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# Students and the Market for Schools in Haiti

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## Abstract

Uniquely among Latin American and Caribbean countries, Haiti has a largely non-public education system. Prior to the earthquake of January 2010, just 19 percent of primary school students were enrolled in public schools, with the remainder enrolled in a mix of religious, for-profit, and non-governmental organization-funded schools. This paper examines changes in Haitian schooling patterns in the last century and shows the country experienced tremendous growth in school attainment, driven almost entirely by growth in the private sector. Additionally, it provides evidence that the private market "works" to the extent that primary school fees are higher for schools with characteristics associated with education quality. The paper also analyzes the demand and supply determinants of school attendance and finds that household wealth is a major determinant of attendance. Given these findings, the authors conclude that in the near-term paying school fees for poor students may be an effective approach to expanding schooling access in Haiti.


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## 1. Introduction

Even before the earthquake of January 2010, Haiti was the poorest country in the Western Hemisphere, with 78 percent of its citizens living on less than US$2 a day. The returns to schooling in the country are substantial, which suggests that education can offer Haitians the hope of moving out of poverty, but school is out of reach for many Haitian children[1]. Three characteristics distinguish Haiti's education system from others in the region: the low attendance rates for primary school, the fact that many primary school students are over-age for their grades, and the minor role played by the public sector. Only 83 percent of those ages 6-14 were attending school in 2005, with much lower attendance rates for the poor. While the mandated age for entering grade 1 is 6, the actual mean age is nearly 10, and students in grade 6 are on average almost 16, (i.e. five years older than expected). Unlike in other countries in the region, schools in Haiti are operated chiefly by non-public organizations.[2] Foremost among these are religious groups, which account for 47 percent of primary schools. An additional 28 percent of schools are classified as "secular independent" (a category which includes those that are for profit) and a smaller number of schools are operated by community groups and other non-governmental organizations. To shed light on Haiti's unusual education system, we examine the historical evolution of school attainment, the correlates of school attendance, the determinants of school fees, and the market structure of schooling.

Since the 1930s, the relative share of public schools in Haiti has declined steadily over time, falling to just 8 percent of all primary schools in 2003. At the same time, the expansion of the non-public sector has increased education access. The primary completion rate grew from 35 percent for Haitians born 1950-1954 to 88 percent for those born a generation later (1980-1984). Despite this progress, as of the most recent (2005) survey data, severe gaps between rich and poor remained. Primary attendance and completion rates for those in the wealthiest quintile are comparable to those of middle income countries in the region, while the rates for the poorest quintile are similar to those of the poorest countries in Africa. Another key feature of the Haitian education system is that many students are over the prescribed age for their grades. Multivariate analysis presented in this paper indicates that parents' education, household composition, and

[1] See World Bank (2006) for estimates of returns to schooling in Haiti based on 2001 survey data. Overall, the estimates for the marginal return from an additional year of education are 15.6-19.7 percent for wage earnings and 14.0-17.2 percent for total earnings (including wages and self-employment earnings).

[2] In Haiti, all non-state providers of education are collectively referred to as the "non-public" sector. In this paper, the terms "private" and "non-public" are used interchangeably.

household wealth are significant correlates of attendance. We also show that the supply of schools and teachers is positively associated with attendance, while greater distance to schools and higher levels of school fees are associated with lower attendance.

The finding from the regression results that the poor are much less likely to attend school is compatible with the subjective responses of parents: 43 percent of families of children not attending school report that the major reason is cost.[3] Given these findings, we analyze the determinants of school fees and the market structure of the schooling system. Higher fees are associated with the presence of teaching-related infrastructure and higher teacher quality but are not associated with the presence of recreational facilities or a lower teacher-student ratio. We also find that schools with larger shares of the local educational market charge higher fees.

A number of policy recommendations follow from our analysis. In the shorter run, given that poverty prevents families from sending their children to private schools in Haiti, scholarships or cash transfers can help increase attendance and provide incentives for timely enrollment into grade 1. Additionally, strengthening of the state's role as regulator and ongoing efforts by the Ministry of Education to license rural schools would allow for better enforcement of a minimum quality of education.

The earthquake that struck Haiti on January 12th 2010 has exacerbated the constraining factors on accessing schools. On the supply-side, an estimated 4,228 schools were severely damaged or destroyed, and approximately 1,350 teachers were killed (along with approximately 38,000 students). The Ministry of Education itself was largely destroyed. On the demand side, the earthquake represents a significant reduction in the already low ability of households to pay for private schooling.[4] While the analysis presented here predates the earthquake, the conclusions and corresponding policy implications remain relevant, particularly considering the significant donor resources expected in the coming years for the education sector in Haiti, and the paucity of data to guide those investments.

## 2. The Data

We draw mainly on the Demographic and Health Surveys (DHS) and the 2003 School Census. The DHS was carried out in Haiti in 1994-95, 2000, and 2005 and is representative at

[3] World Bank (2006), based on analysis of the 2001 *Enquête sur les Conditions de Vie en Haiti*.
[4] See Government of Haiti (2010) and UNICEF (2010)

the national level, for urban and rural areas in the 10 departments of the country, and for the urban area of Port-au-Prince. Although the DHS surveys do not include income or consumption information, it is possible to use the asset data to construct a wealth index, which we employ as a measure of socioeconomic status.

We complement the DHS with information from the 2003 School Census, which contains school-level information for all preschool, primary, and secondary schools in the country and includes information about whether each school is privately or publicly operated, the year the school was opened, and the fees charged. [5] An infrastructure module contains data on access to public services and school facilities. Finally, the census includes characteristics of the teaching personnel: the number of principal and secondary teachers in each grade and the age, gender, and contract status of each teacher. To assess the relationship between school supply and attendance, data on the local availability of schools from the census is matched with household information from the DHS.[6] Households are matched with the aggregated indices of school supply at the level of geographic units defined by urban areas within each *commune* and (separately) rural areas within each *commune*.

## 3. Historical Evolution of the Education Sector in Haiti.

The dominant story in the twentieth century for Haitian education has been the anemic growth of the public school system and the explosive growth of the private school system beginning in the 1960s. Figure 1 shows the population of public and private schools by year from 1930 onwards (based on schools that existed at the time of the 2003 school census), along with estimates of the national population since 1960.[7] Until the early 1960s, most schools in Haiti were public. Thereafter, the share of public schools among all schools declined dramatically, falling to 21 percent in 1980 and just 8 percent in 2003. The number of private schools grew 27-fold between 1960 and 2003, far exceeding the growth of the population, which grew by a factor

[5] The 1982 education reform (Reforme Bernard) introduced a basic education system with three cycles: grades 1-4, 5-6, and 7-9. In the census, the first two cycles make up "primary" education, with secondary education beginning at grade 7 and continuing through until grade 12.

[6] Haiti is divided into 10 *departments*, 41 *arrondissements*, 133 *communes*, and about 477 *sections communales*. We match the DHS surveys to the School Census at the level of *commune* because it is the lowest level for which there are geographical identifiers in the DHS.

[7] The numbers underlying this figure were generated using information on year of founding of the school, among schools that still existed at the time of the 2003 school census. Consequently, to the extent that public and private schools close at different rates—and it is likely that a private school is more likely to close than a public school in any give year—the true population of schools at any given point will differ from that shown here.

of 2.4. The public system continued to expand slowly but with a growth rate below that of the population.

The period of abject relative decline of the public school system corresponds closely with the reign of the dictator François "Papa Doc" Duvalier, who came to power in 1957. After his son Jean-Claude "Baby Doc" Duvalier took over in 1971, the public system continued to stagnate, but the growth rate of non-public schools accelerated, in part due to a rule instituted by Baby Doc that religious missionaries were required to build an affiliated school with any new church. [8] The expansion of private schools increased further in the late 1980s, after the end of the repressive Duvalier regime in 1986. The years 1994-1999 were a peak period for school construction. This coincides with the first democratic transition, a period of relative political stability, and a national campaign to promote the importance of education. The period was also marked by large investments in social sectors from external aid funds.

As of the 2003 school census, 92 percent of Haitian schools were private, accounting for more than 80 percent of school enrollment, as shown in Table 1. Of the 15,223 schools in the country, 33 percent were in urban areas. Fifty-four percent of schools were "multigrade," i.e. had more than one grade in the same classroom. Although this policy has emerged out of necessity due to the limited number of classrooms and teachers, it may contribute to poor student performance, due to the low time of attention that every teacher has to give to the students. The School Census also shows that in 2003 only 8 percent of private schools functioned with a license, a government credential which certifies that minimum facility and quality standards are met. The difference in licensing between urban and rural areas reinforces the geographical differences in schooling: 17 percent of the schools located in urban areas are licensed, compared to only 3 percent of rural schools. This may also be a reflection of the Ministry of Education's weak presence outside of Haiti's urban areas.

To understand the broad evolution of the Haitian education system over time, we examine the schooling attainment levels of Haitians from three birth cohorts: 1950-54, 1965-69, and 1980-84. Students in the first cohort were of primary school age in the late 1950s and early 1960s, a period marked by Papa Doc's arrival. The second cohort reached primary age in the first years of rule of Baby Doc. The third cohort entered primary school in the years after Baby Doc was overthrown by a popular uprising in 1986. The period 1994 to 2000 was characterized by

[8] Fass (1988) provides a history of the growth of schools in Haiti.

relative political stability as a peaceful democratic transition took place from Jean-Bertrand Aristide to René Préval.

Although schooling levels in Haiti today remain low, school attainment improved substantially during the last half-century. Among those born 1950-1954, only 35 percent completed even one year of education and just 10 percent finished primary school. Completed schooling levels are much higher among those in later cohorts. The proportion of people who attended at least some school increased to 61 percent for those born 1965-1969, and 88 percent for those born 1980-1984.

A useful way to visualize differences in school attainment by group and changes by cohorts is through survival plots, which indicate the percentage of people who completed *at least* each level of education. Figure 2 presents these survival estimates using the DHS data from 2005 for our three cohorts. The figure shows a large improvement between our first two cohorts, chiefly in primary education (up to six years of education.). The fraction who completed at least first grade increased by 26 percentage points between the 1950-1954 and 1965-1969 cohorts, but primary school dropout rates remained high, as can be seen by the steep decline of the survival curve over the first few years of schooling. Among those in the second cohort (born 1965-69), only one-third finished primary education. In contrast, in the most recent cohort (born 1980-84), two-thirds completed primary education. Despite the poor state of Haiti's education system, primary enrollment has taken great strides since the 1950s.

Two relatively sharp drop-offs—following fifth grade and sixth grade—are visible in the profiles for the most recent cohort. The drop-off following sixth grade is common to many countries, corresponding to the transition from primary to secondary. However, the sharp decline after *fifth* grade is unusual. In the Haitian school system, at the end of the sixth grade, students have the option of taking a national exam. Passing this national exam permits the student to continue to secondary education. Two possibilities exist to explain the drop-off after fifth grade in the data. If the sixth grade education is largely focused on the exam and the value of completing sixth grade without taking the exam is low, students not intending to take the exam may be more inclined to drop out in fifth grade. An alternative possibility is that students who completed sixth grade but failed the national exam may not consider themselves having "completed" sixth grade and might report fifth grade as their highest grade completed when reporting their education level in the DHS.

