5 *Girls in India: Poverty, location, and social disparities*

Kin Bing Wu, Pete Goldschmidt, Christy Kim Boscardin, and Mehtabul Azam

Impressive gains have been made in bridging gender and social gaps in primary education in India, with an estimated 94 percent of all 6- to 13-year-olds now in school. But secondary enrollment remains under 40 percent. Enrollment—and outcomes—are particularly weak among scheduled tribes, which make up 8.2 percent of the population, and scheduled castes, which make up 16.2 percent (Census of India 2001).[1]

On the margins of society, these groups have limited access to everything—social services, credit, land, and other assets. Membership in these groups is highly correlated with poverty and rural location (more than 70 percent live in rural areas). The depth of social exclusion creates a huge challenge for India.

A patriarchal social structure with a strong male preference predominates in many communities, resulting in gender disparities in all human development indicators (Filmer, King, and Prichett 1998; Siddhanta and Nandy 2003). Discrimination

The authors are grateful to Deepa Sankar for her contributions to the literature review and data analysis and to Venita Kaul for constructive comments.

1 Scheduled tribes settled in the subcontinent in prehistoric times and were pushed back to remote areas by successive waves of invasion and settlement. Scheduled castes are those once known as "untouchables" (*Dalits* in Hindi). At independence, Dalits and members of indigenous tribes were so oppressed that India's constitution put them on schedules for affirmative action. Quotas are set aside for employing members of scheduled castes and scheduled tribes in the public sector and for admitting them to universities in proportion to their shares in the population. Some states, such as Tamil Nadu, have employment and admission quotas for members of other backward castes.

against girls begins before birth—abortion, infanticide, and neglect contribute to a skewed gender balance, with only 933 females for every 1,000 males (Census of India 2001). This adds up to 20 million missing females. In recent years the gender balance has become even more skewed in the economically advanced states and Union Territories, such as Punjab and New Delhi, where readily available ultrasound technology can identify the gender of the fetus (Census of India 2001). The balance is also more skewed among children in the highest-spending households (measured by monthly per capita expenditure). The top 5 percent of rural households have 804 female children for every 1,000 male children (891 in urban households), compared with 946 female children in the bottom 5 percent (903 in urban households) (Siddhanta, Nandy, and Agnihotri 2005).

In 2001 75 percent of males and just 54 percent of females were literate (Census of India 2001). Rural women are twice as likely to be illiterate. Gender bias intersects with social exclusion: reaching girls from scheduled castes and tribes is particularly challenging.

This chapter reviews girls' enrollment and achievement, as well as the key factors contributing to gender and social gaps in India. It asks several questions:

- What are the barriers to girls' education? What accounts for the progress in narrowing gender and social gaps in enrollment and achievement in primary education (grades 1–8)?
- How large are the gender and social disparities in access to secondary education (grades 9–10)? Are some girls more vulnerable than others during the transition to secondary education?
- What determines achievement in secondary education?

The chapter draws on four datasets: the government's National Sample Surveys, the National Health and Family Surveys, the Sixth and Seventh All India Education Surveys, and two surveys of government and private secondary schools in Rajasthan and Orissa conducted by the authors in 2005. It also draws on the literature on Indian education and the Ministry of Human Resource Development's *Selected Education Statistics* and *Analysis of Budgeted Expenditure on Education*.

The chapter begins by reviewing girls' enrollment and achievement in primary school. It then describes gender and social gaps in access to secondary education and explores the reasons for the disparities. Next, it examines gender and social gaps in secondary certificate examination pass rates across states. It assesses the determinants of achievement in Rajasthan and Orissa and their policy implications. The last section suggests broader conclusions and policy implications.

Enrollment and achievement in primary school

India has made extraordinary progress in enrollment. In 2002 an estimated 25 million children (13 percent of the age cohort) were out of school (World Bank 2004). By

Table 5.1. Percentage of out-of-school children in India, by age group, 2005

	Age group		
Group	**6–10**	**11–13**	**6–13**
Males	5.5	7.5	6.2
Females	6.9	10.0	7.9
Rural	6.1	9.6	7.8
Urban	3.5	5.8	4.3
All	6.1	8.6	6.9

Source: Social and Rural Research Institute (2005).

2005 this number had been roughly halved, with only about 13.5 million children aged 6–13 (less than 7 percent of the cohort) out of school (Social and Rural Research Institute 2005).[2] The age-specific enrollment in primary education is nearly 94 percent. Another household study conducted by civic action groups finds similar enrollment rates (Annual Status of Education Report 2006).

About 8 percent of girls and rural children are not enrolled in school (table 5.1). These figures are higher than those for boys (6 percent) and for children from urban areas (4 percent). About two-thirds of these children have never attended school and a third of them have dropped out.

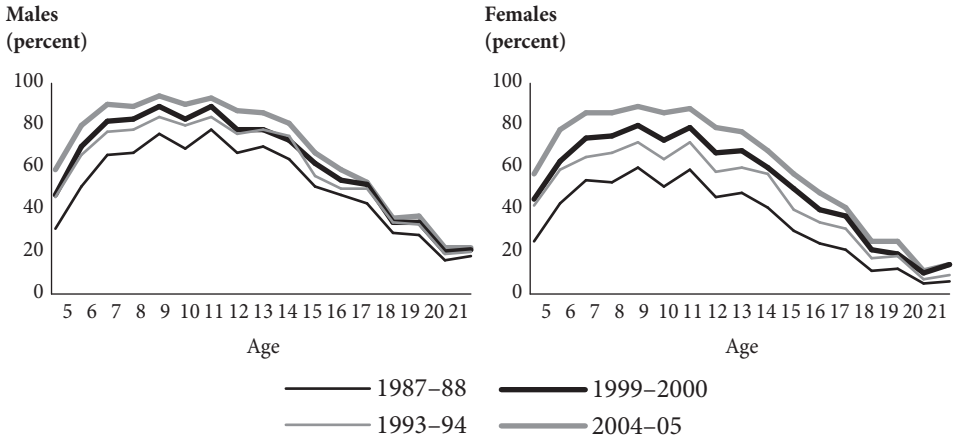
About half of all out-of-school children are physically or mentally challenged. Those out of school include 38 percent of children with disabilities, 10 percent of Muslim children, 10 percent of children from scheduled tribes, and 8 percent of children from scheduled castes.

Much progress has been made in extending access to primary school to girls, children from scheduled castes and tribes, and poor and rural children. Between 1987 and 2005, more children from all social groups entered the system earlier and stayed longer, and the increase in the enrollment of girls and previously excluded groups was higher than that of boys (figures 5.1 and 5.2). Children from the poorest quintile narrowed the gap with those from the top (figure 5.3), and rural children narrowed the gap with those from cities (figure 5.4).

But significant gaps still separate the general Hindu population from scheduled castes and tribes, other backward castes, and Muslims. These gaps are far greater among girls, with girls from scheduled tribes the worst off (figure 5. 5).

