Education Policies and Practices

What Have We Learnt and the Road Ahead

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December 2011
Objective of the Paper

- Study the status of education (both quality and quantity) in Bihar both in absolute terms and in relation to other states in India
- Quantify the correlates of educational outcomes using state level data
- Survey the literature on the effectiveness of education policies adopted in different parts of the world to improve both the “quantity” and “quality” of education.
- Survey the policies adopted by the government of Bihar towards improving educational outcomes in the state.
  - Place these policies appropriately in our broader survey framework to make this work a contextual survey.
- Identify best practices in education policies and make policy recommendations for Bihar
Status of Education in Bihar: Quantity measures

Out of School Rate (source: ASER)
Net Enrolment Ratio (DISE)

In all graphs-
Dashed lines – minimum and maximum of 20 states with non-missing data
Solid black line – median of 20 states with non-missing data
Solid red line – Bihar
Status of Education in Bihar

Out of school rate, primary schools
Status of Education in Bihar

Note: NER missing for Bihar starting 2007-08.
Status of Education in Bihar

Net enrolment ratio, upper primary

- 2003-04
- 2004-05
- 2005-06
- 2006-07
- 2007-08
- 2008-09
- 2009-10

Graph showing the trend of net enrolment ratio from 2003-04 to 2009-10.
Summary of Evidence on Quantity

• Out of school rate higher than the median, but declining over time and converging to the median
  — Gap with the best performing states significant
• Enrolment ratio at primary level above the median starting in 2006-07
  — Near universal primary enrolment
• Enrolment ratio at upper primary level still very low (right at the bottom in India)
Status of Education in Bihar: Quality measures

Can read long paragraph,
Can solve division problem

(Source: ASER)
Status of Education in Bihar

Prop. who can solve division problem, primary schools
Summary of evidence on quality

• In “reading” Bihar slightly below the median
• In math skills, Bihar very close to the median
• In both reading and math skills, the gap with the best performers is substantial
  – Some evidence of narrowing of gap in recent years
  – In absolute terms, not very satisfactory
    • 30% of students in class VI cannot not read a paragraph taken from a class II textbook
    • 50% of class V students cannot solve a simple division problem
Proximate Determinants of Low Schooling Attainment: Schooling Inputs

- pupil-teacher ratio,
- student-classroom ratio,
- no. of teachers per school,
- Proportion of classrooms in good condition
- % schools with common toilet,
- % schools with girls’ toilet,
- % schools with drinking water facility

Source: DISE
Schooling Inputs: Primary Schools

Pupil-teacher ratio, primary
Schooling Inputs: Primary Schools

Student-classroom ratio, primary

- 2003-04
- 2004-05
- 2005-06
- 2006-07
- 2007-08
- 2008-09
- 2009-10

- 0 20 40 60 80 100
Schooling Inputs: Primary Schools

No. of teachers per school, primary

- 2003-04
- 2004-05
- 2005-06
- 2006-07
- 2007-08
- 2008-09
- 2009-10
Schooling Inputs: Primary Schools

Schools with common toilets, primary (%)

- Legend (lines):
  - Solid: ... (not specified)
  - Dashed: ... (not specified)

- Years and data points:
  - 2003-04:
  - 2004-05:
  - 2005-06:
  - 2006-07:
  - 2007-08:
  - 2008-09:
  - 2009-10:

- Values (axes):
  - Y-axis: 0, .2, .4, .6, .8, 1
  - X-axis: 2003-04 to 2009-10
Schooling Inputs: Primary Schools

Schools with girls' toilets, primary (%)

- 2003-04
- 2004-05
- 2005-06
- 2006-07
- 2007-08
- 2008-09
- 2009-10
Schooling Inputs: Primary Schools

Schools with drinking water facility, primary (%)
Schooling Inputs: Primary Schools

Prop. of classrooms in good condition, primary schools
Summary of evidence on schooling inputs

- Primary schools
  - Highest pupil-teacher ratio as well as student-classroom ratio among Indian states
  - Number of teachers per school low, but has become higher than the median
  - % of schools with toilets or separate girls toilet well below the median
  - Surprisingly, % of schools with drinking water facility has gone down from above median to below it
- Somewhat similar story for upper primary schools
Correlation (inputs and outcomes)