Survival plots for educational attainment by gender (Figure 3) show that the gender gap in access to education has closed over time. Only 27 percent of women born in the early 1950s received any education, versus 44 percent of men, and increases in education attainment between the first two cohorts were concentrated among men. Between the second and third cohorts, however, large gains were made for girls, so that for those born 1980-84, there are only small differences between the attainment profile of girls and boys in the first years of primary school. After fifth grade, however, attainment falls much more rapidly for girls than for boys.

Figure 4 shows the differences between quintiles of socioeconomic status, as measured by a wealth index.[9] It is important to note that because these curves are based on household wealth levels in 2005 (and not when the individuals were children), they reflect in part the effect of education on wealth levels. Despite progress, education attainment levels for the poorest Haitians are still exceedingly low. Only 30 percent of those in the poorest quintile born 1980-1984 completed primary education, and just 12 percent completed secondary school. For those in the same cohort in the top quintile, 89 percent completed primary school, and 75 percent secondary school. The figures for the top quintile compare favorably to the average attainment in wealthier countries of the region like Colombia, where in the cohort born 1976-85, 77 percent completed primary school. In contrast, the survival rates for those in the poorest quintile in Haiti are comparable to those of a poor sub-Saharan African country like Rwanda, where only 32 percent in the same cohort completed primary education.[10]

This analysis is based on the education attainment of people living in Haiti in 2005. Consequently, the attainment profiles may differ from those of that of the original cohort. The fact that the less educated probably have lower life expectancy, and thus lower likelihood of surviving through 2005, means that the education levels shown here are probably biased upwards relative to those of the original cohort, particularly for the oldest generations. This would suggest that the increase in education attainments that has taken place over time is even greater than what this analysis suggests.

The effect of migration is harder to assess. The population of Haitians living in the United States was 420,000 in 2000, according to U.S. Census data, and very rough estimates

[9] The wealth index was constructed using the approach of Filmer and Prichett (2001). The wealth index was generated using the pooled dataset with all three survey years. The coefficients of the wealth index can be found in Table A.4 in the appendix.

[10] The figures for Colombia and Rwanda are based on calculations from the 2005 DHS surveys.

suggest that a half million Haitians live in the Dominican Republic. Given a total population for Haiti of 9.5 million in 2005 (based on an adjusted figure from the country's 2003 National Census), this means that roughly 10 percent of the Haitian-born population lives abroad. It is unclear, however, in what direction this biases the figures presented here.

**4. Determinants of School Attendance**

In this section we switch from examining the long-run historical evolution of school attainment to consider the more recent story of school attendance. Figure 5 summarizes attendance rates by age, based on children observed in the 1994, 2000, and 2005 DHS. Substantial increases in attendance rates between 1994 and 2000 are evident at every age, and overall the primary attendance rate (for children 6-14) increased from 73.6 to 86 percent between those two years. The years 2000-05 registered a slight decline in primary school attendance, to 83.4 percent. Table 2 shows attendance rates disaggregated by area of residence and gender. The rural-urban gap in attendance rates diminished greatly between 1994 and 2000 but was still 11 percentage points in 2005. The gender gap in schooling reversed in the most recent survey, so that there were more girls than boys attending school in 2005. This phenomenon follows the recent trends in the Central American and Caribbean region as whole, where girls have higher attendance rates, lower dropout, and better overall performance.

The large expansion of school supply during the late 1990s appears to have narrowed the gap between rich and poor in school attendance. Figure 6 shows the attendance rates for the years 1994, 2000 and 2005, by quintiles of a wealth index. From 1994 to 2000 the attendance rates for the poorest quintile increased from 51 percent to 71 percent, while the attendance rates increased only slightly for the richest quintile. Gaps, however, persist: in 2005 67 percent of children in the poorest quintile attended school compared to 95 percent of the children in the top quintile.

In Figure 8, we disaggregate the attendance figures by preschool, primary, and secondary for 2000 and 2005.[11] This figure reveals an important aspect of Haitian education: a very large number of students are "over-age" for their school level. In 2005, a large proportion of older children were attending preschool: 33 percent of children age 8, 17 percent age 10, and 8 percent

[11] The 1994 data is excluded from this analysis because the 1994 survey did not capture complete information on the level and grade of students attending school.

of those age 12. Likewise, 57 percent of 16 year olds and almost one-third of 18 year olds were attending primary school. The magnitude of the over-age problem in the Haitian educational system is also evident from the average age of children attending each grade, shown in Table 5. The average age of children attending first grade is almost 10, while the official age of entry is six. The problem is substantially more severe in rural areas, where the average age of attendance in grade one is 10.3, versus 8.9 in urban areas. At the end of primary school, sixth-grade students are on average almost 16, five years older than the prescribed age for the grade.

The existence of a large number of students who are over the normal age for their grades is a concern because their presence in the classroom may negatively affect other students. Evidence from other countries suggests that age heterogeneity in the classroom may decrease learning (Schiefelbein, 1975 and Schiefelbein and Wolff, 1992). Teachers with multiage classrooms face the challenge of adapting teaching methods to satisfy the interests and attention needs of children of different age groups at the same time.

The presence of over-age children can be driven by a mix of three causes: 1) late entrance to the school system, 2) grade repetition, and 3) dropping out of school and restarting the same grade when older. The fact that attendance rates increase with age over a substantial range suggests that the over-age phenomenon in Haiti is driven chiefly by late entrance to school. As Figure 7 shows, in 2005 attendance rates grew markedly moving from age 6 to 10, and the peak attendance rate was at age 14. We would not expect to see this pattern if the presence of over-age children were largely a result of grade repetition or dropping out and restarting school.

The slight decrease in attendance between 2000 and 2005 occurred during a time of political turmoil and economic decline. During this time international support from the United States, Canada, and other important donors was suspended, with international aid dropping to US$136 million in 2001-02 from a high of US$611 million in 1994-95.[12] Vulnerable populations tend to draw their children out of schools during an economic downturn, as a coping mechanism during periods of crisis (World Bank, 2007a). Civil unrest during this time also tended to disproportionately affect urban slums and other poor areas. This effect can be seen in the decrease in the attendance rates in this period for the three poorest quintiles, while for children in the two top quintiles attendance remained steady.

[12] See Government of Haiti (2004).

Next we consider the determinants of school attendance in a multivariate framework. We model school attendance and progress in a simple household demand model where schooling is a function of individual characteristics, household characteristics, demographic factors, locality characteristics and the availability of school services. Our reduced form model to be estimated is as follows:

$$Sch_{ijt} = \alpha + \beta_1 X_{ijt} + \beta_2 H_{ijt} + \beta_3 Z_{jt} + \beta_4 S_{jt} + \beta_5 Y_t + \varepsilon_{ijt} \quad , \qquad (1)$$

where $Sch_{ijt}$ represents school attendance of individual $i$ in the locality $j$, at time $t$; $X_{itj}$ is a vector of individual characteristics, $H_{ijt}$ represents a vector of household characteristics that affect schooling decisions, and $Z_{jt}$ is a vector of local characteristics. We include a dummy variable which indicates whether the household is in an urban or rural area, and the mean of the wealth index of households in the cluster.[13] Additionally, $S_{jt}$ is a vector of characteristics of local school characteristics, and $Y_t$ is a survey year dummy variables. Finally, $\varepsilon_{ijt}$ is a random error term. We estimate the model using probit regressions. We follow convention in the literature and refer to the variables in the analysis as "determinants" of school attendance and refer to the estimates as indicating the "effects" of such variables. However, in the absence of an identification strategy, these results should be more modestly understood as conditional correlations which suggest but do not conclusively demonstrate causal relationships.

The first three columns of Table 3 show probit results for each of the three survey years separately, while the last column shows results for the three years pooled. A Chow test of structural change rejects the null hypothesis of stable coefficients over the three years. Nonetheless, given the general similarity in the coefficients across years, we focus on the pooled sample results. The results for individual characteristics mirror the bivariate results presented earlier. As noted, the gender gap in education has closed over time. This is reflected in the coefficients of the gender variable for the regressions for the three years for which we have available information. In 1994, boys had a 2.4 percent higher probability of attending school, controlling for other factors. In 2000 there was no gender difference in attendance rates. By 2005, the gender gap had reversed, and girls had a 1.3 percent higher chance of going to school than boys.

[13] In this case, the lowest level of geographical identifier that we have in the DHS data is the cluster, so we take the average of the wealth index for each of these units. To avoid the endogeneity of this variable, following Lanjouw and Ravallion (1999), we calculate the left out mean, i.e. generating the average of the wealth index in the household's cluster, but leaving out the value of the wealth index for that household.

The probability of a child attending school is positively associated with the household's education and wealth levels. One additional year of education of the most educated person in the household is associated with a 1.3 percent increase in the probability of school attendance. An increase in one point in the wealth index is associated with a 2.3 percent increase in the probability of an individual attending school.[14] We also include a dummy variable indicating if both parents are permanently living in the household. Children that grow up in households where both parents are present are 9.5 percent more likely to attend school.

Neither urban dummy nor the average value of the wealth index at the cluster level appears as a statistically significant determinant of school attendance, once observed household and individual characteristics are controlled for.[15] This result suggests that the simple correlation between attendance and urban residence reflects individual and household characteristics rather than an overall area effect.[16]

To assess the relationship of school supply with attendance we use the 2003 school census, merged with each round of the DHS, only considering the schools that appear to be founded on or before the year in which the survey was taken. We consider a set of variables that approximate the school supply in several dimensions: number of schools, number of classes, total number of teachers, and number of trained teachers. All the variables are divided by the number of children in school age in the locality.[17] These variables are intended to account for both the availability of schools and teachers as well as the quality of the teachers. Additionally, we include in our regressions the average fees charged by schools in the locality. Finally, from the community module in the 1994 and 2000 DHS, we include information on the average time to travel from a central point in the cluster to a primary school.

