The Determinants of Child Schooling in Nigeria

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Contents

List of tables

List of figures

Abstract

This study explores the determinants of child schooling in Nigeria and takes current enrolment and delayed entry into schools as measures of schooling outcome. The study utilized reduced form relationships for male and female children within urban and rural households. Using data from the 1999 Multiple Indicator Cluster Survey (MICS) of Nigeria, the study found that socioeconomic backgrounds of children are significant determinants of schooling with education of parents being the most important determinant. Educated parents desire more schooling for their children. Our decomposition analysis revealed that the way a household treats boys and girls in urban areas contracts the gender gap in enrolment, while it widens the gap in rural areas.

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1. Introduction

Problem statement

Schooling is widely acknowledged as a major investment in human capital that enhances later career opportunities and wages. It serves as an avenue for escaping poverty and reducing income inequality in an economy. The importance of schooling to a child's social and economic status later in life cannot be overemphasized (Binder, 1998). Unfortunately, in many developing countries children either do not have access to education or are enrolled in schools of questionable quality (Khandker et al., 1994). The objective of any reasonable government is to improve access to primary and secondary schools by investing in educational infrastructure and optimizing the resources allocated to the educational sector. This can only be done effectively by having an insight into the factors that determine the schooling outcomes of children in a household as well as those that impede children's participation in schools. This study is interested in these factors and their effects on schooling outcomes. For individuals, education is a sound economic investment which raises not only the quality of life, but also increases the productivity in market and non-market work and therefore future earnings (CBN, 1997); for both individuals and their families, their perceptions of the benefits that would accrue from such investment is a major determinant of the decision to attend school.

Nigeria embarked on a short-lived Universal Primary Education (UPE) programme in 1976. The programme was supposed to make education free and compulsory for primary school children.[1] Although enrolment rates increased shortly after the introduction of the programme, the economic crisis of the 1980s had negative effects on the education sector of the economy, as successive governments embarked on fiscal restraints. As a result, higher enrolments and education quality could not be maintained, especially at primary school level which had experienced a dramatic expansion following the adoption of the UPE programme. Fees were reintroduced in many schools, further reducing enrolment. The growth in poverty levels in the country also raised the opportunity cost of keeping children in schools when they could be involved in child labour and helping increase household income. This high opportunity cost coupled with increasing direct costs adversely affected the decision of parents to keep their children in school. The Universal Basic Education (UBE) programme was introduced in 2000 as an improved and more comprehensive programme than the UPE programme.[2]

The determinants of child schooling can differ with location of residence. Usually, urban areas are favoured because of higher access to government activities. Rural-urban disparities in schooling are well documented in the literature (Al-Samarai and Reilly,

2000). This can be traced to the disparity in school quality in these areas. If the quality of schooling is an important factor in determining the decision to attend, quality differentials are likely to widen the disparities in attendance rates between urban and rural areas. The persistence of ruralurban disparities in access to schooling can prevent a large number of rural children from exploiting educational opportunities and their capacity to render a significant social contribution. Interestingly, there is evidence of disparities in ruralurban education provision and uptake in Nigeria (FOS, 1998).

Even when children are from the same household, studies have identified that gender differences can be pronounced in school outcomes (Isiugo-Abanihe, 1997). The wage gap between males and females later in life can partly be traced to disparities in the amount of schooling they receive in childhood (Browning, 1992). Girls are often worse off as the opportunity cost of keeping a girl child in school may be higher than that of the male child (Glick and Sahn, 2000).

These disparities are a major policy challenge in Nigeria and thus this study examined the key determinants of schooling outcomes within the context of the ruralurban divide and gender disparities in Nigeria.

Objectives of the study

The broad objective of this study was to examine the determinants of child schooling in Nigeria. This necessitated providing answers to the following questions:

- What are the individual and household determinants of child schooling?
- Are these determinants of child schooling different for male and female children?
- Are these determinants different for rural and urban households?
- What implications do the results in the above three questions suggest for policy?

Justification for the study

There is a general consensus that schooling is an important tool for reducing poverty and increasing social mobility because it is capable of equalizing adult socioeconomic status (Handa, 1996). This is why many less developed countries (LDCs) have devoted a large proportion of their budgets to education. In view of this, our study intended to contribute to the knowledge about who is educated in Nigeria by analysing the determinants of child schooling. Despite the importance of education to the economy in terms of higher earnings, better health, better nutrition, greater labour productivity and faster economic growth, it is difficult to find in the literature, a systematic and comparative account of household determinants of child schooling in Nigeria and the gender and urbanrural differentials in schooling outcomes.

While there are numerous studies on the determinants of schooling in many developing countries such as Ghana, Guinea, Morocco, Vietnam, Mexico and Jamaica (for example Glewwe et al., 1995), there is none that we are aware of for Nigeria. Studies on Nigeria have often focussed on the supply side factors (CBN, 1997) and on returns to education (Okuwa, 2004). Although great hopes are placed on child schooling, there is a dearth

of studies aimed at identifying the conditions under which the education sector has growth and employment potentials. This dearth of studies can be traced to a shortage of comprehensive household level data, at least until recently. In many of the countries for which we have evidence, the studies have often utilized the World Bank's Living Standard Measurement Survey data (Tansel, 1993; Glewwe and Jacoby, 1994).

Education generates substantial private and social benefits to an economy. It is because of the benefits accruing to investment in education that it becomes important to identify the factors underlying decisions regarding education of children. There are differences in perception of households concerning the gender of children. Since the benefits to female education are always argued to be higher (e.g. Alayande et al., 2000), it is necessary to investigate the differential determinants of educating this group of children.

This study is expected to contribute to the scarce literature on who actually is schooled in Nigeria. The results will identify the differentials in the schooling outcomes of rural and urban households, and in gender to provide useful implications for policy interventions on ways of improving child schooling in Nigeria. The research will also help in the design of appropriate policies for encouraging and sustaining child enrolment in Nigeria. To do this we utilized the results of the 1999 Multiple Cluster Indicator Survey (MICS), a joint project by the Federal Office of Statistics (FOS) and the United Nations Children's Fund (UNICEF) (Nigeria). The survey covers a representative national sample of 15,580 households with a total of 74,626 persons (male and female, children and adults). This makes it possible to be able to analyse the country-wide situation across age and gender lines.

2. Formal education in Nigeria

The formal education system in Nigeria has four major levels. The first level is pre-primary education which lasts for 2 to 3 years. Pre-primary schools are exclusively owned and managed by the private sector and community-based organizations; the entry age ranges from 3 to 5. Children attend pre-primary schools before admission to the primary schools. Primary education follows for six years for children between the ages of 6 and 11. The third level is secondary education for six years; this is split equally between junior and senior secondary schools. Secondary education is for children aged between 12 and 17. The final tier of formal education is tertiary education comprising universities, polytechnics and colleges of education and is designed for children aged 18 and above.

Tables 1 and 2 present some schooling indicators for primary and secondary schools in Nigeria. Both enrolment and number of teachers in primary schools increased substantially between 1989 and 2004. The increase in enrolment can partially be traced to the high rate of population increase in Nigeria coupled with an increased awareness of the positive benefits of education. However, the quality indicator as represented by the studentteacher ratio and the studentschool ratio paints a gloomy picture. According to the National Policy on Education the ideal studentteacher ratio for primary and secondary schools are 35 and 30 students respectively to one teacher (FGN, 1981). Between 1989 and 2001, this standard was never attained. It is only in 2004 that the ratio of students to teachers was 31:1; this may have been the result of the UBE policy and the education tax fund intervention programmes. In addition, in a country where most schools have less than six classrooms (Olaniyan, 2000), an average of 364 students per school (the lowest during the review period) portrays congestion in many schools. Similar to the situation in primary schools, the studentteacher ratio in secondary schools was higher than the acceptable standard. However, the studentteacher ratio consistently declined from 41:1 in 2000 to 31:1 in 2004, which is an acceptable figure.

While the benefit of schooling is highest if a child can start and complete a level of formal school, Table 1 shows that there is a high dropout rate in primary schools. By 1995, more than 18% of the children who attended primary school had dropped out before their fourth year while more than 43% had dropped out before completing the normal six years necessary to obtain a primary school leaving certificate. This denied them the opportunity of attending secondary schools, as a primary school certificate is a prerequisite for entering secondary school in Nigeria.

This study is interested in children who should be in primary and secondary schools. As revealed in Table 3, despite having more than 16.8 million children enrolled in primary schools in 1994, this was only 53.4% of children of primary school age who should have been in primary schools.

Table 1: Primary school indicators in Nigeria (19892004)

Year	Enrolment	Female enrolment (%)	Number of schools	Number of teachers	Student school ratio	Student teacher ratio	Percentage drop out before 4 years	Percentage drop out before 6 years
1989	12,721,087	45	34,904	343,813	364	37		47
1990	13,607,249	43	35,433	377,979	384	36		41
1991	13,776,854	44	35,446	372,347	389	37	25	40
1992	14,805,937	44	36,610	379,639	404	39	19	30
1993	15,911,888	44	37,812	388,095	421	41	18	27
1994	16,831,560	44	38,000	336,631	443	50	14	26
1995	17,994,620	44	39,677	299,910	454	60	18	43
1996	19,794,082	42	41,660	412,377	475	48		
1997	21,161,852	44	43,951	406,959	481	52		
1998	22,473,886	45	45,621	416,183	493	54		
1999	23,709,949	46	47,902	455,961	495	52		
2000	24,895,446	49	48,860	461,027	510	54		
2001	27,384,991	51	49,343	489,018	555	56		
2002	29,575,790	51	47,694	591,516	545	50		
2003	26,292,370	53.0	52,815	691,904	498	38		
2004	28,144,967	53.0	65,627	907,902	428	31		

Source: Central Bank of Nigeria Annual Report and Statement of Accounts (1993, 1998, 2000 and 2004)

Enrolment rates improved over the years such that more than 79% of primary school-aged children were enrolled in primary schools in 2002; the figure fell to 72% in 2004. However, if we control for the number of children enrolled in primary school but whose age does not fall into the primary school age category the enrolment rates would be substantially lower. This is occasioned by the prevalence of delayed entry into school beyond the official enrolment age of six for primary schools.

The secondary schools present a more dismal picture as only 20.6% of the Nigerian population aged 1217 were enrolled in secondary schools in Nigeria in 1990 (see Table 4). This figure increased over the years to 34% in 1996 and further to 40% in 2002, but this is still a very low enrolment rate for a country that needs to develop citizens into highly skilled manpower. Despite this, gross enrolment rate fell to 35% in 2004.

