade, results show the expected increasing pattern of learning, whereby children enrolled in grade 4 are more likely to have reached higher levels in the ASER reading tool – although still well below grade level. For instance, nearly 14% of children in grade 4 are able to read a paragraph whereas only 3.1% of children in grade 2 are able to do so. Finally, with respect to social category, although the number of Scheduled Tribe children in the sample is very small, these children are far more likely than their peers to be at the lower end of the reading distribution (53.3% are at the beginner level in reading). On the other hand, children in the General Social category are far more likely than others to be at the upper end of this distribution (14.1% are able to read a grade 1 level paragraph).

Table 1: ASER reading levels⁴ by gender, grade and social category



| | Sample | Level 1 Beginner | Level 2 Letter | Level 3 Word | Level 4 Paragraph | | |
|-------|-------------|---------------------|-------------------|-----------------|----------------------|-------|-----|
| All | 23,959 | 36.40 | 46.54 | 8.87 | 8.19 | 100 | |
| Sex | Boys | 11,233 | 35.46 | 46.12 | 9.72 | 8.70 | 100 |
| | Girls | 12,726 | 37.23 | 46.91 | 8.11 | 7.75 | 100 |
| Grade | Grade 2 | 8,152 | 48.86 | 43.06 | 4.98 | 3.10 | 100 |
| | Grade 3 | 8,007 | 34.98 | 47.88 | 9.33 | 7.81 | 100 |
| | Grade 4 | 7,800 | 24.83 | 48.81 | 12.45 | 13.91 | 100 |
| Caste | General | 2,203 | 27.92 | 46.39 | 11.58 | 14.12 | 100 |
| | SC | 11,290 | 39.34 | 46.24 | 7.91 | 6.51 | 100 |
| | ST | 104 | 53.85 | 30.77 | 6.73 | 8.65 | 100 |
| | OBC | 10,151 | 34.68 | 47.18 | 9.37 | 8.78 | 100 |
| | Do not know | 211 | 42.18 | 41.23 | 8.53 | 8.06 | 100 |

How to read this table: The reading tool is a progressive tool. Each row shows the variation in children's reading level within the specified subpopulation. For example, among girls, 37.23% cannot even read letters, 46.91% can read letters but not words or more, 8.11% can read words but not a paragraph, and 7.75% can read a paragraph. For each subpopulation, the total of these exclusive categories is 100%. This means, for example, that the proportion of girls who can read letters is 46.91+8.11+7.75 = 62.77%. Additional Note on Caste: Schedule Caste (SC); Schedule Tribe (ST); Other Backward Class (OBC)

Table 2: ASER arithmetic levels⁵ by gender, grade and social category

| MATH TOOL | | | |
|---|---|--|--------------------------------------|
| Number Recognition/ संख्या पहचान 1-9 | Number Recognition/ संख्या पहचान 11-99 | Subtraction/घटाना (2 digit with carry over) | Division/भाग (2 digit by 1 digit) |
| 3 7 | 65 38 | 52 76 - 24 - 47 | 9 919 |
| 1 4 | 92 23 | 48 75 - 29 - 37 | 7 869 |
| 8 9 | 47 72 | 46 31 - 38 - 15 | 5 583 |
| 5 2 | 56 87 | 65 23 - 18 - 14 | 3 512 |
| 29 11 | | | |

| | Sample | Level 1 Beginner | Level 2 1-9 | Level 3 11-99 | Level 4 Subtraction | Level 5 Division | | |
|-------|-------------|---------------------|----------------|------------------|------------------------|---------------------|------|-----|
| All | 23,959 | 14.00 | 67.57 | 15.56 | 2.47 | 0.41 | 100 | |
| Sex | Boys | 11,233 | 12.11 | 65.05 | 19.16 | 3.17 | 0.52 | 100 |
| | Girls | 12,726 | 15.67 | 69.79 | 12.38 | 1.85 | 0.31 | 100 |
| Grade | Grade 2 | 8,152 | 22.33 | 67.89 | 8.92 | 0.79 | 00.9 | 100 |
| | Grade 3 | 8,007 | 12.29 | 68.68 | 16.32 | 2.40 | 0.31 | 100 |
| | Grade 4 | 7,800 | 7.05 | 66.09 | 21.71 | 4.31 | 0.85 | 100 |
| Caste | General | 2,203 | 10.30 | 62.87 | 22.24 | 3.95 | 0.64 | 100 |
| | SC | 11,290 | 15.32 | 68.76 | 13.68 | 1.95 | 0.29 | 100 |
| | ST | 104 | 17.31 | 64.42 | 15.38 | 2.88 | 0.00 | 100 |
| | OBC | 10,151 | 13.22 | 67.35 | 16.19 | 2.74 | 0.50 | 100 |
| | Do not know | 211 | 17.54 | 64.46 | 16.11 | 1.90 | 0.00 | 100 |