Table 4 shows results from the analysis of school determinants taking into account school supply variables. The availability of schools in the urban/rural commune (both in terms of the number of schools and classes) is positively associated with the probability of attending school. A greater number of teachers is associated with a higher probability of school attendance,

[14] The standard deviation of the wealth index is 1.96.
[15] In order to reduce endogeneity problems with this variable, we use the left out mean for every household.
[16] Table A.5 and Table A.6 in the appendix show the results from Table 3, run separately for urban and for rural areas.
[17] The population of school age is defined as the number between 5 and 19 years old who lived in the urban/rural area of the commune at the time of the 2003 population census.

although the number of trained teachers is not.[18] As the time needed to travel to the closest school increases, the probability of children going to school significantly decreases. Finally, a higher average fee charged by schools in the community is associated with lower school attendance. This finding matches the subjective responses of parents: in a 2001 survey, 43 percent of families with children not attending school reported that the major reason for not attending was cost.[19]

## 5. Determinants of School Fees and the Educational Market in Haiti

Given the apparent importance of fees as a barrier to attendance, we next consider their determinants, using data on the fees charged by each school from the 2003 School Census.[20] To the extent that the fees are determined in a competitive education market, they reflect families' willingness-to-pay, so that the correlates of fees provide an indication of what characteristics the families of children value when choosing schools. We examine school fees using the following regression framework:

$$\log(fee)_{ij} = \alpha + \beta_1 I_{ij} + \beta_2 A_{ij} + \beta_3 T_{ij} + \beta_4 C_{ij} + \beta_5 H_j + \mu_j + \varepsilon_{ij} \quad , \tag{3}$$

where our dependent variable is the logarithm of fees charged by school *i* in locality *j*. A locality is defined as the urban or rural portion of a *commune*, $I_{ij}$ is a vector of variables for school *i's* infrastructure, $A_{ij}$ is a vector of administrative characteristics of the school, and $T_{ij}$ is a vector of variables related to teacher supply and quality in the school. We measure market concentration

[18] We define a teacher to be trained if he or she is reported to have a university degree or teaching training certificate (reported in French as *universitaire, normalien,* or *capiste*).
[19] World Bank (2006), based on analysis of the 2001 *Enquête sur les Conditions de Vie en Haiti*.
[20] The descriptive statistics for this data are shown in Table A.7 in the appendix.

by calculating the adjusted Herfindahl-Hirschman Index[21] for every *section communale*, denoted by $H_j$. The portion of the local market owned by school *i* in the *section communale j* is represented by $C_{ij}$.[22] The term $\mu_j$ captures a fixed effect at the locality level, and $\varepsilon_{ij}$ is a random error term at the school level.[23]

Regression results are presented in Table 6. Column (1) presents the results for the basic specification including school characteristics and controls for the size of potential demand in the *section communale*, as measured by the number of students in school age. Coefficients on almost all of the school characteristics plausibly linked to the quality of education are statistically significant with the expected signs. Schools with greater access to services (electricity, bathrooms, latrines), as well as those with smaller class sizes, and more teaching materials (chairs, tables, offices, etc.) have higher fees. On the other hand, the presence of recreation areas, sports areas, and a kitchen is not associated with any difference in fees. Overall, assuming that the fees reflect willingness to pay, these patterns suggest that families value characteristics that are generally associated with higher quality education.

Administrative characteristics of the school also impact fees. In particular, schools with management committees and those that are licensed by the Ministry of Education charge higher fees. On the other hand, the number of shifts offered by the school, having a preschool, and having a parents' committee do not have a significant association with fees. We also consider how teachers' characteristics are associated with fees. The number of teachers per student has no

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[21] The Herfindahl-Hirschman Index (HHI) is a measure of market concentration that is computed as the sum of the squared shares of each firm in the market: $H = \sum_{i=1}^{n} s_i^2$, where $s_i$ is the market share of firm (school) *i* in the market, and *n* is the number of schools. The HHI captures the relative size and distribution of the firms in the market and approaches zero when a market consists of a large number of firms of relatively equal size. The HHI increases both as the number of firms in the market decreases and as the disparity in size between those firms increases. We use the adjusted HHI, which is a normalization of the usual index that ranges from zero to one. The adjusted HHI is defined as: $H^* = \frac{(H - 1/n)}{1 - 1/n}$, where again, n is the number of firms in the market, and H is the usual Herfindahl Index, as above.

[22] As a measure of the market power of school *i*, in this case, we use the square of the share of the market owned by each school. The share of the market is defined as the ratio of the number of students enrolled in the school over the number of students enrolled in any school in the area.

[23] The fixed effects are calculated at the higher locality (i.e urban/rural commune) level rather than at the lower *section communale* level so that variation by *section communale* can be used to examine the relationship of fees with the market share variables.

statistically significant association with the level of fees. However, fees are higher in schools in which a greater proportion of the teachers have undergone teacher training.

Column (2) and subsequent columns include fixed effects at the locality level. Overall, comparing columns one and two, we see that results are broadly similar with locality fixed effects, though the magnitude of most coefficients is reduced.

The interpretation of the coefficient as a reflection of willingness-to-pay relies on the assumption that prices are determined in a competitive market. There are two substantial reasons this may be an inadequate approximation of the education market in Haiti. First, as noted earlier, private schools are provided largely by a mix of secular and independent groups, community groups, and religious groups. Pricing by non-profit institutions might be determined by factors other than market forces. The regression results do show that average prices do vary systematically by school type. Controlling for observed characteristics, in the specification with locality effects (column 2), fees charged by schools run by independent/secular groups are 21 percent higher than those run by religious groups (the omitted group). The same specification shows that schools managed by community groups charge fees that are 15 percent lower than those run by religious groups. We also run separate regressions for the three types of schools. (These are shown in Table A.8 in the annex.) Although magnitudes vary somewhat across school type, the overall patterns are remarkably similar to those from the analysis pooling all schools. This provides rough evidence that despite the non-profit orientation of community and religious groups, their prices may reflect the same competitive pressures which affect secular/independent schools.

A second reason school fees might not perfectly reflect willingness-to-pay is that the education market may be characterized by monopolistic competition. If this is the case, schools will price above the marginal cost, meaning higher fees conditional on school characteristics. In a very concentrated market, schools at the high end of the market may behave as market leaders, setting the price as monopolists, so that smaller schools behave as price takers. To consider these possibilities, the specifications Columns (3) through (5) include the adjusted Herfindahl-Hirschman Index, which is a measure of market concentration at the *section communale* level along with a measure of the market power of each school.

The coefficient on the adjusted Herfindahl-Hirschman Index is not statistically significant (column 3 specification), which indicates that we do find evidence of monopolistic competition

in local educational markets. We do find, however, that schools with a larger share of the local school market have higher fees (column 4 specification). These results hold even after controlling for the concentration of the local market by including both the school's market power and the market concentration variables (column 5 specification). Although we do not have a full explanation for this result, it may reflect a segmented local market structure in which a leading school sets the price as a monopolist, and other schools in the market compete among themselves, charging lower fees.

## 6. Conclusions

During the past century there has been a major expansion of the non-public school system in Haiti. With this growth, school attainment has advanced, and the large gender gap in schooling has closed. Nonetheless, severe gaps in school attainment persist between urban and rural areas and between the poor and the better off. Our analysis suggests that among the many obstacles to school attendance, poverty was a key barrier before the earthquake, a situation that has likely worsened since. The multivariate analysis of the determinants of school attendance suggests that among the most important determinants of schooling are the education of the parents, the structure of the household (single parents, number of siblings), and the socioeconomic level of the household. An important aspect of the Haitian educational system is that a large fraction of students are over the prescribed age for their grades. Investigating further on this issue, we find that the over-age phenomenon appears to be driven by late entrance to school rather than repetition or drop-out and reentrance to school.

Recognizing that fees are a major barrier to school attendance for many Haitians, we investigate their determinants. We find that factors associated with higher education quality and teacher quality (as measured by the proportion of qualified teachers) are associated with higher fees while recreational facilities and the student-teacher ratio do not have any statistically significant association with fees. We also find that licensed schools and those with management committees charge premiums, while schools managed by institutions that presumably have altruistic motives (religious and community groups) charge lower fees than secular and independent schools. While we do not find evidence of monopolistic competition in the schooling market, we do find that schools with a larger share of the market charge more.

Overall, the evidence shows that achieving universal school attendance requires attacking the underlying economic factors that constrain families from sending their children to school. On the demand-side, this might include financial incentives and/or public information campaigns informing families of the benefits to enrolling children into grade one at the prescribed age (six or seven years old). The government's ongoing efforts to finance tuition fees in private schools for families sending their children to first grade on time would be one good candidate for expansion. A program of school fee financing would provide more and more predictable financing for schools.

In the long run, increasing the supply of schools (with a focus on rural areas, in addition to the reconstruction of schools in Port-au-Prince, Leogane, and other densely populated earthquake-affected areas) would address the attendance and on-time attendance issues, as well as facilitate access for the poorest children. However, given the highly dispersed nature of the rural population, the expansion of education supply in those remote, hard-to-reach areas would likely require a differentiated approach to that of urban or peri-urban areas. For instance, the recommendation in the Government's *Strategie Nationale d'Action/Education Pour Tous* calling for partial, multi-grade schools with few classrooms could be a quicker, more cost-effective approach to providing basic education services to those most in need. This would likely require a community-based approach, given the historic low capacity of the public sector (further weakened by the earthquake), and the dearth of entrepreneurs and capital in these areas.

The analysis has shown that parents value (pay more) for school characteristics associated with quality education: trained teachers, and licensed schools. Aside from financing the provision of education through private actors, the government needs to create the enabling environment for accelerated teacher training. Ongoing efforts by the Ministry of Education to license non-public schools should also be intensified. This strengthening of the state's role as regulator would allow for more enforcement of a minimum quality of education. Over time, as the education system recovers from the earthquake (e.g. the supply of trained teachers and the capacity of Ministry of Education inspectors and engineers to conduct infrastructural audits grows), the minimum standards for receiving accreditation could be raised. Enhancing the quality of schools in this way may also stimulate higher attendance rates.

The challenges and policy recommendations outlined here are not specific to the post-earthquake environment. The main differences now are the degree of urgency in addressing

these issues and the scale of resources available for investing in the sector. A well-guided response by the international community, together with local policymakers, could put Haiti on a virtuous cycle of improved education quality and increased educational achievement, thereby enhancing human development outcomes and reducing poverty.