Table 2: Secondary school indicators in Nigeria (19892004)

Year	Enrolment	Female enrolment (%)	Number of schools	Number of teachers	Student-school ratio	Student-teacher ratio
1989	2,723,791	42	5,868	73,616	464	37
1990	2,901,993	43	6,001	80,611	484	36
1991	3,123,277	42	5,860	84,413	533	37
1992	3,600,620	45	6,009	92,323	599	39
1993	4,150,917	49	6,162	101,241	674	41
1994	4,500,000	49	6,300	107,143	714	42
1995	5,084,546	43	6,452	127,114	788	40
1996	5,389,619	39	9,111	145,665	592	37
1997	5,578,255	42	7,311	143,032	763	39
1998	5,795,807	46	7,801	144,895	743	40

continued next page

Table 2 Continued

Year	Enrolment	Female enrolment (%)	Number of schools	Number of teachers	Student-school ratio	Student-teacher ratio
1999	6,056,618	45	8,113	159,384	747	38
2000	6,359,449	46	8,275	155,109	769	41
2001	6,995,394	47	8,275	174,884	845	40
2002	7,485,072	48	8,351	182,563	685	41
2003	7,091,376	43	11,918	186,615	595	38
2004	6,745,186	43	13,333	217,587	505	31

Source: Central Bank of Nigeria Annual Report and Statement of Accounts (1993, 1998, 2000 and 2004)

Table 3: Primary school enrolment rates in Nigeria (19892004)

Year	Enrolment	Population (611 years old)	Enrolment rate(%)
1989	12,721,087	28,265,285	45
1990	13,607,249	28,887,121	47
1991	13,776,854	29,522,638	47
1992	14,805,937	30,172,136	49
1993	15,911,888	30,835,923	52
1994	16,831,560	31,514,313	53
1995	17,994,620	32,207,628	56
1996	19,794,082	32,916,196	60
1997	21,161,852	33,640,352	63
1998	22,473,886	34,380,440	65
1999	23,709,949	35,136,810	67
2000	24,895,446	35,909,820	69
2001	27,384,991	36,699,836	75
2002	29,575,790	37,507,232	79
2003	26,292,370	38,332,391	69
2004	28,144,967	39,175,704	72

Source: Central Bank of Nigeria Annual Report and Statement of Accounts (1993, 1998, 2000 and 2004)

Table 4: Secondary school enrolment rates in Nigeria (19892004)

Year	Enrolment	Population (1217 years old)	Enrolment rate(%)
1989	2,723,791	13,786,712	20
1990	2,901,993	14,090,020	21
1991	3,123,277	14,400,000	22
1992	3,600,620	14,716,800	24
1993	4,150,917	15,040,570	28
1994	4,500,000	15,371,462	29
1995	5,084,546	15,709,634	32
1996	5,389,619	16,055,246	34
1997	5,578,255	16,408,462	34
1998	5,795,807	16,769,448	35
1999	6,056,618	17,138,376	35
2000	6,359,449	17,515,420	36
2001	6,995,394	17,900,759	39
2002	7,485,072	18,697,057	40
2003	7,091,376	19,108,392	37
2004	6,745,186	19,528,776	35

Source: Central Bank of Nigeria Annual Report and Statement of Accounts (1993, 1998, 2000 and 2004)

3. Literature review

Schooling is widely argued to be critical to the development process and poverty alleviation. There are many ways in which schooling outcomes have been defined in the literature. These are the age when a child starts school, the grades passed per year at school, and the last completed grade of the child. Others are the examination scores in the last completed grade, the withdrawal rate and marks obtained from a special cognitive test (Hanushek, 1995; Behrman and Knowles, 1999; Glick and Sahn, 2000; Handa, 2002). The importance of the age that a child starts school cannot be overemphasized because, all things being equal, the earlier a child starts school, the more rapidly the child completes his or her schooling. In many countries this age is inversely associated with income, as children from households with higher income tend to start school earlier (Glewwe and Jacoby, 1995).

Another important indicator of schooling is the last completed grade. According to Behrman and Knowles (1999), it is the most emphasized schooling indicator in the literature and in some cases the only indicator that is used. One of the reasons for this is that it is an indicator of cumulative investment in an individual's education. The examination score obtained in the last completed grade is also common in the literature. The belief is that the amount of learning by children who have completed the same number of grades varies. Several studies have investigated this issue and find that cognitive tests scores have an explanatory power beyond that of completed grades for estimated labour income relations (see, e.g., Alderman et al., 1996; Glewwe, 1996). Some other studies have investigated the decisions to withdraw children from school (e.g., Glick and Sahn, 2000) and reveal that household characteristics influence this decision. This schooling outcome is important because the benefits are higher for those who stay longer in school, especially if they stay until the end of the course.

The factors that determine child schooling can be classified broadly into two: demand side and supply side factors (Khandker et al., 1994). The demand side factors include individual, household and community level variables. Individual factors include the age and gender of the child. The older a child becomes, the higher the probability of attending school, while gender is a very important factor in deciding whether a child attends school. (Glick and Sahn, 2000). This can be traced to two main issues: First, parents may just prefer to send boys to school rather than girls and second, the expected returns to female schooling arising from labour market discrimination and lower female participation can discourage parents from investing in education of the girl child (Glick and Sahn, 2000).

Household level factors include household income and assets, parental education and household structure in terms of demographic composition while community level

variables include locational productive potentials and school quality. Out of all the household determinants, many studies have emphasized household income (Behrman and Knowles, 1999). There are controversies on the limitations of household income in estimation. Such limitations include measurement errors associated with using current annual income. Several studies (e.g., Glewwe and Jacoby, 1995; Handa, 1996) note that household income is less truly revealed in surveys than expenditure is. In order to correct for this error, certain studies have used household expenditure as a proxy for income (Tansel, 1997, 2002).

The relationship between household income and schooling is usually argued to be positive (Glick and Sahn, 2000). This is because poor households may be unable to afford the direct and indirect costs of schooling and may be constrained in their ability to borrow to cover the costs. Generally, a household would not send its children to school if it falls into poverty. In fact low level of incomes of parents has been argued as one of the main reasons why many children withdraw from schools (Ray, 2000). Basu and Van (1998) state a hypothesis based on the idea of parental altruism that: "A family will send the children to the labour market only if the income from the non-child labour sources drop very low". This suggests that poverty is the main cause of child withdrawal from school into child labour. The relationship between child labour and child schooling is, however, fraught with controversy. While Ray (2000) argues that child labour prevents children from benefiting fully from school by increasing the opportunity cost of education and reducing child schooling, Patrinos and Psacharopulos (1997) find that in some countries working actually makes it possible for the children to go to school, especially when parents do not have enough funds to keep their children in enrolment. Using Peru as a case study, they found that many Peruvian children combine employment with schooling with reduced negative consequences compared with many countries.

Furthermore studies have shown that parents' education is a significant determinant of child schooling (Handa, 1996). Like household income, parental education is positively related to child schooling. This is because educated parents are more able to assist in child learning, as they are more likely to recognize the value of their children's education and resist the temptation of pulling them out of school even when they have low income. In addition, the consumption benefits of child schooling for educated parents are high. In Morocco, Khandker et al. (1994) find that the rate of ever attending school for children from households where the heads have no education is 62% for rural boys, 29% for rural girls, 94% for urban boys and 84% for urban girls. The percentages in households where the head has an education of secondary level are 82%, 62%, 100% and 94% respectively.

There are numerous studies investigating the effects of school quality on schooling outcomes (Behrman and Birdsall, 1983; Hanushek, 1995; Basu, 1998; Behrman and Knowles, 1999). These studies reveal that school quality and children's success in school are positively related. Behrman and Knowles (1999) suggest that part of the positive association between parental household income and expenditures paid to schools may result from households paying for higher quality schooling and not from a progressive school fees structure for a given school quality.

Evidence from sub-Saharan African countries reveals that substantial gender gaps exist in child schooling. Female enrolment ratios are generally lower than those of males

even in countries with high total gross enrolment ratios (World Bank, 1989). In addition, female students are more likely to drop out of school than male students in part because of the demand for female labour within the household. This is partly traceable to the fact that the school progress of boys has little association with parental household income than that of girls. While public investment in education may be gender neutral, parents seem to bias private investment towards boys than girls. This gender gap imposes a high cost on the economy as evidence has shown that the mother's education is perhaps the single most important determinant of family health and nutrition (Alayande et al., 2000).

Another major issue in the literature is the sharp differences that exist between rural and urban children. Khandker et al. (1994), in a study on Moroccan children, find that urban children outperform their rural counterparts and that underinvestment in education is more pronounced in rural than in urban areas, especially with regards to school enrolment and attainment. Using Tanzania as a case study, Cooksey et al. (1998) find important differences between urban and rural schools. Specifically, they report a differential of 17 percentage points in net enrolment rates between rural and urban areas.

4. Methodology and data

Theoretical framework

The demand for child schooling is derived from a Becker-Lewis model of household production. In this framework, we followed the approach in Khandker et al. (1994) and assumed that parents care about the future wealth and income of their children because it directly yields utility to them. The utility function of parents can then be written as:

$$U = U(S, L, C) \quad (1)$$

where S, L and C respectively are schooling, children's leisure and household consumption. The curvature of the utility function is influenced by the preferences of both parents. Schooling is one of the outputs of home-based market production that use both market purchased and home provided inputs, given the technology of production and the environment in which the household production takes place. The production function of schooling is thus given as:

$$S = S(M, K; \alpha) \quad (2)$$

Where M is a vector of market purchased inputs such as books, papers, pencils, etc., K is the effective time devoted to schooling and α represents both individual endowment and school environment. There is also the time constraint for the child, which can be written as:

$$\sum(H) = Y + L + N \quad (3)$$

Equation 3 states that the total time available to the child can be spent either to generate income from child labour (Y), on leisure (L) and on schooling (N). However, the parents' income constraint is given as:

$$P_M M + P_Z Z = I + \pi Y \tag{4}$$

where π is the child income from child labour given to the household.

In order to derive the optimal amount of market purchased inputs used in the production of schooling, and the amount of time spent on schooling and leisure, we maximize the utility function in Equation 1 subject to the constraints given by (2), (3) and (4).

The solution to the maximization problem is that the relative productivities of the inputs (M and N), in school production must be equal to the ratio of their respective prices. Also, the parents' marginal utility from their children's leisure must be equal to their marginal valuation of children's time in alternative uses such as income generation that augments the parents' total income.

Given this framework it is possible to identify the reduced from demand equation for schooling as:

$$S^* = D\,(P_M, P_Z, I, \pi, \alpha, \Gamma_M, \Gamma_F) \tag{5}$$

The explanatory variables in the reduced form equation are prices (Pi), household income (I), current opportunity cost of children's time in schooling (π), school environment (α) and parental preferences (Γ). However, the structure of our data could not allow us to include all the explanatory variables. As revealed in the literature review, these explanatory variables can be classified into three: individual, household and community characteristics. The individual characteristics to be considered were the age and the gender of the child. The household characteristics included the parental characteristics such as parental age and education (father's or mother's schooling level or both), gender of the household head, household size and structure variables among others.

Method of analysis

In this study we estimated a version of the reduced form equation for schooling outcome. Two schooling outcomes were considered. The first is the current enrolment of children aged 6 to 17,[3] while the second one is, for each child, the number of years of delayed enrolment into school.[4] In tackling the current enrolment of the child, we modelled the probability that a child is currently enrolled in school.

We used a probit model and denoted the enrolment situation for individual *i* by a dichotomous variable which equals 1 if the child is enrolled and 0 if otherwise. This is specified as follows:

$$prob\,[Enrol_i = 1] = \phi\,(X_I'\beta) \tag{6}$$

where:

X_i is a vector of individual, household, and community level characteristics taken to influence the probability that an individual is currently enrolled in a school,

β is the vector of unknown parameters to be estimated, and

$\phi(.)$ is the standard normal cumulative distribution function.

Equation 6 was estimated separately for male and female children within rural and urban areas. This facilitated gender decomposition of the schooling gap. In the case of years of delayed entry into school, we estimated an ordinary least square (OLS) equation of the form:

$$Yi = f(Xi) \tag{7}$$

where Yi is the number of years delayed before entering school and Xi is as defined for Equation 6. This equation was also estimated separately for male and female children within rural and urban areas.

