School characteristics, socio-economic status and culture as determinants of primary school enrolment in India

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Abstract

We test hypotheses on the role of socio-economic and cultural factors and of characteristics of the educational infrastructure on primary school enrolment using data for 70,000 children living in 439 districts of 26 states of India. Most of the variation in educational enrolment (around 70%) is explained by factors at the household level, of which socio-economic factors are most important. In urban areas, none of the characteristics of educational facilities studied is significantly related to participation, thus indicating that in the cities schooling decisions are hardly influenced by supply-side factors. In rural areas, however, these factors do play an important role. If there are fewer schools or teachers, or if the local culture is more patriarchal, rural children – in particular girls – participate substantially less. Interaction analyses show that effects of factors at the household level depend on characteristics of the context in which the household lives. A major finding in this respect is that in rural areas inequalities between socio-economic status groups are lower if more schools and teachers are available.

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Introduction

In the last decade India has made remarkable progress in getting children into school. While Asia dominated the worldwide reduction in out-of-school children after 2000, most of the decline took place in India. In the two years after the start of the Sarva Shiksha Abhiyan (universal primary education) programme in 2001, there was a drop of almost 15 million in the number of Indian out-of-school children (UNESCO, 2010: 56). However, in spite of this great achievement, in 2007 still over 7 million primary school-age children were not in school. While the majority of these 7 million were drop-outs who did go to school in the past, a substantial part (13.2%) of India's children aged 7–16 has never been to school (UNESCO, 2010).

This is an unfavourable situation. Education is a major development-enhancing tool and is seen as essential to people's chances in life (Self and Grabowski, 2004; Mankiw, Romer and Weil, 1992). Those who have gone to school are healthier and less likely to live in poverty (UNESCO, 2008; World Bank, 2006; Hannum and Buchmann, 2005). Education empowers people and improves their ability to communicate, argue, and choose in informed ways (Sen, 1999). While India in the 1990s emerged as a global player in skill-based service industries – especially information technology – and is now positioning itself to become one of the world's leading economies, it still needs to make a considerable effort to assure basic education for all its children. In this context, it is essential to gain a better understanding of the factors that influence educational participation in this country. This paper sets out to contribute to this understanding by analysing the effect on primary school participation in India of three major determinants of educational enrolment: socio-economic status, educational infrastructure, and culture.

The importance of each of these three (groups of) factors, is widely recognized. Socio-economic status characteristics of households, in particular parental income, wealth, education and occupation, have long been known to be major determinants of educational enrolment and achievement in both developing and developed countries (Evangelista de Carvalho Filho, 2008; Mingat, 2007; Shavit and Blossfeld, 1993; Jencks, 1972; Coleman et al., 1966). The same is true for characteristics of the local educational facilities: if there are good quality schools at a reasonable distance from the home, the chances that children are in school increase substantially (Huisman and Smits, 2009; Buchmann and Hannum, 2001; Vasconcellos, 1997). Cultural factors may play an intermediate role. They influence the choices made by individuals, through their own attitudes, and those of the people in their close environment. With respect to culture, India is part of what Caldwell (1982) has called the belt of classical patriarchy that stretches from North Africa to China and includes both Muslim, Hindu and Confucian cultures. In these countries, especially in the more conservative parts, the social position of women is weak, as reflected in low enrolment rates for girls. Besides patriarchy, also caste is an important cultural factor that still, to a substantial extent, determines outcomes in life in many parts of India, even though the 1950 Constitution banned "untouchability" (UNESCO, 2010: 171). In states where caste still plays a dominant role (like Rajasthan and Bihar), educational participation of children from the backward castes is low.

To find out to what extent educational participation in India is determined by these three groups of factors, we have brought them together into an encompassing theoretical framework and derived hypotheses on the expected direction of their effects. To test these hypotheses, we have constructed a large multilevel database with data at the household level for over 70,000 primary school-age children, supplemented with information on the available educational facilities, culture and policies at the level of 439 districts and 26 states. Because of the large differences between urban and rural areas in India, a global analysis of the country as a whole is supplemented with more detailed analyses of these areas separately. To gain insight into gender inequality in India, we study for all relevant factors also whether and to what extent their effects differ between boys and girls.

To address, within the framework of large-scale quantitative research, the fact that each situation is unique and the effects of the various factors may differ depending on the circumstances, besides the direct effects of the – three groups of – explanatory variables, the interactions between them in their effects on educational participation were also studied. The information thus obtained may be helpful in developing tailor-made policy interventions aimed at improving educational participation in specific situations. From a scientific point of view, this approach is valuable because it increases our understanding of the circumstances under which the various risk factors for educational non-participation are more or less important. It might, for example, shed new light on an ongoing debate in the literature initiated by Heyneman and Loxley (1983), who proposed that, under the more difficult circumstances experienced in developing countries, educational facilities are more important relative to resources at the household level. Our large database, with combined information on household characteristics and educational facilities for a broad range of circumstances, makes possible a strong test of this hypothesis.

Background

At the time of India's independence in 1947, literacy levels were very low. Only 9% of the female population and 27% of the male population was literate according to the 1951 census. Under British rule, some contributions to Indian education were made, but mainly for the purpose of reinforcing an elite that could help to administer the country (Kingdon et al., 2005). After independence, efforts were made to improve the situation. The 1950 Indian Constitution declared that "the State shall endeavour to provide, within a period of ten years from the commencement of this Constitution, for free and compulsory education for all children until they complete the age of 14 years". This aim was reconfirmed by successive central governments and compulsory primary education acts were passed by most state governments. However, in spite of great efforts, the educational level of the population increased rather slowly and large differences among social groups and between the sexes still remain. Children from the richest 20% of the population have an average of 11.1 years of schooling, compared to 4.2 years for children from the poorest 20%. Poor rural girls do even worse, with an average of only three years of education. Children from the lower castes and tribes have school attendance rates well below the national average (UNESCO, 2010:172).

The substantial inequality in access to education by caste was worsened by colonial educational policy (Borooah and Iyer, 2005). Macaulay's Minute on education (1835) actually changed the dominant language of the curriculum to English, its main aim being to prepare Indians for government jobs. The spread of western education among the elite resulted in greater social prestige for the upper castes and further widening of inequality. Nevertheless, some efforts were made to improve the situation of the lower castes during British rule. For instance, the non-Brahmin (lower caste) movement in Southern India tried to address caste inequality through positive discrimination of non-Brahmins in education and jobs (Borooah and Iyer, 2005). This movement, however, did not pick up in any other part of India and it is only recently that some states have tried to put affirmative action in place.

In the post-independence period several efforts were made to reduce inequalities. The National Policy on Education in 1986 attempted to equalize educational opportunities among different social groups. The central focus regarding the educational development of Scheduled Castes and Tribes became the equalization with the non-scheduled castes (Nambissan, 1996). Since independence, caste groups have been clustered in broad categories and are identified in a government schedule as beneficiaries of affirmative action – Scheduled Castes, Scheduled Tribes, Other Backward Castes, and Others (Deshpande, 2007: 239). Scheduled Castes (SC) are the former "untouchables". Historically they are subjected to discrimination and deprivation; they still belong to the poorest groups in India. The Other Backward Castes (OBC) were not considered untouchable, but their social and economic position was close to that of the "untouchables". There has been considerable debate, even during the British period, whether preferential treatment should be extended to the OBCs, as they have not suffered the stigma of "untouchability". In addition to the caste system, India has been home to several tribes that have been designated Scheduled Tribes (ST).

