Appendices

Appendix A: Categorising School Types

The increase in students currently accessing private primary schools has led to a rise in household expenditure on education. Frequently, household paying capacity determines the quality of education, as assessed by their children. Unfortunately, very few studies have explored the patterns of household expenditure. Nevertheless, it is difficult to ignore the household's role in demanding primary school education, especially in the context of shrinking public funds for the public school sector. Examining the pattern of household expenditure on education will be vital to creating a private school cost scale that moves from lower to higher fees and captures the broad fee spectrum found in the 2015 NEDS data. This is in line with Srivastava (2005) and others, who argue that a key category that may be used to distinguish between private schools is with respect to fees.

An understanding of expenditure patterns highlights key education expenditures and their variations across geographical areas and regions. Beyond calculating the private school cost scale, I will contribute to the literature by examining the heterogeneity in household education expenditure in Nigeria using the 2015 NEDS. Additionally, given Nigeria's large population size and contributions to the private school sector, my study of Nigeria offers insights into the extent of private primary school provision that will be relevant for urban and rural contexts in other SSA countries.

1. Components of household expenditure in my analysis

To explore household expenditure, I used the 2015 NEDS. Oseni et al. (2018, page 5) describe the scope of household expenditure on education as, at a minimum, ''all expenditures incurred by members of a household on formal education.'' According to the UNESCO Institute of Statistics (UIS) guide, this includes direct payments by students to schools, payments made by households for purchases of personal items used in schools, and household expenditures on living and other expenses incurred to attain education.

Tiyab and Ndabananiye (2013) defined two main criteria that can be used to describe private education expenditure: the direct link between expenditure on education and the mandatory nature of expenditure. Based on these criteria, all education expenditures incurred by households due to school attendance and paid directly to the school (tuition fees, registration fees, etc.) or an outside agent (textbooks and supplies, uniforms, etc.) can be considered education expenditures.

In my study, I extended these criteria to public schools because, as mentioned, public schools in Nigeria are only tuition-free. There are significant hidden fees in the form of uniforms, books, registration fees, etc. I divide education expenditure into two components:

- Mandatory expenses: These are required for school enrolment and attendance. I divide these into two groups:
    - Tuition and other related enrolment fees include school fees, registration fees, exam fees, and other associated expenses.
    - Non-tuition expenses include uniforms, textbooks, and other mandatory learning materials and supplies.
- Secondary expenses: fees that are not mandatory for enrolling and attending schools, but are required to facilitate learning. They include costs for transportation, meals, accommodation, boarding facilities, and so on.[1]

[1] [1] While some primary schools in Nigeria offer boarding facilities, this article excludes boarding costs as it focuses solely on mandatory expenses directly related to schooling, of which boarding is not considered a part.

To create the private school cost scale, I focus my analysis only on mandatory costs because I am interested in the fees associated with attending schools. This does not negate the importance of other expenses such as transportation for attending school. However, the purpose of school categorization is to define schools by the direct costs associated with enrolling and attending them and to create an absolute method of classifying a continuous scale of school costs. These costs are also the most commonly cited expenditure per pupil expenditure on primary education per year in the 2015 NEDS. In Table A1 below, I present a breakdown of these individual expenditures, the average amounts households spend on them in public and private schools, and the percentage of households who pay it by school type (public/private).

Therefore, the total education expenditure includes the following:

- Tuition/School fees (T)
- Uniforms (U)
- Textbooks and supplies (S)
- Other costs (which will include registration fees and exam fees) (O)

Table A1: Most Cited Per Pupil Household Expenditure on Primary Education Per Year (2015).

Item		Percent Citing Payment
Tuition	Public Schools	19
	Private Schools	97
Textbooks/Supplies	Public Schools	93
	Private Schools	99
Uniforms	Public Schools	88
	Private Schools	93
Food	Public Schools	49
	Private Schools	55
PTA Fees	Public Schools	60
	Private Schools	89
Exam Fees	Public Schools	45
	Private Schools	89

Source: 2015 NEDS

2. Creating the private school cost scale

In my research, I refer to private school costs instead of fees, as is the norm in the literature. I argue that the costs and fees are not the same. Tuition fees constitute one part of household expenditure on education, including uniforms, supplies, and transport, as stated in the previous section and represented in the 2015 NEDS. My analysis of the 2015 NEDS reveals that both public and private households bear these costs. Therefore, I categorize and refer to schools by cost instead of fees, and low-cost schools instead of low-fee schools.