Decomposition of schooling gap

One of the basic objectives of this study was to investigate the differentials in child schooling between male and female children. This was done separately for urban and rural areas and nationally. The decomposition approach that was utilized is an extension to the one proposed by Oaxaca (1973). The decomposition of the differences in the dependent variable between two sectors (Oaxaca, 1973) is such that the decomposition exploits the property that the regression plane passes through the means of the data and the average values of the dependent variable is perfectly predicted. While this is easily possible for the OLS estimates, there are problems with non-linear binary models such as the probit (Al-Samarrai and Reilly, 2000). One such problem is that the decomposition predicted by the standard index approach usually falls outside the [0,1] interval. Given the estimates of the probit model, the average differential in schooling outcome between two sectors is expressed as:

$$\Delta_i = \overline{\Phi(X'_{mi}\beta_m)} - \overline{\Phi(X'_{fi}\beta_f)} \tag{8}$$

Following the approach by Giomulka and Stern (1990) that is applicable to non-linear models such as probit, the average differential in schooling outcomes between the male and female children may be decomposed into two parts as follows:

$$\overline{\Delta_i} = [\overline{\Phi(X'_{fi}\beta_m)} - \overline{\Phi(X'_{fi}\beta_f)}] + [\overline{\Phi(X'_{mi}\beta_m)} - \overline{\Phi(X'_{fi}\beta_m)}] \tag{9}$$

Equation 9 uses the urban coefficient to unpack differential components. As revealed by the expression, the differentials can be decomposed into two parts shown on the right-hand side. The first part of the right-hand side of Equation 9 in parentheses is the portion of the average differential that is explained by the differences in the coefficients (or the estimated relationships) between the rural and the urban sectors and is called the unexplained portion of the differential.

The second part of the right-hand side of Equation 9 in parentheses is the portion of the average differential that is explained by the rural urban differences in individual, household and other characteristics. This is called the explained portion of the differential. In the same vein, Equation 9 can be evaluated using the rural coefficients in which case the average differentials would be expressed as:

$$\overline{\Delta_i} = [\overline{\Phi(X'_{mi}\beta_m)} - \overline{\Phi(X'_{mi}\beta_f)}] + [\overline{\Phi(X'_{mi}\beta_f)} - \overline{\Phi(X'_{fi}\beta_f)}] \quad (10)$$

All estimations were undertaken using STATA.

Data

The study utilized data from the 1999 MICS, a joint project of FOS and UNICEF (Nigeria). As with other household surveys conducted by FOS, the sample is a two-stage sampling design. Enumeration areas were used in the first sampling and housing units were used in the second sampling units.

Two types of questionnaires were used for the survey. They were the household questionnaire and the children questionnaire. The household questionnaire was based on the general MICS model and adapted to the Nigerian situation. The questionnaire was administered in each household to collect information on all household members including their gender, age, and relationship to head, school attendance, marital status and occupation. Specifically, the household questionnaire had 10 modules:

1. Household listing
2. Water and sanitation
3. Salt iodization
4. Children (aged 317) education
5. Fertility and mortality
6. Tetanus toxoid
7. Maternal mortality
8. Care of acute respiratory illness
9. Prenatal and childbirth
10. Family planning

The children questionnaire was administered in each household for all children under the age of 5 and it included modules on personal information, health, illness and anthropometrics of each child.

Specifically, the education information included whether each member of the household had never attended school, was currently enrolled or had been to school before but now had withdrawn. Furthermore, the children education module for children aged 317 contained information on the last grade attended by each child and on the causes of non-enrolment in non-formal education if a child had not attended one. This information was adequate for analysing our outcome variable of being currently enrolled in school identified in Equation 11.

The survey was administered in 1999 and covers a representative national sample of 15,580 households with a total of 74,626 persons. Out of these households, 68% are in the rural sector while 32% are from the urban sector. In addition, 36,951 (or 49.5%) are male while 37,675 (or 51.5%) are female members of the households. There are 26,459 individuals within the ages of 6 and 17 but we were left with 25,232 individuals (out of whom 48.6% are female) after eliminating households missing the values for the variables of interest to us. The eliminated group only represents 4.7% of the entire group. The 25,232 individuals represent 32.2% of all the individuals in the household survey and an age-by-age proportion of the total individuals aged 617 are presented in Table 5. This age group comprises 33.5% of total male household members and 30.8% of total female members of the surveyed household members (Table 5). Our analysis was, however, based on 22,019 children because we also left out children whose parents were not present within the household.

The descriptive statistics of the variables used in our study are presented in Tables 6.[5] The first two variables represent the outcome of interest to this study. Starting with the number of years children were delayed, we found that delayed entry to school is more pronounced in rural areas. Boys and girls had an average of 4.7 and 5.3 years of delay before being enrolled in school. However, boys and girls residing in the urban areas have on average 2.6 and 2.8 years of delay before being enrolled in schools. Furthermore, 78% of male children in urban areas are currently enrolled in school compared with 75% of female children in urban areas. Generally, 60% of all children are currently enrolled in schools. However, enrolment is lower in rural areas although male children fared better. Of the children in rural areas, 56% of the males are currently enrolled compared with 51% of the females.

Table 5: Breakdown of composition of children aged 617 in the population

	Male		Female		Total	
Age in years	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
6	1445	3.73	1367	3.43	2812	3.58
7	1358	3.51	1304	3.28	2662	3.395
8	1341	3.46	1361	3.42	2702	3.44
9	978	2.52	943	2.37	1921	2.445
10	1484	3.83	1404	3.53	2888	3.68
11	726	1.87	635	1.6	1361	1.735
TOTAL (Pry School Age)	**7332**	**18.92**	**7014**	**17.63**	**14346**	**18.275**
12	1252	3.23	1143	2.87	2395	3.05
13	889	2.3	803	2.02	1692	2.16

continued next page

Table 5: Continued

	Male		Female		Total	
Age in years	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
14	841	2.17	849	2.13	1690	2.15
15	1193	3.08	1071	2.69	2264	2.885
16	700	1.81	652	1.64	1352	1.725
17	760	1.96	733	1.84	1493	1.9
TOTAL Sec (Schl Age)	**5635**	**14.55**	**5251**	**13.19**	**10886**	**13.87**
Total (617 Years)	**12967**	**33.47**	**12265**	**30.82**	**25232**	**32.145**

Source: Computed from the 1999 MICS data.

Table 6: Descriptive statistics of relevant variables from the 1999 Multiple Indicator Cluster Survey (children aged 617)

	Rural male		Rural female		Urban male		Urban female	
Variable	**Mean**	**Std dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Deva	4.793	4.782	5.292	4.892	2.566	3.894	2.811	4.147
Enrol	0.566	0.496	0.511	0.500	0.780	0.414	0.751	0.432
Age	10.716	3.411	10.683	3.429	11.244	3.432	11.130	3.424
age2	126.459	76.852	125.884	77.355	138.205	78.533	135.605	78.098
hheadsex	0.099	0.299	0.122	0.327	0.128	0.334	0.158	0.364
Siblings<5	0.101	0.301	0.138	0.345	0.129	0.336	0.172	0.377
boys6_11	0.099	0.299	0.122	0.327	0.128	0.334	0.158	0.364
girls6_11	0.358	0.604	0.561	1.193	0.291	0.323	0.472	1.100
boys12_17	0.561	0.202	0.997	0.226	0.451	0.946	0.674	0.135
girls12_17	0.334	0.135	1.217	2.200	0.586	0.151	1.309	2.111
men_18_59	1.299	0.812	0.737	0.874	1.473	2.242	0.911	1.433
women_18_59	0.973	0.706	0.691	0.910	0.274	0.737	0.236	0.858
adult_60	0.261	0.629	0.654	1.643	0.604	0.450	0.226	0.860
Mother_ miss	0.135	0.342	0.151	0.358	0.119	0.323	0.063	0.244
Father_miss	0.139	0.346	0.111	0.315	0.124	0.380	0.069	0.254
f_ed_no	0.591	0.492	0.590	0.492	0.329	0.470	0.336	0.472
fated_pry	0.243	0.429	0.240	0.427	0.249	0.433	0.244	0.430
fated_ppry	0.163	0.370	0.166	0.372	0.418	0.493	0.414	0.493
m_ed_no	0.693	0.461	0.683	0.465	0.459	0.498	0.445	0.497
motted_pry	0.199	0.399	0.199	0.400	0.249	0.433	0.249	0.432
motted_ppry	0.106	0.308	0.115	0.319	0.288	0.453	0.301	0.459
Asset	0.116	1.025	0.135	1.038	0.982	1.013	0.986	1.011
southwest	0.171	0.376	0.176	0.381	0.479	0.500	0.489	0.500
southeast	0.276	0.447	0.279	0.448	0.156	0.363	0.161	0.367
northwest	0.299	0.458	0.293	0.455	0.185	0.388	0.167	0.373
north east	0.254	0.476	0.252	0.449	0.180	0.387	0.183	0.421
Number of Observations	8,598		7,646		2,964		2,811	

Source: Computed from the 1999 MICS data.

One issue we considered was the number of children whose parents were not members of the household. The question here is whether the children should be included in the

estimation. Is it only children living with their parents or all children within the household? All children could only be included if we had information on parents of children not living with their parents. In the MICS data that we used, there is no information on the children who are not living with their parents. In addition, each household includes boys and girls whose parents are not within the household. Table 7 presents the distribution of boys and girls within the household. The results in the table reveal that 87.2% of the boys and girls live with their parents while 12.6% of the children can be regarded as fostered children. The number of fostered children is higher in urban areas where they represent 12.9% and 17.2% of male and female children against 10% and 13.8% respectively that reside in rural areas. Furthermore, female children have a higher probability of being fostered than the male children. The inclusion of these fostered children can affect the impact of parental education on child schooling because there is the likelihood that they are considered differently by the households in terms of the investment into their human capital (Tansel, 2002). We therefore omitted the children whose parents were not members of the households. We were thus left with 22,019 children who have at least one of their parents as the head of the household.

Table 7: Boys and girls (aged 617) according to relationship with the household head

	Number of individuals	Percentage
Sons	11,506	45.61
Daughters	10,513	41.67
Other male members	1,403	5.56
Other female members	1,801	7.15
Total	25,232	100

Source: Computed from the 1999 MICS data.

The covariates used in our estimation included some individual characteristics variables, household characteristics variables and controls for regions of the country. Individual variables that were explored included the child's age and gender. The average age of the children was about 10.5 with children living in urban areas slightly older, with a mean age of 11.2.

Among the household variables included are parental education variables, which have been identified in the literature as an important covariate of child schooling in many countries. This is as a result of its effect on the preference of the parents as well as the knowledge of benefits of education. In terms of parental education, urban households fared better. While about 59% and 68% of fathers and mothers in rural locations had no formal education, about 33% and 45% of fathers and mothers in urban locations had no formal education. In addition to this, fathers were more educated than mothers.

Household size affects the time per person for household production activity. Since this is dependent on the structure of the household, the proportion of children and the proportion of adults will definitely affect the time cost of involvement in household production activities. It is therefore necessary to categorize household composition since this affects the opportunity cost of time indirectly through the demographic composition of each household. This is because the need for a child to work at home varies with the number of childen and the number of potential substitutes in home activity among others.

Given the structure of the information in the data, it was possible to derive various demographic structures of each household such as proportion of children under 6 years and the proportion of adults in the household. In addition, we also derived, for each child, the number of older and younger siblings. The data showed that there are fewer children in the households than adults on average.

The household's economic status is an important factor but the MICS did not collect information on household consumption expenditure or household income. The questionnaire did, however, enquire about household ownership of various assets and characteristics of the household's dwelling. We therefore used these variables to create an asset index to proxy for household "wealth". Specifically, we used information on ownership of consumer durables (clock/watch, donkey, horse or camel, canoe, bicycle, motorcycle car, radio, television and telephone). We also used information on the characteristics of the household's dwelling, especially toilet facilities and source of drinking water.

We avoided the problem of assigning the appropriate weights to each asset by using the statistical procedure of principal components. This is a technique for extracting a small number of variables that best represent the common information in a larger set of related variables by creating a series of linear combinations of the original variables. The first principal component is created by choosing the weights on each of the variables such that the linear combination captures the greatest amount of information common to all the variables. We simply assume that what causes the most common co-movement of the asset variables is a household's wealth (Filmer and Pritchett, 1998; Sahn and Stifel, 2000). Based on the constructed asset index, urban households are far richer than rural households.

Tables 8, 9 and 10 give the age-by-age schooling status of children in the sample. The highest enrolment figures for both sexes occur at age 11. The highest number of children withdrew from school by age 17.