Equity has become part of the language of educational policy, wherein the question is not merely that of providing equal opportunity in education but also requiring affirmative action. To achieve this, several educational schemes have been implemented by the national government, with the objective of enabling the SCs and STs to upgrade their educational levels, increase enrolment and reduce drop-out rates (Jha and Parvati, 2008). However, the picture remains quite dismal. According to the 2001 census, the literacy rates of the SCs and STs were 55% and 47% as against the national literacy rate of 65%. Although the gross enrolment ratios of both SC and ST children in 2006/7 had increased in a number of states compared to 2000/1, there was at the same time an increase in drop-out rates in several states (e.g. Bihar and Rajasthan).

Besides differences among castes, there are still huge gender disparities in India. Policy documents from the 1960s onwards have emphasized gender equity in education through a reduction in the gender gap in access, retention and transitions. A greater push towards gender equality was given during the1980s and 1990s, when several innovative programmes were introduced by the government and NGOs, often in partnership (Ramachandran, 1998). A major initiative was the District Primary Education Project (DPEP), which targeted 600 regions where female literacy was below the national average. This programme

contributed substantially to improving school enrolments (Schmid, 2007). The interventions under DPEP included investment in and upgrading of school infrastructure, provision of learning aids, training of teachers, and employment of additional teachers. A midday meals scheme and a total literacy campaign were initiated in the 1990s through centrally funded projects (Kingdon et al., 2005) to reduce gender and caste disparities. To improve primary schooling, several states initiated individualized programmes, such as the use of professionally unqualified teachers, known as para-teachers where it was difficult to find regular teachers (Govinda, 2002).

Another major development in the 1990s was the growth of private schools. The expansion of the private sector reflected the great demand for education amongst diverse populations, as well as the lack of adequate facilities in government schools. This sector is diversifying into a wide range of schools, many of which are also affordable for poorer households. Even households below the poverty line increasingly prefer to send their children to private fee-paying schools rather than to free public schools (Pradhan and Subramanian, 2000). This indicates that parents of all socio-economic levels want quality education and good facilities for their children. However, girls, low caste children, and other under-privileged children are still overrepresented in government schools (Mehta, 2005; Kumar et al., 2005; Aggarwal, 2000; PROBE, 1999).

Multilinguism or diversity of languages is one of the special features of India. The 1961 census registered 1,652 languages and an even larger number of dialects. Of these languages, by 2003 only 22 had obtained constitutional recognition in terms of being labelled a "scheduled language" (Mohanty, 2006). In 1957 a three-language formula was proposed for education. For the first five school years a regional language is used as the first teaching language. During school years 6 to 8, a second language is taught as a school subject; Hindi in non-Hindi areas and another Indian language in the Hindi areas. From the third year onwards, English is taught as a school subject (Koul and Devaki, 2000). Mother tongue instruction was thus deeply rooted in the Indian educational system. However, English is gaining a hegemonic status within the Indian education system. The official three-language formula is increasingly replaced by bilingualism with English and Hindi or with English and a regional language as the medium of instruction. Private English medium schools are considered to be superior to government-run regional or vernacular medium schools, because they give access to better jobs (Mohanty, 2006). More and more people from the lower strata seek expensive English-medium private schools for their children in the hope that their ability to speak English enables them to find decent employment. Nevertheless, a discrepancy between the language spoken at home and the language of instruction may remain for the smaller language groups, perhaps constituting a barrier to schooling for children of these groups (Smits, Huisman and Kruijff, 2008; Sujatha, 2002).

Model

Figure 1 shows the theoretical framework that will be tested in our analyses. It contains socio-economic factors at the household level, cultural factors at the household and district level, characteristics of educational facilities and policies at the district and state level, plus a set of control factors at each of the levels. In the following sections, we discuss the reasons for including them and the expected directions of their effects (indicated in Figure 1 by a + or – sign).

Socio-economic status

Both in developed and developing countries, children from families with more socio-economic resources are more often enrolled in school (Huisman and Smits, 2009; Mingat, 2007; Shavit and Blossfeld, 1993; Jencks 1972; Coleman et al., 1966). For wealthier families, the direct costs associated with education, such as fees, books and uniforms are less likely to be an obstacle. Opportunity costs of children not being able to help at home, at the family farm or by earning additional income through child labour, are also less important to them (Evangelista de Carvalho Filho, 2008; Basu, 1999).

Besides household wealth, the educational level and labour market position of the parents is expected to play a role. There is ample evidence that children from better educated parents more often go to school and tend to drop out less (UNESCO, 2010; Huisman and Smits, 2009; Ersado, 2005; Buchmann and Brakewood, 2000; Colclough, Rose and Tembon, 2000; Shavit and Blossfeld 1993). Parents who have reached a certain educational level might want their children to achieve at least that level (Breen and Goldthorpe, 1997). For educational enrolment of girls, education of the mother might be especially important (Emerson and Portela Souza, 2007; Shu, 2004; Kambhampati and Pal, 2001; Fuller, Singer and Keiley, 1995). Mothers who have succeeded in completing a certain level of education have experienced its value and know that it is within the reach of girls to complete that level. Therefore, we expect them to use the power and insights derived from their higher education to make sure that their daughters are educated too (Smits and Gündüz-Hoşgör, 2006).

Regarding father's labour market position, we expect fathers who are in salaried employment to be more aware of the importance of education and hence to invest more in their children's education (Breen and Goldthorpe, 1997). The children themselves may also be more aware of the benefits of education. On the other hand, parents are less likely to invest in their children's education when direct occupational transmission or transference of capital is a viable option to obtain a good position in society for their children (Treiman and Ganzeboom, 1990; Blau and Duncan, 1967). Hence farmers and business owners may feel less need to invest in their children's education than people in dependent employment. Also, for small farmers the opportunity costs of sending their children to school may be high, since they are more likely to expect their children to help out tending the land and rearing livestock, especially during peak working times (Bhalotra and Heady 2003; Basu, Das and Dutta, 2003).

Mother's work status may exercise an independent influence over her children's educational chances, especially those of her daughters. According to the resource theory of conjugal power (Smits, Mulder and Hooimeijer, 2003; Rodman, 1972; Blood and Wolfe, 1960) the degree to which partners can influence important household decisions depends on the extent to which they bring valued resources into the marriage. This implies that mothers who are gainfully employed and contribute to the household income have more influence on family decisions than women who are not employed (Lakwo, 2007). More independent women may be able to create better possibilities for their children, and especially their daughters, to go to school. On the other hand, when the mother is forced to work because of poverty, the daughters may have to take over her household tasks and, therefore, have fewer chances to go to school. The effect of the mother's employment may thus be different under different circumstances and we cannot formulate a clear-cut hypothesis on this effect.

School characteristics

Availability and quality of schools are important determinants of educational participation, particularly for specific groups like the poor and girls (Ersado, 2005; Buchmann and Hannum, 2001; Colclough, Rose and Tembon, 2000). There is evidence that in poorer countries school characteristics are more important for educational achievement than in richer ones (Long, 2006; Heyneman and Loxley, 1983). The case for resource availability seems obvious: when there are no schools or teachers, children are not able to obtain an education. Also, the way schools are distributed across the country may play a role, because it determines the distance children have to travel to school (Mingat, 2007). Schools are mostly attended by children living in the vicinity. Colclough, Rose and Tembon (2000) found for Ethiopia and Guinea, and Glick and Sahn (2006) found for Madagascar, that children who lived further away from school were less likely to be enrolled.