Area/Unit of analysis

I am interested in examining inequalities in attendance and outcomes across several demographics, one of which is the different regions across Nigeria. I am also interested in running separate analyses for rural and urban areas. Therefore, the unit of analysis is at the regional level for each geographical setting (rural and urban). Nigeria has six regions: southwest, southeast, south, north-central, northwest, and northeast. In Table A2 below, I

show variations in total per pupil household expenditure per year. The table highlights the disparities between rural and urban areas and across regions in Nigeria. This variation underscores the reason why I will create separate indices for rural and urban areas.

Table A2: Per Pupil Average Household Expenditure on Primary Education Per Year

Per Pupil Household Expenditure on Education		Amount (NGN)	Amount (USD)
National Average		15,585	77
Residence	Urban	23,207	116
	Rural	8,797	43
Region	North Central	10,871	54
	North East	6,970	35
	North West	4,468	22
	South East	17,357	87
	South South	21,662	108
	South West	30,410	152
School Type	Public	6,425	32
	Private	34,786	174
Wealth Group	Poorest	3,885	19
	Poorer	5,517	28
	Middle	9,257	46
	Richer	15,905	80
	Richest	38,140	191

USD conversion is based on the 2015 exchange rate of 200 Nigerian Naira (NGN) to 1 United States Dollar (USD). The USD amounts are rounded up to the nearest whole number.
Source: Author's calculations based on the 2015 NEDS data.

Further, I analyze reported fees by grade level, as analysis of the 2015 NEDS reveals that the association with schooling usually varies by grade level. For example, there are registration costs associated with most students in the first year of primary school (Primary 1), but less so for other grades (where it exists, it usually reflects the fact that a child enrolled in a new school in the academic year).

Structure of the School Cost Scale

In the 2015 NEDS, household education expenditure was distinctly reported for each enrolled child. Education spending was reported for each enrolled child and by the main education expenditure items (tuition fees, textbooks and supplies, uniforms, etc.).[2]

In this case, total education expenditure per enrolled child, I, in a particular grade g =

$$EE_{gk} = \frac{\sum_i w*Y_{ig,k}}{\sum_i w*N_{ig,k}}$$

where:

[2] In cases where education spending is not reported by child, but for all enrolled children in the household, it is possible to calculate expenditure per child. For example, by dividing by the number of enrolled children in the household or using econometric modelling to estimate mean/average expenditure per child.

- EE_{gk} is the student estimate of household education expenditure at primary grade level g, among sub-group of interest k.[3]
- **g** is the grade level of school (g ranging from Primary 1 to 6).
- k is the sub-group of interest. In this case, I am interested in the total expenditure of public and private schools in rural and urban areas. Therefore, an example of a sub-group would be a student in a public school in a rural area.
- **i** is an enrolled student at a given **g** level in subgroup k.
- Y_{igk} is the total education expenditure incurred by individual student **i** in grade level **g** and subgroup *k*.
- w_i is the weight of the i*th* student in the sample.
- N_{igk} is equal to 1 when individual I is enrolled at grade level g and is part of the subgroup of interest.

Education expenditure comprises four subcomponents, which are first combined:

Total education expenditure per child in a particular grade level = T + U + TS + O
where total education expenditure (EE) is the sum of all components of tuition (T), uniforms (U), Textbooks and Supplies (S), and other fees (O), which include registration and exam fees.

Benchmark
One of the objectives of this thesis is to determine whether the 2015 NEDS dataset will provide evidence for or against the benefits of private schooling relative to public schools in terms of attendance and learning outcomes. To achieve this, my first step is to establish the total fees associated with public schools. Given that public schools are tuition-free across Nigeria, summing up the costs of other mandatory non-tuition fees will form the basis for establishing a benchmark for the continuous scale.

It is important to note that I do not attempt to define an absolute low-cost number; instead, I suggest that creating cost bands is a more flexible and valuable way of categorizing schools that highlights the relational differences between private schools, without being suggestive of or opining on the affordability of schools.

Step one – Calculate the average reported total education expenditure for public schools for a particular region, for the same grade level, and in the same geographic setting.