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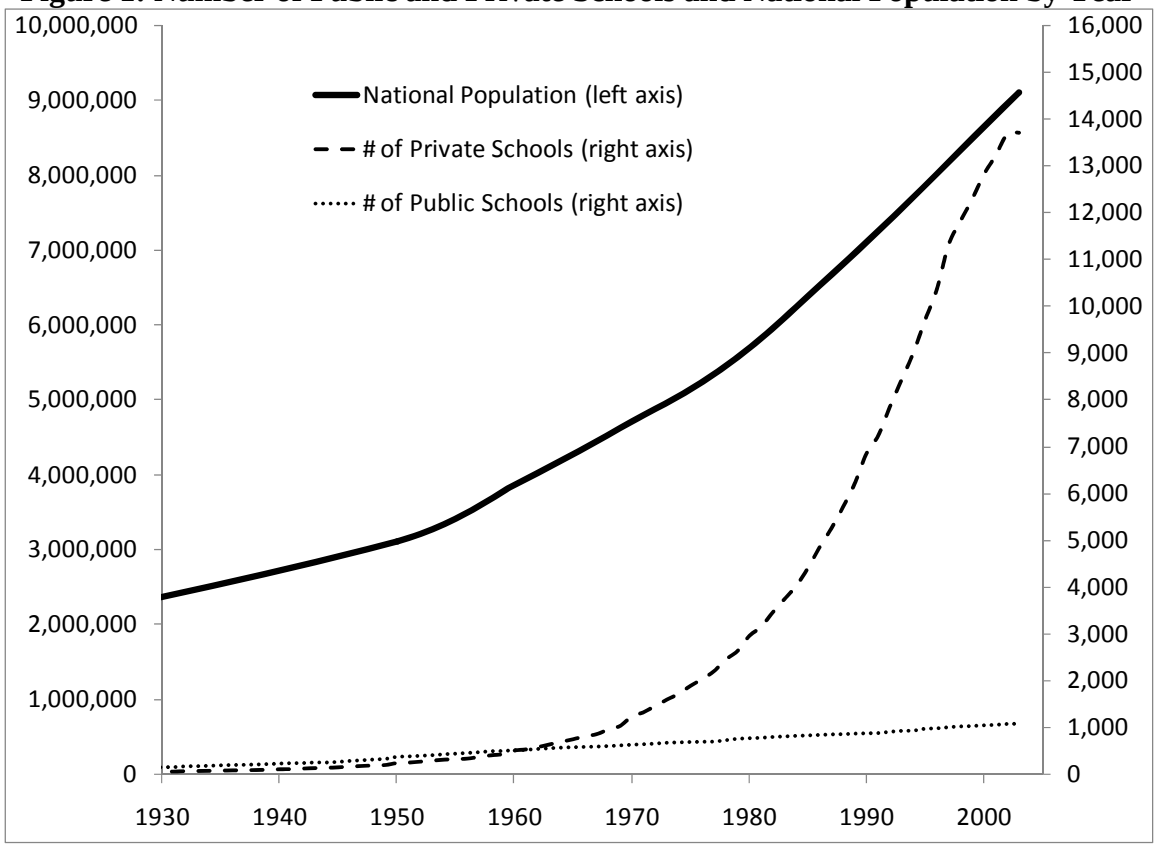
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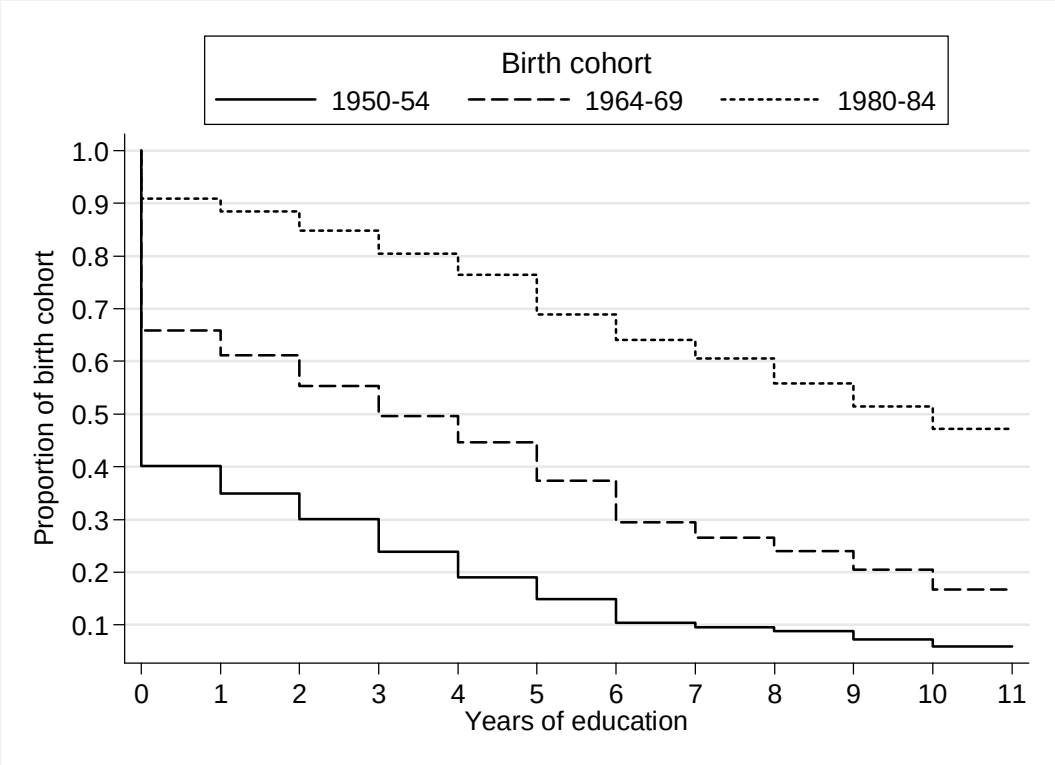
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**Figure 1: Number of Public and Private Schools and National Population by Year**



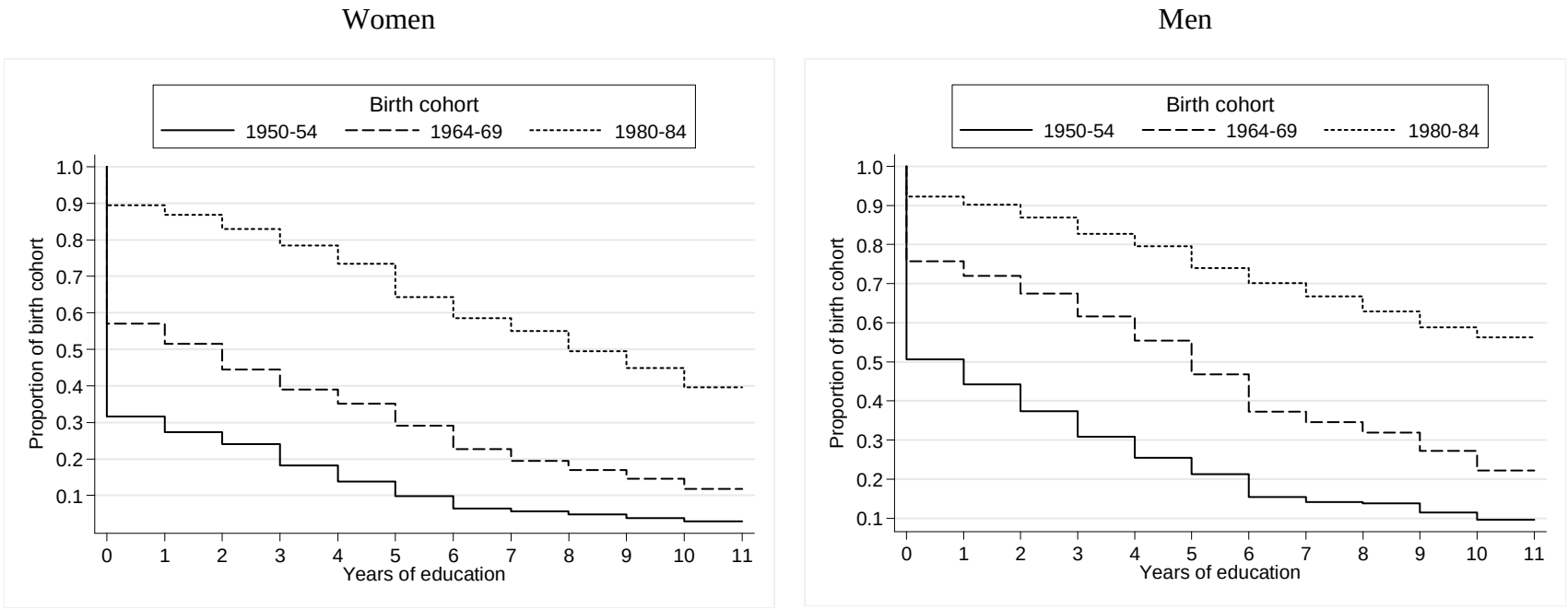

Source: Authors' analysis of Haiti 2003 School Census data (schools) and World Development Indicators (population 1960-2003). Population for 1950 is from a Haitian census estimate published in Dyer (1954) and the population before 1950 is estimated using a linear extrapolation based on an estimate of the population in 1914 found in Perusek (1984) The counts of public and private schools are based on the year of founding of schools as reported in the 2003 School Census. Schools that no longer existed at the time of the 2003 school census are not captured in these figures.

**Figure 2: Survival Plots for Education Attainment by Birth Cohort**




Source: Authors' analysis using data from the 2005 DHS.
Note: These are plots of Kaplan-Meier survivor functions. The plots indicate the proportion of individuals in each birth cohort who achieved *at least* the indicated number of years of education.

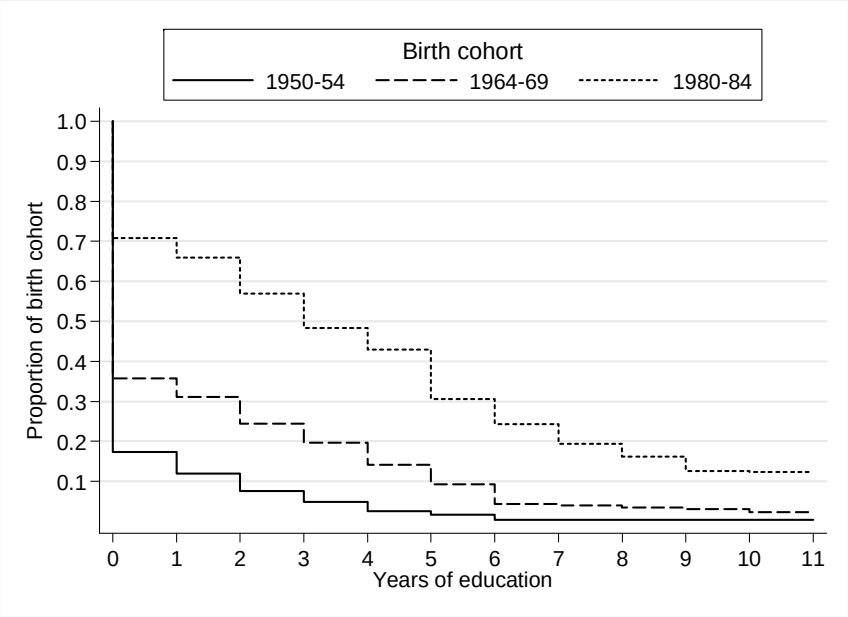
**Figure 3: Survival Plots for Education Attainment by Gender**



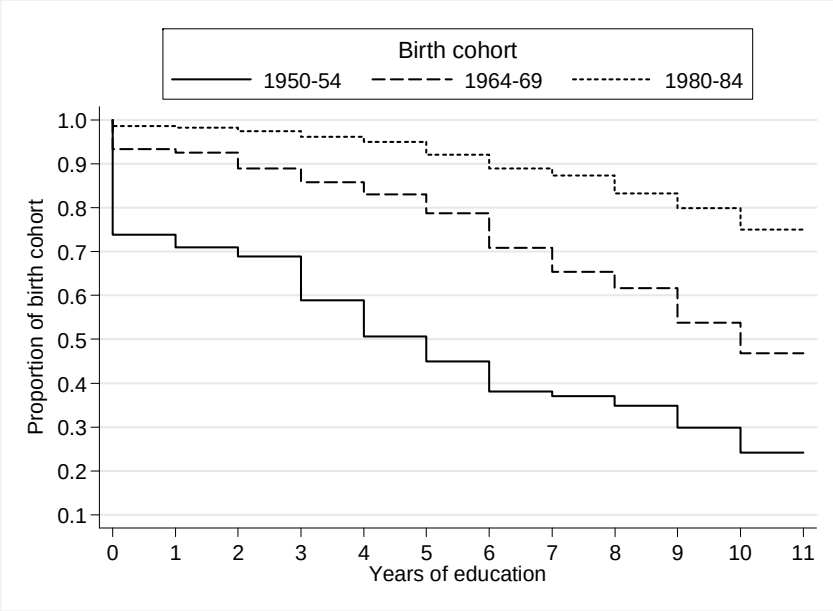

Source: Authors' analysis using data from the 2005 DHS.
Note: These are plots of Kaplan-Meier survivor functions. The plots indicate the proportion of individuals in each birth cohort who achieved *at least* the indicated number of years of education.