How to read this table: The arithmetic tool is a progressive tool. Each row shows the variation in children’s arithmetic level within the specified subpopulation. For example, among Grade 3 children, 12.29% cannot even recognise numbers 1-9, 68.68% can recognise numbers up to 9 but cannot recognise numbers up to 99 or higher, 16.32% can recognise numbers up to 99 but cannot do subtraction, 2.4% can do subtraction but not division, and 0.31% can do division. For each subpopulation, the total of these exclusive categories is 100%. This means, for example, that the proportion of Grade 3 who can recognise numbers 11-99 is 16.32+2.4+0.31 = 19.03%. Additional Note on Caste: Schedule Caste (SC); Schedule Tribe (ST); Other Backward Class (OBC)

Table 2 shows patterns of attainment in the ASER arithmetic test by gender, current grade, and social category. Overall, children’s math ability is significantly below grade level. As is the case with reading, girls are more likely than boys to be at beginner level in arithmetic: 15.7% of girls are at beginner level compared with 12.1% of boys. Similarly, children in higher grades show higher levels of achievement in the ASER arithmetic tool. Children in grade 4 are more likely to be able to at least do subtraction (5.2%) than children in grade 2 (0.9%). With respect to social category, results show that Scheduled Tribe children are more likely to be at beginner level (17.3%), although the difference with respect to other social categories is not as marked as with the reading tool. As in the case of

reading ability, children in General Social category are more likely to achieve higher levels in the ASER arithmetic tool (4.6% are able to do a subtraction or more).

We collected household information for 96.5% of the sample children for whom we have assessment data. Household affluence was constructed using confirmatory factor analysis (CFA) on ownership of 9 different assets (mobile phone, tv, clock, radio, electric fan, table, chair, pressure cooker, sewing machine); access to electricity and toilet in the home; as well as access to modes of transportation for the household (bicycle, motorcycle, car, tractor, rickshaw, cart). From CFA one factor was extracted which indicated the underlying wealth of the household. This wealth index was then used to generate quartiles, from the poorest 25th percentile to the richest 25th percentile. Mother's education was based on self-reported highest educational level attended by the mother.

Children's ability to read simple text and do simple arithmetic is clearly related to indicators of both household affluence and mother's education. Figure 1 shows that nearly a quarter of children from the richest 25% of the households are at level 3 or above in reading and arithmetic. Looked at by mother's education, an intergenerational gradient is shown whereby a quarter of children whose mothers have more than 5 years of education (that is, those who completed at least lower primary school) achieved level 3 or above in reading and arithmetic. Only around 15% of children whose mothers had no schooling achieved level 3 or higher in reading or arithmetic.

Figure 1: Children at Level 3 or higher in reading or arithmetic, by household affluence