Enrolment rates were higher in urban areas than in rural areas for all age categories. The highest enrolment rate was for ages 9 and 10 for urban male and female children respectively, while it was 11 years for rural children. We assumed this was because of delayed enrolment in rural areas. Generally, for those who had never been to school, the rate reduces as the age of the child increases. However, by 17 years old, 9.28% and 11.66% of urban male and female children respectively and 27% and 24% of rural male and female children respectively had never been to school. When this is combined with those who withdraw from school at this age, the problem of inadequate schooling can be appreciated.

Table 8: Enrolment rates of male and female children in Nigeria by age of the child (%)

	Male			Female		
Age (Years)	Illiteracy	Enrolment	Withdrawal	Illiteracy	Enrolment	Withdrawal
	rate	rate	rate	rate	rate	rate
6	49.13	47.34	3.53	50.18	45.65	4.17
7	41.53	54.12	4.34	44.1	52.45	3.45
8	33.26	62.19	4.55	39.75	55.91	4.34
9	27.81	69.12	3.07	32.24	63.52	4.24

continued next page

Table 8: Continued

	Male			Female		
Age (Years)	**Illiteracy**	**Enrolment**	**Withdrawal**	**Illiteracy**	**Enrolment**	**Withdrawal**
	rate	**rate**	**rate**	**rate**	**rate**	**rate**
10	30.12	64.29	5.59	37.39	57.98	4.63
11	21.49	72.87	5.65	23.62	71.02	5.35
Average (Pry School Age)	**33.89**	**61.66**	**4.46**	**37.88**	**57.76**	**4.36**
12	22.6	70.61	6.79	27.47	65.88	6.65
13	21.71	67.04	11.25	26.4	61.52	12.08
14	19.38	70.63	9.99	23.67	65.61	10.72
15	25.23	58.93	15.84	30.16	56.21	13.63
16	18.86	67.43	13.71	20.71	60.89	18.4
17	21.84	53.42	24.74	26.6	47.2	26.19
Average (Sec School Age)	**21.60**	**64.68**	**13.72**	**25.84**	**59.55**	**14.61**
TOTAL	**29.56**	**62.21**	**8.23**	**33.93**	**57.74**	**8.33**

Notes:
1. Illiteracy rate is calculated as the proportion of children who have never been to school.
2. Enrolment rate is calculated as the proportion of children who are currently enrolled in school.
3. Withdrawal rate is calculated as the proportion of children who have been to school before but are now out of school.

Source: Computed from the 1999 MICS data.

For all categories of age level, there were substantial gaps in attendance rates either when examined along urbanrural classification or by gender (see Figure 1). The highest gap occurred for the ruralurban classifications at 6 years old. In the case of the gender gap, the highest were at ages 16 and 10 years.

Table 9: Enrolment rates in rural Nigeria by age and gender of the child (%)

	Male			Female		
Age (Years)	**Illiteracy**	**Enrolment**	**Withdrawal**	**Illiteracy**	**Enrolment**	**Withdrawal**
	rate	**rate**	**rate**	**rate**	**rate**	**rate**
6	54.63	41.61	3.76	56.3	39.19	4.51
7	48.14	48.05	3.81	50.1	46.49	3.41
8	38.48	57.28	4.24	46.57	48.63	4.8
9	34.17	62.2	3.63	39.48	55.79	4.73
10	35.9	58.87	5.23	45.34	50.29	4.37
11	24.81	69.19	6.01	27.01	67.41	5.58
Average (Primary school age)	**39.36**	**56.20**	**4.45**	**44.13**	**51.30**	**4.57**
12	28.42	64.7	6.89	33.13	60.17	6.7
13	26.28	61.65	12.07	31.78	57.38	10.84
14	24.04	65.44	10.53	29.24	59.86	10.9

continued next page

Table 9: Continued

	Male			Female		
Age (Years)	**Illiteracy**	**Enrolment**	**Withdrawal**	**Illiteracy**	**Enrolment**	**Withdrawal**
	rate	**rate**	**rate**	**rate**	**rate**	**rate**
15	31.53	53.45	15.03	38.13	48.81	13.06
16	24.1	64.27	11.63	25.5	55.26	19.24
17	27.53	48.76	23.71	33.27	39.96	26.77
Average (Secondary school age)	**26.98**	**59.71**	**13.31**	**31.84**	**53.57**	**14.59**
TOTAL	**35.56**	**56.59**	**7.85**	**40.69**	**51.09**	**8.22**

Notes:
1. Illiteracy rate is calculated as the proportion of children who have never been to school.
2. Enrolment rate is calculated as the proportion of children who are currently enrolled in school.
3. Withdrawal rate is calculated as the proportion of children who have been to school before but are now out of school.

Source: Computed from the 1999 MICS data.

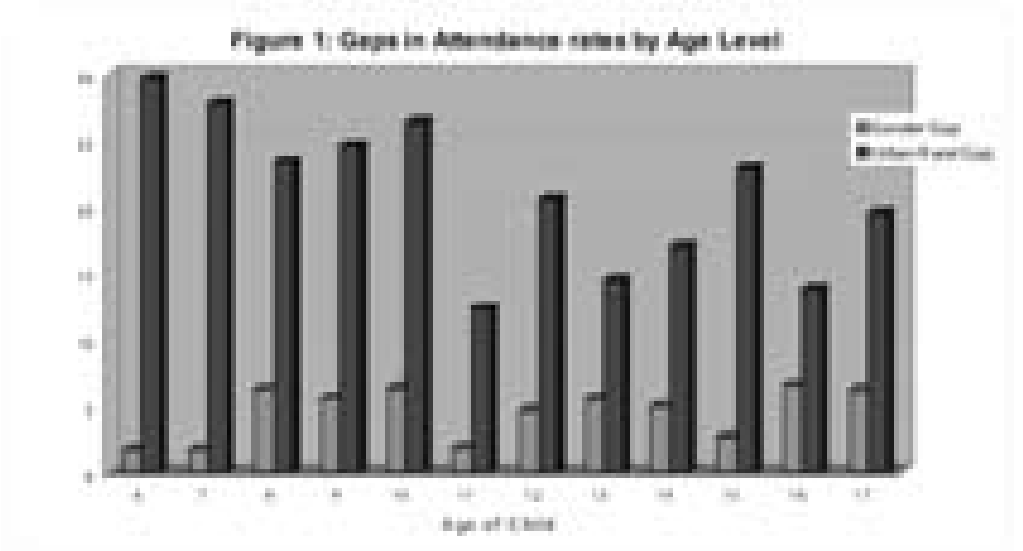
Table 10: Enrolment rates in urban Nigeria by age and gender of the child (%)

	Male			Female		
Age (Years)	**Illiteracy**	**Enrolment**	**Withdrawal**	**Illiteracy**	**Enrolment**	**Withdrawal**
	rate	**rate**	**rate**	**rate**	**rate**	**rate**
6	26.23	70.06	3.7	26.28	69.49	4.23
7	17.52	76.13	6.34	22.46	73.65	3.89
8	16.49	77.89	5.61	20.95	75.87	3.17
9	10.76	88.05	1.2	16.25	80.51	3.25
10	12.07	81.32	6.61	13.95	81.1	4.94
11	13.33	81.9	4.76	15.59	79.57	4.84
Average (Primary school age)	**16.07**	**79.23**	**4.70**	**19.25**	**76.70**	**4.05**
12	6.87	87.16	5.97	14.03	79.7	6.27
13	12.14	78.57	9.29	15.79	69.55	14.66
14	9.63	81.48	8.89	11.94	77.99	10.07
15	7.17	74.59	18.24	10.9	74.04	15.06
16	8	73.78	18.22	10.29	73.53	16.18
17	9.28	63.71	27	11.66	64.13	24.22
Average (Secondary school age)	**8.85**	**76.55**	**14.60**	**12.44**	**73.16**	**14.41**
TOTAL	**12.69**	**78.02**	**9.29**	**16.26**	**75.11**	**8.63**

Notes:
1. Illiteracy rate is calculated as the proportion of children who have never been to school.
2. Enrolment rate is calculated as the proportion of children who are currently enrolled in school.
3. Withdrawal rate is calculated as the proportion of children who have been to school before but are now out of school.

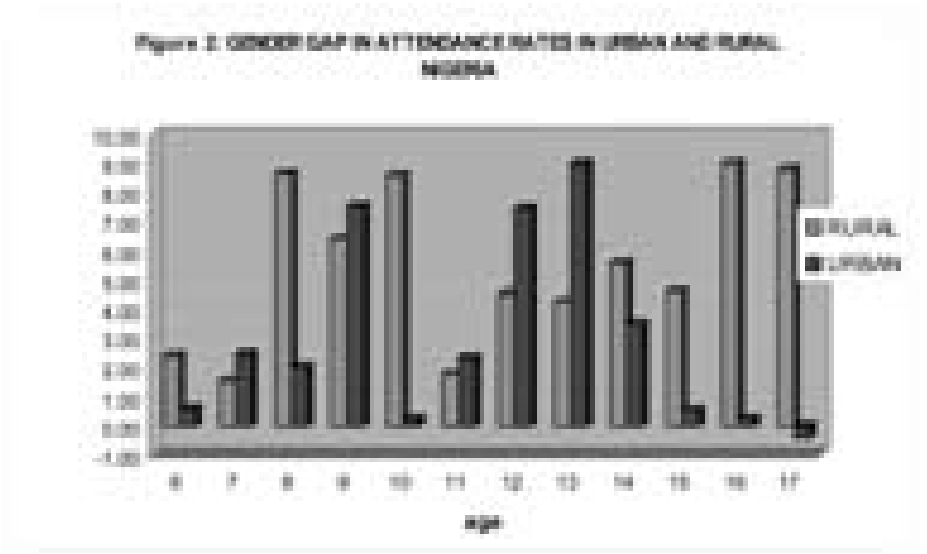
Source: Computed from the 1999 MICS data.

Figure 1: Gaps in attendance rates by age level



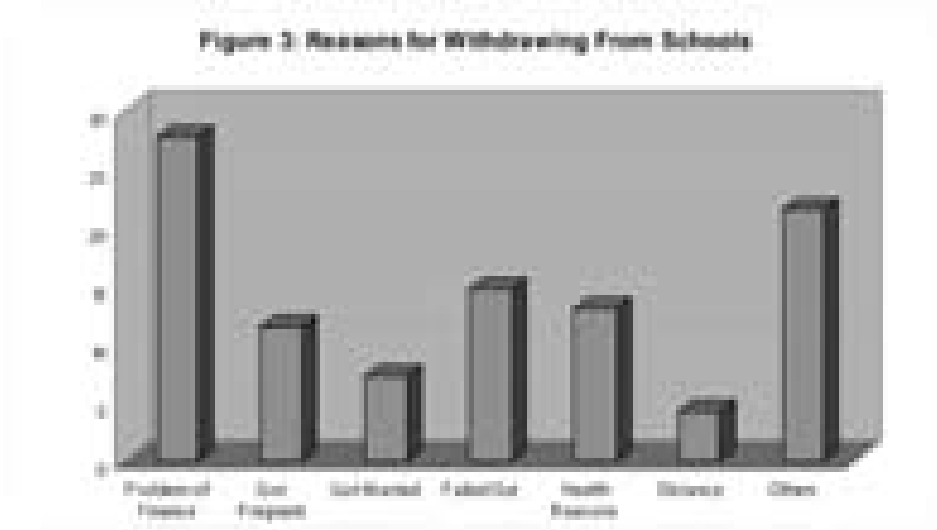
Taking the enrolment gap further, we investigated the gender gap within the rural and urban households (Figure 2). We found that the gender gap is more pronounced in rural areas although for certain ages such as 9, 12 and 13, there were substantial gaps in urban areas. By age 17, the enrolment rate of girls was higher than that of boys leading to a negative gender gap in the urban area for that age.