<table>
<thead>
<tr>
<th></th>
<th>(A)</th>
<th>(B)</th>
<th>(C)</th>
<th>(D)</th>
<th>(E)</th>
<th>(F)</th>
<th>(G)</th>
<th>(H)</th>
<th>(I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Can read long paragraph (A)</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>% Can solve division problem (B)</td>
<td>0.82</td>
<td>1.00</td>
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<td></td>
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<tr>
<td>Out of school rate (C)</td>
<td>-0.53</td>
<td>-0.32</td>
<td>1.00</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pupil-teacher ratio (D)</td>
<td>-0.35</td>
<td>-0.09</td>
<td>0.55</td>
<td>1.00</td>
<td></td>
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<tr>
<td>Student-classroom ratio (E)</td>
<td>-0.37</td>
<td>-0.13</td>
<td>0.53</td>
<td>0.81</td>
<td>1.00</td>
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<tr>
<td>% Schools with toilet (F)</td>
<td>0.28</td>
<td>0.20</td>
<td>-0.39</td>
<td>-0.08</td>
<td>-0.28</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Schools with girls' toilet (G)</td>
<td>0.32</td>
<td>0.22</td>
<td>-0.35</td>
<td>-0.03</td>
<td>-0.28</td>
<td>0.71</td>
<td>1.00</td>
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</tr>
<tr>
<td>Schools with drinking water facility (H)</td>
<td>0.40</td>
<td>0.36</td>
<td>-0.37</td>
<td>0.08</td>
<td>-0.20</td>
<td>0.43</td>
<td>0.67</td>
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</tr>
<tr>
<td>% Classrooms in good condition (I)</td>
<td>0.13</td>
<td>0.04</td>
<td>-0.37</td>
<td>-0.09</td>
<td>-0.29</td>
<td>0.38</td>
<td>0.57</td>
<td>0.40</td>
<td>1.00</td>
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</tbody>
</table>
Summary of correlation table

- Pupil-teacher ratio and student-classroom ratio negatively associated with learning attainment
- Quality of schooling infrastructure positively associated with learning
- Pupil-teacher ratio and student-classroom ratio positively associated with out of school rate
- Quality of schooling infrastructure negatively associated with out of school rates
Regression Analysis
### Correlates of Reading

<table>
<thead>
<tr>
<th>Independent variables:</th>
<th>All</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pupil-teacher ratio</strong></td>
<td>-0.0035 ** (0.001)</td>
<td>-0.0022 * (0.001)</td>
<td>-0.0004 (0.001)</td>
</tr>
<tr>
<td><strong>Student-classroom ratio</strong></td>
<td>0.0005 (0.001)</td>
<td>0.0003 (0.001)</td>
<td>-0.0002 (0.001)</td>
</tr>
<tr>
<td><strong>% Schools with toilet</strong></td>
<td>0.0407 (0.047)</td>
<td>0.0040 (0.045)</td>
<td>0.0390 (0.036)</td>
</tr>
<tr>
<td><strong>% Schools with girls' toilet</strong></td>
<td>0.0185 (0.058)</td>
<td>0.0310 (0.065)</td>
<td>0.0121 (0.055)</td>
</tr>
<tr>
<td><strong>% Schools with drinking water facility</strong></td>
<td>0.3551 *** (0.090)</td>
<td>0.0145 (0.106)</td>
<td>0.3290 *** (0.089)</td>
</tr>
<tr>
<td><strong>% Classrooms in good condition</strong></td>
<td>-0.0816 (0.066)</td>
<td>-0.1464 (0.105)</td>
<td>-0.0003 (0.001)</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>0.2706 ** (0.081)</td>
<td>0.4505 *** (0.130)</td>
<td>0.2805 *** (0.082)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year and state fixed effects</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adj. R-squared</td>
<td>0.287</td>
<td>0.783</td>
<td>0.217</td>
<td>0.854</td>
<td>0.386</td>
<td>0.896</td>
</tr>
<tr>
<td>No. of observations</td>
<td>119</td>
<td>119</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
</tbody>
</table>
Correlates of Reading

• Lower pupil-teacher ratio associated with higher reading attainment
• Availability of drinking water facility associated with higher reading attainment
• The above relationships hold when looking at reading attainment of boys and girls separately
• Statistical significance goes away in fixed effect regression
  – Results driven by cross-state variation rather than within-state
## Correlates of Math

### Table: Independent variables:

<table>
<thead>
<tr>
<th>Independent variables:</th>
<th>All</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupil-teacher ratio</td>
<td>-0.0018</td>
<td>0.0022</td>
<td>-0.0005</td>
</tr>
<tr>
<td>(0.001) (0.001) (0.001) (0.001) (0.001) (0.001)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student-classroom ratio</td>
<td>0.0008</td>
<td>0.0010</td>
<td>0.0003</td>
</tr>
<tr>
<td>(0.001) (0.001) (0.001) (0.001) (0.001) (0.001)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>% Schools with toilet</td>
<td>0.0472</td>
<td>0.0332</td>
<td>0.0107</td>
</tr>
<tr>
<td>(0.052) (0.047) (0.053) (0.044) (0.053) (0.044)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Schools with girls’ toilet</td>
<td>-0.0162</td>
<td>0.0625</td>
<td>-0.0237</td>
</tr>
<tr>
<td>(0.064) (0.066) (0.063) (0.067) (0.063) (0.066)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Schools with drinking water facility</td>
<td>0.3642 ***</td>
<td>-0.0923</td>
<td>0.3500 **</td>
</tr>
<tr>
<td>(0.100) (0.108) (0.103) (0.118) (0.104) (0.116)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Classrooms in good condition</td>
<td>-0.0932</td>
<td>-0.0743</td>
<td>-0.0007</td>
</tr>
<tr>
<td>(0.073) (0.106) (0.001) (0.001) (0.001) (0.001)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Constant</td>
<td>0.1041</td>
<td>0.2760 *</td>
<td>0.1441</td>
</tr>
<tr>
<td>(0.090) (0.132) (0.096) (0.147) (0.096) (0.144)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year and state fixed effects</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adj. R-squared</td>
<td>0.126</td>
<td>0.777</td>
<td>0.091</td>
<td>0.807</td>
<td>0.190</td>
<td>0.835</td>
</tr>
<tr>
<td>No. of observations</td>
<td>119</td>
<td>119</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
</tbody>
</table>
Correlates of Math