School quality determines, to a large extent, whether children benefit from going to school. For various developing countries a so-called push out effect has been found, meaning that children have a higher probability of dropping out if school quality is low (e.g. Burkina Faso, Mali, Tanzania (Bergmann, 1996); China (Brown and Park, 2002); Bolivia (Punch, 2004)). Parents often realize that their children gain more from higher quality education and are, therefore, more willing to send them to school when they perceive the quality of education to be better (Colclough, Rose and Tembon, 2000; Buchmann and Brakewood, 2000). Several quality indicators have been accredited with a negative impact on educational attainment, such as under-qualified teachers, indifferent teaching and teacher absence (Kremer et al., 2005; PROBE, 1999). In India there are many single and two-teacher schools. These schools have to rely on multi-grade teaching, which has a negative impact on students' learning abilities (Glick and Sahn, 2006). Besides full-time teachers, there are also part-time and para-teachers in India. Para-teachers are full-time teachers who earn less than a regular teacher's salary and often have lower qualifications than regular teachers. They are appointed to meet the demand for basic education within the limited financial resources available. Although

their appointment was supposed to be temporary, they seem to be well entrenched in the system today (Kingdon and Sipahimalani-Rao, 2010).

Availability of resources that facilitate learning, such as electricity, blackboards and school books have an important influence. Bacolod and Tobias (2006), for instance found for the Philippines that electricity was more important for student achievement than class size or teacher-training programmes. Many Indian schools do not have basic amenities like blackboards, drinking water facilities and separate toilets for girls (Ramachandran, 2003). A quality indicator, which might be especially important to girls, is the presence of female teachers. Male teachers might not provide girls with enough support, or might even be sexually threatening to them (Leach, 2006; Dee, 2005; Colclough, Rose and Tembon, 2000). Given concerns about safety in public spaces, separate toilets for girls might be important too.

Several countries have experimented with policy measures to increase educational participation and reduce the gap between boys' and girls' enrolment. In recent years, mother-tongue instruction has gained much attention. Children who are taught in their own language are more likely to go to and stay in school (Smits et al., 2008; Lewis and Lockheed, 2006; Benson, 2000). Other policies try to influence participation through monetary incentives. Scholarships for girls have been found to increase their school participation in several countries (e.g. Chad and Nepal (UNESCO, 2010); Bangladesh (Pitt et al., 2003); Cambodia (Filmer and Schady, 2006); Latin American countries (Reimers, DeShano da Siva and Trevino, 2006)). Programmes that cut costs of schooling might not even need to focus on girls to lead to a reduction in gender inequality. This was, for instance, an outcome of the Universal Primary Education (UPE) programme in Uganda (Deininger, 2003). In India, provision of midday meals or free clothes was found to substantially improve enrolment rates for girls in rural areas (Mehrotra, 2006; Dreze and Kingdon, 2001; PROBE, 1999). Similarly, the food-for-education programme in Bangladesh (where food transfers are made to poor households as long as the children remain enrolled in primary school) was successful in increasing enrolment (Ahmed and del Ninno, 2002). An experiment in Kenya found that students who did not own school uniforms were more likely to go to school if they received one free (UNESCO, 2010; Evans, Kremer, Ngatia, 2008).

Evidence from impact evaluations suggests that policies aimed at some sort of monetary transfer have been highly effective in improving school enrolments among the poor (Lomeli, 2008; Reimers, DeShano da Siva and Trevino, 2006; Ponce, 2006). There is also strong evidence that higher public expenditure on education directly leads to better educational outcomes (Baldacci et al., 2008; Anyanwu and Erhijakpor, 2007). However, project evaluations also highlight that the increases in school enrolment may be accompanied by a decrease in educational quality, as the schools become more crowded (Reimer, DeShano da Siva and Trevino, 2006; Ponce, 2006). Lomeli (2008) concludes that the focus of programmes to increase participation should also be on quality of education. Iyer (2009), who examined the effectiveness of public spending on primary education outcomes in 115 districts across three Indian states (Uttar Pradesh,

Andhra Pradesh and Karnataka), suggests that there is a need to focus on improving the quality of primary education, and make more effective use of public funds.

Culture

Two distinct cultural features of India are patriarchy and the caste system. Many authors have emphasized the role of patriarchy with respect to the gender gap in education in developing countries (Kambhampati and Rajan, 2008; Smits and Gündüz-Hoşgör, 2006; UNESCO, 2003; Colclough, Rose, and Tembon, 2000; Leach, 2000). According to these researchers, the strategies of national governments and international agencies like the World Bank, aimed at increasing girls' participation in developing countries can only be successful if they acknowledge the link between girls' under-enrolment and women's status in society. Improving the supply of education is not enough if the factors at home which influence demand for it are not addressed, such as the division of labour between men and women, which is to a large extent culturally determined.

The form of patriarchy in India can be described as a "classical patriarchal system" (Kandiyoti, 1988; Agarwal, 1988). There are "specific views on the appropriate roles to be played by women in family and society, and controls placed on female mobility and chastity" (Bandyopadhyay and Subrahmanian, 2008: 3). The major task of men is to provide income and security for their families. Power is in the hands of the senior male, and property, residence and descent proceed through the male lineage (Moghadam, 2004). The major task of women is producing offspring, and most of the power they eventually obtain within this system is through their sons. Gender roles are clearly defined. There is a strict separation between the male and female domains, with men operating in the public sphere and women in the private sphere. Boys are future breadwinners and often have to take care of their parents when they are old, since there is no social security scheme. Girls fulfil domestic responsibilities as future mothers (child rearing). In a traditional Indian context, girls after marriage are generally expected to become part of their husband's household and are "lost" to their parents. This might mean daughters are not sent to school, since investments in daughters' education accrue to their future husbands' family, whereas boys are, since investments in their education stay in the family. These gender specific roles may be responsible for continuing wide gaps in education across gender in patriarchal areas (Gündüz-Hoşgör and Smits, 2008; Shamshad, 2007).

Although the system has come under pressure since the onset of modernization, its ideology is still broadly upheld and its influence strongly present in the legal framework and institutions (Moghadam, 2004). Given these traditions, it might come as no surprise that many parents invest much more in their sons' education (Colclough, Rose and Tembon, 2000). This might then lead to a self-fulfilling prophesy. Illiterate women are economically, and for their information, strongly dependent on their male family members and thus may play an important role in the prolongation of the prevailing values – including the values that stress a subordinate position of women – to the next generation. Only if this circle is broken and women become more educated, the chances may increase for their daughters to get an education too (Smits

and Gündüz-Hoşgör, 2006). Thus, we expect to find lower educational participation among girls coming from areas where more traditional gender-role attitudes are prevalent.

Another aspect of India's cultural fabric is its caste system, which still, to a large extent, determines people's position in society. Although discrimination based on caste or tribe is currently considered a criminal offence, both covert and overt discrimination is widespread (Kamat, 2007). Children from a scheduled caste or tribe have a lower chance of being in school (UNESCO, 2010: 171). If they do go, they are often treated differently. Teachers from higher castes tend to have low expectations for these children, and the attitude of teachers and other pupils towards the children from low-caste families often forces them to drop out (Jha and Parvati, 2008; PROBE, 1999; Malik, 1999; Nambissan, 1996). Children from lower castes were found to perform worse in tests when their caste was announced publicly than when that was not the case (UNESCO, 2010; Hoff and Pandey, 2006). Consequently, we expect children from the higher castes more likely to be in school.