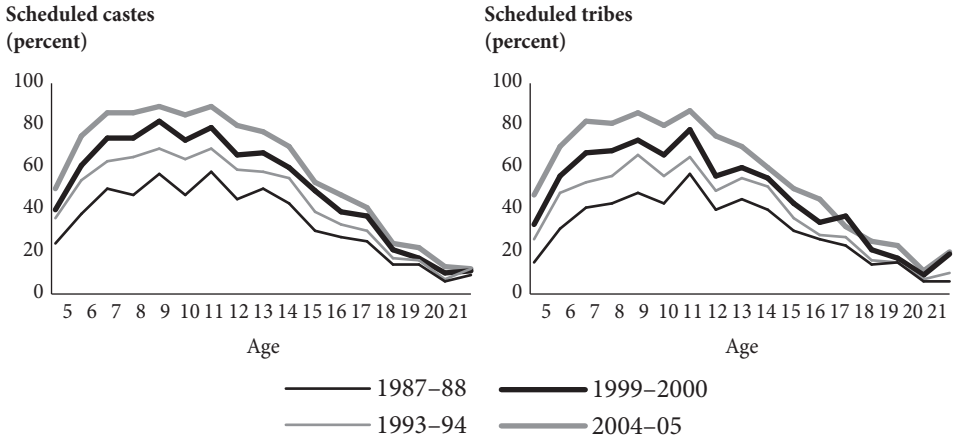
2 This sample-based household study was commissioned by the Ministry of Human Resource Development to validate the education status of school-age children. The survey was based on the sampling frame of National Sample Survey and so is nationally representative. Its findings are consistent with the state household surveys and with those of the Annual Status of Education Report 2006.

Figure 5.1. Age-specific enrollment rates by gender, 1987–2005



Source: India National Sample Surveys, 43rd , 50th, 55th and 61st rounds.

Figure 5.2. Age-specific enrollment rates of scheduled castes and tribes, 1987–2005



Source: India National Sample Surveys, 43rd, 50th, 55th, and 61st rounds.

What keeps girls out of primary school?

Both demand and supply factors affect access to school, particularly for girls and disadvantaged groups (King and Hill 1993; Lavy 1996; Alderman and Gertler 1997; Ravallion and Wodon 1999; Gertler and Glewwe 1992; Lloyd 2005). Students' academic performance and school retention and completion rates are affected by parental

Figure 5.3. Age-specific enrollment rates of richest and poorest expenditure quintiles, 1987–2005

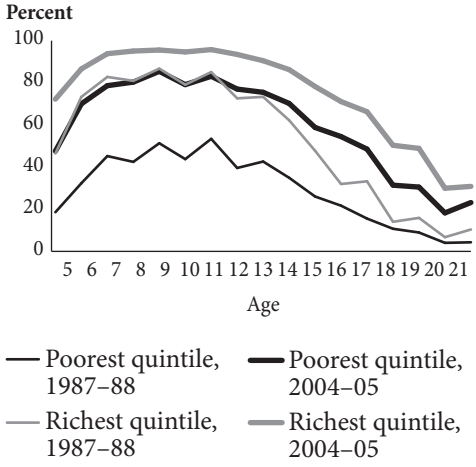
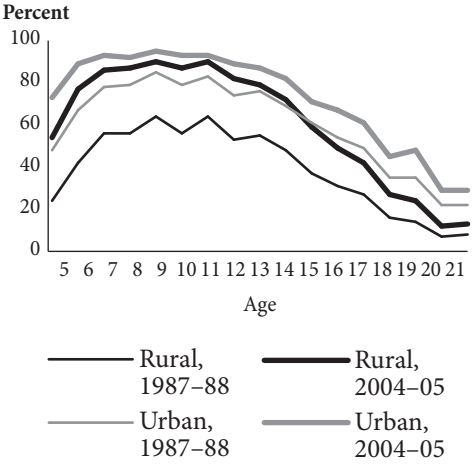
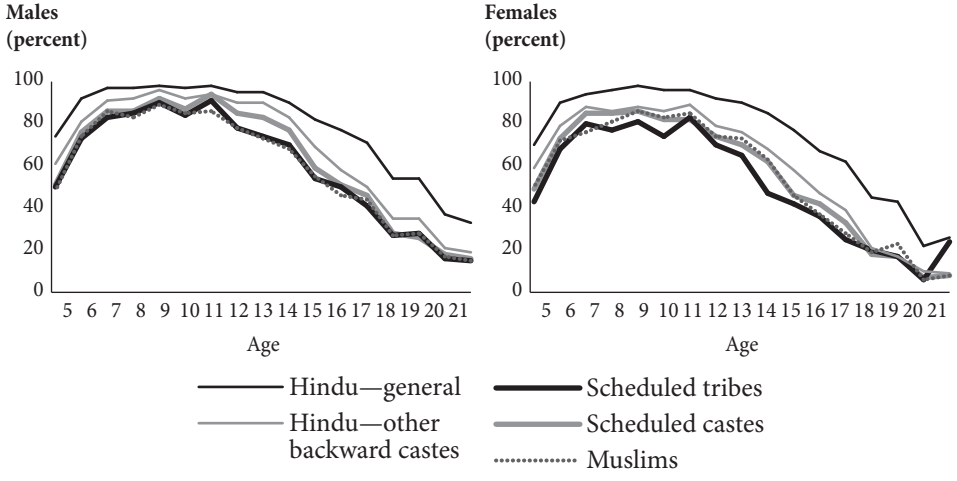


Figure 5.4. Age-specific enrollment rates in rural and urban areas, 1987–2005



Source: India National Sample Surveys, 43rd, 50th, 55th, and 61st rounds.

Figure 5.5. Age-specific enrollment rates of excluded groups, 2005



Source: India National Sample Survey, 61st round.

traits (educational attainment, involvement, and expectations), school traits (socio-economic, gender, and ethnic composition, the availability of teaching and learning materials, and teachers' content knowledge and pedagogical practices), and students'

schooling experience and prior learning (Lockheed and Verspoor 1991; Rumberger 1995; Jimerson 1999; Lloyd 2005).

Parental and social attitudes are major demand-side sources of gender inequality in India, but other factors are also important—the child's motivation, the household's ability to bear the costs of schooling, and the demand for the child's labor raising the opportunity cost (Sen 1992; Drèze and Sen 1995; Probe 1999; Kingdon 2002). Although government primary schools do not charge tuition, parents must pay for school uniforms, books, and transportation. The cost of these items can be prohibitive in poor households with many children.

Household chores, particularly sibling care in poor families, are a significant factor in girls' nonenrollment, frequent absence, and dropout. In the mid-1990s about 54 percent of girls (and 8 percent of boys) could not attend school because of sibling care (Probe 1999). That the proportion of out-of-school children is higher in the 11–13 age group than in the 6–10 age group suggests that the opportunity cost of schooling rises with age, as adolescents are more able to share the household burden or generate income. Culture can also play a role—as girls reach puberty, they may be kept out of school to seclude them.

In better-off states and cities where private schools thrive, a different type of inequality surfaces as education becomes more inclusive. Parents who do not want their children to learn in overcrowded classrooms or mix with children from low socioeconomic backgrounds send them to fee-charging private schools. Parents' aspirations for boys and girls differ, so more boys attend private schools, which are perceived to be better and often teach in English. Girls attend government schools, which charge no fees and teach in the regional language. The different treatment of girls in the intrahousehold allocation of resources worsens the gender gap, girls' achievement, and future job prospects (Kingdon 2002).