## Figure 4: Survival Plot for Education by Wealth Quintile

**Poorest Quintile**

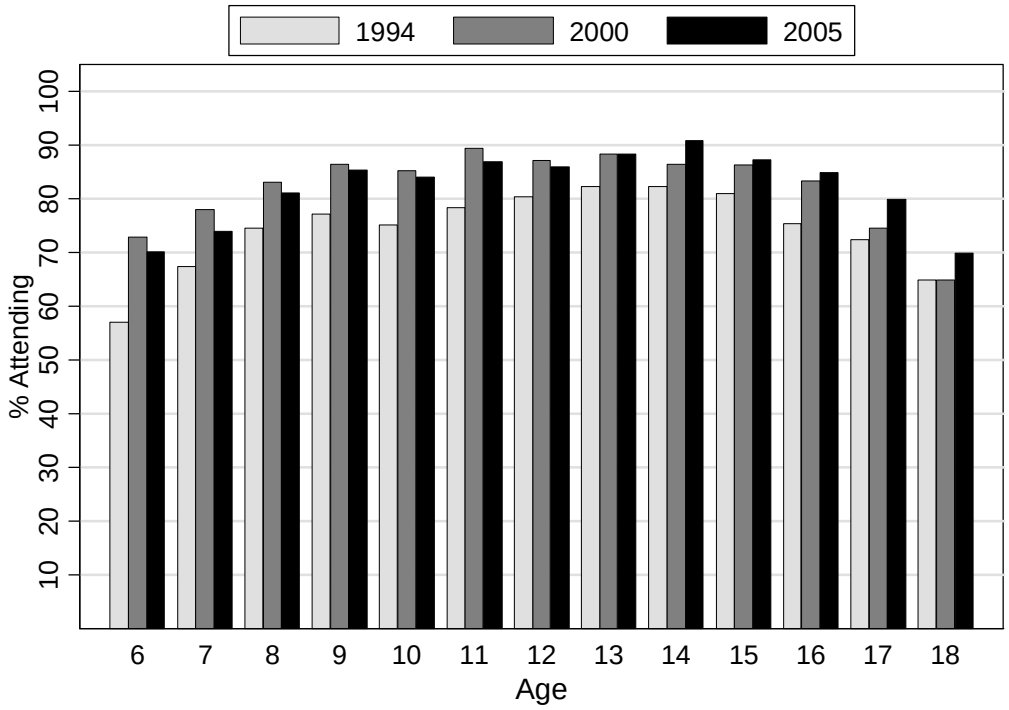



**Wealthiest Quintile**



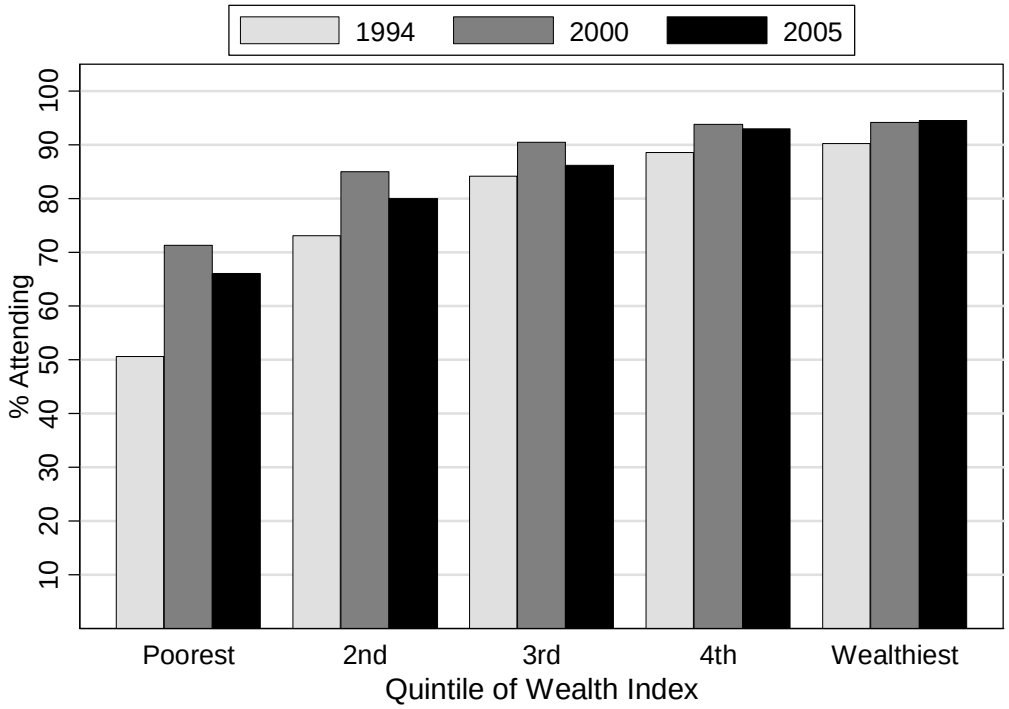

Source: Authors' analysis using data from the 2005 DHS.
Note: These are plots of Kaplan-Meier survivor functions. The plots indicate the proportion of individuals in each birth cohort who achieved *at least* the indicated number of years of education. Quintiles are calculated using an wealth index. Because the wealth index is calculated using the individual's household information as an adult in 2005 (rather than during the childhood of his/her cohort), the observed relationships reflect in part the causal effect of education on wealth.

**Figure 5: Percent of Population Attending School By Age 1994, 2000, and 2005**




Source: DHS 1994/95, 2000, and 2005.

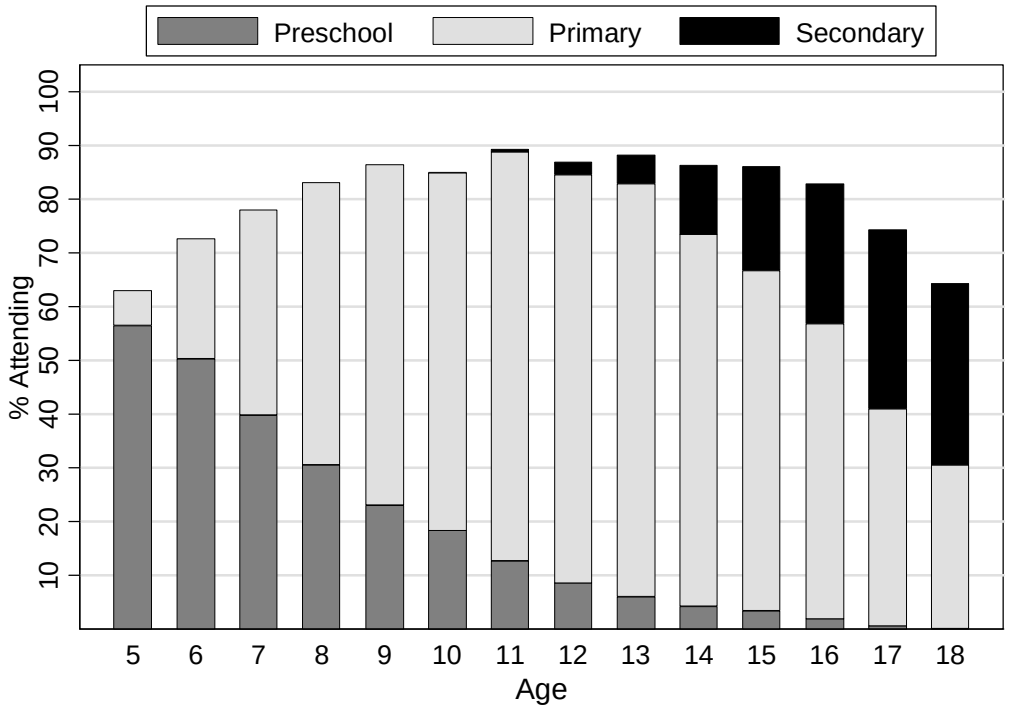
**Figure 6: School Attendance by Quintiles of the Wealth Index**



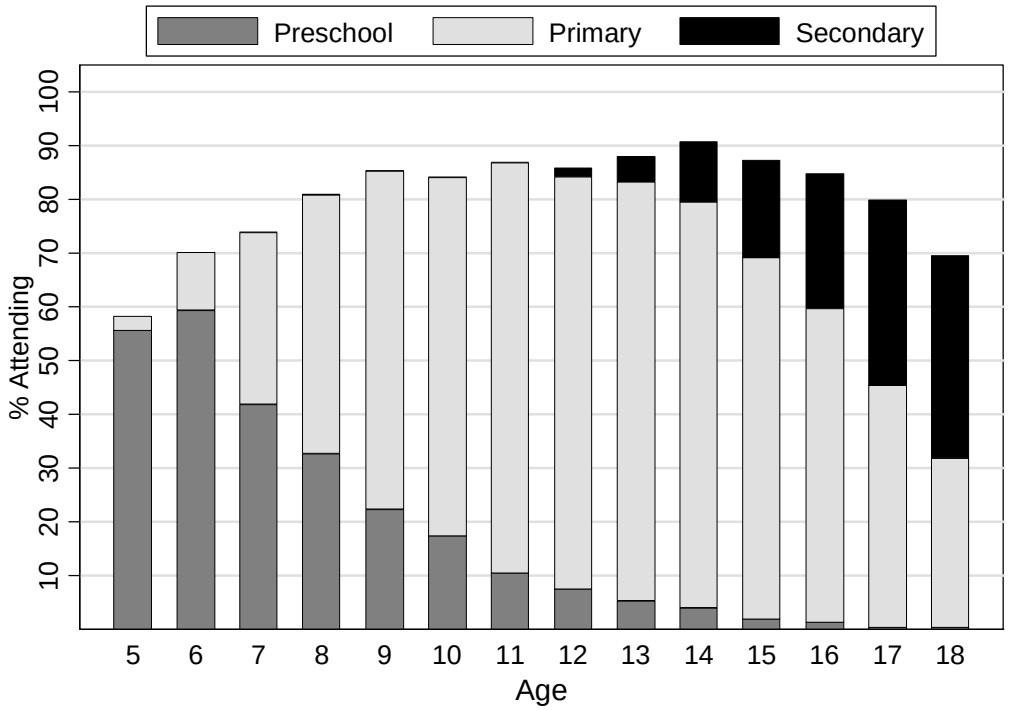

Source: Author's analysis using data from the DHS.

**Figure 7: Percent of Population Attending School By Age and Level Attending**

**2000**




**2005**




Source: DHS 2000 and 2005.

## Table 1: Characteristics of Schools in Haiti

| School characteristic | All schools | Private schools | Public schools | Rural schools | Urban schools |
|---|---|---|---|---|---|
| Public | 8% | - | - | 8% | 9% |
| Urban | 32% | 32% | 37% | - | - |
| School has management committee | 60% | 59% | 80% | 59% | 64% |
| School has parent committee | 65% | 63% | 84% | 70% | 54% |
| School has license | 7% | 8% | 3% | 3% | 17% |
| School has school feeding program | 14% | 12% | 35% | 13% | 15% |
| School has multigrade classrooms | 54% | 57% | 26% | 60% | 42% |
| Mean number of classrooms | 4.23 | 3.99 | 6.84 | 3.6 | 5.55 |
| Mean number of teachers | 4.16 | 3.92 | 6.64 | 3.45 | 5.61 |
| Average age of teachers in school | 32 | 31 | 40 | 32 | 33 |
| % of teachers trained | 14% | 11% | 38% | 7% | 27% |
| % of teachers who are men | 69% | 70% | 56% | 74% | 59% |
| Students per teacher | 31 | 30 | 47 | 32 | 30 |
| Class size (number of students per class) | 33 | 31 | 48 | 33 | 31 |
| Average annual fees (Haitian gourdes) | 777 | 777 | - | 458 | 1469 |

Source: Authors' analysis of Haiti 2003 school census data.