Control factors

We have included various control factors known to be related to educational participation. At the household level these are number and gender of siblings, birth order, living in an extended family, being a foster or adopted child and religion. Children with more siblings face more competition regarding the distribution of scarce resources, such as time and money (Ray, 2000; Downey, 1995). For Western societies and several developing countries, family size has been shown to be negatively correlated with educational participation (Thailand (Buchmann and Hannum, 2001; Knodel, Havanon and Sittitrai, 1990); Malaysia (Pong, 1997); the USA (Blake, 1989)). For developing countries, there is evidence that older siblings are more likely to suffer the consequences of high fertility than younger ones (Basu, Das and Dutta, 2003; Buchmann and Hannum, 2001), since older children do the household chores or contribute to the household income by earning some extra money. This has been found to be especially the case for older girls in the household, who often receive the least education in developing countries (Ota and Moffatt, 2007). On the other hand, living in an extended family, where relatives help out in the household and add to the household income may make it easier to go to school. Single parenthood generally has a negative effect on educational attainment in developed, as well as in developing, countries (Park, 2008), because children often have to replace the work done by the missing parent. It also seems likely that parents will favour their own children over adopted or foster children, when deciding about their schooling (Fafchamps and Wahba, 2006). A final control factor at the household level that may play a role is religion, because it may influence parents in their choic between the official school system and other socialization options. For example, Jeffery, Jeffery and Jeffery (2007) found that in the Bijnor district of the Indian state Uttar Pradesh, the majority of the Muslim children go to madrasas rather than government schools.

Control factors at the context level are labour market structure and level of economic development. When estimating future rewards, parents will take their children's employment prospects into account.

Since a job in the formal sector requires at least secondary education, parents are more likely to send their children to school if formal job opportunities are realistic. If it is easier for men than women to find a (well-paid) job, parents may also take their child's sex into account (Song, Appleton and Knight, 2006; Colclough, Rose and Tembon, 2000; Buchmann, 2000). A feature of modern value patterns is the stress on the importance of education and equality between the sexes. Modernization is generally associated with urbanization, lower distance to schools, better road and communication infrastructure, and more impact of globalization. In urban areas, state influence is generally stronger and there is more pressure on parents to send their children to school. Indeed, Fafchamps and Wahba (2006) find for Nepal that children living near towns and cities are more likely to attend school, than those in rural areas.

Interactions

The causes of underlying problems with educational participation of young children may be different for boys and girls and among the various social groups of the country. This means that standard solutions to such problems do not always work and that policy measures aimed at improving participation should be as specific as possible. In this paper, this specificity is achieved by incorporating interactions in our models. The assumption underlying this approach is that the uniqueness of a situation can, for practical purposes, be addressed by considering it as resulting from a unique combination of more general factors (cf. Huisman and Smits, 2009; Smits, 2007). In our approach we assume that these general factors may play a role in any situation, but that the degree to which they are important differs depending on characteristics of the larger context of that situation. For instance, financial support may be very helpful in persuading poor parents to send their daughters to school if financial restrictions are a major reason for them not being in school. However, in rural areas where concerns about safety (due to longer travelling distances) are stronger and in regions with a strong patriarchal culture that restricts access of women to public places, financial incentives may not always be helpful in convincing parents to send their daughters to school (Bandyopadhyay and Subrahmanian, 2008; Moghadam, 2004; Kandiyoti, 1988). It also makes little sense to try to influence household-level factors when there are no good educational facilities available, and even when such facilities are available they might remain underused in regions where there are no job opportunities for educated people (Huisman and Smits, 2009).

To address such conditioning effects of the context in which children live, we analyse interactions between school characteristics and cultural characteristics of the context with the major household-level factors. This may help us to shed light on the circumstances under which specific determinants are more or less important for getting children into school. According to Heyneman and Loxley (1983), under the more difficult circumstances experienced in developing countries, school characteristics are more important compared to family background characteristics in explaining the educational outcomes of children. Since the formulation of this Heyneman and Loxley (HL) hypothesis, some 30 years ago, it has been tested in many empirical studies (e.g. Huang, 2010; Long, 2006; Baker, Goesling and Letendre, 2002), but the

findings are mixed and no definitive conclusion has been drawn. For the Indian situation, the HL-hypothesis would imply a negative interaction effect between school factors and household socio-economic status, especially in rural areas where factors hampering educational participation are rife. If there are more and better facilities it will be easier for parents to send their children to school, and socio-economic resources might have less influence. The same can be argued about subsidies. In the presence of school subsidies, parental socio-economic resources will have less influence on participation. On the other hand, if local educational facilities are of low quality or lacking, and in the absence of subsidies, only parents with more resources will be able to send their children to school (Handa, 2002; Filmer and Pritchett, 1999).

Regarding the effect of culture, we expect more traditional parents to be less influenced by characteristics of the educational infrastructure and this effect to be strongest for girls. In this paper we distinguish between ideas present in the household, and ideas prevalent in the environment of the household, i.e. the culture in which the household is situated. Parents might favour their daughters' education, but when the community in which they live opposes girls going to school, they might choose to keep their daughters at home in order not to harm their relationships with their neighbours. Consequently, we also expect people living in more traditional districts to be less influenced by better school characteristics.

Data and Methods

Data

Data are used from the 1998/99 National Family Health Survey (NFHS-2), a large representative survey covering over 99% of India's population (IIPS, 2000). The NFHS-2 data are unique in that they contain detailed information on education and family background at the household level and offer excellent possibilities for studying context effects. It is the most recent dataset with distance to school at the village level and with which effects of context factors at the district level can be determined. We added district-level information on educational facilities derived from the 7th All India Education Survey 2002 (www.7thsurvey.ncert.nic.in). Additional indicators at district and state level were generated by aggregating from the household data. Because the sample is large, we could create indicators for level of development, labour market structure and culture by taking the district's average of characteristics of households and individuals. The resulting dataset contains information on 71,352 children (36,837 boys and 34,515 girls), living in 439 districts of 26 states.

Methods

The data are analysed with bivariate and multivariate logistic regression models. Because we use explanatory variables at three levels of aggregation (family-level, district-level and state level), we apply multilevel versions of the logistic regression models. With multilevel analysis it is possible to include explanatory variables at different levels simultaneously and to study interactions among levels (Hox, 2002;

Snijders and Bosker, 1999). The analyses are performed separately for urban and rural areas. If the coefficients differ significantly between girls and boys, gender-specific coefficients are presented.

Dependent variable is a dummy variable indicating whether (1) or not (0) a child aged 8–13 was enrolled in education at the time of the survey. The lower boundary of 8 for being in primary education is taken because our findings made clear that in India, as in other developing countries, many children, especially girls, start primary education at an older age than the official entry age. The upper boundary is set at 13 because we want to focus on participation in primary education and there are states where secondary education starts at age 14.

Besides models with direct effects, models with interactions between selected educational variables and the socio-economic and cultural variables are also estimated. To compute the interaction terms, centred versions of the involved variables are used. The main effects, therefore, can be interpreted as average effects. Given the large number of possible interactions, only significant interactions are included. In the analyses, the case weights present in the data set were used to make the data representative of the Indian population. Given the large differences between the urban and the rural areas in India, for these areas separate analyses are done. In all analyses robust standard errors (sandwich estimators) are used.