Both overt and subtle discrimination have contributed to the nonenrollment and dropout of children from scheduled castes (World Bank 1997). Teachers from higher castes tend to have low expectations for these children, and other students may also look down on them (Probe 1999; World Bank 1997). These expectations affect students' performance and motivation to remain in school. Hoff and Pandey (2004) asked 624 high- and low-caste students from grades 6 and 7 in Uttar Pradesh to work in groups of six to learn and perform a task (solving mazes). The castes of the students were revealed in the control group but not in the experimental group. There was no caste gap in the control groups, but the low-caste students performed worse than in the test group.

For scheduled tribes, often in dispersed groupings in remote areas, the distance to school is the key supply constraint. These areas also have difficulties recruiting teachers, and, even when teachers are posted, they face cultural barriers. Language adds to the problem, as the language of instruction is often not that spoken at home (Sujatha 2002). The lack of connection to the school contributes to absenteeism, underachievement, and dropout (World Bank 1997).

Rural children must be strong enough to walk the distance to school, leading to late enrollment, but primary school participation peaks at ages 9–10. The combination of late entry and early dropout means fewer years of education for students without a local school. For girls, particularly those at puberty, distance deters enrollment because of safety concerns.

Government action to narrow gender and social gaps in enrollment

Progressive public policy—through a partnership of national and state governments and civil society's movement for women's empowerment and inclusion—has transformed Indian education and society in the past two decades. Total public spending on education grew from less than 1 percent of GDP in 1950 to 3.8 percent in 2003, with primary education accounting for about half the total.

States bear the main responsibility for providing and financing education, but they vary considerably in their economic and social circumstances. A series of centrally sponsored initiatives have brought massive additional resources to equalize funding in primary education (Wu, Kaul, and Sankar 2005).

The most notable centrally sponsored scheme, begun in 1993, is the District Primary Education Program (DPEP), which intervened in half of India's 600 districts where female literacy was below the 1990 national average. It funds teacher training, instructional materials, and more schools and classrooms. The National Program for Universal Elementary Education of the 21st Century, which began in 2001, extends the DPEP nationwide, expanding the grades included from primary education (grades 1–5) to upper primary education (grades 6–8).

Under the National Elementary Education Program, the central government sets norms for planning and budgeting. Districts aggregate village plans and submit them to a central government board. After approval, funds are transferred for implementation by the states and districts, with community oversight. The goal of the National Elementary Education Program is to enable all children ages 6–14, including those with disabilities, to complete eight years of primary education of satisfactory quality by 2010.

The National Program for Universal Elementary Education increases funding for elementary education by about 10 percent through a cost-sharing arrangement, with 75–90 percent of funding from the central government and 10–25 percent from the states. Interventions to overcome access barriers focus on supply:

- Grants to schools for equipment, repair and maintenance, and learning and teaching materials.
- Grants to teachers for salaries, in-service training, learning resources centers, and teaching and learning materials.
- Grants for innovation.
- Grants to districts that support children with special needs.
- Grants for management, monitoring, and evaluation (Government of India 2001).

Interventions also address demand constraints for excluded groups, emphasizing public education and community oversight to change attitudes:

- Providing free textbooks to all girls and members of scheduled castes and tribes.
- Building toilets for girls.
- Hiring female teachers as role models.
- Creating residential bridge courses to help girls who have dropped out to reenter regular schools after six months.

The National Program for Education of Girls at Elementary Level (NPEGEL) supports subdistricts with female literacy below the national average, districts with at least 5 percent of the population coming from scheduled castes or tribes with female literacy below 10 percent, and districts containing selected urban slums. It mobilizes the community to target out-of-school girls, girls from marginalized social groups, and girls with low achievement. It also includes bridge courses for girls who have dropped out.

Other programs complement these initiatives. The Mid-Day Meal Scheme provides a daily hot meal to all children in government primary schools. An integrated child development service supports early childhood development. Preschools are attached to primary schools to lighten the burden of sibling care on older children and to improve school readiness.

States also supplement national interventions with their own programs. Madhya Pradesh provides free uniforms to all girls in grades 1–8, substantially raising their status. State tribal development departments fund stipends and scholarships for children from scheduled tribes, although coverage remains partial.

Student achievement in primary education

Increased access to primary education has not led to higher student achievement. An assessment of 88,000 fifth-grade students in government schools, covering 30 states and Union Territories, found that the average student responded correctly to just 45 percent of mathematics questions and 58 percent of language questions (National Council of Education Research and Training 2003). Although gender differences in average scores and standard deviations were small, there were gender variations across states, particularly in the Hindi heartland, which has stronger male preferences (table 5.2).

According to the Annual Status of Education Report 2006, many teens cannot read or solve numerical problems supposedly mastered in the early primary grades (table 5.3).[3] Students who attend private schools scored 11 percentage points higher than

3 In 2005 citizen action groups, under the leadership of Pratham (a nongovernmental organization), tested some 600,000 children in 240,000 rural households in 525 districts (of about 600) to monitor the progress of the Elementary Education Program. The first Annual Survey of Education Report documented the results.

Table 5.2. Achievement of fifth-grade students, by gender and area, 2002

		Rural		Urban		Total	
Subject	Gender	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Mathematics	Boys	46.72	21.11	47.36	21.53	46.90	21.24
	Girls	45.54	21.21	47.29	21.61	46.09	21.35
	Total	46.15	21.17	47.32	21.57	46.51	21.30
Language	Boys	57.95	18.00	61.36	18.43	58.94	18.19
	Girls	57.37	18.18	61.89	18.51	58.79	18.41
	Total	57.67	18.09	61.63	18.47	58.87	18.30

Source: National Council of Educational Research and Training (2003).

Table 5.3. Deficiencies in reading and numeracy among primary-school-age children in rural India, 2005

	Percentage of children who cannot read		Percentage of children who cannot solve numerical problems	
Age	Short paragraphs with short sentences	Story text with long sentences	Subtraction or division	Division only
7–10	48	68	54	80
11–14	17	31	24	47

Source: Annual Status of Education Report (2006).

those attending government schools. The study did not examine gender differences in test scores, and the public-private differences did not adjust for selection bias.

What factors affect student achievement in primary education? Studies found a positive correlation between student test scores and parents' education and fathers' occupation (Govinda and Varghese 1993; Saxena, Singh, and Gupta 1995). The test scores of primary school students from the highest and lowest consumption quartiles differed by a a third of a standard deviation on average—equivalent to an additional year of schooling (World Bank 1996).

Hierarchical linear modeling[4] of the DPEP's data shows that differences among schools account for 20–60 percent of math achievement variation and 14–45 percent of reading achievement variation across states. Differences in students' family backgrounds

4 Hierarchical linear models are relevant in analyzing data that present a clustered structure with unequal sampling probabilities. These data are commonly found in educational systems, where students are typically nested within classrooms and schools (Raudenbush and Bryk 2002). A multilevel analytical approach can examine whether similar students might have different learning outcomes if they attended classrooms with different characteristics.

account for the rest (World Bank 1996). The family's allocation of time at home for study, their encouragement of reading, and their support of their children's educational aspirations have positive effects on student achievement. Student outcomes are also positively correlated with school-level inputs—the existence of standards, textbooks, and teaching materials, better curricula, infrastructure, pedagogical content knowledge, teaching practices, academic climate, and more opportunities to learn, created by encouraging regular attendance, increasing time on task, and assigning homework (World Bank 1996).