• Availability of drinking water facility positively associated with math attainment
• Again, the relationship holds separately for both boys and girls
• Relationship driven by cross-state variation rather than within state variation
### Correlates of out of school rate

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent variables:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pupil-teacher ratio</td>
<td>0.0016 ***</td>
<td>0.0001</td>
<td>0.0015 ***</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Student-classroom ratio</td>
<td>-0.0004</td>
<td>-0.0004</td>
<td>-0.0005 *</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>% Schools with toilet</td>
<td>0.0343 **</td>
<td>-0.0127</td>
<td>-0.0183</td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.014)</td>
<td>(0.013)</td>
</tr>
<tr>
<td>% Schools with girls’ toilet</td>
<td>0.0219</td>
<td>-0.0288</td>
<td>0.0046</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td>(0.020)</td>
<td>(0.016)</td>
</tr>
<tr>
<td>% Schools with drinking water facility</td>
<td>-0.0955 ***</td>
<td>0.0387</td>
<td>-0.1013 ***</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.032)</td>
<td>(0.026)</td>
</tr>
<tr>
<td>% Classrooms in good condition</td>
<td>-0.0408 *</td>
<td>-0.0458</td>
<td>-0.0007 ***</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.032)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.1186 ***</td>
<td>0.0854 *</td>
<td>0.1582 ***</td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td>(0.039)</td>
<td>(0.024)</td>
</tr>
<tr>
<td><strong>Year and state fixed effects</strong></td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Adj. R-squared</strong></td>
<td>0.520</td>
<td>0.763</td>
<td>0.457</td>
</tr>
<tr>
<td><strong>No. of observations</strong></td>
<td>119</td>
<td>119</td>
<td>99</td>
</tr>
</tbody>
</table>
Correlates of out of school rate

• Availability of (common) toilet, drinking water facility and well-maintained classrooms are associated with lower out of school rate (higher school attendance).
• The cross-sectional relationships hold for both boys and girls separately
• Regressions with state fixed effects show that
  – States which have improved classrooms have lowered out of school rates
  – States which have increased the % of schools with separate girls’ toilet have improved girls’ enrolment
Correlates of out of school rate

• Pupil-teacher ratio
  – Cross-sectional relationship shows that States with lower pupil-teacher ratio also have lower out of school rate (higher school enrolment)
  – Fixed effect estimate shows that States where pupil-teacher ratio has increased, out of school rate has decreased (enrolment has increased)

• Reverse causality: states with greater enrolment drive haven’t had a commensurate increase in the hiring of teachers
Overall summary

- Bihar has made substantial progress on the “quantity” front at primary level
- Enrolment at upper primary level still very low
- In reading and math, Bihar’s performance satisfactory in relative terms, but weak in absolute terms
  - For example, 30% of students in class VI could not read a paragraph taken from a class II textbook
  - 50% of class V students cannot solve a simple division problem
- Record on the schooling input front weak in both relative and absolute terms
  - Schooling input provision hasn’t kept pace with enrolment
  - Policy should focus on improving schooling input
Work in progress: survey part

I. Increase enrollment in schools
   • Supply-side interventions
     – Classroom availability and accessibility
     – Complementary facilities
     – Primary and secondary facilities balance
   • Demand-side interventions
     – Reduce cost §
       • Subsidized or free uniforms, bicycles (augment supply-side), school supplies § Scholarships § Vouchers for private schools, especially if public schools can't accommodate all eligible students
     – Increase perceived benefit §
       • Information provision on returns to schooling and job opportunities
Work in progress: survey part

II. Sustain enrollment and grade progression

• Health-related interventions
  – Immunization
  – Deworming
  – School lunch or breakfast (with fortified food)

• Conditional cash transfers

• Compulsory schooling (also addresses parents' preferential treatment on certain children)
Work in progress: survey part

III. Improve schooling quality and learning outcomes

• Teacher inputs
  – Recruitment and promotion
  – Addressing absenteeism
  – Hiring contract teachers
Work in progress: survey part

III. Improve schooling quality and learning outcomes

• Other inputs and pedagogical changes
  – Changes in curriculum § Concentrate on basic skills and core competencies § Design of textbooks and other materials
  – Using information technology for instruction
  – Classroom tracking (to address variable teacher effort and to allow less prepared students to catch up)
  – Remedial education § summer camps, community volunteers, college students
Work in progress: survey part

III. Improve schooling quality and learning outcomes

• Incentive structure
  – Incentive pay for teachers § Implementation architecture § Standardized tests
  – Merit scholarships and other rewards for students
  – Community participatory programs for parents
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