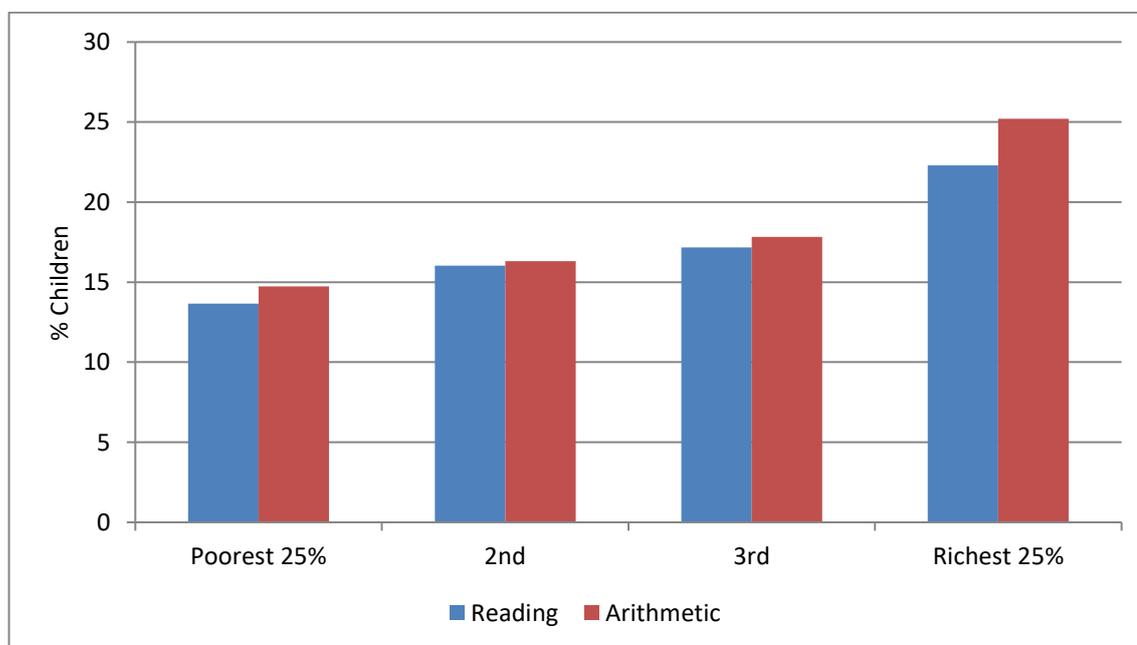
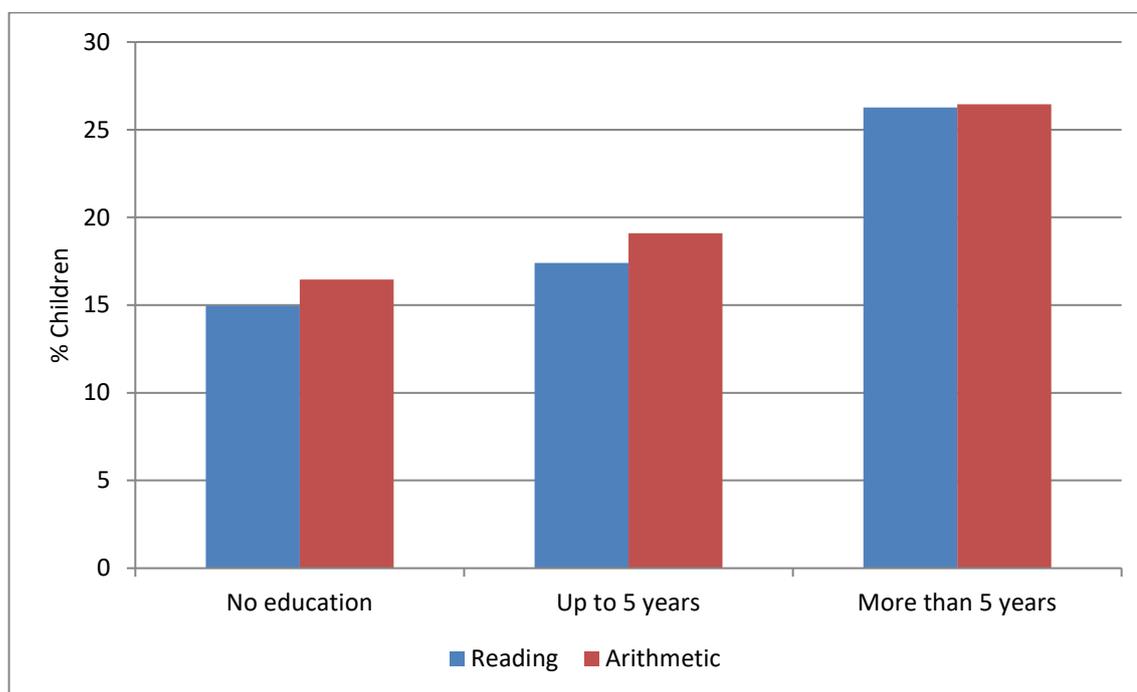


Figure 2: Children at Level 3 or higher in reading or arithmetic, by mother's education



Reflections

Not surprisingly given the criteria used for sample selection (children already reading at the grade 2 'Story' level, the highest level of reading ability tested, were excluded from the sample), the ability levels reflected in the figures above are significantly poorer than ASER results for rural Uttar Pradesh as a whole. Although ASER results for Uttar Pradesh show clear improvements from 2016 to 2018 in reading and arithmetic in early grades for children in government schools, average figures for the state from 2018 continue to reflect serious learning deficits among school going children, with just over half of all children in grade 5 able to read a grade 2 level text and under 30% able to solve a 3-by 1-digit division problem.