Despite the huge investment, the basic requirements for learning are not present in all schools. Teacher hiring often lags behind student intake. In Bihar, the average pupil-to-teacher ratio was far above recommended guidelines (40:1) at 78:1 in 2005, with a minimum of 58:1 and a maximum of 208:1 (Ministry of Human Resource Development 2006). By comparison, in Andhra Pradesh the average was 28:1, with a minimum of 22:1 and a maximum of 34:1.

Simply adding inputs will not raise student learning if the system lacks incentives and accountability—this is the message of recent research (Hanushek 2003; Glewwe, Ilias, and Kremer 2003; Pritchett 2004; Vegas 2005). In India, the World Bank (2003) found a teacher absence rate of 25 percent—higher than in Peru (13 percent) and Zambia (17 percent) and only slightly lower than in Uganda (27 percent). Another 25 percent of teachers were engaged in non-teaching activities in school. Absence varied within India, ranging from of 15 percent in Gujarat to 39 percent in Bihar. Men and senior teachers had more absences, while schools with better infrastructure and transportation had fewer (Kremer and others 2005). Student absence was also high—61 percent in Bihar. Teachers and students in government schools had higher absence rates than those in private schools.

But service delivery can be improved, as recent randomized studies have shown (Banerjee and Duflo 2005; Duflo 2005). In rural Udaipur—with teacher absence as high as 44 percent—teachers in an experimental group were given a tamper-proof camera to photograph themselves with their students at the beginning and end of each day. They received a bonus for the number of days of proven presence with a minimum number of students. Teachers in the control group also received a bonus and were told that they could be dismissed if they were absent, but there was no proof-of-presence requirement. Unannounced visits found that teacher absence fell dramatically in the treatment group to 24 percent, compared with 43 percent in the control group. Student test scores increased by 0.17 standard deviations in the treatment group (Duflo and Hanna 2005).

In India's Andhra Pradesh, a study gave bonuses to teachers for the average improvement in student scores on independently administered tests. Students in "incentive" schools outperformed those in control schools in math tests (0.19 standard deviations) and language tests (0.12 standard deviations) (Muralidharan and Sundararaman 2006).

Similar randomized methods have shown that changing teaching methods can improve achievement. In Mumbai and Vadodara, low performing primary school

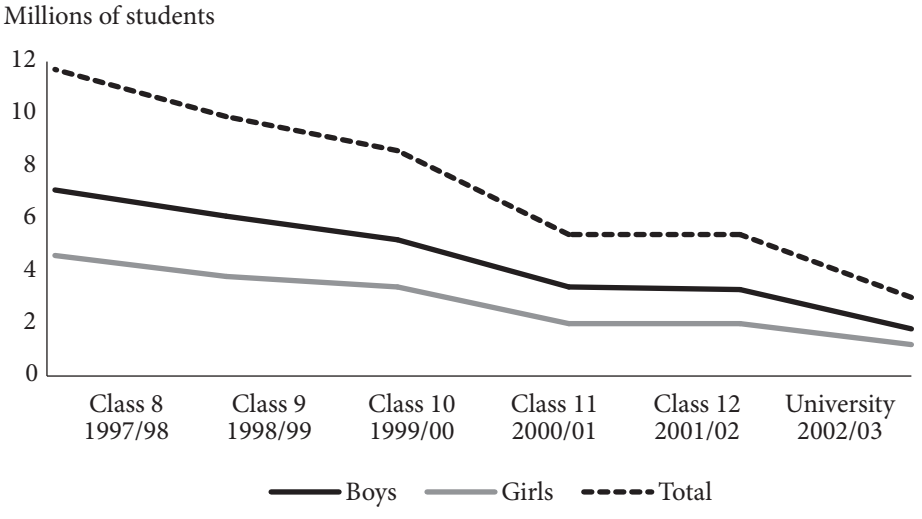
students in government schools were removed from class for half the day and given individualized, non-threatening remedial education in literacy and mathematics by community women. To reinforce their mathematics skills, they played games using a computer-assisted learning program. Literacy scores increased by 0.14 standard deviations in the first year and 0.28 in the second year. Mathematics scores increased by 0.36 standard deviations in the first year and 0.54 in the second year (Banerjee and others 2004).

These studies show that service delivery and student outcomes can be improved. Future research can explore how to improve teacher and student incentives to close the gender gap.

Gender and social disparities in access to secondary education

With elementary education approaching universal coverage, attention now focuses on the long-neglected problems of secondary education. The gross enrollment rate in secondary school (grades 9–12) is under 40 percent—and even lower for girls, Muslims, and children from scheduled castes, scheduled tribes, and other backward castes. Girls account for less than 40 percent of secondary enrollment, while middle-class, urban boys are overrepresented. About 6 percent of children from scheduled castes

Figure 5.6. Transition from primary to secondary, upper-secondary, and university for boys and girls



Source: Government of India, Selected Education Statistics, various years.

Table 5.4. Enrollment in grades 9–12, by gender and location, 1993 and 2002 (percent)

	Urban			Rural		
Year/grades	Total	Boys	Girls	Total	Boys	Girls
1993						
Grades 9–10	62	37	25	38	27	11
Grades 11–12	49	29	20	51	35	16
2002						
Grades 9–10	54	31	22	46	27	19
Grades 11–12	58	32	25	42	26	16

Source: Government of India (1993, 2002).

Table 5.5. Household expenditures on education, 1995/96 (Indian rupees)

	Expenditure quintile					School type			
	Q1 (poorest)	Q2	Q3	Q4	Q5 (richest)	Governmental and local bodies	Private aided	Private unaided	Average
Primary	200	309	425	605	1,161	269	1,186	1,431	507
Upper primary	426	586	729	907	1,554	639	1,350	2,159	921
Secondary	693	858	1,000	1,278	1,950	1,058	1,565	2,759	1,333
Senior secondary	1,133	1,372	1,462	1,853	3,067	1,831	2,553	3,698	2,257
Tertiary	1,381	1,669	1,897	2,329	4,048	2,683	3,416	5,509	3,164

Note: Data represent most recent data available.