## Table 2: School Attendance Rates

| | % of children ages 6-14 attending school | | |
|---|---|---|---|
| | 1994/95 | 2000 | 2005 |
| *Panel A: School attendance, by area of residence* | | | |
| Rural | 67% | 83% | 80% |
| Urban | 86% | 93% | 91% |
| *Panel B: School attendance, by gender* | | | |
| Girls | 74% | 87% | 85% |
| Boys | 74% | 85% | 82% |
| All children 6-14 | 74% | 86% | 83% |

Source: Author's analysis using DHS data.
Note: The school attendance rate is defined as the percentage of children ages 6-14 attending pre-school, primary, or secondary school.

## Table 3: Determinants of School Attendance

| | Dependent variable: School attendance | | | |
|---|---|---|---|---|
| | 1994 | 2000 | 2005 | All years pooled |
| Gender (1=male) | 0.024 | 0.001 | -0.013 | 0.000 |
| | (0.012)** | (0.006) | (0.006)** | (0.004) |
| Age | 0.120 | 0.091 | 0.070 | 0.088 |
| | (0.019)*** | (0.010)*** | (0.009)*** | (0.007)*** |
| Age squared | -0.005 | -0.004 | -0.003 | -0.004 |
| | (0.001)*** | (0.001)*** | (0.000)*** | (0.000)*** |
| Both parents at home dummy | 0.204 | 0.109 | 0.050 | 0.095 |
| | (0.020)*** | (0.012)*** | (0.007)*** | (0.007)*** |
| Number of of household members | -0.011 | -0.006 | -0.013 | -0.010 |
| | (0.003)*** | (0.002)*** | (0.001)*** | (0.001)*** |
| Maximum years of education completed in the household | 0.015 | 0.009 | 0.016 | 0.013 |
| | (0.002)*** | (0.001)*** | (0.001)*** | (0.001)*** |
| Wealth index | 0.042 | 0.026 | 0.014 | 0.023 |
| | (0.007)*** | (0.004)*** | (0.004)*** | (0.003)*** |
| Average wealth index for cluster | 0.017 | -0.005 | 0.008 | 0.005 |
| | (0.012) | (0.007) | (0.005) | (0.004) |
| Urban dummy | -0.057 | 0.009 | -0.003 | -0.006 |
| | (0.036) | (0.016) | (0.012) | (0.010) |
| Year=2000 | | | | 0.065 |
| | | | | (0.009)*** |
| Year=2005 | | | | 0.071 |
| | | | | (0.010)*** |
| Mean value of dependent variable | 0.795 | 0.876 | 0.865 | 0.855 |
| Chow test for difference in coefficients across regressions | $Chi^2$ (18) = 136.92 Prob>$Chi^2$ =0.000 | | | |
| Observations | 5633 | 10578 | 10790 | 27001 |
| Pseudo R-sq | 0.15 | 0.09 | 0.12 | 0.11 |

Regressions are computed for children between 6 and 14 years old. Robust standard errors clustered at the cluster level in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%
Note: Mean values of the dependent variable differ from the attendance rates shown in Table 2 because the regressions do not include observations with missing values of the explanatory variables.

## Table 4: School Attendance and the Characteristics of the School Supply

| | Dependent variable: School attendance | | | | | |
|---|---|---|---|---|---|---|
| Gender (1=male) | -0.000 | -0.000 | -0.000 | 0.000 | 0.000 | 0.009 |
| | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.006) |
| Age | 0.087 | 0.087 | 0.088 | 0.088 | 0.088 | 0.100 |
| | (0.007)*** | (0.007)*** | (0.007)*** | (0.007)*** | (0.007)*** | (0.009)*** |
| Age squared | -0.004 | -0.004 | -0.004 | -0.004 | -0.004 | -0.004 |
| | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** |
| Both parents at home dummy | 0.097 | 0.096 | 0.096 | 0.095 | 0.095 | 0.140 |
| | (0.007)*** | (0.007)*** | (0.007)*** | (0.007)*** | (0.007)*** | (0.011)*** |
| Number of of household members | -0.009 | -0.009 | -0.009 | -0.010 | -0.010 | -0.007 |
| | (0.001)*** | (0.001)*** | (0.001)*** | (0.001)*** | (0.001)*** | (0.001)*** |
| Maximum years of education completed in the household | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.011 |
| | (0.001)*** | (0.001)*** | (0.001)*** | (0.001)*** | (0.001)*** | (0.001)*** |
| Wealth index | 0.023 | 0.023 | 0.023 | 0.023 | 0.023 | 0.032 |
| | (0.003)*** | (0.003)*** | (0.003)*** | (0.003)*** | (0.003)*** | (0.003)*** |
| Average wealth index for cluster | 0.007 | 0.006 | 0.006 | 0.006 | 0.009 | -0.002 |
| | (0.004) | (0.004) | (0.004) | (0.004) | (0.005)** | (0.006) |
| Urban dummy | -0.012 | -0.013 | -0.013 | -0.003 | -0.001 | -0.009 |
| | (0.012) | (0.012) | (0.011) | (0.010) | (0.010) | (0.016) |
| # schools per school-age children in area population | 3.987 | | | | | |
| | (1.121)*** | | | | | |
| # classes per school-age children in area population | | 0.491 | | | | |
| | | (0.191)** | | | | |
| # teachers per school-age children in area population | | | 0.432 | | | |
| | | | (0.199)** | | | |
| # trained teachers per school-age children in area population | | | | -0.495 | | |
| | | | | (0.382) | | |
| Log(Average annual fees in area) | | | | | -0.012 | |
| | | | | | (0.006)** | |
| Travel time to closest school (minutes) | | | | | | -0.001 |
| | | | | | | (0.000)*** |
| Year=2000 | 0.057 | 0.062 | 0.062 | 0.065 | 0.062 | 0.070 |
| | (0.009)*** | (0.009)*** | (0.009)*** | (0.009)*** | (0.009)*** | (0.011)*** |
| Year=2005 | 0.063 | 0.068 | 0.068 | 0.071 | 0.068 | |
| | (0.009)*** | (0.009)*** | (0.009)*** | (0.010)*** | (0.010)*** | |
| Observations | 26871 | 26966 | 26966 | 26966 | 27001 | 16211 |
| Pseudo R-sq | 0.12 | 0.12 | 0.12 | 0.11 | 0.11 | 0.13 |

Robust standard errors clustered at the cluster level in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

**Table 5: Average Age of Children Attending by Primary School Grade**

| Grade | Rural | Urban | National |
|---|---|---|---|
| 1 | 10.3 | 8.9 | 9.8 |
| 2 | 11.9 | 10.8 | 11.6 |
| 3 | 13.3 | 12.0 | 12.8 |
| 4 | 14.3 | 12.8 | 13.6 |
| 5 | 15.7 | 14.3 | 15.1 |
| 6 | 16.5 | 15.3 | 15.9 |

Source: Author's analysis using data from the 2005 DHS.

## Table 6: Determinants of School Fees

| | Dependent variable.: log(average school fees) | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| *School infrastructure* | | | | | |
| School has a library | 0.091 | 0.084 | 0.084 | 0.084 | 0.083 |
| | (0.037)** | (0.035)** | (0.035)** | (0.035)** | (0.035)** |
| School has an office for the principal | 0.255 | 0.170 | 0.171 | 0.168 | 0.168 |
| | (0.030)*** | (0.024)*** | (0.024)*** | (0.024)*** | (0.025)*** |
| # of offices per teacher | 0.058 | 0.048 | 0.047 | 0.047 | 0.046 |
| | (0.029)** | (0.026)* | (0.026)* | (0.026)* | (0.026)* |
| # of tables per teacher | 0.178 | 0.158 | 0.158 | 0.158 | 0.158 |
| | (0.025)*** | (0.021)*** | (0.021)*** | (0.021)*** | (0.021)*** |
| # of chairs per teacher | 0.080 | 0.090 | 0.091 | 0.091 | 0.091 |
| | (0.023)*** | (0.020)*** | (0.020)*** | (0.020)*** | (0.020)*** |
| Class size (# students per class) | -0.004 | -0.002 | -0.002 | -0.002 | -0.002 |
| | (0.001)*** | (0.001)** | (0.001)** | (0.001)** | (0.001)*** |
| School has kitchen | -0.003 | 0.040 | 0.039 | 0.038 | 0.037 |
| | (0.030) | (0.025) | (0.025) | (0.025) | (0.025) |
| School has electricity | 0.362 | 0.188 | 0.187 | 0.188 | 0.188 |
| | (0.047)*** | (0.039)*** | (0.039)*** | (0.038)*** | (0.038)*** |
| School has latrine | 0.212 | 0.142 | 0.143 | 0.142 | 0.140 |
| | (0.033)*** | (0.030)*** | (0.031)*** | (0.030)*** | (0.031)*** |
| School has bathrooms | 0.197 | 0.191 | 0.192 | 0.191 | 0.192 |
| | (0.031)*** | (0.028)*** | (0.028)*** | (0.028)*** | (0.029)*** |
| School has sports areas | 0.030 | 0.051 | 0.051 | 0.050 | 0.049 |
| | (0.048) | (0.047) | (0.047) | (0.047) | (0.047) |
| School has recreation areas | -0.053 | -0.001 | -0.001 | -0.002 | -0.001 |
| | (0.038) | (0.029) | (0.029) | (0.029) | (0.029) |
| *School administrative quality* | | | | | |
| School has preschool | 0.087 | 0.029 | 0.029 | 0.029 | 0.029 |
| | (0.037)** | (0.028) | (0.028) | (0.028) | (0.028) |
| Number of shifts available | 0.072 | -0.041 | -0.040 | -0.042 | -0.042 |
| | (0.066) | (0.067) | (0.067) | (0.067) | (0.067) |
| School has management committee | 0.132 | 0.115 | 0.114 | 0.113 | 0.112 |
| | (0.029)*** | (0.026)*** | (0.026)*** | (0.027)*** | (0.027)*** |
| Scholl has parent committee | -0.102 | -0.006 | -0.006 | -0.006 | -0.006 |
| | (0.033)*** | (0.029) | (0.029) | (0.029) | (0.029) |
| School has a license | 0.329 | 0.273 | 0.274 | 0.274 | 0.274 |
| | (0.039)*** | (0.045)*** | (0.045)*** | (0.046)*** | (0.046)*** |
| School is managed by an independent/secular group | 0.259 | 0.211 | 0.210 | 0.210 | 0.211 |
| | (0.030)*** | (0.024)*** | (0.024)*** | (0.024)*** | (0.024)*** |
| School is managed by a community group | -0.132 | -0.149 | -0.149 | -0.149 | -0.149 |
| | (0.046)*** | (0.034)*** | (0.034)*** | (0.034)*** | (0.034)*** |
| *Teachers' characteristics* | | | | | |
| Teacher-student ratio | 0.185 | -0.039 | -0.032 | -0.032 | -0.012 |
| | (0.451) | (0.370) | (0.370) | (0.372) | (0.371) |
| % of teachers trained | 0.434 | 0.292 | 0.292 | 0.291 | 0.292 |
| | (0.058)*** | (0.042)*** | (0.042)*** | (0.042)*** | (0.042)*** |
| *Market size and concentration* | | | | | |
| log(# of students in the *section communale*) | 0.211 | 0.074 | 0.078 | 0.094 | 0.092 |
| | (0.017)*** | (0.034)** | (0.042)* | (0.038)** | (0.045)** |
| Adjusted Herfindahl-Hirschman | | | 0.012 | | -0.151 |
| | | | (0.514) | | (0.504) |
| Square of the share of the local market controlled by the school | | | | 0.777 | 1.246 |
| | | | | (0.351)** | (0.508)** |
| Constant | 3.440 | 4.783 | 4.749 | 4.615 | 4.634 |
| | (0.161)*** | (0.300)*** | (0.381)*** | (0.337)*** | (0.399)*** |
| Commune/urban dummies | No | Yes | Yes | Yes | Yes |
| Observations | 11505 | 11505 | 11498 | 11505 | 11498 |
| Number of commune/urban | | 261 | 261 | 261 | 261 |
| R-squared (overall) | | 0.41 | 0.41 | 0.42 | 0.42 |
| R-squared (within) | 0.44 | 0.15 | 0.15 | 0.15 | 0.15 |
| R-squared (between) | | 0.49 | 0.49 | 0.48 | 0.46 |
| ρ | | 0.30 | 0.30 | 0.30 | 0.30 |