The data from this baseline assessment reinforce the findings that large proportions of children in rural Sitapur, as in much of the country, begin to fall behind curriculum expectations in their very first years of schooling. Confirming findings from other studies, the extent of this gap depends to a great extent on what children bring with them when they enter school. Girls from Scheduled Tribe families, living in less affluent homes, with mothers who have never been to school are the least likely to be able to keep pace.

References

- ASER Centre (2019). *Annual Status of Education Report (Rural) 2018*. New Delhi: ASER Centre
- ASER Centre (2015). *Trends over time 2006–2014; a supplement to the Annual Status of Education Report*. New Delhi: ASER Centre.
- Banerjee, A., Banerji, R., Duflo, E., Glennerster, R., & Khemani, S. (2006). *Can Information Campaigns Spark Local Participation And Improve Outcomes ? A Study Of Primary Education In Uttar Pradesh, India*. <https://doi.org/10.1596/1813-9450-3967>
- Banerji, R., Berry, J., & Shotland, M. (2015). *The impact of mother literacy and participation programs on child learning: Evidence from a randomized evaluation in India*. <https://doi.org/10.23846/ow2153>
- Banerjee, A., Cole, S., Duflo, E., & Linden, L. (2007). *Remedying education: Evidence from two randomized experiments in India*. <https://doi.org/10.1162/qjec.122.3.1235>
- Bhattacharjea, S., Wadhwa, W., & Banerji, R. (2011). *Inside Primary Schools: A study of teaching and learning in rural India*. New Delhi: ASER Centre
- Onwuegbuzie, A. & Hitchcock, (2017). *A meta framework for conducting mixed methods impact evaluations: implications for altering practice and the teaching of evaluation*. *Studies in Educational Evaluation* 53: 55-68
- Pritchett, L., & Beatty, A. (2015). *Slow down, you're going too fast: Matching curricula to student skill levels*. *International Journal of Educational Development*, 40, 276-288
- Rolleston, C., James, Z., & Aurino, E. (2014). *Exploring the effect of educational opportunity and inequality on learning outcomes in Ethiopia, Peru, India, and Vietnam*. Background Paper for the UNESCO Education for All Global Monitoring Report 2013/4.
- Rose, P., & Alcott, B. (2015). *How can education systems become equitable by 2030?* Report commissioned by the UK's Department for International Development. Oxford, UK: Health & Education Advice and Resource Team.
- Rose, P., Sabates, R., Alcott, B. and Ilie, S. (2016). *Overcoming inequalities within countries to achieve global convergence in learning*. Background paper for the International Commission on Financing Global Education Opportunity. Available at: <http://report.educationcommission.org/resource-materials/>

Endnotes

1. A comparison of sample children's learning outcomes across the 3 randomised groups (community+school intervention, community intervention, control) shows that children across the 400 villages have largely similar learning levels. In both reading and math, grade-wise comparison of learning levels shows no significant difference in almost all cases. It is only in the case of grade 2 and 3 in reading and grade 3 in math that percentage of children at the beginner level (unable to read or recognise numbers) is slightly higher in intervention villages as compared to the control villages. What this means is that if we find significant improvements in the intervention villages it would indicate that the potential impact is even larger.
2. ASER was conducted annually for the decade from 2005 to 2014. After a break in 2015, it switched to an alternate-year cycle, where the "full" ASER is conducted in every rural district of the country one year, and a smaller exercise that employs the same design principles to look at a different aspect of the education sector the following year. After 2014, the "full" ASER has been conducted in 2016 and 2018.
3. In the event that 10 children below "story" level could not be identified from the first 20 children tested, additional children were sampled from the enrolment register and tested, until 10 such children were found.
4. The ASER Reading tool has five levels. For the purposes of this study the sampling process was designed to exclude children who were already able to read at the highest level (a grade 2 level text or 'story' level); therefore only the first 4 levels are shown in the table. Division is introduced in grade 3 or 4 in Indian schools; therefore children in this sample would not be expected to have mastered division.



**UNIVERSITY OF
CAMBRIDGE**
Faculty of Education



Research for Equitable Access and Learning

REAL Centre

Faculty of Education
University of Cambridge
184 Hills Road, Cambridge
CB2 8PQ, UK

 @REAL_Centre

REAL Centre Director: Professor Pauline Rose

Email: pmr43@cam.ac.uk
Telephone: +44 (0) 1223 767511

REAL Centre Administrator

Email: REALCentre@educ.cam.ac.uk
Telephone: +44 (0) 1223 767693

www.educ.cam.ac.uk/centres/real

All details correct at the time of going to print,
February 2020..