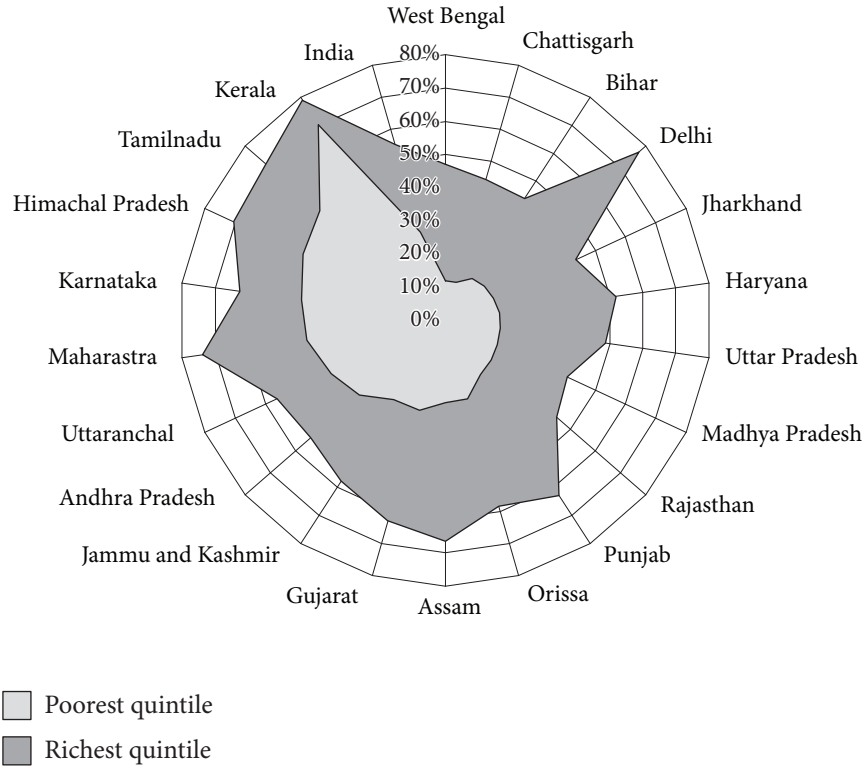
Source: India National Sample Survey, 52nd round.

and 3 percent from scheduled tribes enroll, far below their shares in the population. The gender gap is also larger than in primary schools (figure 5.6).

Safety concerns make distance an important obstacle to girls' enrollment. Only 65 percent of villages have a secondary school within the official guideline of five kilometers (Seventh All India Educational Survey 2002). Beyond five kilometers, walking to school takes more than an hour, particularly without roads, deterring enrollment or regular attendance.

Although more than 70 percent of the population lives in rural areas, rural enrollment accounts for only half of total enrollment. Girls account for a much smaller share of enrollment in rural areas than in urban areas (table 5.4).

Figure 5.7. Net secondary enrollment rates for secondary and upper secondary schools across different states, by richest and poorest quintiles, 1999/2000



Source: National Sample Survey, 55th round.

Parental and societal preferences for single-sex secondary schools create another barrier. In more traditional states, such as Rajasthan, boys and girls attend separate secondary schools. Only about 7 percent of Rajasthan's secondary schools and 15 percent of its senior-secondary schools are accessible to girls. As a result, Rajasthan boys made up 71 percent of students in secondary and senior-secondary schools in 2003/04 (Wu and Sankar 2005).

Because government funding has focused on primary education, expansion in secondary education has occurred through growth in private schools. Secondary education, unlike primary education, is not a constitutional right. So family costs for secondary schooling—for tuition, examinations, uniforms, textbooks, stationery, transportation, and private tutoring—are twice those for primary education (table 5.5). The

costs of senior-secondary education are four times as large. School fees constitute only part of the cost; examination, uniforms, transport, and private tuition account for other costs (see annex table 5A.1 for details). Private secondary schools without any government support cost three times as much as public secondary schools per student (table 5.5).

The differential access to secondary education across household expenditure quintiles is striking (figure 5.7). It suggests that households' inability to bear the cost of schooling is a major constraint on enrollment.

What determines student achievement in secondary school?

School-leaving exams test student achievement in India's secondary schools. Girls constituted only 36 percent of those who stood for the school-leaving examinations after grade 10 in 2001 (Government of India 2001, 2002). They accounted for less than a third of test-takers in Hindi-speaking states in northern and central India (Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh), Punjab, and Andhra Pradesh. The number of girls exceeded the number of boys only in Kerala and Manipur.[5]

Girls outperformed or equaled boys in pass rates in many states; they had lower pass rates in Punjab, West Bengal, Orissa, and, particularly, in Jammu and Kashmir. Selection effects may have played a role in the gender differences or lack thereof (table 5.6).

In states with low gross secondary enrollment rates (30–40 percent), usually the poorer states, students come mainly from middle-class families. In states with secondary gross enrollment rates above 50 percent, the student body is more heterogeneous, with more students from scheduled castes, scheduled tribes, and other backward castes.

Little is known about what determines secondary school achievement. A World Bank study (2002) in the southern state of Karnataka, with secondary enrollment of more than 50 percent, finds that passing the grade-10 examination is correlated with higher levels of father's and mother's education, better libraries and laboratories in school, lower pupil-teacher ratios, attending an English language primary school, and private tutoring. The failure rate was higher for students from scheduled castes whose parents had no education and did not speak English. No gender effects were evident. The determinants of passing the examination at the end of grade 12 are similar, with added positive effects for urban location and being female and negative effects for being from a scheduled caste or tribe.

5 Appearance and pass rates are not comparable across states because different states have their own board examinations, and there are also central boards for specific types of schools. There is no uniform standard applicable nationwide, nor has any test been benchmarked against any international studies to calibrate relative standards.

Table 5.6. Performance by boys and girls on secondary school-leaving certification examination, by state, 2000

	Percentage that took exam		Percentage that passed exam	
State/school system	**Girls**	**Boys**	**Girls**	**Boys**
Andhra Pradesh	35.3	64.7	49.3	44.6
Bihar	28.2	71.8	44.5	34.9
Central Board of Secondary Education, New Delhi	42.5	57.5	64.4	64.2
Council for Indian School Certificate (Central Board)	42.5	57.5	94.9	93.1
Gujarat	38.9	61.1	44.9	37.3
Haryana	36.0	64.0	55.8	50.6
Jammu and Kashmir	46.1	53.9	25.0	46.1
Karnataka	41.8	58.2	48.3	43.2
Kerala	53.2	46.8	51.9	49.7
Madhya Pradesh	28.9	71.1	42.1	32.8
Maharashtra	37.9	62.1	47.5	40.6
Orissa	39.7	60.3	52.7	53.5
Punjab	35.1	64.9	57.6	62.2
Rajasthan	25.7	74.3	50.7	45.7
Tamil Nadu	45.6	54.4	72.0	65.1
Uttar Pradesh	26.0	74.0	69.6	40.3
West Bengal	39.1	60.9	58.4	64.1
Total	35.7	64.3	52.3	43.6

Source: Board of Secondary and Higher Secondary Education in India reported in Government of India (2001, 2002).

To understand what determines achievement in states with limited opportunities for secondary education, we surveyed private and public secondary schools in Rajasthan and Orissa in 2005. Per capita income in these states is below the national average, and enrollment is less than 40 percent.[6]

6 Rajasthan is on the border of Pakistan, and about half of its land is desert. It has a population of 56 million and a per capita state gross domestic product (SGDP) of $312 in 2002. Rajasthan culture is strongly influenced by that of the warrior-ruler class, emphasizing honor and gallantry, with a strong preference for men. Orissa is on the coast of the Bay of Bengal. It has a population of 37 million and an SDP of $245. Orissa has a more equal society. Compared to India's Gross Domestic Product (GDP) of nearly $600, both states are poor. They also have large tribal populations—12.6 percent in Rajasthan and 22.1 percent in Orissa—much higher than the 8.2 percent nationally. Scheduled castes are 17.2 percent of the population in Rajasthan and 16.5 percent in Orissa, slightly above the national average of 16.2 percent.