Robust standard errors clustered at the commune/urban level in parentheses.* significant at 10%;** significant at 5%;*** significant at 1%

# APPENDIX

## Table A. 1: Detail on the Owners of Schools in Haiti

| Category | Frequency | Percent |
|---|---|---|
| Public | 1,240 | 8% |
| Secular independent | 4,225 | 28% |
| Congregation | 783 | 5% |
| Community | 674 | 4% |
| Communitarian | 1,806 | 12% |
| Presbyterian | 885 | 6% |
| Protestant (Independent) | 2,669 | 18% |
| Protestant (Mission) | 2,765 | 18% |
| Others | 176 | 1% |
| Total | 15,223 | 100 |

Source: Authors' analysis of 2003 School Census.

## Table A.2: Descriptive Statistics for School Attendance Children in School Age (6-14)

| | Obs | Mean | Pooled s.d. | Min | Max |
|---|---|---|---|---|---|
| School attendance | 29497 | 0.82 | 0.38 | 0.00 | 1.00 |
| =1 if child attends school over-aged | 16787 | 0.75 | 0.43 | 0.00 | 1.00 |
| Gender (1=male) | 29552 | 0.50 | 0.50 | 0.00 | 1.00 |
| Age | 29552 | 9.92 | 2.57 | 6.00 | 14.00 |
| Age squared | 29552 | 104.97 | 51.40 | 36.00 | 196.00 |
| Both parents at home | 29552 | 0.63 | 0.48 | 0.00 | 1.00 |
| Maximum years of education completed in the HH | 27186 | 6.23 | 3.81 | 0.00 | 21.00 |
| # of household members | 29552 | 6.84 | 2.66 | 1.00 | 27.00 |
| Wealth index | 29415 | -0.16 | 1.96 | -2.53 | 6.35 |
| Average wealth index for cluster | 29415 | -0.20 | 1.65 | -2.51 | 4.47 |
| Urban | 29552 | 0.34 | 0.47 | 0.00 | 1.00 |
| # schools per pop in school age | 29421 | 0.00 | 0.00 | 0.00 | 0.04 |
| # Classes per pop in school age | 29517 | 0.02 | 0.02 | 0.00 | 0.28 |
| # of teachers per pop in school age | 29517 | 0.02 | 0.02 | 0.00 | 0.31 |
| # of trained teachers per pop in school age | 29517 | 0.00 | 0.01 | 0.00 | 0.09 |
| Log(Average annual fees) | 29552 | 5.97 | 0.91 | 0.00 | 7.75 |
| Travel time to the closest school | 17901 | 10.96 | 43.19 | 0.00 | 420.00 |
| year== 1994 | 29552 | 0.21 | 0.41 | 0.00 | 1.00 |
| year== 2000 | 29552 | 0.39 | 0.49 | 0.00 | 1.00 |
| year== 2005 | 29552 | 0.40 | 0.49 | 0.00 | 1.00 |

Source: Author's analysis using data from three rounds of the DHS survey merged with 2003 School Census.

**Table A.3:**
**Descriptive Statistics for Children in School Age (6-14) in Each Survey**

| | 1994 | | | | | 2000 | | | | | 2005 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Obs | Mean | s.d. | Min | Max | Obs | Mean | s.d. | Min | Max | Obs | Mean | s.d. | Min | Max |
| School attendance | 6009 | 0.74 | 0.44 | 0.00 | 1.00 | 11849 | 0.86 | 0.35 | 0.00 | 1.00 | 11639 | 0.83 | 0.37 | 0.00 | 1.00 |
| =1 if child attends school over-aged | 4484 | 0.75 | 0.43 | 0.00 | 1.00 | 6521 | 0.73 | 0.44 | 0.00 | 1.00 | 5782 | 0.78 | 0.42 | 0.00 | 1.00 |
| Gender (1=male) | 6049 | 0.49 | 0.50 | 0.00 | 1.00 | 11852 | 0.50 | 0.50 | 0.00 | 1.00 | 11651 | 0.50 | 0.50 | 0.00 | 1.00 |
| Age | 6049 | 9.89 | 2.57 | 6.00 | 14.00 | 11852 | 9.91 | 2.58 | 6.00 | 14.00 | 11651 | 9.94 | 2.56 | 6.00 | 14.00 |
| Age squared | 6049 | 104.32 | 51.26 | 36.00 | 196.00 | 11852 | 104.92 | 51.69 | 36.00 | 196.00 | 11651 | 105.38 | 51.18 | 36.00 | 196.00 |
| Both parents at home | 6049 | 0.75 | 0.43 | 0.00 | 1.00 | 11852 | 0.77 | 0.42 | 0.00 | 1.00 | 11651 | 0.42 | 0.49 | 0.00 | 1.00 |
| Maximum years of education completed in the HH | 5688 | 5.56 | 3.89 | 0.00 | 17.00 | 10644 | 6.11 | 3.63 | 0.00 | 21.00 | 10854 | 6.71 | 3.87 | 0.00 | 17.00 |
| # of household members | 6049 | 7.25 | 2.92 | 2.00 | 25.00 | 11852 | 6.80 | 2.56 | 2.00 | 21.00 | 11651 | 6.65 | 2.59 | 1.00 | 27.00 |
| Wealth index | 6034 | -0.29 | 2.05 | -2.53 | 5.86 | 11784 | -0.21 | 1.90 | -2.53 | 5.84 | 11597 | -0.05 | 1.97 | -2.53 | 6.35 |
| Average wealth index for cluster | 6034 | -0.37 | 1.75 | -2.51 | 4.47 | 11784 | -0.26 | 1.61 | -2.50 | 3.99 | 11597 | -0.04 | 1.62 | -2.37 | 4.41 |
| Urban | 6049 | 0.34 | 0.47 | 0.00 | 1.00 | 11852 | 0.32 | 0.47 | 0.00 | 1.00 | 11651 | 0.35 | 0.48 | 0.00 | 1.00 |
| # schools per pop in school age | 6014 | 0.00 | 0.00 | 0.00 | 0.02 | 11822 | 0.01 | 0.00 | 0.00 | 0.04 | 11585 | 0.00 | 0.00 | 0.00 | 0.04 |
| # Classes per pop in school age | 6014 | 0.02 | 0.01 | 0.00 | 0.18 | 11852 | 0.02 | 0.02 | 0.00 | 0.28 | 11651 | 0.02 | 0.02 | 0.00 | 0.28 |
| # of teachers per pop in school age | 6014 | 0.01 | 0.01 | 0.00 | 0.18 | 11852 | 0.02 | 0.02 | 0.00 | 0.31 | 11651 | 0.02 | 0.02 | 0.00 | 0.31 |
| # of trained teachers per pop in school age | 6014 | 0.00 | 0.00 | 0.00 | 0.04 | 11852 | 0.00 | 0.01 | 0.00 | 0.09 | 11651 | 0.00 | 0.00 | 0.00 | 0.09 |
| Log(Average annual fees) | 6049 | 6.02 | 0.96 | 4.13 | 7.59 | 11852 | 5.95 | 0.90 | 0.00 | 7.75 | 11651 | 5.97 | 0.90 | 0.00 | 7.71 |
| Travel time to the closest school | 6049 | 17.81 | 54.51 | 0.00 | 360.00 | 11852 | 7.18 | 34.86 | 0.00 | 420.00 | | | | | |

Source: Author's calculations using DHS data merged with 2003 school census data.

**Table A.4: Coefficients on Each of the Assets from the Principal Component Analysis**

| | Pooled sample (19954/95, 2000, 2005) |
|---|---|
| Radio | 0.30 |
| Refrigerator | 0.30 |
| Television | 0.39 |
| Bicycle | 0.13 |
| Motorcycle/scooter | 0.08 |
| Car | 0.21 |
| Drinking water from pump/well | 0.02 |
| Drinking water from spring,river,lake,dam,rain | -0.29 |
| Drinking water from other source | 0.17 |
| Flush toilet | 0.21 |
| Pit toilet | 0.24 |
| No toilet | -0.34 |
| Electricity | 0.39 |
| Finished floors | 0.33 |
| % of variance explained | 29.63% |

## Table A.5: Determinants of School Attendance – Rural Sample

| | Dependent variable: School attendance | | | | | |
|---|---|---|---|---|---|---|
| Gender (1=male) | -0.015 | -0.016 | -0.015 | -0.015 | -0.015 | -0.015 |
| | (0.006)*** | (0.006)*** | (0.006)*** | (0.006)*** | (0.006)*** | (0.006)*** |
| Age | 0.119 | 0.119 | 0.119 | 0.118 | 0.120 | 0.119 |
| | (0.009)*** | (0.009)*** | (0.009)*** | (0.009)*** | (0.009)*** | (0.009)*** |
| Age squared | -0.005 | -0.005 | -0.005 | -0.005 | -0.005 | -0.005 |
| | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** |
| Both parents at home | 0.090 | 0.091 | 0.091 | 0.090 | 0.091 | 0.090 |
| | (0.009)*** | (0.009)*** | (0.009)*** | (0.010)*** | (0.009)*** | (0.009)*** |
| Maximum years of education | 0.019 | 0.018 | 0.018 | 0.018 | 0.019 | 0.019 |
| completed in the HH | (0.002)*** | (0.002)*** | (0.002)*** | (0.002)*** | (0.002)*** | (0.002)*** |
| # of household members | -0.014 | -0.013 | -0.013 | -0.013 | -0.013 | -0.014 |
| | (0.002)*** | (0.002)*** | (0.002)*** | (0.002)*** | (0.002)*** | (0.002)*** |
| Wealth index | 0.035 | 0.035 | 0.035 | 0.035 | 0.035 | 0.035 |
| | (0.004)*** | (0.004)*** | (0.004)*** | (0.004)*** | (0.004)*** | (0.004)*** |
| Wealth index | 0.034 | 0.032 | 0.031 | 0.030 | 0.040 | 0.035 |
| | (0.009)*** | (0.009)*** | (0.008)*** | (0.008)*** | (0.009)*** | (0.009)*** |
| Average annual fees | | | | | | -0.004 |
| | | | | | | (0.009) |
| # of trained teachers per pop in school age | | | | | -5.145 | |
| | | | | | (1.551)*** | |
| # of teachers per pop in school age | | | | 1.319 | | |
| | | | | (1.041) | | |
| # Classes per pop in school age | | | 1.016 | | | |
| | | | (0.939) | | | |
| # schools per pop in school age | | 5.130 | | | | |
| | | (3.431) | | | | |
| year== 2000.0000 | 0.073 | 0.066 | 0.069 | 0.069 | 0.074 | 0.073 |
| | (0.014)*** | (0.015)*** | (0.014)*** | (0.014)*** | (0.014)*** | (0.014)*** |
| year== 2005.0000 | 0.060 | 0.052 | 0.056 | 0.056 | 0.058 | 0.059 |
| | (0.014)*** | (0.016)*** | (0.015)*** | (0.015)*** | (0.014)*** | (0.014)*** |
| Observations | 16858 | 16823 | 16823 | 16823 | 16823 | 16858 |
| Pseudo R-sq | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 |