Independent variables

Father's occupation is measured in rural areas with three categories: (1) farm, (2) lower non-farm, and (3) upper non-farm. Since in urban areas there are hardly any fathers with an agricultural job, in the analyses for these areas we look at the difference between upper non-farm (1) and all other occupations (0). Employment of the mother is measured with a dummy indicating whether (1) or not, (0) she was gainfully employed. The father's education is measured with three categories: (1) none, (2) at least some primary, and (3) at least some secondary. Given the low level of education of most mothers in India, their education is measured with a dummy indicating whether (1) or not (0), she had at least some primary education. Because income is lacking in the NFHS-2 data, household wealth is measured with an index constructed on the basis of household assets (such as televisions, cars, telephones), housing characteristics (such as floor material, roofing, toilet facilities, source of drinking water) and possession of land. Using a method developed by Filmer and Pritchett (1999), all households within the country are ranked based on their available assets and divided into wealth deciles. Land possession was measured with a variable indicating how many acres of land a family has under cultivation. All these socio-economic variables are at the household level.

Teacher and school availability is measured by the number of primary teachers and schools per 1,000 children age 5 to 9 in the district. To account for the effect of distance, the distances at the village level to the nearest lower and upper primary schools are used. Since the possibility to continue with secondary education after finishing primary might influence primary enrolment, we also include the distance to the nearest lower secondary school. The effect of class size is measured by the Pupil Teacher Ratio in the district. The number of teachers per school is measured by the district primary Teacher School Ratio. Since

teachers might be divided very unevenly over schools, we also added the percentage of lower primary schools in the district with less than four teachers.

Teacher quality is measured by the number of full-time teachers compared to the number of part-time or para-teachers in the district and by the percentage of female teachers in the district. Quality of school buildings is indicated by several variables. Availability of drinking water, lavatories, separate lavatories for girls and electricity are measured by the percentage of primary schools having these facilities at the state level. Quality is also indicated by the percentage of schools in the district with a pucca or partly pucca building as opposed to schools with a kuchcha building, tents or schools without a building. A school building is treated as pucca if it has walls made of burnt bricks, stones (duly packed with lime or cement), cement, concrete or timber, plywood, artificial wood of synthetic material and PVC and roofs made of tiles, metal or asbestos sheets, concrete, bricks, stone, timber plywood, artificial wood of synthetic material and PVC. A school building is treated as partly pucca if it has its walls made of the above mentioned materials, but the roof is made of other materials such as bamboo, grass, thatch, etc. A school building is treated as kuchcha if the walls and/or roof are made of materials other than those mentioned above, such as unburned bricks, bamboo, mud, grass, reeds, thatch or loosely packed stones.

Indicators for educational policies are the state-level percentages of primary schools with mother-tongue education, of lower primary schools providing free uniforms, and of primary schools providing attendance scholarships for girls. Expenditure on education at the state level is measured by the budgeted per capita expenditure (in Rs.1000) on education for the year 1996/97, which is available from Central Statistical Organisation (CSO). Private school availability is measured by its percentage at the state level.

To capture the effect of caste, we included dummies indicating whether the children belong to a (1) forward caste, (2) scheduled caste, (3) scheduled tribe, or (4) other backward caste. Traditionalism of the household is indicated by a dummy indicating whether (1) or not (0) the mother had her first child under age 18. Traditionalism is additionally measured by son preference, indicated by the ideal number of sons minus daughters a mother stated she would like to have. Both measures are also aggregated to the district level in order to indicate a traditional cultural context. The position of women in the district is indicated by the percentage of women among persons aged 20–59. In line with Sen's (1992) "missing women" thesis, this variable gives an indication of the degree to which women and girls are disadvantaged in the district and, hence, whether parents might invest more in their sons.

Control factors. Presence of the parents is measured with two dummies indicating whether (1) or not (0) the mother or father is missing from the household. Extended family structure is measured with four categories: (1) nuclear family, (2) more than two adults in the household but no grandparents, (3) including grandparents from mother's but not father's side, or (4) including grandparents from father's side. We also included a dummy indicating whether (1) or not (0) the mother was widowed, divorced or separated. Whether or not the child is a biological child is measured using a dummy with categories (0) for foster,

adopted or unrelated children and (1) for biological children. Birth order and number of sisters and brothers are measured with interval variables. Age of the child is measured in years. Sex of the child is measured as (0) for boys and (1) for girls. Openness to influences from outside, and consequently ideas regarding the advantages of education, is measured with a dummy indicating whether (1) or not (0) the mother watches television at least once a week. For rural areas, we also included a variable measuring the distance to the district headquarters in units of 10 kilometres. A child's religion is given by dummies for Christian (0), Hindu (1), Muslim (2), or other religion (3).

Labour market opportunities in the district are indicated by the percentages of men working in a white-collar (professional, technical, managerial, clerical) occupation. District-level development is measured with an index constructed on the basis of six variables aggregated from our household datasets: the proportion of households in the district with a fridge, car, telephone, television, electricity, or running water. Of these characteristics, the mean was taken of the standardized values. State level of development is measured by Net State Domestic Product at current prices 1996/97, in Rs.10,000 Crores (CSO 1998).

Children with a missing parent were given the mean score of the other children in the database on the variables indicating characteristics of the parents. Because there are dummies for missing mother or father in the model, this procedure leads to unbiased estimates of these variables (Allison, 2001: 87). For children with mothers younger than 16 or older than 49, no information on the mother being separated, the age at which she had her first child, whether she watches television every week and her preference for boys over girls,was available in the dataset. To be able to include those children in the analyses, these variables were given the average of the children for which information was available and we included a dummy indicating whether (1) or not (0) the information was available for this child. To find out whether the coefficients of the other variables were biased by this procedure, two robustness tests were performed. In the first test, the models were re-estimated after (separately) removing these variables. In the second test, the models were re-estimated after removing the children with missings on these variables. Both tests showed that the way we handled these missings hardly influenced our results.

Results

Table 1 (upper panel) presents information on the percentage of the total variation in educational participation that is due to factors at the household, district and state level. We see that household factors are clearly most important for educational enrolment in India; they explain two-thirds (girls in rural areas) to three quarters (boys in rural areas) of the variation in educational participation. State-level factors are more important for girls than for boys. State policies seem to be particularly important for rural girls.

Bivariate analyses

Table 2 presents bivariate regression coefficients of the socio-economic, cultural and educational variables, derived from multilevel logistic regression models with being in school as the dependent variable and age

and sex as the only control variables. These bivariate figures are important, because they represent the observed reality in the rural and urban areas of India. If the coefficients differ significantly between girls and boys, gender-specific coefficients are presented.

The *socio-economic variables* almost all have the expected effects. Children of fathers with an upper non-farm job are significantly more in school, both in urban and rural areas. In rural areas, girls are also more in school if their father has a lower non-farm job. Children with a working mother are significantly less in school. This suggests that women who work in India tend to do so out of poverty. Having a father with secondary education or a mother with primary education, increase the odds of being in school, but if the father has only primary education children are less in school. Children from wealthier households are significantly more in school. This effect is nonlinear; at the lowest wealth levels it is weak – and in urban areas even negative – but, at the higher wealth levels, it is positive with strong effects. The initial negative effect might seem puzzling, but these are bivariate effects are not controlled for other differences among the households. In the multivariate analyses (Table 3) the expected positive effect is observed over the whole range of this variable. Children from wealthier households in terms of land possession are significantly more in school.