The sample comprised 3,418 grade 9 students in 144 schools in Rajasthan and 2,856 students in 109 schools in Orissa—from government schools, privately managed schools receiving public aid, and unaided private schools.[7] Students were selected randomly, with a maximum of 30 from each school. The survey included a 90-minute math test to measure learning outcomes.[8] It administered separate questionnaires to students, math teachers, and principals. The student questionnaire collected data on student characteristics (gender and social composition, age, disability), family background (parental educational level, home resources), schooling experience (preprimary and primary school enrollment, repetition and dropout, absence, private tutoring, school resources), parental expectations, the opportunity to learn (new lessons, questions, homework, and tests),[9] and work outside school. The math teacher questionnaire asked about gender, age, professional qualifications and experience, terms and conditions of service, and perception of student performance. The principal questionnaire collected data on school characteristics, such as enrollment, repetition, and dropout rates, school resources, and management practices.

In both states average scores were low and standard deviations high. Girls performed better than boys, except those from other backward castes (table 5.7).

We used hierarchical linear models to address two questions. Does the gender gap persist after controlling for student background, teacher characteristics, school resources, and school type? Do the factors contributing to student performance vary by state, or are some factors common to both?

---

7 Sampling began by selecting three districts randomly within each of the three socio-cultural regions (SCR) in each state. The schools were distributed between rural and urban areas by their share in the total number of schools. The number of schools in the government, private aided, and private unaided sectors was selected by two criteria: the distribution of total schools by school type and the distribution of schools by secondary only (grade 9).

8 The items were selected from a sample of published items from the Third International Mathematics and Science Study (TIMSS) for grade 8. The test primarily assessed general math content knowledge of data representation and analysis, fraction and number sense, algebra, geometry, and measurement. The math test comprised 36 items. Although the original TIMSS populations were the eighth grade, in Rajasthan, grade 8 is the last year of elementary education, and grade 9 is the beginning of secondary education. Although secondary education begins in Orissa in the eighth grade, to apply the test to the same grade in both states, the TIMSS eighth grade test was applied to the ninth grade in both Rajasthan and Orissa, but with more difficult items from the TIMSS tests chosen to adjust for the grade difference. The tests were shown to teachers, students, and state-level officials to ensure that they were within the curriculum.

9 The opportunity to learn is measured by asking the following questions: how is a new chapter introduced (whether the focus of the lesson is clear, whether the class discusses a practical problem, whether the class solves related examples, and whether students look at the textbooks)? How is a lesson being taught in class (whether the teacher encourages questions, whether teaching methodology is stimulating, whether the class solves problems together, whether students copy notes from the board)? How does the teacher give and check the homework and tests in class (whether the teacher gives and checks homework, whether the teacher provides feedback on homework, whether the teacher explains examination rules)?

Table 5.7. Math performance in Rajasthan and Orissa 2005, by location, school type, and gender (percent questions correct)

	Rajasthan				Orissa			
	Urban		Rural		Urban		Rural	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Government schools								
Mean	30.2 (14.2)	31.6 (15.5)	27.6 (9.5)	28.7 (11.7)	36.8 (18.5)	39.9 (18.5)	34.8 (14.8)	32.7 (17.2)
Private aided schools								
Mean	33.4 (11.4)	37.9 (11.5)	—	—	39.7 (16.2)	30.4 (11.2)	39.3 (15.4)	36.9 (15.0)
Private unaided schools								
Mean	39.1 (14.7)	36.7 (15.5)	46.7 (19.9)	48.4 (20.8)	35.5 (16.9)	41.2 (17.7)	40.5 (19.5)	37.6 (19.3)

— indicates data not available.

Note: Mean scores are not weighted. The results cannot be generalized to the state as a whole. Standard deviations presented in parentheses. Sample size provided in table 5A.2.

Source: Authors' survey of student achievement described in text.

Separate analyses were conducted for Rajasthan and Orissa to identify the models that best explain the data and to investigate regional differences in achievement. In Rajasthan about 54 percent of the variation is attributable to differences among schools, and the rest to differences among students. In Orissa, school and student differences each contribute roughly 50 percent.

Gender, mother's education, parental expectations, and previous performance in math are significantly associated with achievement in both Rajasthan and Orissa, although the predictive power of these characteristics varies among states (tables 5.8 and 5.9).

In Rajasthan, girls scored an average of 3.7 percentage points below boys, accounting for other factors. However, the gender gap varies significantly across schools. Girls attending classes taught by female teachers scored about 1.1 points higher than their male classmates. In Orissa girls scored an average of 1.9 percentage points below boys.

In both states coming from a scheduled caste or tribe did not directly affect achievement after controlling for family background. This is likely due to selection effects—only the highest performers in those groups entered secondary school. However, parents of students from scheduled tribes were less able to provide academic support.

In Rajasthan home resources aggregated at the school level (not at the individual level) seemed to be associated with performance. Students performed worse in schools

Table 5.8. Student- and classroom-level results of the hierarchical linear model for grade 9 math performance in Rajasthan

	Coefficient	*t*-statistic	Effect size
Grand mean	33.01		
Student variables impacting student performance			
Student characteristics			
Female (vs. male students)	–3.72	–3.22**	–0.25
Between-classroom effects on the gender gap			
Basic home resources	–2.87	–2.76**	–0.35
Advanced home resources	4.49	2.82**	0.35
OTL 1: introduction to new concepts	0.90	2**	0.20
OTL 2: lessons	–0.93	–2.74**	–0.22
Teacher characteristics			
Female	4.86	2.42**	0.32
Duration of the class	0.53	2.54**	0.24
Preparation time	0.52	2.44**	0.20
Teacher perceptions: students have inadequate materials at home	–1.53	–2.91**	–0.21
School characteristics			
Private aided school (vs. public)	7.80	2.84**	0.52
Urban school (vs. rural)	–6.40	–3.72***	–0.43
General school resources	–1.31	–3.3**	–0.29
Specific school resources	2.40	2.38**	0.27
Scheduled tribe effect	–0.86	–1.55	
Between-classroom effects on achievement gap between scheduled tribes and other students			
School size (proxy = number of secondary teachers)	–0.36	–2.48**	–0.18
Family background			
Basic home resources	1.36	1.16	
Additional impact of OTL 3 (homework and exams) on basic home resources	–0.14	–2.51**	–0.49
Advanced home resources	–0.59	–0.27	
Additional impact of OTL 1 (new topics) on advanced home resources	–0.26	–2.53**	–0.63
Additional impact of OTL 2 (lessons) on advanced home resources	0.21	2.33**	0.51
Number of siblings	–0.28	–2.5**	–0.06