Given that public schools are tuition-free, it is expected that there will be some cases where households report no expenditure on a child. This is the case for all 12 units (urban and rural areas of the six regions**).** In Figures A1 and A2, I show the total education expenditure (TEE) distribution in the urban and rural areas of the north-central region. The figures indicate two important things: in both units, many observations with TEE were reported as 0, and both had long right-hand tails with high outlier values. The mean values in both units are approximately double the median values shown in the figure below. For example, the mean value of public expenditure in the urban areas of Northcentral is 8,800 naira, while the median is approximately 4,500 naira. Thus, the mean does not represent the average expenditure per unit.

The distribution in both units is representative of the distribution of the 10 other units.

[3] K can also represent a sub-item of interest, such as tuition, uniforms, and supplies. In my study, I combine total expenditure to focus on the sub-group.

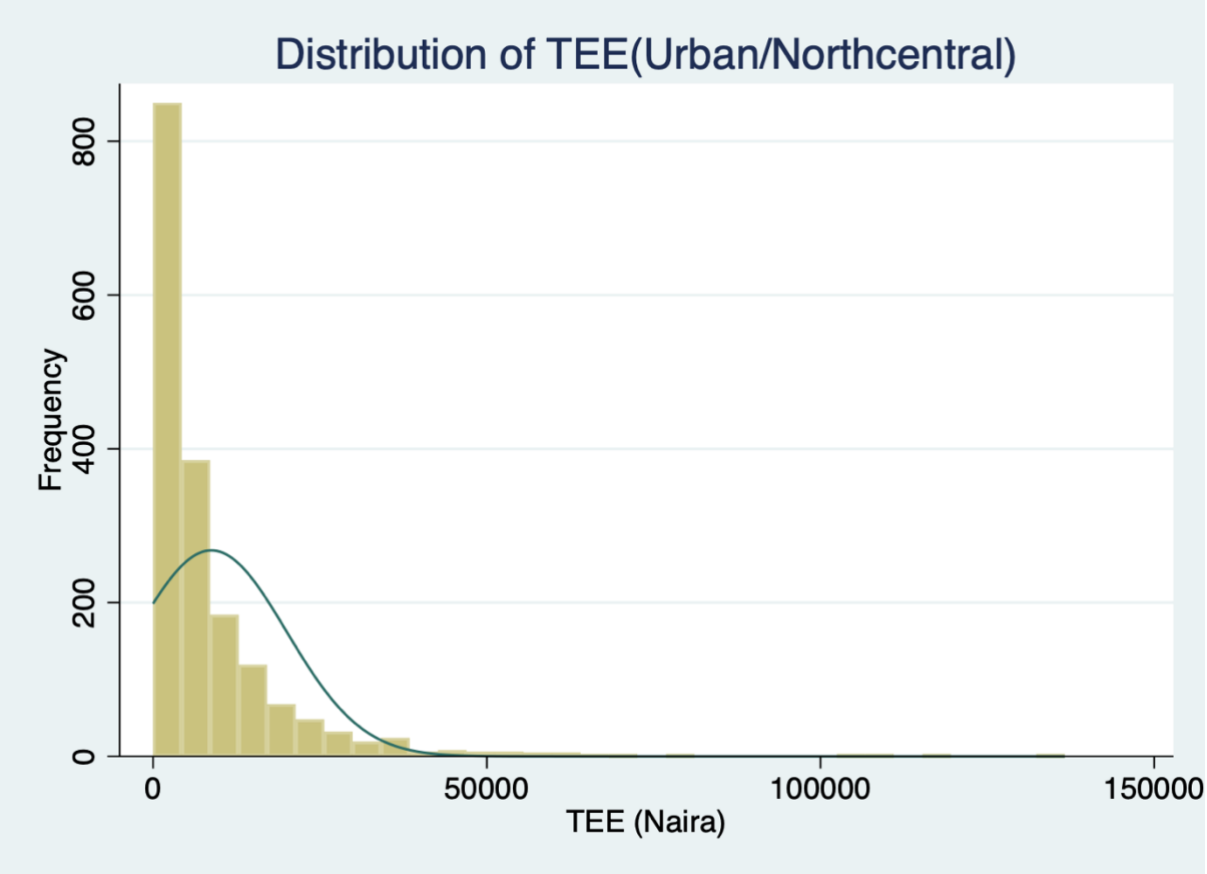

Figure A1: Total Education Expenditure (Urban/North Central)