The coefficients of the *cultural factors* show that belonging to a disadvantaged caste or tribe is negatively associated with schooling. Girls belonging to a scheduled caste are less in school in rural areas and girls belonging to a scheduled tribe are less in school in urban areas. The odds of being in school are also significantly reduced for children whose mothers had their first child at a young age and for children whose mothers have a preference for boys over girls. These last two variables also show significant coefficients at the district level. The percentage of women compared to men in the age group 20–59 is positively related to the odds of being in school in rural areas, thus indicating that in districts with less "missing women" (Sen, 1992) the chances of children being in school are higher.

A first striking conclusion that can be drawn from the coefficients of the *school characteristics* is that in urban areas only a few of them are significantly related to primary participation. Hence, primary participation in the cities seems to be more driven by variation in demand for education than by supply-side factors. In the rural areas facilities and policies do matter much more. There we also see clear gender differences, with most significant factors being more important for boys than girls. In rural areas, children tend to be more in school in districts where there are more teachers and schools compared to the number of children, and where the number of teachers per school is higher. The effect of the number of teachers is nonlinear; if there are few of them, an increase in the number has a larger effect than if there are already many teachers. A higher percentage of primary schools with at most three teachers, and a higher Pupil Teacher Rate are significantly negatively related to participation in rural areas. The first of these factors is also negative in urban areas, thus indicating that if teachers have to teach more classes, the quality of their teaching deteriorates.

As could be expected, in rural areas a larger distance to school is negatively related to primary participation. The effect is nonlinear; hence, after a certain distance an additional kilometre becomes less important. Distance to secondary education seems to matter too. This might indicate that people also take possibilities to pursue education after primary school into account in the decision to go to primary school, but in this bivariate model it might also be due to the fact that bad infrastructure at primary and secondary level often go together.

For children in rural areas, especially for girls, teacher quality, indicated by the district's percentage of teachers working full-time instead of part-time or as para-teacher, is positively associated with being in school. The same is true for the percentage of female teachers in the district, a factor that is also important in urban areas. In rural districts with a higher proportion of good quality school buildings, educational participation of girls compared to boys is higher. The availability of facilities in school is not much related to participation, with the exception of electricity and of lavatories for rural boys. Private schools in rural areas are positively related to the participation of boys. Policy measures, such as mother-tongue education and providing free uniforms are not significantly related to participation. However, attendance scholarships for girls have the expected positive effect. States with higher per capita expenditure on education have higher participation rates for boys and girls in both urban and rural areas.

The coefficients in Table 2 are important because they represent the observable reality in India at the time of the survey. However, they do not show us which of the variables are more or less important in explaining educational enrolment. Therefore, we now turn to the results of the multivariate analyses.

Multivariate analyses

To gain insight into the relative contribution of the three groups of explanatory factors on educational enrolment, Table 1 (bottom panel) presents the percentage of increase in model fit (as measured by the deviance) for entering all factors belonging to a group into the empty model, compared to the increase obtained when all the explanatory variables are entered together. The socio-economic characteristics clearly contribute most to the explanation of variation in educational participation. Their contribution ranges from 76% of the difference for girls in urban areas to 87% for girls in rural areas. The contribution of the cultural factors is, with 16% to 26%, much lower, and the contribution of the supply factors, with 5% to 17%, the least. For girls in rural areas, the circumstances at all three levels matter more than for girls in the urban areas. This is also reflected in the number of significant effects in the multivariate models presented in Table 3.

Because several of the indicators for availability and quality of the educational facilities were highly correlated, we could only include a selection of them in the multivariate model. Selection took place on the basis of theoretical relevance or strength of the effect in the multivariate model. For school availability we included the number of primary schools per 1,000 children, for teacher availability the primary Teacher School Rate, and for distance to school the distance to lower primary school. Teacher quality was indicated

by the percentage of primary teachers working full-time and by the proportion of female primary teachers. For school quality, we used the percentage of primary school buildings which is pucca or partly pucca, and for educational policy, the per capita state expenditure on education.

As can be seen when comparing Tables 2 and 3, the sign and the significance level of most coefficients remains the same when they are analysed simultaneously. The effect of the father's occupation is an exception. Having a father with a lower non-farm occupation becomes negatively significant in rural areas and having a father with an upper non-farm occupation loses its significance for all children. Hence, it seems that it is not so much father's occupation but other characteristics, such as their education that are important for children's enrolment. The negative effect of having a father with at least some primary education becomes positive, as expected, in the multivariate analysis. Also, the negative effect of wealth in the cities becomes positive.

With respect to the cultural factors, we see that in the rural areas children belonging to a Scheduled Caste, Tribe, or Other Backward Caste are significantly less in school than children from a forward caste. In the urban areas this effect is only present for girls. Also the other cultural factors show the expected effect in rural areas, whereas in urban areas this is only true for having a mother who bore her first child at a young age and for living in a district with stronger boy preference.

The difference between urban and rural areas is particularly striking for the characteristics of the educational infrastructure. In urban areas none of the infrastructural characteristics makes a significant difference, whereas in rural areas most of them are important. A longer distance to school is negative for educational participation of all rural children. School density, as measured by the number of schools per 1,000 children, and teacher quality, measured by the percentage of full-time teachers, are especially important for participation of rural girls. Investment in school buildings, without increasing the number of schools or teachers, works out negative for girls.

When the other educational characteristics are controlled for, the proportion of female teachers turns out to be unimportant. The same is true for state-level educational expenditure. This last finding is not surprising, given that investment in education works through availability and quality at the local level, for which indicators are in the model.

Interactions

Table 4 presents the coefficients of the significant interactions between the educational and cultural context factors and the household-level variables. A first important conclusion that can be drawn from this table is that in the urban areas only one of the many potential interactions with the characteristics of the educational infrastructure shows a significant effect: In districts with more female teachers, children of upper non-manual fathers tend to be more in school. The finding that in urban areas no other interactions or main effects of the infrastructural variables are significant might mean that availability of schools and teachers is not a big issue there any more, as far as educational participation is concerned.

In the rural areas, interactions with infrastructural factors are much more important. Table 4 shows that if there are more schools and teachers in rural areas, or if there are better teachers, the importance of parental education, household wealth and having a working mother, for children's participation, is reduced. In states with higher expenditure on education, the advantage of belonging to a family with more resources in the form of agricultural land is lower. These findings are in line with the idea that socio-economic resources may compensate for a lack of educational facilities to a certain extent. If there are few or low-quality facilities, children of parents with more resources tend to be more in school. Only children of fathers with a lower non-farm occupation seem to be an exception. They do worse than the children of farmers in districts with better teachers or more female teachers. However, in the rural areas this group may, to a large extent, consist of uneducated workers whose situation is even worse than that of small farmers. Hence, the negative interactions might mean that children of farmers profit more from the better facilities.

In areas with better school buildings, children belonging to a forward caste generally do better than those belonging to a Scheduled Caste or Tribe. In these areas, however, the disadvantage of having a traditional mother is larger. In urban areas where more women have their first child at a young age, having a father with an upper non-farm occupation becomes more important. On the other hand, the father's education, and being from a household with more land holdings, becomes less important both in rural and urban areas. In the urban areas of districts where more women have a preference for boys, wealth, caste and boy preference of the mother are more important. In the rural areas of these districts, on the other hand, having a mother with a preference for boys is less important. In districts where women enjoy a relatively better position – as indicated by the percentage of women in the age group 20–59 – mother's education becomes more important and the size of the land holdings becomes less important in the rural areas and having a mother who prefers boys becomes more important in the urban areas.