	Coefficient	*t*-statistic	Effect size
School experience			
Time to school (minutes)	–0.03	–2.43**	–0.06
Commute to school via school bus	–3.20	–3.02**	–0.21
Receive mathematics tutoring	–1.79	–2.4**	–0.12
Language grades	0.07	3.22**	0.10
Mathematics grades	0.12	5.68***	0.19
Parent involvement			
Parent expectations (compared with senior secondary or less)			
Certificates	1.70	2.83**	0.11
BA or professional degree	1.92	3.44**	0.13
Postgraduate degree	1.27	2.03**	0.08
Opportunity to learn			
OTL 3 (homework and exams)	0.41	2.19**	0.13
Work experience			
Household chores	0.07	2.54**	0.07
Classroom aggregate student variables impacting classroom performance			
Basic home resources	5.62	2.89**	0.68
Language grades	–0.40	–3.29**	–0.32
Teacher variables impacting classroom performance			
Teacher perceptions: students lack family support	–1.97	–2.33**	–0.23
Teacher perceptions: students' school supplies	1.26	2.06**	0.18
Teacher perceptions: need training—subject matter	2.39	1.94*	0.17
Teacher perceptions: need training—teaching skills	2.57	2.28**	0.19
School variables impacting classroom performance			
Percent completing 9th grade	0.14	2.71**	0.30
Private aided school	6.18	2.23**	0.41
Private unaided school	10.62	3.14**	0.71
Urban school	–4.83	–2.19**	–0.32
School resources	–2.07	–2.16**	–0.23

* Significant at the 10 percent level.
** Significant at the 5 percent level.
*** Significant at the 1 percent level.

Source: Authors' survey of student achievement described in text.

Table 5.9. Student- and classroom-level results of the hierarchical linear model for grade 9 math performance in Orissa

	Coefficient	*t*-statistic	Effect size
Grand mean	36.57		
Student variables impacting student performance			
Student characteristics			
Female (vs. male students)	–1.9	–2.18*	–0.11
Family background			
Mother education level—graduation degree	3.89	1.92*	0.22
Basic home resources	0.21	0.92	
School experience			
Attended preprimary school	1.60	1.93*	0.09
Hours of private tutoring	0.11	3.46**	0.12
Language marks	0.10	3.86**	0.20
Mathematics marks	0.17	7.69**	0.34
Parent expectations and involvement			
Diploma	2.93	2.86**	0.17
BA	2.01	2.08*	0.11
Postgraduate degree	2.07	1.89*	0.12
Parent check homework	–0.08	–0.77	
Teacher variables impacting classroom performance			
Highest level of teaching training: B.Ed.	5.62	1.86	0.32
Classroom aggregates of student variables			
Average class marks on mathematics	0.34	2.71**	0.37
School variables impacting classroom performance: not applicable			

* Significant at the 10 percent level.
** Significant at the 5 percent level.
*** Significant at the 1 percent level.

Note: For continuous variables the effect sizes are calculated as the effect of a characteristic for a student who is one standard deviation above average on that characteristic, compared with a student who is one standard deviation below average on that characteristic, divided by the standard deviation of the outcome. For dichotomous variables, the effect size equals the differences between a student who has that characteristic and one who does not—that is, the coefficient estimate divided by the standard deviation of the outcome. Effect sizes are considered small when less than 0.2, and moderate to about 0.4, and large above 0.6.

Source: Authors' survey of student achievement described in text.

where students lack home resources. A positive association between individual home resources and student performance was found in Orissa.

Did school type matter? It did in Rajasthan, but not in Orissa. Rajasthan students from private unaided schools outperformed those from other school types. Students from government schools performed worst, accounting for student and teacher characteristics (table 5.9). Urban schools performed significantly worse than rural schools, holding everything else constant. So parent decisions to send boys to private schools and girls to government schools affect achievement.

Although the gender gap remained in both states—boys outperformed girls—increases in opportunity to learn seemed to help. A good introduction to new concepts by teachers narrowed the gap, suggesting an important new strategy. But the teaching has to fit girls' learning style, or it could further exacerbate gender inequalities. The gender of the teacher also had a strong effect on girls' mathematics performance.

Conclusions and policy implications

India has made impressive progress in narrowing gender and social gaps in primary education. Progressive policy, sustained public financing, and civil society's determination have contributed to the improvement. But the persistent achievement gaps in secondary education—between boys and girls and across subgroups—underscore the need to reassess educational policies affecting underrepresented groups.

The implications for policy are clear. First, India must complete the task of bringing primary education to all. With only 7 percent of children now out of school, the government must deal with the most marginalized and hard to reach. Targeted demand-side interventions addressing the needs of each subgroup are needed to bring all children into the school system—and keep them there.

Second, India must raise student achievement in primary schools. Without a solid foundation, girls and other marginalized groups cannot compete at the next level, and they lose out in the labor market. Early childhood interventions can improve school readiness, compensatory education, and language instruction for students whose first language is not that used in school. More and better teacher education and in-service training are essential to address girls' learning needs.

Third, to achieve gender and social parity in secondary education, India must improve its public schools. Because parents are reluctant to pay to send their daughters to private schools, improving government schools will give girls from poor or disadvantaged backgrounds a better chance to succeed. Although using vouchers and stipends is an option where the supply of private schools is sufficient, this alternative is unrealistic in remote, rural areas. Government schools remain the provider of last resort for marginalized groups.

Annex to Chapter 5

Table 5A.1. Household expenditures on secondary education by category of spending, 1995/96 (Indian rupees)

	Expenditure quintile					School type			
	Q1 (poorest)	Q2	Q3	Q4	Q5 (richest)	Governmental and local bodies	Private aided	Private unaided	Average
Secondary									
Tuition fee	193	278	309	423	807	197	553	1,138	549
Examination	67	58	58	67	85	64	71	113	70
Other fees	76	79	96	115	165	89	148	299	121
Books	198	214	223	231	296	236	251	315	246
Stationery	118	141	152	175	219	163	187	227	175
Uniforms	270	294	318	358	437	350	371	458	366
Transportation	190	197	302	338	476	333	378	560	379
Private tuition	520	559	628	832	1103	734	992	1195	865
Other expenses	67	87	93	117	156	107	129	177	118
Total expenditure	693	858	1,000	1,278	1,950	1,058	1,565	2,759	1,333
Senior secondary									
Tuition fee	264	321	343	437	1030	335	833	1592	701
Examination	94	99	108	121	132	118	111	174	120
Other fees	176	145	188	212	307	186	282	480	242
Books	286	335	334	381	463	389	408	460	402
Stationery	173	194	195	218	285	227	248	287	240
Uniforms	438	343	393	445	554	462	491	592	480
Transportation	309	369	341	412	598	437	569	532	501
Private tuition	733	950	1,021	1,178	1,956	1,356	1,793	1,674	1,571
Other expenses	101	136	150	166	231	171	188	322	188
Total expenditure	1,133	1,372	1,462	1,853	3,067	1,831	2,553	3,698	2,257

Source: India National Sample Survey, 52nd round.

Table 5A.2. Number of observations associated with means in table 5.7

	Rajasthan				Orissa			
	Urban		Rural		Urban		Rural	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Government schools	339	149	976	432	152	117	573	488
Private aided schools	119	66	—	—	86	65	144	101
Private unaided schools	582	391	282	82	110	44	475	501

— indicates data not available.