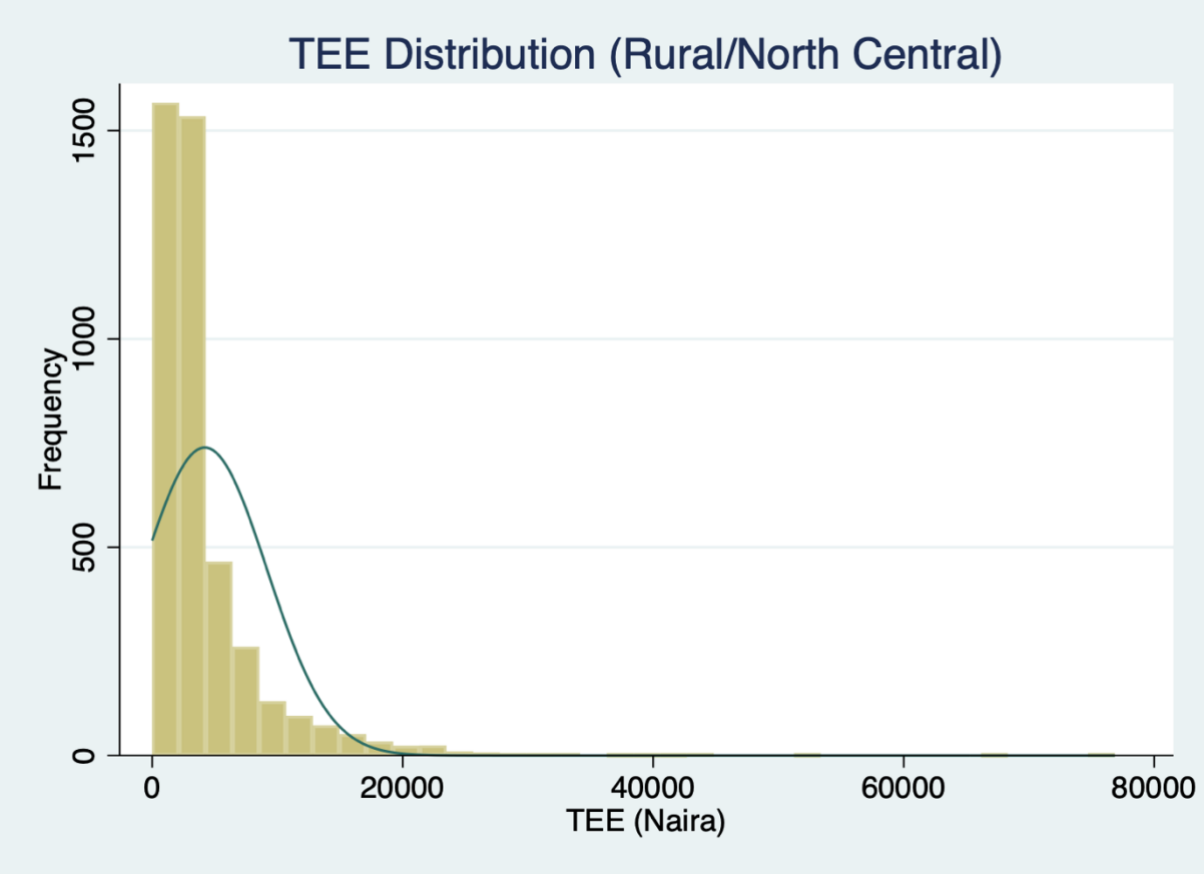

Figure A2: Total Education Expenditure (Rural/North Central)

Step two – Create the first private school category. I categorize a school as low-cost if the reported fees are equal to or lower than the median reported fees for public schools in the same region, class level, and geographic setting.

Step three – Categorizing the remaining private schools
To calculate the following three categories, I drop all data for public and low-cost private schools and focus on the remaining reported fees for private schools.