Conclusions

The effects of socio-economic, cultural and infrastructural factors on educational enrolment of children aged 8–13 in India were studied on the basis of data for 36,837 boys and 34,515 girls living in 439 districts within 26 states. Separate analyses were conducted for urban and rural areas. Our analyses showed that most of the variation in educational participation (about 70%) was due to factors at the household level. Of the household-level factors, socio-economic resources are the most important. If the household is wealthier, if the parents have more education, or if they possess more agricultural land, the likelihood of children being in school is substantially increased. Household wealth is particularly important in urban areas where, at each one step higher wealth decile, the odds of children being in school are 45% higher. Parental education is important in both urban and rural areas. Having a father with more than primary education increases the odds of being in school by 120–160%. Having a mother with at least some primary education increases the odds of being in school by 150–170% for girls and by 80–100% for boys. Mothers with more knowledge are thus better able, or motivated, to get their daughters into school. This knowledge probably

need not be very extensive; our measure of mothers' education only distinguished between those with none and those with at least some education. Given the substantial difference in participation of girls found using this simple variable, it seems that mastering basic skills, such as reading and writing, plays an important role in empowering women. Of the other socio-economic factors, employment of the mother showed a negative effect, indicating that employment of mothers in India tends to be a sign of poverty rather than of empowerment, while father's occupation showed weak and variable effects.

Regarding the characteristics of the local educational facilities, the first striking finding was that, in the urban areas, hardly any effect of these characteristics could be found. Consequently, in the cities of India, the decision of parents to send their children to school is not strongly influenced by supply-side factors. In rural areas, school characteristics do play an important role, and particularly so for the schooling of girls. If there are more or better primary schools, educational participation of girls is significantly increased, and if the distance to the nearest school is longer both girls and boys are less in school. These results are in line with expectations. They suggest that particularly in rural areas investment in schools and teachers do pay off in terms of enrolment. This idea is also supported by our finding of significant positive effects of state-level expenditure on education in the bivariate models.

Our analyses further revealed that specific characteristics of the school building (like the presence of drinking water facilities, lavatories, or electricity) had little direct effect on educational participation. Most of these factors, which were significant in the bivariate model, lost their significance in the multivariate models. Only the percentage of schools with high quality buildings was still significant for girls. This effect was, however, the opposite of what was expected; rural girls were less in school in districts with more high quality schools. This finding might mean that investment in education, without increasing the number of schools or teachers, is not conducive to girls' enrolment.

The third major determinant of educational participation studied in this paper is culture. Our cultural indicators make clear that this factor plays a bigger role in rural than in urban areas. In the rural areas, both boys and girls belonging to a Scheduled Caste or Tribe, or to an Other Backward Caste were less in school. In the urban areas such an effect was only found for girls belonging to a Scheduled Caste or Tribe. With respect to cultural attitudes, our analyses revealed that rural children are less in school if their mother had her first child at a young age or if they live in a district where it is more usual to have the first child young. Rural children are also less in school if their mother has a preference for sons, and rural girls when they live in a district with more women having a preference for sons. In the cities, negative effects were found for children of mothers who had their first child young and for children living in districts where more women have son preference. To indicate the position of women in the districts, we used the percentage of women in the adult population, an indicator inspired by Sen's (1992) "missing women" thesis. In line with expectations, we found rural girls to participate more in districts where the percentage of women was higher.

Our interaction analyses revealed that in rural areas most socio-economic household resources become less important when teacher and school availability improve. This result is in line with our expectation that socio-economic resources to a certain extent may compensate for a lack of educational facilities. If there are few or low-quality facilities, children of parents with more resources are more in school. This finding is important because it indicates that existing socio-economic inequalities in primary enrolment in the rural areas of India can be reduced by appointing more teachers and building more schools. To what extent in this way also inequalities in educational achievement are reduced cannot be determined with our data, but getting poor children into school in any case is a major first step. The results of our interaction analyses with respect to the cultural factors showed mixed results, so that no clear conclusions can be drawn. However, our finding of many direct and interaction effects of these factors on educational enrolment of children and especially of girls suggest that caste and gender still play an important role in India and that for getting all children into school policies aimed at strengthening the position of women and the lower castes remain very important.

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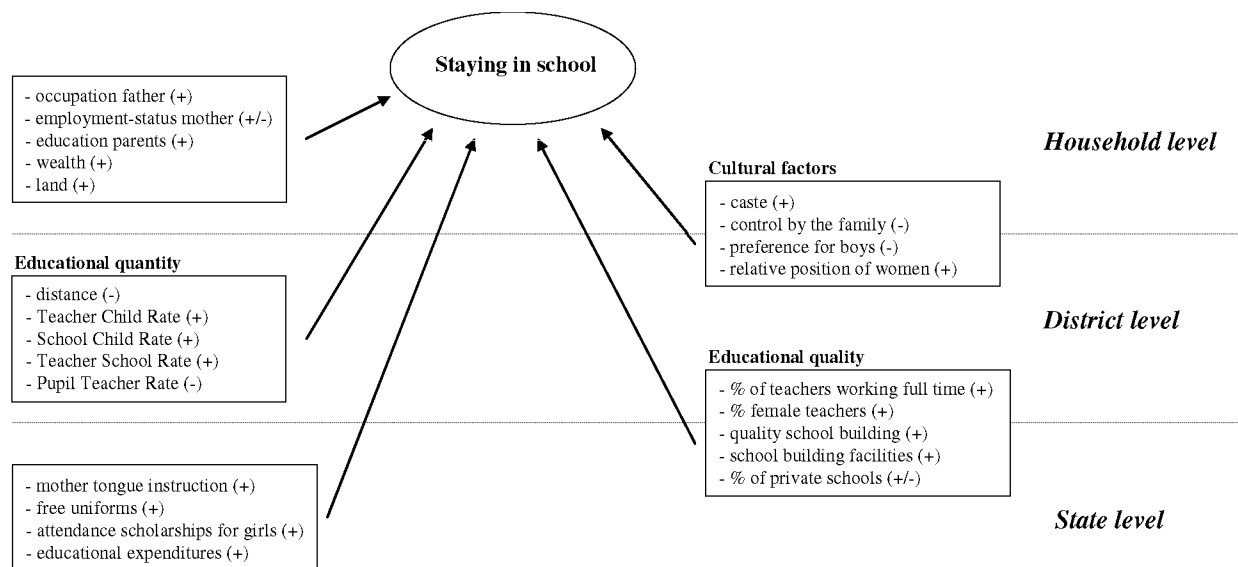
Figure 1. Theoretical model of educational attainment

Table 1. Percentages of variation in educational participation due to factors at household, district and state level and improvement in model fit for the three groups of factors

	Rural		Urban	
Percentage variation at levels	Boys	Girls	Boys	Girls
% due to household level factors	76.2	67.8	71.8	69.2
% due to district level factors	10.3	9.0	16.9	15.9
% due to state level factors	13.5	23.1	11.2	14.9
Improvement in model fit compared to full model[a]				
% Improvement Socio-economic factors	80.5	86.5	79.3	76.3
% Improvement Cultural factors	17.7	26.1	18.8	16.5
% Improvement Educational Supply Factors	9.2	17.5	9.0	5.2

[a] Due to correlations among the variables, the percentages do not add up to 100

Table 2: Bivariate coefficients of multi-level logistic regression analysis with being in school as dependent variable