Figure 2: Gender gap in attendance rates in urban and rural Nigeria



The high withdrawal/dropout rate from school is a major policy issue. The results in Figure 3 present the various reasons given in the survey for withdrawing from schools. The most common reason was the problem of finance, accounting for 27.7% of the reasons for leaving school. Also, female children are particularly vulnerable to dropping out of school with 18% indicating either pregnancy or marriage as reasons for dropping out of school. The reason "others" included factors such as a child refusing to continue or the child being withdrawn because they are needed at home or in the farm.

Figure 3: Reasons for withdrawing from school



This situation could be because many young boys in Nigeria often drop out of school to fend for themselves and engage in trading activities or to become apprentices in order to learn new trades. However, the gap for rural areas can be explained by the fact that, girls are sometimes withdrawn from school for marriage, because of the culture of early marriage in many parts of the country. Where this is not the case, pregnancy could force girls out of school.

We also examined the issue of when children start school. In Nigeria the official age for starting primary school is six; this helps us to know how many children have progressed in line with the norm. We found that for all the children, only 13.9% started school on time while 42.5% had delayed enrolment (Table 11). However, 9.1% of the children started school earlier at ages below six. In addition, more than 34% of the children had not been enrolled in formal schools. The younger generation of children had a lower percentage of being delayed in their enrolment. This could be because more parents are beginning to recognize the benefits of schooling and are willing to allow their children to start school as soon as possible. The results in Table 12 show the summary of this status by gender within rural and urban areas.

Table 11: Profile of starting school by age (%)

Age (Years)	Never attended school	Started late	Started on time	Started early	Total
6	51.97	10.09	23.40	14.53	100
7	44.40	22.59	22.07	10.94	100
8	40.01	33.68	16.56	9.75	100
9	33.04	44.56	13.73	8.68	100
10	36.53	43.56	10.72	9.19	100
11	24.71	49.04	14.93	11.32	100
12	26.64	54.08	9.66	9.62	100
13	26.28	54.98	10.20	8.54	100
14	23.72	58.48	10.32	7.47	100
15	29.13	57.29	6.90	6.68	100
16	21.05	64.27	8.52	6.15	100
17	26.29	60.76	12.01	0.94	100
Total	34.02	42.95	13.90	9.13	100

Source: Computed from the 1999 MICS data.

We also found that there was a high incidence of pupils who had not been enrolled in schools and that many children were delayed in their entry to schools. The results of the number of children who started schools early and those who delayed entry by age of the child are shown in Table 12. In general, male children performed better that their female counterparts in all categories of schooling whether starting early, starting on time or for delayed enrolment (Table 12). This is because a lower proportion of boys had not been to school. We also found that 83.3% of urban children were enrolled in schools. This was the highest proportion for any group. The group also had the highest proportion of children starting school on time at 20.7%. This is because parents in urban centres are more likely to have been educated themselves and also appreciate and recognize the full benefits of education for the children. It might also mean that parents in urban areas are more affluent than their rural counterparts and are therefore able to send children to school early.

In the urban areas, girls were better in terms of starting school, while more urban boys started school later than the official age at 50.1%. One explanation for more children starting early in urban areas is due to the high prevalence of working mothers and the availability of nursery schools where mothers may keep their children until office closing hours.

Table 12: Profile of starting school by children (%)

	Never attended schools	Start late	Start on time	Start early	Total
All children	34.02	42.95	13.90	9.13	100
All male children	31.94	44.43	14.11	9.52	100
All female children	36.22	41.39	13.69	8.71	100
All urban children	16.79	48.25	20.72	14.22	100
All rural children	40.37	40.99	11.36	7.24	100
Rural male	37.88	42.42	11.76	7.94	100
Rural female	43.06	39.46	10.98	6.51	100
Urban male	15.25	50.07	20.69	13.99	100
Urban female	18.35	46.42	20.77	14.46	100

Source: Computed from the 1999 MICS data

We also decomposed the environment situation of children in a different way to show the number and proportion of children of each age at a particular level. Table 13 presents the enrolment status by different levels of education. We found that 34% of children had never enrolled in schools, while the highest enrolment rate of 45% was in primary school. In all cases male children performed better than their female counterparts just as children in urban areas performed better than those in rural areas.

Table 13: Enrolment in various levels of education (%)

Children	None	Nursery	Primary	Secondary	Tertiary	Total
Total	34.02	1.82	45.96	17.94	0.25	100
Male rural	37.88	1.43	45.79	14.71	0.17	100
Female rural	43.05	1.72	42.07	12.97	0.16	100
Male urban	15.25	2.49	51.95	29.7	0.58	100
Female urban	18.35	2.5	50.57	28.21	0.35	100

Source: Computed from the 1999 MICS data

5. Empirical results

Determinants of current enrolment

The probit estimates of the probability of enrolment in Nigeria using the MICS data for rural and urban households using Equation 6 are presented in Tables 14 and 15 respectively. The tables present the probit results for male and female children in rural areas. Two variants of the model were estimated. The first was estimated using age of the child measured as the number of years while the second was estimated with the age of the child measured as categories for the different age levels. The omitted category was age six, as this allowed for better comparison with other age levels. There was no significant difference in the results of the two estimations (Tables 14 and 15). We now explain the effects of the various covariates.

Effects of individual child characteristics

The age of the child was a significant determinant of the probability of enrolment by the children whether living in the rural or an urban area. The effects of age of the child were higher for both male and female children in rural areas than in urban areas. Furthermore, in specific locations, the effects were higher for boys than for girls. The probability of being enrolled increased with the age of the child, and decreased slightly at a later age for both sexes. The coefficients of the quadratic variable revealed that as children become older they might be needed at home either to help or for work, implying that the opportunity cost of their continued stay in school was too high to be spared for schooling. This supported our earlier findings, especially for girls, that they might be withdrawn for marriage or forced to drop out as a result of pregnancy (see Handa, 1996). In the case of the dummies for age of the child, we found that there was an increased probability of enrolling in schools compared with the age of entry into schools in Nigeria. However, the point at which the increase in enrolment rate varied from that of decreasing probability to enrol in school happened earlier among urban households than among rural households. While the turning point was at age 15 and 13 respectively for the male and female children in urban areas, the turning point was at ages 17 and 16 for boys and girls respectively in the rural areas.

Table 14: Marginal and impact effects from probit regression (probability of current enrolment of rural children)

	Male age in years			Male age in dummies			Female age in years			Female age in dummies		
deva	dF/dx	z	P>/z/	dF/dx	z	P>/z/	dF/dx	z	P>/z/	dF/dx	z	P>/z/
age	0.170	13.450	0.000				0.164	11.970	0.000			
age2	-0.007	-13.37	0.000				-0.008	-12.76	0.000			
ag_7_yr*				0.100	4.430	0.000	0.114	4.580	0.000			
ag_8_yr*				0.164	7.430	0.000	0.130	5.260	0.000			
ag_9_yr*				0.213	8.960	0.000	0.171	6.160	0.000			
ag_10_yr*				0.191	8.870	0.000	0.158	6.420	0.000			
ag_11_yr*				0.210	7.650	0.000	0.222	7.000	0.000			
ag_12_yr*				0.204	7.850	0.000	0.165	5.530	0.000			
ag_13_yr*				0.121	4.090	0.000	0.068	2.090	0.036			
ag_14_yr*				0.194	6.590	0.000	0.102	3.110	0.002			
ag_15_yr*				0.091	3.270	0.001	0.007	0.230	0.819			
ag_16_yr*				0.127	3.920	0.000	-0.004	-0.120	0.906			
ag_17_yr*				-0.035	-1.030	0.303	-0.154	-4.370	0.000			
hheadsex	0.044	2.090	0.037	0.045	2.130	0.033	0.065	3.170	0.002	0.063	3.080	0.002
asset	0.015	2.450	0.014	0.015	2.540	0.011	0.028	4.440	0.000	0.028	4.450	0.000
Siblings<5	-0.173	-5.030	0.000	-0.268	-5.100	0.000	-0.019	-4.340	0.000	-0.081	-1.860	0.063
boys6_11	0.016	2.080	0.037	0.066	0.660	0.507	0.149	5.420	0.000	0.142	6.150	0.000
girls6_11	0.156	1.780	0.075	0.254	8.130	0.000	0.138	10.240	0.000	0.137	8.790	0.000
boys12_17	0.052	0.120	0.903	0.070	0.750	0.455	0.207	4.660	0.000	0.218	4.670	0.000
girls12_17	0.047	2.290	0.022	0.045	0.190	0.848	0.077	4.520	0.000	0.066	4.610	0.000
men_18_59	0.074	5.500	0.000	0.042	1.370	0.171	0.128	5.510	0.000	0.129	8.400	0.000
women_18_59	0.009	1.500	0.132	0.008	15.410	0.000	0.135	8.340	0.000	0.125	2.770	0.006
adult_60	0.001	0.190	0.852	0.001	0.010	0.990	0.005	1.130	0.260	0.009	1.500	0.132
mother_miss	-0.131	-5.070	0.000	-0.097	-3.310	0.001	-0.144	-5.600	0.000	-0.201	-2.340	0.019
father miss	0.074	1.470	0.142	0.142	3.360	0.001	0.074	2.640	0.008	-0.315	-7.550	0.000

continued next page

Table 14 Continued

	Male age in years			Male age in dummies			Female age in years			Female age in dummies		
deva	dF/dx	z	P>/z/	dF/dx	z	P>/z/	dF/dx	z	P>/z/	dF/dx	z	P>/z/
f_edpry	0.151	10.880	0.000	0.152	10.970	0.000	0.129	8.400	0.000	0.130	8.440	0.000
f_edppry	0.168	10.320	0.000	0.167	10.240	0.000	0.139	7.970	0.000	0.140	8.040	0.000
m_edpry	0.135	8.340	0.000	0.135	8.350	0.000	0.168	9.950	0.000	0.168	9.950	0.000
m_edppry	0.153	7.480	0.000	0.151	7.360	0.000	0.243	11.620	0.000	0.243	11.600	0.000
southwest	0.318	19.230	0.000	0.318	19.190	0.000	0.349	19.430	0.000	0.349	19.400	0.369
southeast	0.302	19.120	0.000	0.302	19.080	0.000	0.362	21.630	0.000	0.362	21.550	0.000
northwest	-0.155	-10.66	0.000	-0.156	-10.70	0.000	-0.178	-10.97	0.000	-0.177	-10.87	0.000
Child Variables	181.74			216.57			173.38			193.52		
p value	0.000			0.000			0.000			0.000		
Parental education	344.63			342.89			367.87			368.73		
p value	0.000			0.000			0.000			0.000		
Household variables	9.970			8.580			31.890			31.750		
p value	0.019			0.036			0.000			0.000		
All covariates	2649.8			2665.710			2796.190			2802.180		
p value	0.000			0.000			0.000			0.000		
Number of observations	9564			9564			8868			8868		
LR chi2	3232.37			3673.860			3521.920			3543.340		
Prob > chi2	0.000			0.000			0.000			0.000		
Pseudo R2	0.247			0.250			0.287			0.288		
Log likelihood	-4929.8			-4896.62			-4383.749			-4373.038		

Notes:

1. The probit estimates are transformed to marginal effects for continuous variables and impact effects for the binary variables before being reported in the table. Marginal effect is the change in the probability for an infinitesimal change in each independent, continuous variable, while the impact effect reports the discrete change in the probability for dummy variables.
2. Standard errors have been adjusted to take into consideration the clustered nature of the data.