Robust standard errors clustered at the cluster level in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

## Table A.6: Determinants of School Attendance – Urban Sample

| | Dependent variable: School attendance | | | | | |
|---|---|---|---|---|---|---|
| Gender (1=male) | 0.016 | 0.016 | 0.016 | 0.016 | 0.016 | 0.016 |
| | (0.005)*** | (0.005)*** | (0.005)*** | (0.005)*** | (0.005)*** | (0.005)*** |
| Age | 0.035 | 0.035 | 0.035 | 0.035 | 0.035 | 0.035 |
| | (0.008)*** | (0.008)*** | (0.008)*** | (0.008)*** | (0.008)*** | (0.008)*** |
| Age squared | -0.002 | -0.002 | -0.002 | -0.002 | -0.002 | -0.002 |
| | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** |
| Both parents at home | 0.094 | 0.096 | 0.094 | 0.094 | 0.093 | 0.094 |
| | (0.008)*** | (0.008)*** | (0.008)*** | (0.008)*** | (0.008)*** | (0.008)*** |
| Maximum years of education | 0.007 | 0.007 | 0.007 | 0.007 | 0.007 | 0.007 |
| completed in the HH | (0.001)*** | (0.001)*** | (0.001)*** | (0.001)*** | (0.001)*** | (0.001)*** |
| # of household members | -0.003 | -0.003 | -0.003 | -0.003 | -0.003 | -0.003 |
| | (0.001)*** | (0.001)*** | (0.001)*** | (0.001)*** | (0.001)*** | (0.001)*** |
| Wealth index | 0.014 | 0.014 | 0.014 | 0.014 | 0.014 | 0.014 |
| | (0.003)*** | (0.003)*** | (0.003)*** | (0.003)*** | (0.003)*** | (0.003)*** |
| Average wealth index for cluster | -0.013 | -0.012 | -0.012 | -0.012 | -0.013 | -0.010 |
| | (0.003)*** | (0.003)*** | (0.003)*** | (0.003)*** | (0.003)*** | (0.005)** |
| Average annual fees | | | | | | -0.006 |
| | | | | | | (0.009) |
| # of trained teachers per pop in | | | | | -0.269 | |
| school age | | | | | (0.210) | |
| # of teachers per pop in school | | | | 0.050 | | |
| age | | | | (0.076) | | |
| # Classes per pop in school age | | | 0.071 | | | |
| | | | (0.084) | | | |
| # schools per pop in school age | | 0.600 | | | | |
| | | (0.582) | | | | |
| year== 2000.0000 | 0.033 | 0.031 | 0.033 | 0.033 | 0.033 | 0.031 |
| | (0.007)*** | (0.007)*** | (0.007)*** | (0.007)*** | (0.007)*** | (0.008)*** |
| year== 2005.0000 | 0.058 | 0.057 | 0.057 | 0.057 | 0.058 | 0.056 |
| | (0.008)*** | (0.008)*** | (0.008)*** | (0.008)*** | (0.008)*** | (0.008)*** |
| Observations | 10143 | 10048 | 10143 | 10143 | 10143 | 10143 |
| Pseudo R-sq | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 |

Robust standard errors clustered at the cluster level in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

## Table A.7: Descriptive Statistics – School Fees Determinants

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Log(monthly fees charged) | 13656 | 5.90 | 1.25 | 0.00 | 10.53 |
| =1 The school has electricity | 13673 | 0.24 | 0.43 | 0.00 | 1.00 |
| =1 The school has a sports field | 13632 | 0.15 | 0.36 | 0.00 | 1.00 |
| =1 The school has library | 13535 | 0.12 | 0.32 | 0.00 | 1.00 |
| =1 The school has recreation fields | 13738 | 0.78 | 0.42 | 0.00 | 1.00 |
| =1 The school has Salons de Toilettes | 13983 | 0.14 | 0.35 | 0.00 | 1.00 |
| =1 The school has office for the principal | 13521 | 0.41 | 0.49 | 0.00 | 1.00 |
| =1 The school has Cuisine | 13983 | 0.18 | 0.38 | 0.00 | 1.00 |
| =1 The school has latrine | 13983 | 0.73 | 0.45 | 0.00 | 1.00 |
| Class size - # students per class | 13897 | 31.17 | 20.50 | 0.00 | 377.00 |
| # of offices per teacher | 13757 | 0.30 | 0.49 | 0.00 | 7.00 |
| # of tables per teacher | 13746 | 0.67 | 0.71 | 0.00 | 8.00 |
| # of chairs per teacher | 13747 | 0.66 | 0.74 | 0.00 | 10.00 |
| Has preschool | 13896 | 0.55 | 0.50 | 0.00 | 1.00 |
| Number of shifts | 13896 | 1.03 | 0.17 | 1.00 | 2.00 |
| Management committee? | 13837 | 0.59 | 0.49 | 0.00 | 1.00 |
| Parent committee? | 13911 | 0.63 | 0.48 | 0.00 | 1.00 |
| =1 if the school has a license | 13983 | 0.08 | 0.26 | 0.00 | 1.00 |
| School is managed by independent and secular groups | 13983 | 0.30 | 0.46 | 0.00 | 1.00 |
| School is managed by community groups | 13983 | 0.18 | 0.38 | 0.00 | 1.00 |
| School is managed by religious groups | 13983 | 0.51 | 0.50 | 0.00 | 1.00 |
| Teacher-student ratio | 13896 | 0.05 | 0.04 | 0.00 | 1.00 |
| % of teachers trained (vs. hired) | 12524 | 0.11 | 0.25 | 0.00 | 1.00 |
| log(# of students in the *section communale*) | 13983 | 8.56 | 1.43 | 2.08 | 11.74 |
| Adjusted Herfindahl-Hirschman Index | 13974 | 0.03 | 0.03 | 0.00 | 0.52 |
| Square of the share of the local market owned by the school | 13897 | 0.01 | 0.03 | 0.00 | 1.00 |

Source:Authors' analysis of 2003 school census.

## Table A. 8: Determinants of School Fees

| | Dependent var.: log(average school fees) | | |
|---|---|---|---|
| | Independent | Community | Religious |
| *School infrastructure* | | | |
| *Chow test for difference in coefficients* | | *F( 24, 260) = 2.87 Prob > F = 0.0000* | |
| =1 The school has libraries | 0.220 | -0.051 | 0.027 |
| | (0.046)*** | (0.115) | (0.043) |
| =1 The school has an office for the principal | 0.209 | 0.181 | 0.142 |
| | (0.036)*** | (0.063)*** | (0.032)*** |
| # of offices per teacher | 0.077 | -0.070 | 0.045 |
| | (0.038)** | (0.050) | (0.034) |
| # of tables per teacher | 0.148 | 0.235 | 0.150 |
| | (0.032)*** | (0.060)*** | (0.026)*** |
| # of chairs per teacher | 0.071 | 0.153 | 0.091 |
| | (0.030)** | (0.061)** | (0.023)*** |
| Class size - # students per class | -0.001 | -0.001 | -0.003 |
| | (0.001) | (0.001) | (0.001)*** |
| =1 The school has kitchen | 0.025 | -0.033 | 0.077 |
| | (0.049) | (0.086) | (0.032)** |
| =1 The school has electricity | 0.186 | 0.465 | 0.114 |
| | (0.058)*** | (0.116)*** | (0.045)** |
| =1 The school has latrine | 0.166 | 0.122 | 0.146 |
| | (0.050)*** | (0.062)* | (0.043)*** |
| =1 The school has bathrooms | 0.150 | 0.286 | 0.191 |
| | (0.037)*** | (0.099)*** | (0.043)*** |
| =1 The school has sports areas | 0.048 | 0.049 | 0.053 |
| | (0.046) | (0.085) | (0.057) |
| =1 The school has recreation areas | -0.013 | -0.149 | 0.034 |
| | (0.031) | (0.076)* | (0.037) |
| *School administrative quality* | | | |
| *Chow test for difference in coefficients* | | *F( 10, 260) = 2.21 Prob > F = 0.0178* | |
| =1 Has preschool | 0.054 | 0.065 | -0.003 |
| | (0.045) | (0.073) | (0.036) |
| Number of shifts available | -0.118 | -0.012 | 0.005 |
| | (0.082) | (0.165) | (0.083) |
| =1 Management committee | 0.022 | 0.125 | 0.142 |
| | (0.033) | (0.067)* | (0.033)*** |
| =1 Parent committee | -0.040 | 0.054 | 0.010 |
| | (0.042) | (0.062) | (0.034) |
| =1 if the school has a license | 0.224 | 0.336 | 0.281 |
| | (0.052)*** | (0.134)** | (0.065)*** |
| *Teachers' characteristics* | | | |
| *Chow test for difference in coefficients* | | *F( 4, 260) =2.16 Prob > F=0.0734* | |
| Teacher-student ratio | -0.256 | -1.387 | 0.223 |
| | (0.556) | (0.879) | (0.415) |
| % of teachers trained (vs. hired) | 0.378 | 0.269 | 0.236 |
| | (0.054)*** | (0.182) | (0.059)*** |
| *Market size and concentration measures* | | | |
| *Chow test for difference in coefficients* | | *F( 6, 260) = 1.19 Prob > F = 0.3142* | |
| log(# of students in the *section communale*) | 0.091 | 0.002 | 0.135 |
| | (0.079) | (0.065) | (0.045)*** |
| | -0.723 | -0.610 | 0.300 |
| Adjusted Herfindahl-Hirschman Index | (0.775) | (0.999) | (0.718) |
| Square of the share of the local market owned | 0.575 | 1.518 | 1.294 |
| by the school | (0.930) | (1.103) | (0.646)** |
| Constant | 5.110 | 5.098 | 4.176 |
| | (0.709)*** | (0.593)*** | (0.421)*** |
| Commune/urban dummies | Yes | Yes | Yes |
| *Chow test for difference in coefficients* | *F( 44, 260) = 14.02* | *Prob > F = 0.0000* | |
| Observations | 3509 | 1883 | 5964 |
| Number of group(commune urban) | 240 | 203 | 257 |
| R-squared (overall) | 0.51 | 0.25 | 0.33 |
| R-squared (within) | 0.18 | 0.14 | 0.12 |
| R-squared (between) | 0.45 | 0.21 | 0.36 |
| ρ | 0.43 | 0.44 | 0.32 |

Robust standard errors clustered at the commune/urban level in parentheses.* significant at 10%;** significant at 5%;*** significant at 1%