	Rural			Urban		
	Girls	All	Boys	Girls	All	Boys
Socio-economic status						
Occupation father, ref.: farm						
Lower non-farm	0,085 **		-0,080			
Upper non-farm		1,194 **			1,259 **	
Mother employed		-0,649 **			-0,642 **	
Education father						
At least some primary, ref.: no education	-0,800 **		-0,657 **		-0,968 **	
At least some secondary, ref.: at least some primary		1,358 **			1,842 **	
Education mother at least some primary	1,363 **		1,146 **	1,825 **		1,512 **
Household wealth		0,258 **			-0,196 **	
Household wealth square		0,016 **			0,056 **	
Land under cultivation: log (acres)	0,148 **		0,230 **		0,193 **	
Culture						
Caste						
Forward caste		0,579 **			0,654 **	
Scheduled caste	-0,402 **		-0,272 **		-0,375 **	
Scheduled tribe		-0,711 **		-0,847 **		-0,368 *
Other backward caste	0,106 **		0,245 **		-0,081	
Mother had 1st child under age 18		-0,252 **			-0,709 **	
Mother's preference for boys	-0,122 **		-0,048 *		-0,142 **	
Percentage of mothers who had 1st child under age 18		-2,700 **			-3,519 **	
Preference for boys by women in the district	-1,280 **		-0,404		-1,986 **	
Percentage of age group 20-59 which is female		5,204 **			-2,937	
Education variables						
Teacher and school availability						
No. of primary teachers per 1,000 children		0,030 **			0,003	
No. of primary teachers per 1,000 children square		0,000 **				
No. of primary schools per 1,000 children		0,046 **			0,008	
Primary Teacher School Rate		0,158 **			0,080	
Perc. of lower primary schools with at most 3 teachers		-0,012 **			-0,011 *	
Primary Pupil Teacher Rate	-0,020 **		-0,016 **		-0,016	
Distance						
Distance to lower primary school		-0,028 **				
Distance to lower primary school square		0,000 **				
Distance to upper primary school		-0,047 **				
Distance to upper primary school square		0,001 **				
Distance to lower secondary school		-0,044 **				
Distance to lower secondary school square		0,001 **				
Teacher characteristics						
Perc. of primary teachers working full-time	0,027 **		0,013 **		0,006	
Perc. of primary teachers which is female	0,028 **		0,017 **		0,013 *	
School characteristics						
Perc. of primary school with higher quality building	-0,872		0,521		1,743	
Percentage of primary schools with drinking water facilities	-0,004		0,009		0,011	
Percentage of primary schools with lavatories	0,004		0,012 *		0003	
Percentage of primary schools with lavatories for girls	0,003		0,013		0,002	
Percentage of primary schools with electricity	0,019 **		0,014 **		0,012 *	
Percentage of primary schools which is private	0,011		0,030 **		0,005	
Educational policy						
Perc. of primary schools with mother tongue instruction		-0,490			0,198	
Perc. of lower primary schools providing free uniforms	0,669		0,158		0,531	
Perc. of lower primary schools with girls´ attendance scholarships	1,188 *		0,724		0,620	
State expenditure on education per capita 1996/97	0,522 **		0,278 **		0,534 **	

**P<0.01; *P<0.05

Table 3: Logistic coefficients of multi-level logistic regression analysis including interactions for children aged 8-13 with being in school as dependent variable

	Rural						Urban					
	Girls		All		Boys		Girls		All		Boys	
Socio-economic status												
Occupation father												
Farm												
Lower non-farm			-0,13	**								
Upper non-farm			0,12						0,05			
Mother employed			-0,34	**					-0,22	**		
Education father												
At least some primary, ref.: no education			0,50	**					0,63	**		
At least some secondary, ref.: at least some primary			0,29	**					0,32	**		
Education mother at least some primary	0,92	**			0,70	**	1,00	**			0,60	**
Household wealth			0,17	**					0,37	**		
Household wealth square			0,01	**								
Land under cultivation: log (acres)	0,04	**			0,11	**			0,14	**		
Culture												
Caste												
Forward caste												
Scheduled caste			-0,25	**			-0,27	*			0,17	
Scheduled tribe	-0,63	**			-0,79	**	-0,51	*			0,15	
Other backward caste			-0,12	**					0,05			
Mother had 1st child under age 18			-0,13	**					-0,41	**		
Mother's preference for boys			-0,07	**					-0,09			
Perc. of women in district with 1st child under age 18			-1,58	**					-0,80			
Preference for boys by women in the district	-0,79	**			-0,12		-1,50	**			-0,93	**
Perc. of age group 20-59 which is female			5,56	**					-0,18			
School characteristics												
Teacher and school availability												
No. of primary schools per 1,000 children	0,12	*			0,10				-0,04			
Primary Teacher School Rate			0,20						0,04			
Distance												
Distance to lower primary school			-0,16	**								
Distance to lower primary school square			0,01	**								
Teacher characteristics												
Perc. of primary teachers working full-time	0,12	**			0,01				0,11			
Perc. of primary teachers which is female	0,16				-0,09				0,01			
School characteristics												
Perc. of primary schools with higher quality building	-0,17	**			-0,09				-0,04			
Educational policy												
State expenditure on education per capita			0,81						1,29			
N	24754		51055		26301		9761		20297		10536	

**P<0.01; *P<0.05

Control variables: age child, sex child, parent missing from the household, mother separated, family structure, birth order, number of siblings, biological child, religion household head, mother watches tv every week, distance of household to district head quarters, percentage of men in the district with a white collar job, district development index, State Domestic Product

Table 4: Logistic interaction coefficients of multi-level logistic regression analyses for children aged 8-13 with being in school as dependent variable

	Rural					Urban				
	Girls	All		Boys		Girls	All		Boys	
No. of primary schools per 1,000 children										
Mother employed		0,12	**							
Education mother at least some primary		-0,18	**							
Household wealth		-0,02	*							
Caste										
Scheduled tribe	-0,04			-0,29	**					
Primary Teacher School Rate										
Education father										
At least some secondary, reference: at least some primary		-0,23	**							
Household wealth		-0,04	*							
Perc. of primary teachers working full-time										
Occupation father										
Lower non-farm		-0,05	*							
Mother employed		-0,07	**							
Education mother at least some primary	-0,04			-0,21	**					
Caste										
Scheduled caste		-0,09	**							
Perc. of primary teachers which is female										
Occupation father										
Lower non-farm		-0,16	**							
Upper non-farm							0,56	*		
Caste										
Scheduled tribe		-0,30	**							
Perc. of primary schools with higher quality building										
Caste										
Scheduled caste		0,15	**							
Scheduled tribe	0,26	**		0,07						
Mother had 1st child under age 18		-0,15	**							
Mother's preference for boys		-0,09	**							
State expenditure on education per capita										
Land under cultivation: log (acres)		-0,08	**							
Percentage of women in the district who had their 1st child under age 18										
Occupation father										
Upper non-farm							0,35	*		
Education father										
At least some primary, reference: no education		-0,12	**							
At least some secondary, reference: at least some primary							-0,27	**		
Land under cultivation: log (acres)		-0,03	**				-0,07	*		
Preference for boys by women in the district										
Household wealth							0,05	**		
Caste										
Other backward caste							0,32	**		
Mother's preference for boys		0,04	**				-0,10	*		
Percentage of age group 20-59 which is female										
Education mother at least some primary		0,15	**							
Land under cultivation: log (acres)		-0,02	*							
Mother's preference for boys							-0,10	*		

**P<0.01; *P<0.05