Cohort effects

Empirical studies have identified the composition of a household as an important determinant of schooling because it alters the marginal costs of the children's time. The opportunity cost of children's time may be different depending on their ages which suggests that any plausible analyses should take into consideration the various cohorts within the household. In this study, we have identified nine cohorts from siblings who are younger than 5 years to adults aged over 60. However, there are possibilities that household structure is jointly determined with schooling investment (Glick and Sahn, 2000). The endogeneity is premised on the assumption that parents jointly determine the number of children and the quality of their life subject to their income constraints, prices and other exogenous variables. In order to examine the possibility of the endogeneity problem, we have estimated our model without the number of children as explanatory variables (see Table A2). This, according to Glick and Sahn (2002), would be the appropriate reduced form of schooling demand as long as the omitted variables are correctly omitted. The estimation results showed that there are no significant differences between the estimation with the number of children and those without the number of the children.

As reported for both rural and urban children in Tables 14 and 15, we found that the number of children below age six in the household reduces the probability of being enrolled in school. The explanation for this is that it is a result of competition for resources among children in the households. Although the number of boys aged 611 had no significant effects on the probability of enrolment, the number of children (boys and girls) aged 1217 had significant positive effects with the probability of enrolment of boys but not for girls. The number of adults in the household had no effect on enrolment, as its coefficient is not significant for male children, but there is a positive significant relationship for female children. This shows that the presence of adults in the household increases the probability of girls being enrolled in school. This suggests that the higher the number of adult household members, the lower the workload available for each member and this frees more time for children to be enrolled in school.

Table 15: Marginal and impact effects from probit regression (probability of current enrolment of urban children)

enrol	dF/dx	z	P>/z/	dF/dx	z	P>/z/	dF/dx	z	P>/z/	dF/dx	z	P>/z/
Individual Child variable												
age	0.104	6.740	0.000				0.094	5.650	0.000			
age2	-0.005	-7.460	0.000				-0.005	-6.420	0.000			
ag_6_yr(omitted)												
ag_7_yr				0.065	2.380	0.017				0.686	2.320	0.021
ag_8_yr				0.062	2.160	0.031				0.088	2.980	0.003
ag_9_yr				0.148	5.640	0.000				0.103	3.370	0.001
ag_10_yr				0.088	3.340	0.001				0.117	4.200	0.000
ag_11_yr				0.086	2.690	0.007				0.054	1.460	0.144
ag_12_yr				0.106	3.450	0.001				0.056	1.630	0.104
ag_13_yr				0.023	0.670	0.503				-0.280	-0.720	0.474
ag_14_yr				0.049	1.420	0.156				0.012	0.320	0.750
ag_15_yr				-0.004	-0.130	0.900				-0.004	-0.130	0.895
ag_16_yr				-0.028	-0.720	0.474				-0.022	-0.510	0.607
ag_17_yr				-0.100	-2.340	0.019				-0.196	-4.140	0.000
Household variables												
hheadsex*	0.052	2.340	0.019	0.050	2.220	0.026	0.019	0.860	0.388	0.020	0.910	0.360
asset	0.135	4.990	0.000	0.152	7.480	0.000	0.056	7.520	0.000	0.052	9.920	0.000
Cohort variables												
Siblings<5	-0.097	-8.550	0.000	-0.094	-7.370	0.000	-0.007	-7.490	0.000	-0.003	-7.039	0.000
boys6_11	0.005	9.680	0.000	0.008	2.180	0.000	0.011	2.420	0.015	0.033	2.520	0.046
girls6_11	0.027	1.900	0.057	0.095	1.570	0.116	0.040	6.400	0.000	0.134	4.660	0.000
boys12_17	0.080	4.440	0.000	0.090	2.970	0.003	0.062	4.360	0.000	0.086	4.770	0.000
girls12_17	0.036	2.340	0.019	0.032	1.730	0.084	0.071	5.530	0.000	0.062	5.110	0.000
men_18_59	0.018	2.110	0.035	0.033	0.590	0.559	0.047	3.230	0.001	0.032	4.516	0.000
women_18_59	0.021	3.330	0.001	0.045	4.290	0.000	0.068	4.760	0.000	0.090	4.260	0.000
adult_60	0.004	1.360	0.175	0.029	0.470	0.641	0.004	1.020	0.310	0.244	2.540	0.011

continued next page

Table 15 Continued

enrol	dF/dx	z	P>/z/	dF/dx	z	P>/z/	dF/dx	z	P>/z/	dF/dx	z	P>/z/
mother_miss	-0.163	-5.230	0.000	-0.164	-3.980	0.000	-0.260	-3.790	0.000	-0.196	-6.550	0.000
father miss	0.078	2.580	0.010	0.104	3.180	0.001	0.198	2.040	0.042	0.192	7.530	0.000
Parental education												
f_ed_no(omitted)												
m_ed_no(omitted)												
f_edpry*	0.079	4.410	0.000	0.056	2.960	0.003	0.098	5.200	0.000	0.073	3.660	0.000
f_edppry*	0.098	5.450	0.000	0.209	10.700	0.000	0.108	6.220	0.000	0.108	5.750	0.000
m_edpry*	0.055	2.910	0.004	0.036	5.120	0.000	0.075	3.710	0.000	0.056	7.610	0.000
m_edppry*	0.085	5.180	0.000	0.096	5.370	0.000	0.107	5.710	0.000	0.258	12.370	0.000
Geographical zones												
Northeast (omitted)												
southw˜ t*	0.205	10.520	0.000	0.056	2.940	0.003	0.258	12.380	0.000	0.019	0.900	0.369
southe˜t*	0.152	7.410	0.000	0.000	0.030	0.978	0.205	9.930	0.000	-0.002	-0.470	0.639
northw˜t*	0.053	2.790	0.005	-0.015	-1.640	0.102	0.020	0.920	0.357	-0.014	-1.480	0.139
obs. P	0.780						0.751					
pred. P	.8152224 (at x-bar)						.7958065 (at x-bar)					
Child Variables	234.460			289.390			201.550			264.130		
p value	0.000			0.000			0.000			0.000		
Household variables	112.070			96.550			96.520			52.570		
p value	0.000			0.000						0.000		
	0.000											
Parental education	483.920			500.030			197.050			179.910		
p value	0.000			0.000			0.000			0.000		

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Table 15 Continued

enrol	dF/dx	z	P>/z/	dF/dx	z	P>/z/	dF/dx	z	P>/z/	dF/dx	z	P>/z/
All covariates	3975.410			3870.900			1170.990				1166.390	
p value	0.000			0.000			0.000				0.000	
Number of obs =	3403			3403			3395				3395	
LR chi2	544.06			566.73			790.62				811.75	
Prob > chi2	0			0			0				0	
Pseudo R2	0.1518			0.1581			0.2075				0.2131	
Log likelihood	-1520.205			-1508.8675			-1509.689				-1499.1235	

Notes:
1. The probit estimates are transformed to marginal effects for continuous variables and impact effects for the binary variables before being reported in the table. Marginal effect is the change in the probability for an infinitesimal change in each independent, continuous variable, while the impact effect reports the discrete change in the probability for dummy variables.
2. Standard errors have been adjusted to take into consideration the clustered nature of the data.

Effects of parents education

All the explanatory variables of parents' education attainment confirm *a priori* expectation and are highly significant indicating that parental education significantly increases the probability of school enrolment by the children. This shows that parental education matters and is important in creating benefits for children. Similar significant positive impacts have been found in earlier studies including Tansel (1997, 2002), Glick and Sahn (2006) and Handa et al. (2004). The issue of parental education presents further interesting results especially for rural households. Our results revealed that although generally parents' education level was a significant determinant of probability of enrolment, mothers' educational attainment was more important for girls than fathers' education, and fathers' education appeared more important for male children than mothers' education was in rural areas. However, in urban areas, fathers' educational attainment was more important for both genders, except for the coefficients of mothers with post-primary education. Another interesting finding was that the more the education of the parents, the higher the probability of the children being enrolled in schools. Children whose parents attained post-secondary education have a higher probability of being enrolled in a formal school than children whose parents have lower level of educational attainment.

The sample used in this study included only children in relation to household heads. Where the educational attainment of either the mother or father was missing, we generated dummy variables (father_miss and mother_miss) for the concerned child and then entered the median level of education for the education of the parent concerned. The results revealed that the probability of enrolment in school decreased if the mother was not present within the household.

The dummy for the gender of the household head showed that female heads supported education, as children living in female-headed households had a higher probability of getting enrolled in schools.

Effects of permanent income

There was a positive significant relationship between permanent income (proxied by the asset index) of the household and the probability of child enrolment in schools. This indicates that schooling is a normal good and this positive relationship has also been found in earlier studies (see, e.g., Handa, 1996; Tansel, 2002). The results further revealed that the marginal effects were larger for girls than for boys which indicates that female children benefit more than male children in terms of the effect of income on school enrolment. In addition, it may also reflect credit constraints which makes it more important for poor households (Tansel, 2002).

Effects of geographical zones

The zonal dummies were included because of the assumption that they might include the effects of supply constraints in these geographical zones of the country. The coefficients of these variables were large and had significant results. While children from the southern zones had a higher probability of being enrolled in school, those from the northwest had a lower probability of enrolment with reference to the base category which was the northeast zone.

In all cases, we conducted the F test for the joint significance of all the specicific individual child variables, the household, parental education and all covariates. The tests suggest in all cases that jointly, the covariates were significant determinants of the probability of school enrolment.

Determinants of late entry into primary school

We examined whether children currently enrolled in school delayed starting school beyond the government mandated starting age of six. An explanation of these determinants offers new insight contrary to the prediction of human capital theory that schooling will begin at the earliest possible age, there was substantial delayed entry into primary schools in Nigeria. The explanatory variables used were the same as those used in the probit model. The results in Table 12 showed that delayed entry into school is common in Nigeria. Tables 16 and 17 present the results of the determinants of delayed enrolment among rural and urban children.

Effects of individual child characteristics

Age was included as one of the explanatory variables so as to determine if there was a cohort effect. In the case of boys the age coefficient was negative and increased with its square. This was contrary to that of the girls where the coefficient of age was positive and significant showing that many female children have delayed enrolment. This is likely to be as a result of the opportunity cost of schooling. Many female children are needed to help with household chores and, since this is regarded as valuable, girls are prone to delay entry into schools. The positive significant coefficient of age squared reflected that older children were more likely to delay entry than younger ones. In terms of the dummy variables for age of the children, we found that a larger proportion of older children delayed in enrolment than the younger children. This indicates that the problem of delayed enrolment might have been on the decrease over time. Those born later were less likely to have delayed enrolment. The coefficients for the different age categories revealed that older children had higher delayed entry than younger children. A similar result was found by Weir (2000).

In the case of urban children, the results were generally similar to those of rural children (Table 17). The higher the age of the child the lower the number of years delayed before enrolment in the case of boys, but age was not a significant determinant of delayed enrolment for girls.

Cohort effects

The number of children below six was positively related to delayed enrolment for boys and girls. However, the presence of older siblings in the household reduced delayed entry into school. This is because of the possibility of complementing each other within the household. If older siblings are in school, they encourage the younger ones. Household chores are shared and this reduces the opportunity cost of time. Unlike the case of probability of current enrolment, in this regression result, the coefficient for number of boys and girls aged 1217 was significant and reduced delayed enrolment.