Source: Authors' survey of student achievement described in text.

References

Alderman, H., and P. Gertler. 1997. "Family Resources and Gender Differences in Human Capital Investments: The Demand for Children's Medical Care in Pakistan." In L. Haddad, J. Hoddinott, and H. Alderman, eds., *Intrahousehold Resource Allocation in Developing Countries: Models, Methods, and Policy*. Baltimore, Md.: Johns Hopkins University Press.

Annual Status of Education Report. 2006. New Delhi. www.Indiatogether.org.

Banerjee, A., S. Cole, E. Duflo, and L. Linden. 2004. "Remedying Education: Evidence from Two Randomized Experiments in India." Poverty Action Lab Paper 5, MIT, Cambridge, Massachusetts.

Banerjee, A., and E. Duflo. 2005. "Addressing Absence." Policy Paper No. 9, Bureau for Researching Economic Analysis for Development.

Census of India. 2001. www.censusindia.net.

Drèze, J., and A. Sen. 1995. *India: Economic Development and Social Opportunity*. New York and London: Oxford University Press.

Duflo, E. 2005. "Field Experiments in Development Economics." Paper prepared for the World Congress of the Econometric Society.

Duflo, E., and R. Hanna. 2005. "Monitoring Works: Getting Teachers to Come to School." National Bureau of Economic Research Working Paper 11880.

Filmer, D., E.M. King, and L. Pritchett. 1998. "Gender Disparities in South Asia: Comparisons between and within Countries." Working Paper Series 1867, World Bank, Washington, D.C.

Gertler, P., and P. Glewwe. 1992. "The Willingness to Pay for Education for Daughters in Contrast to Sons: Evidence from Rural Peru." *World Bank Economic Review* 6 (1): 171–88.

Glewwe, P., N. Ilias, and M. Kremer. 2003. "Teacher Incentives." National Bureau of Economic Research Working Paper 9671, Cambridge, Massachusetts.

Government of India. 1993. *Sixth All Indian Education Survey*. New Delhi.

———. 2001. *Sarva Shiksha Abhiyan Framework of Implementation*. Ministry of Human Resource Development, New Delhi.

———. 2002. *Seventh All Indian Education Survey*. New Delhi.

Govinda, R., and N.V. Varghese. 1993. *Quality of Primary Schooling in India: A Case Study of Madhya Pradesh*. Paris and New Delhi: International Institute for Educational Planning and National Institute of Education Planning and Management.

Hoff, K., and P. Pandey. 2004. "Belief Systems and Durable Inequalities: An Experimental Investigation of Indian Caste." Policy Research Working Paper 3351, World Bank, Washington, D.C.

Hanushek, E. A. 2003. "The Failure of Input-Based Schooling Policies." *Economic Journal* 113, F64–98.

Jimerson, S. R. 1999. "On the Failure of Failure: Examining the Association between Early Grade Retention and Education and Employment Outcomes During Late Adolescence." *Journal of School Psychology* 37 (3): 243–72.

King, E.M., and M.A. Hill, eds. 1993. *Women's Education in Developing Countries*. Baltimore, Md.: Johns Hopkins University Press.

———. 2002. "The Gender Gap in Educational Attainment in India: How Much Can Be Explained?" *Journal of Development Studies* 39 (2): 25–53.

Kremer, M., N. Chaudhury, F. H. Rogers, K. Mauralidharan, and J. Hammer. 2005. "Teacher Absence in India: A Snapshot." *Journal of European Economic Association* 3: 658–67.

Lavy, V. 1996. "School Supply Constraints and Children's Educational Outcomes in Rural Ghana." *Journal of Development Economics* 51: 291–314.

Lloyd, C.B., ed. 2005. *Growing Up Global: The Changing Transitions to Adulthood in Developing Countries*. Washington, D.C.: National Academies Press.

Lockheed, M., and A. Verspoor. 1991. *Improving Primary Education in Developing Countries*. New York: Oxford University Press.

Ministry of Human Resource Development. 2006. Database. Unpublished.

Muralidharan, K., and V. Sundararaman. 2006. "Teacher Incentives in Developing Countries: Experimental Evidence from India." Draft.

National Council of Educational Research and Training. 2003. "Learning Achievement of Students at the End of Class V." New Delhi.

Pritchett, L. 2004. "Towards a New Consensus of Addressing the Global Challenge of the Lack of Education." A Copenhagen Consensus Challenge Paper. Available from www.copenhagenconsensus.com.

Probe Team. 1999. *PROBE: The Public Report on Basic Education in India*. New Delhi: Oxford University Press.

Ravallion, M., and Q. Wodon. 1999. "Does Child Labor Displace Schooling? Evidence on Behavioral Responses to an Enrollment Subsidy." Working Paper 2116, World Bank, Washington, D.C.

Rumberger, R. 1995. "Dropping Out of Middle School: A Multilevel Analysis of Students and Schools." *American Educational Research Journal* 32(3): 583–625.

Saxena, R.R., S. Singh, and J.K. Gupta, eds. 1995. "School Effectiveness and Learner's Achievement: A DPEP Baseline Study." Department of Measurement, Evaluation, Survey and Data Processing, National Council of Educational Research and Training, New Delhi.

Sen, A. 1992. *Inequality Reexamined*. New York: Oxford University Press.

Siddhanta, S., and D. Nandy. 2003. "Gender Gap in Education: A Fresh Exploration." Conference Paper.

Siddhanta, S., D. Nandy, and S. Agnihotri. n.d. "Sex Ratios in India and the 'Prosperity Effects'." Mimeo. New Delhi.

Social and Rural Research Institution of IMRB International. 2005. "A Report on Out-of-School Children." Report commissioned by the Ministry of Human Resource Development of India, New Delhi.

Sujatha, K. 2002. "Education among Scheduled Tribes." In R. Govinda, ed., *India Education Report*. New Delhi: Oxford University Press.

Velkoff, V.A. 1998. "Women's Education in India." Bureau of the Census, Economics and Statistics Administration, U.S. Department of Commerce, Washington, D.C.

World Bank. 1996. "India Primary Education Achievement and Challenges." South Asia Country Department II Report 15756-IN, World Bank, Washington, D.C.

———. 1997. *Primary Education in India*. Washington, D.C.: World Bank.

———. 2002. *India. Karnataka: Secondary Education and the New Agenda for Economic Growth*. South Asia Human Development Sector Report 24208-IN, World Bank, Washington, D.C.

———. 2003. *World Development Report 2004: Making Services Work for Poor People*. Washington, D.C.: World Bank.

———. 2004. "Project Appraisal Document: Elementary Education Project." Report 27703-IN. The World Bank, Washington, D.C.

Wu, K.B., V. Kaul, and D. Sanker. 2005. "The Quiet Revolution." *Finance and Development* 42 (2): 29–31.

Wu, K.B., and D. Sanker. 2005. "Report on Education in Rajasthan." Unpublished paper for the World Bank, New Delhi.

Vegas, E. 2005. *Incentives to Improve Teaching: Lessons from Latin America*. Washington, DC.: World Bank.