One of the shortcomings of the previous methods of classifying private schools by cost is that they do not represent the true extent and diverse nature of the private education sector operating in many developing countries, including Nigeria. This stems mainly from the fact that there is a lack of data on all private schools in many countries. The information in the literature often stems from the limited knowledge of private schools that are formally registered and recognized by the governments in the countries they operate. There is less documentation of the scale and coverage of unregistered/unrecognized private schools, which, given the discrepancies between household-based surveys and school surveys in Nigeria on the proportion of students attending private schools, constitute a large proportion of providers.

In recognition of this, I further classify the remaining private schools into two categories, attempting to represent the heterogeneity of private schools by cost. The following two categories are informed by the distribution of the available data. The rest of the categories for my research were informed by the 2015 NEDS. However, I aim to describe an approach that can be replicated using similar surveys containing various household education expenditures.

Category B – Midcost schools: A school is categorized as mid-cost if the reported costs/household expenditure on children for the year falls above the median and below or equal to the 95th percentile of the expenditure/reported costs for all private school students in the region and residential area.

Category C – High-cost schools: A school is categorized as a higher-cost *school if* the reported cost/household expenditure on the child for the year is above the 95th percentile of the expenditure/reported fees for all private school students in the region and locality. In other words, a child in a particular region/locality is classified as attending a high-cost school for all reported costs above the low-cost private-school threshold in each region and residential area.

Appendix B: Supplemental Statistical Tables

Table B1: Dependent and Independent Variable Means

Variable	Means: Urban	Means: Rural
Dependent Variable		
School Type		
Low-cost private	0.18	0.07
Mid-cost private	0.12	0.06
High-cost private	0.05	0.01
Explanatory Variables		
Individual (student) characteristics		
Age		
4 to 7	0.30	0.32
8 to 11	0.54	0.49
12 to 16	0.16	0.19
Gender		
Male	0.52	0.54
Female	0.48	0.46
Religion		
Islam	0.41	0.45
Christian	0.59	0.55
Region		
North	0.37	0.61
South	0.64	0.39
Wealth asset index		
Poor	0.28	0.80
Rich	0.72	0.20
Household characteristics		
Parent education		
Parent attended school	0.79	0.62
Never attended school	0.21	0.38
Household head occupation		
Agriculture	0.18	0.55
Non-agriculture	0.82	0.45
School variables		
Distance in minutes to nearest public primary school		
<20 minutes	0.70	0.67
>=20 minutes	0.30	0.33
Closest school to household		
Child's school is closest	0.49	0.76
Not closest	0.51	0.24

Source: 2015 NEDS

Table B2: Frequency of Variables				
	Urban		Rural	
Variable	N	%	N	%
School Type				
Public	10,864	64.67	18, 415	86.27
Low-cost private	3,056	18.19	1,431	6.70
Mid-cost private	2,030	12.09	1,200	5.62
High-cost private	849	5.05	301	1.41
Explanatory Variables				
Individual (student) characteristics				
Age				
4 to 7	5,004	29.79	6,911	32.37
8 to 11	9,128	54.34	10,366	48.56
12 to 16	2,667	15.88	4,070	19.06
Gender				
Male	8,755	52.11	11,531	54.02
Female	8,044	47.89	9,816	45.98
Religion				
Islam	6,887	41.00	9,628	45.10
Christian	9,889	58.86	11,649	54.57
Missing	24	0.14	71	0.33
Region				
North	6,117	36.42	13,007	60.93
South	10,682	63.59	6,489	39.07
Wealth asset index				
Poor	4,621	27.51	16,552	77.54
Rich	12,014	71.51	4,003	18.76
Missing	165	0.98	792	3.71
Household characteristics				
Parent education				
Parent attended school	13,260	78.93	13,197	61.82
Never attended school	3,493	20.79	8,086	37.88
Missing	47	0.28	64	0.30
Household head occupation				
Agriculture	2,560	15.24	10,126	47.44
Non-agriculture	11,469	68.27	8,143	38.15
Missing	2,770	16.49	3,077	14.42
School variables				
Distance in minutes to nearest public primary school				
<20 minutes	11,618	69.16	14,286	66.92
>=20 minutes	5,075	30.21	6,900	32.33
Missing	106	0.63	160	0.75
Closest school to household				
Child's school is closest	8,279	49.28	16,122	75.52
Not closest	8,514	50.68	5,213	24.42
Missing	5	0.03	12	0.06

Source: 2015 NEDS