Table 16: Determinants of late entry of children aged 617 to school (rural children)

	Male age in years			Male age in dummies			Female age in years			Female age in dummies		
Deva	**Coef.**	**t**	**P>/t/**	**Coef.**	**t**	**P>/t/**	**Coef.**	**t**	**P>/t/**	**Coef.**	**t**	**P>/t/**
Individual Child variable												
age	-0.005	-0.060	0.951				0.181	2.100	0.036			
age2	0.019	5.030	0.000				0.015	2.800	0.000			
ag_6_yr (omitted)												
ag_7_yr*				0.113	0.710	0.480				0.103	0.650	0.517
ag_8_yr*				0.316	1.960	0.050				0.606	3.820	0.000
ag_9_yr*				0.716	4.000	0.000				1.217	6.760	0.000
ag_10_yr*				1.366	8.640	0.000				1.791	11.340	0.000
ag_11_yr*				1.301	6.430	0.000				1.656	7.970	0.000
ag_12_yr*				1.886	9.770	0.000				2.332	12.100	0.000
ag_13_yr*				2.630	12.420	0.000				3.136	14.900	0.000
ag_14_yr*				2.731	12.510	0.000				3.485	16.630	0.000
ag_15_yr*				3.584	18.200	0.000				4.700	23.930	0.000
ag_16_yr*				3.877	16.650	0.000				4.129	18.110	0.000
ag_17_yr*				4.776	20.450	0.000				5.678	25.220	0.000
Household variables												
hheadsex	-0.256	-1.880	0.060	-0.256	-1.880	0.060	-0.602	-4.740	0.000	-0.587	-4.620	0.000
asset	-0.257	-6.280	0.000	-2.589	-6.340	0.000	-0.262	-6.510	0.000	-0.264	-6.570	0.000
Cohort variables												
Siblings<5	0.109	10.110	0.000	0.120	10.220	0.000	0.045	1.440	0.149	0.045	1.290	0.196
boys6_11	-0.105	-12.420	0.000	-0.106	-12.300	0.000	-0.004	-1.440	0.150	-0.014	-0.440	0.661
girls6_11	-0.036	-3.540	0.000	-0.038	-3.080	0.002	-0.040	-3.310	0.001	-0.048	-5.250	0.000
boys12_17	-0.070	-1.970	0.049	-0.091	-3.460	0.001	-0.037	-3.740	0.000	-0.018	-4.230	0.000
girls12_17	-0.018	-1.580	0.114	-0.011	-2.530	0.012	-0.060	-6.260	0.000	-0.067	-1.970	0.049
men_18_59	0.029	1.390	0.164	0.060	1.610	0.107	0.045	4.510	0.000	0.069	1.980	0.047
women_18_59	0.053	1.460	0.145	0.056	1.930	0.054	0.079	7.870	0.000	0.014	0.440	0.661
adult_60	0.061	1.010	0.311	0.077	2.040	0.041	0.012	2.740	0.006	0.048	1.170	0.244

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Table 16: Continued

	Male age in years			Male age in dummies			Female age in years			Female age in dummies		
Deva	**Coef.**	**t**	**P>/t/**	**Coef.**	**t**	**P>/t/**	**Coef.**	**t**	**P>/t/**	**Coef.**	**t**	**P>/t/**
Parental education												
f_ed_no(omitted)												
m_ed_no(omitted)												
mother_miss	0.161	8.590	0.000	-0.182	7.300	0.000	-0.016	-1.320	0.186	0.006	1.920	0.055
father miss	-0.008	6.760	0.000	0.012	2.260	0.024	0.040	3.310	0.001	0.013	4.350	0.000
f_edpry	-1.244	-12.570	0.000	-1.249	-12.630	0.000	-1.047	-10.410	0.000	-1.045	-10.420	0.000
f_edppry	-1.474	-12.840	0.000	-1.465	-12.760	0.000	-1.222	-10.770	0.000	-1.221	-10.780	0.000
m_edpry	-1.054	-9.490	0.000	-1.056	-9.510	0.000	-1.334	-12.010	0.000	-1.328	-11.970	0.000
m_edppry	-1.301	-9.390	0.000	-1.282	-9.240	0.000	-1.921	-14.280	0.000	-1.902	-14.160	0.000
Geographical zones												
Northeast (omitted)												
southwest	-3.377	-26.060	0.000	-3.368	-25.980	0.000	-3.565	-27.500	0.000	-3.563	-27.520	0.000
southeast	-3.153	-26.360	0.000	-3.144	-26.270	0.000	-3.596	-30.210	0.000	-3.592	-30.130	0.000
northwest	1.176	11.250	0.001	1.173	11.200	0.000	1.322	-2.450	0.014	1.298	12.250	0.000
_cons	4.666	9.990	0.000	5.404	34.350	0.000	4.019	8.590	0.000	5.749	36.270	0.000
Child Variables	232.83			59.44			358.33			93.900		
p value	0.000			0			0.000			0.000		
Parental education	120.25			119.41			140.180			139.130		
p value	0.000			0.000			0.000			0.000		
Household variables	15.48			15.59			20.120			19.970		
p value	0.000			0.000			0.000			0.000		
All covariates	382.49			233.58			468.890			288.690		
p **value**	0.000			0.000			0.000			0.000		
Number of obs =	9564			9564			8868			8868		
F stat	348.79			228.74			425.16			398.34		
Prob > F	0.000			0.000			0.000			0.000		
R-squared	0.383			0.384			0.450			0.453		
Adj-R-squared	0.382			0.382			0.449			0.451		
Root MSE	3.752			3.751			3.627			3.619		

Effects of parents' education

Parents' education is the most significant determinant of delayed enrolment. Parents' education consistently had negative significant effects in reducing the number of the years delayed. This was consistent with the findings under the probit model that educated parents were highly interested in the education of their own children. The effects of fathers' education were higher for boys, while mothers' education had a higher effect for girls. In addition, parents' education was found to be the most important factor determining reduction in delayed entry among urban children. One interesting revelation was that the impact was consistently higher for the females than for the males. The implication is that in addition to the fact that parents' education increases the probability of children being enrolled in school, it also had an additional effect of making sure that children were enrolled in school on time and without delay.

Effects of permanent income

The higher the income of the family (as proxied by asset index) the lower the years of delayed enrolment children will experience. Permanent income of the household had a significant negative effect on delayed enrolment. This means that children from rich families are less likely to have delayed enrolment into primary schools. The effect of permanent income was also higher for girls than for boys no matter the location of residence. In addition, the effects were also larger for urban children than for rural children.

Effects of geographical zones

Compared with the northeast region of the country, other geopolitical zones of the country had less delayed enrolment. In the case of the zonal dummy, the years of delayed entry was higher for northern zones than for southern zones.

Table 17: Determinants of late entry of children aged 617 to school (urban children)
Urban delayed enrolment

	Male age in years			Male age in dummies			Female age in years			Female age in dummies		
deva	**Coef.**	**t**	**P>/t/**	**Coef.**	**t**	**P>/t/**	**Coef.**	**t**	**P>/t/**	**Coef.**	**t**	**P>/t/**
Individual Child variable												
age	-0.203	1.560	0.118				-0.032	-0.250	0.806			
age2	0.017	3.080	0.002				0.014	2.440	0.015			
ag_6_yr(omitted)												
ag_7_yr				-0.391	-1.500	0.134				-0.093	-0.360	0.717
ag_8_yr				-0.087	-0.320	0.748				-0.149	-0.570	0.567
ag_9_yr				-0.102	-0.360	0.718				0.510	1.890	0.058
ag_10_yr				0.267	1.030	0.303				0.599	2.340	0.019
ag_11_yr				0.272	0.880	0.379				1.057	3.420	0.001
ag_12_yr				0.215	0.710	0.477				1.174	4.050	0.000
ag_13_yr				1.220	3.950	0.000				1.784	5.860	0.000
ag_14_yr				0.933	2.960	0.003				2.049	6.780	0.000
ag_15_yr				1.140	3.680	0.000				1.890	6.410	0.000
ag_16_yr				1.423	4.260	0.000				2.270	6.900	0.000
ag_17_yr				2.121	6.250	0.000				3.424	10.470	0.000
Household variables												
hheadsex	-0.072	-0.400	0.691	-0.056	-0.310	0.757	-0.503	-3.000	0.003	-0.519	-3.100	0.002
asset	-0.398	-6.680	0.000	-0.405	-6.780	0.000	-0.495	-8.400	0.000	-0.499	-8.440	0.000
Cohort variables												
Siblings<5	0.006	2.190	0.029	0.004	3.230	0.000	0.046	1.310	0.189	0.041	1.390	0.165
boys6_11	0.100	11.090	0.000	0.117	12.960	0.000	0.155	7.220	0.000	0.142	4.270	0.000
girls6_11	0.130	13.860	0.000	0.133	3.950	0.000	0.056	1.640	0.100	0.035	1.150	0.250
boys12_17	0.081	1.291	0.213	0.046	1.460	0.144	0.055	1.480	0.138	0.041	1.600	0.128
girls12_17	0.138	12.160	0.000	0.115	4.340	0.000	0.011	5.450	0.000	0.016	5.360	0.000
men_18_59	0.038	10.170	0.000	0.024	13.040	0.000	0.144	4.470	0.000	0.135	4.150	0.000
women_18_59	0.314	12.270	0.000	0.398	12.390	0.000	0.245	1.290	0.698	0.267	1.610	0.465

continued next page

Table 17: Continued

	Male age in years			Male age in dummies			Female age in years			Female age in dummies		
deva	**Coef.**	**t**	**P>/t/**	**Coef.**	**t**	**P>/t/**	**Coef.**	**t**	**P>/t/**	**Coef.**	**t**	**P>/t/**
adult_60	0.425	16.580	0.000	0.454	14.530	0.000	0.171	5.880	0.000	0.215	6.190	0.000
Parental education												
f_ed_no(omitted)												
m_ed_no(omitted)												
mother_miss	0.322	-7.300	0.000	0.385	10.740	0.000	0.115	1.690	0.091	0.171	2.270	0.023
father miss	0.354	-8.710	0.000	0.300	3.990	0.000	0.134	1.510	0.131	0.205	-2.180	0.029
f_edpry	-0.982	-6.090	0.000	-0.973	-6.030	0.000	-0.756	-4.710	0.000	-0.772	-4.800	0.000
f_edppry	-0.877	-6.130	0.000	-0.874	-6.100	0.000	-1.120	-7.830	0.000	-1.132	-7.910	0.000
m_edpry	-0.665	-4.140	0.000	-0.670	-4.170	0.000	-0.714	-4.440	0.000	-0.706	-4.390	0.000
m_edppry	-0.932	-6.070	0.000	-0.930	-6.050	0.000	-1.384	-9.060	0.000	-1.384	-9.060	0.000
Geographical zones												
Northeast (omitted)												
southwest	-2.773	-15.800	0.000	-2.774	-15.770	0.000	-3.693	-21.050	0.000	-3.699	-21.070	0.000
southeast	-2.561	-11.760	0.000	-2.546	-11.680	0.000	-3.552	-16.460	0.000	-3.560	-16.480	0.000
northwest	-0.626	-3.280	0.001	-0.630	-3.300	0.001	-0.477	-2.450	0.014	-0.475	-2.440	0.015
_cons	5.548	7.510	0.000	5.103	18.130	0.000	5.817	8.030	0.000	6.240	23.480	0.000
* POST ESTIMATION TEST												
Child												
Variables	204.460			183.070			91.390			97.220		
p value	0.000			0.000			0.000			0.000		
Household												
variables	29.900			9.800			30.840			63.580		
p value	0.000			0.020			0.000			0.000		
Parental												
education	371.980			345.060			84.970			115.540		
p value	0.000			0.000			0.000			0.000		
All covariates	2803.150			2647.890			464.030			649.470		
p **value**	0.000			0.000			0.000			0.000		

continued next page

Table 17: Continued

	Male age in years			Male age in dummies			Female age in years			Female age in dummies		
deva	**Coef.**	**t**	**P>/t/**	**Coef.**	**t**	**P>/t/**	**Coef.**	**t**	**P>/t/**	**Coef.**	**t**	**P>/t/**
Number of obs =	3403			3403			3395			3395		
F stat	70.83			46.950			113.000			74.440		
Prob > F	0.000			0.000			0.000			0.000		
R-squared	0.262			0.266			0.363			0.365		
Adj-R-squared	0.2587			0.260			0.359			0.360		
Root MSE	3.330			3.327			3.300			3.298		

Decomposition analysis

We explored the decomposition of overall gender gap in enrolment rates into its explained and unexplained components. The results of the decomposition of the gender gap are presented in Table 18.[6] The actual gender gap in enrolment, as revealed by Table 18 was 0.0447, 0.0291 and 0.0549 for all children, urban and rural children respectively.

Table 18: Decomposing the gender gap in school enrolment

	All		Urban		Rural	
Male	0.6221		0.7802		0.5659	
Female	0.5774		0.7511		0.5109	
Gap	0.0447		0.0291		0.0549	
Using male enrolment rate		**%**		**%**		**%**
Unexplained	0.0202	45	-0.0630	-216	0.0451	82
Explained	0.0325	73	0.0926	318	0.0238	43
Approximation Error	-0.0080	-18	-0.0005	-2	-0.0139	-25
Gender Gap	0.0447	100	0.0291	100	0.0549	100
Using female enrolment rate						
Unexplained	0.0127	28	-0.0464	-160	0.0400	73
Explained	0.0400	89	0.0759	261	0.0289	53
Approximation Error	-0.0080	-18	-0.0005	-2	-0.0139	-25
Gender Gap	0.0447	100	0.0291	100	0.0549	100

The gender gap was decomposed into explained and unexplained portions. The explained portion of the gap is the gap that is due to the differences in the values of the explanatory variables, while the unexplained portion of the gap is determined by the differences in coefficients and as such the gap is due to the differences in the way household characteristics affect male and female children. There is also a third part of the gap, which is accounted for by approximation error or a residual part of the total enrolment gap which forces an adding-up constraint (see Handa, 1996; Al-Samarai and Reilly, 2000). Even and Mcpherson (1993) show that this residual is equal in size when the reference group is switched either from the male to the female or vice versa.

The decomposition is explained in terms of their effects in either widening or narrowing the overall gender gap. While a positive sign suggests a widening of the differential, a negative sign indicates a contraction of the gap. Results from Table 20 reveal that our model predicted a gender gap of 4.5%, but 3.3% of it is explained by the differences in the characteristics between groups (explained portion), while 2.0% of attendance rates or 45% of the entire gap is due to the differences in the way households treat male and female children (i.e. unexplained portion).

However, separating the gap by location of residence, we note that both characteristics between male and female widened the differentials in both rural and urban areas. However, the way households treat male and female children in urban areas contracts the gender gap in enrolment, while the actual gap is accounted for by the widening of the gap through the characteristics of the male and female children. This is not surprising because most households in urban areas are not too strong on the "boys are better than girls" attitude. However, in rural areas, both the characteristics of the children and the way households treat different genders were gap widening. The explained portion of the gap was 43% of the whole gap.

6. Conclusion and policy implications

This study examined the determinants of child schooling in Nigeria and, based on the findings, decomposed the gender gap in schooling outcome. We examined two main schooling outcomes in Nigeria: Enrolment rates and delayed enrolment of children aged 617 which is the official schooling age in primary and secondary schools in Nigeria. We utilized the data obtained in the 1999 MICS conducted by FOS.

One of the important findings from the analysis is that many children are currently not enrolled in schools in Nigeria. There are differences across locations, as it is higher in rural areas than urban areas. Enrolment rates have, however, increased over the years. Our study also revealed evidence of delayed enrolment by children into formal schools in Nigeria. This means that not only are many children not in formal schools, but also a high proportion of those that are in school started late and this has implications for subsequent entry into the labour market. Socioeconomic backgrounds of children were found to be important determinants of schooling in Nigeria. Household income was found to be a significant positive correlate of the probability of schooling and had a negative significant relationship with delayed enrolment. In addition, our results showed that parental education matters and is important in creating benefits for their children. The issue of parental education presents interesting results. Mothers' education appeared more important for female children than fathers' education, while fathers' education appeared more important for male children than mothers' education did.

Our decomposition of gender gap in schooling enrolment showed that the way a household treats boys and girls in urban areas contracts the gender gap in enrolment, while it widens the gap in rural areas. One policy implication of this is that parents in rural areas should be educated on the benefit of gender equity among children.

Therefore, our findings suggest that there is a need to effectively implement the UBE programme which proposes universal and compulsory basic education for Nigerian citizens. Since income has a significant influence on child schooling it means that poverty can reduce the probability of child enrolment in schools, hence policies that reduce poverty and increase income generating opportunities will have significant effects in increasing the enrolment rate in the country.

Notes

1. It should be noted that UPE was not achieved although enrolment increased substantially.

2. In the new UBE programme, formal schooling is expected to be free and compulsory for the first nine years of schooling.

3. The age range 617 is chosen because it corresponds with the official primary and secondary school ages in Nigeria.

4. Delayed enrolment is defined as the number of years beyond six years that it takes a child to start primary school. It is zero if a child starts school on time, positive if the child has delayed enrolment by a number of years and negative if the child starts before the official age of entry to school.

5. Description of the definition of the variables is presented in Table A1.

6. The regression results on which the decomposition is performed is a logit regression of enrolment rate and the results of the estimation is presented in Table A3.

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Appendixes

Appendix A1: Variable description

Variable	Variable description
deva	Number of years of delayed entry into primary school by the child
enrol	1 if child is currently enrolled in a school
Individual child variables	
age	Age of the child expressed in years
age2	The square of age of the child expressed in years
Gender	Gender of the child (1 if the child is female)
no_parents	Dummy = 1 if the individual is not the child of household head
Household variables	
Hheadsex	Gender of the household head (1 if female)
Hhsize	Size of the household
Asset	Asset of the household
Rural	1 if household is located in a rural area
Cohort variables	
children<5	Number of members of household under 6 years
boys6_11	Number of male members of household aged 6-11
girls6_11	Number of female members of household aged 6-11
boys12_17	Number of male members of household aged 12-17
girls12_17	Number of female members of household aged 12-17
men_18_59	Number of male members of household aged 18-59
women_18_59	Number of female members of household aged 18-59
adult_60	Number of members of household aged over 60
Parental education	*Set of Dummies (reference categories are no education)*
Mother_miss	Mother of child not present in the household
Father_miss	Father of child not present in the household
F_ed_no	1 if father has no formal education
fated_pry	1 if father has attended up to primary school level
Fated_ppry	1 if father has attended beyond primary school level
m_ed_no	1 if mother has no formal education
motted_pry	1 if mother has attended up to primary school level
Motted_ppry	1 if mother has attended beyond primary school level
Geographical zones	*Set of Dummies (reference category is northeast)*
Southwest	1 if household is located in a southwest geographical zone
Southeast	1 if household is located in a southeast geographical zone
Northwest	1 if household is located in a northwest geographical zone
Northeast	1 if household is located in a northeast geographical zone

Appendix A2: Determinants of child schooling (probit estimates without cohort variables)

	Rural male			Rural female		
Urban male enrol z	Urban female Z P>z		P>z	z P>z		
ag_7_yr*	0.100	4.450	0.000	0.115	4.610	0.000
0.065	2.400	0.016	0.069	2.330	0.020	
ag_8_yr*	0.164	7.440	0.000	0.133	5.380	0.000
0.063	2.210	0.027	0.090	3.070	0.002	
ag_9_yr*	0.214	9.010	0.000	0.174	6.290	0.000
0.150	5.760	0.000	0.104	3.420	0.001	
ag_10_yr*	0.191	8.920	0.000	0.162	6.640	0.000
0.091	3.470	0.001	0.119	4.290	0.000	
ag_11_yr*	0.200	7.500	0.000	0.217	7.050	0.000
0.083	2.770	0.006	0.044	1.220	0.222	
ag_12_yr*	0.213	9.590	0.000	0.195	7.570	0.000
0.123	4.850	0.000	0.080	2.720	0.007	
ag_13_yr*	0.130	5.020	0.000	0.102	3.500	0.000
0.049	1.660	0.097	0.002	0.050	0.961	
ag_14_yr*	0.203	7.890	0.000	0.134	4.630	0.000
0.074	2.590	0.010	0.039	1.200	0.230	
ag_15_yr*	0.104	4.360	0.000	0.040	1.460	0.145
0.026	0.900	0.371	0.026	0.820	0.412	
ag_16_yr*	0.142	4.970	0.000	0.032	1.000	0.319
0.006	0.170	0.865	0.010	0.270	0.791	
ag_17_yr*	-0.008	-0.270	0.784	-0.119	-3.780	0.000
-0.061	-1.790	0.074	-0.148	-3.680	0.000	
hheadsex*	0.044	2.100	0.036	0.060	2.920	0.003
0.055	2.500	0.012	0.025	1.140	0.256	
asset	0.015	2.540	0.011	0.028	4.500	0.000
0.037	5.260	0.000	0.057	7.740	0.000	
mother_miss	0.002	1.450	0.147	0.004	2.520	0.012
0.003	1.780	0.076	0.003	1.700	0.090	
father_miss	0.005	0.250	0.800	0.006	0.310	0.758
-0.092	-3.950	0.000	-0.121	-5.570	0.000	
f_edpry*	0.152	10.950	0.000	0.128	8.340	0.000
0.076	4.250	0.000	0.099	5.250	0.000	
f_edppry*	0.167	10.210	0.000	0.139	8.000	0.000
0.084	5.140	0.000	0.109	6.310	0.000	
m_edpry*	0.135	8.350	0.000	0.165	9.750	0.000
0.053	2.820	0.005	0.073	3.610	0.000	
m_edppry*	0.150	7.310	0.000	0.241	11.480	0.000
0.094	5.270	0.000	0.107	5.700	0.000	
southw~t*	0.321	19.460	0.000	0.356	19.980	0.000

0.212	10.910	0.000	0.263	12.730	0.000	
southe~t*	0.304	19.220	0.000	0.366	21.930	0 . 0 0 0
0.154	7.630	0.000	0.205	9.990	0.000	
northw~t*	-0.157	-10.780	0.000	-0.178	-10.970	0 . 0 0 0
0.055	2.930	0.003	0.017	0.780	0.435	
Number of obs	9564			8870		3403
		3395				
LR chi2	3252.8			3518		
556.97			800.92			
Prob > chi2	0			0		
0.000			0.000			
Pseudo R2	0.2485			0.286		

Appendixes

0.1554 0.2102
Log likelihood = -4920 -4387 -1513.7
-1504.53

Appendix A3: Results from logit regression (current enrolment = 1)

	All children		*Urban children*		*Rural children*	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
age	0.714***	0.736***	0.721***	0.644***	0.725***	0.761***
age2	-0.032***	-0.035***	-0.034***	-0.032***	-0.032***	-0.035***
no_parents	-0.165	-0.172**	-0.561**	-0.681***	-0.006	0.019
hheadsex	0.248**	0.253*	0.369*	0.154	0.222*	0.312***
hhsize	0.026	0.044	0.043*	0.039	0.008	0.037
under5	-0.068***	-0.106*	-0.122	-0.102**	-0.043**	-0.102***
adults	0.008	-0.019	-0.002	-0.005	0.022	-0.013
fated_pry	0.684***	0.617***	0.546***	0.646***	0.705***	0.584***
fated_ppry	0.831***	0.737***	0.570***	0.680***	0.804***	0.624***
motted_pry	0.564***	0.690***	0.368***	0.495***	0.644***	0.746***
motted_ppry	0.779***	1.064***	0.689***	0.761***	0.746***	1.135***
asset	0.165**	0.238	0.220***	0.334***	0.070**	0.126***
southwest	1.484***	1.579***	1.375***	1.624***	1.602***	1.593***
southeast	1.343***	1.571***	1.270***	1.709***	1.415***	1.627***
northwest	-0.463***	-0.599***	0.353**	0.074	-0.649**	-0.776***
Number of obs	12967	12263	3403	3395	9564	8868
LR chi2(15)	4108.340	4790.640	551.250	809.080	3253.130	3559.190
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.239	0.287	0.154	0.212	0.249	0.290
Log likelihood	-6543.185	-5957.116	-1516.606	-1500.457	-4919.454	-4365.111

*** indicates that using a two-tailed test, it is significant at 0.01; ** indicates that using a two tailed test, it is significant at 0.05.

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