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How does education policy reform affect schooling outcomes? Novel evidence from Nigeria

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Abstract: This study evaluated the effects of the Universal Basic Education (UBE) policy on schooling outcomes in Nigeria. We analyzed the effects of the UBE policy of 2004 on school enrollment outcomes for primary and junior secondary school-age children in Nigeria using two waves (2004 and 2015) of the Nigeria Education Data Survey (NEDS). We applied descriptive statistics to estimate the Net Enrollment Rate (NER) and Age-Specific Enrollment Rate (ASER) and ordered logit regression to model the effect of this policy. The findings revealed that the enrollment rates increased generally in primary schools in southern Nigeria and increased in junior secondary schools (JSS) all over the country in the two periods. The change in NER was positive and significant for JSS enrollment, but insignificant in primary school enrollment. The significant increase in the enrollment of children in primary and junior secondary schools shows the contribution of appropriate policies in improving schooling outcomes. This paper contributes to the body of knowledge on the effects of education policies and programs on schooling outcomes. The paper offered policy recommendations to further improve school enrollment and reduce the high rate of out-of-school children in the country.

Keywords: *Evaluation, Nigeria education data survey, Ordered logit regression, School enrolment, Universal basic education policy.*

1. Introduction

Education has been recognized as a critical driver of the modern economy due to its role in building human capital, an important factor of sustainable development. It has been a driver of sustainable development, a skills and well-being provider for individuals and society, a poverty alleviator for economies and countries, and an enabler of environmental management [1] requiring that efforts are geared towards improving its quality. Many global education initiatives like the defunct Millennium Development Goals (MDGs) and the current Sustainable Development Goals (SDGs) recognized its importance and advocated that developing nations increase their commitment to education to promote life-long learning opportunities, national development, and inclusion.

In Nigeria, the changes made to introduce a Universal Basic Education (UBE) system were adopted to remove outright certain barriers in basic education delivery, which hindered the smooth progression of pupils from primary to secondary schools. This was made under the umbrella of the National Policy of Education (NPE). Although the NPE was repealed, it remains the basis for the educational structure (6-3-3-4) of UBE. The 6-3-3-4 system of education means that every Nigerian child enjoys 9 years (6

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years in primary school and 3 years in junior secondary school) of free and compulsory basic education, with the intention to bridge the gap between primary and junior secondary. Its prime beneficiaries are children aged between 6 and 12 years for primary school education, and children aged between 12 and 15 years for the junior secondary school cadre [2].

According to the UBE Act of May 26, 2004, the objectives of the UBE included: "ensuring unfettered access to 9 years of formal basic education, the provision of free, universal basic education for every Nigerian child of school-going age, reducing drastically the incidence of drop-out from the formal school system, through improved relevance, quality and efficiency and ensuring the acquisition of appropriate levels of literacy, numeracy, manipulative, communicative and life skills, as well as the ethical, moral and civic values needed for laying a solid foundation for lifelong learning". This is to ensure access to quality basic education in Nigeria. The Nigerian government recognizes the importance of quality education in enhancing sustainable development. The objectives of the UBE Act are clearly in line with the targets of Goal 4 of the United Nations Sustainable Development Goals.

The compulsory nature of UBE as envisaged by the Act means that the three tiers of government (federal, state and local) are tasked with providing free and compulsory basic education for every Nigerian child of primary and junior secondary school age. In like manner, all stakeholders involved, including parents/guardians, are compelled to make certain children attend and complete their primary and junior secondary education [2]. The Act makes it an offense and stipulates various sanctions against parents/guardians who fail to send their children/wards to school. Free education here entails that the following should be provided free of charge: tuition, textbooks in the core subject areas of primary and junior secondary schools (JSS), classrooms and other infrastructural facilities, and meals (the last is optional).

The importance of quality education in sustainable development has led to the transformation of educational policies in Nigeria and different parts of the world, which has improved knowledge and understanding of quality education [3]. The Education for All Initiative of the Millennium Development Goals and Dakar Framework for Action used certain quantitative and qualitative indicators, such as learning outcomes, enrolment of children, and national standards, to measure quality of education [4]. This was one of the core reasons for the commencement of the UBE program to increase access to quality education for children, who are often described as "leaders of tomorrow", to develop their skills and values, and prepare them to address the challenges of sustainable development.

The core compulsory subjects as summarized by the NERDC [5] are presented in Table 1.

Table 1.
Nine-year basic education curriculum structure with compulsory subjects.

Lower Basic Education (Primary 1–3) Compulsory Subjects	**Middle Basic Education (Primary 4–6) Compulsory Subjects**	**Upper Basic Education (Junior Secondary 1–3) Compulsory Subjects**
English Studies	English Studies	English Studies
One major Nigerian Language (Igbo, Hausa, or Yoruba)	One major Nigerian Language (Igbo, Hausa, or Yoruba)	One major Nigerian Language (Igbo, Hausa, or Yoruba)
Mathematics	Mathematics	Mathematics
Basic Science and Technology	Basic Science and Technology	Basic Science and Technology
Social Studies	Social Studies	Social Studies
Civic Education	Civic Education	Civic Education
Cultural and Creative Arts	Cultural and Creative Arts	Cultural and Creative Arts
Christian Religious Studies/Islamic Studies	Christian Religious Studies/Islamic Studies	Christian Religious Studies/Islamic Studies
Physical and Health Education	Physical and Health Education	Physical and Health Education
Computer Studies/ICT	Computer Studies/ICT	Computer Studies/ICT

Source: NERDC [5].

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The themes of basic science and technology, physical and health education, and social studies deal with various aspects of sustainable development—society, economy, and the environment. These subjects expose pupils and students to environmental management; man, and energy; science and development; man, and his physical environment; living and non-living things; understanding basic technologies; pathogens, diseases and prevention; safety; health education; food and nutrition security; climate change; peace and conflict resolution; disaster risk reduction education; and sustainable consumption education [6].

Fifteen years after the adoption of the UBE system, there are few studies that have attempted to evaluate the impact and effectiveness of the UBE Act on schooling outcomes for children. Empirical evidence emerging from the assessment of the impact of this policy is scanty and lacking in-depth analysis. For example, Gersberg, et al. [7] used the 2004 World Development Report Accountability Framework to review education reforms in Nigeria and some other developing countries. They found no significant changes in school performance. Mordi [8] used focus group discussions and teachers' perception of UBE to assess the impact of the program on the incidence of drop-out from school by Nigerian children. Even though the methodology of the research was not rigorous, and the sample size was small, the study found a reduction in schools' drop-out due to UBE implementation. Adeniyi, et al. [9] and Sule [10] used reviews to evaluate the effect of educational policy reforms on students' performance. Their studies generated interesting findings; however, they failed to analyse the impacts of UBE policy on school enrolment using rich and representative dataset covering every part of the country. There is a dearth of rigorous empirical studies on the effects of the UBE program on enrolment rates of different school-age children. This study therefore sought to fill this gap in the research. The objectives of the study are to:

1. Determine the difference in the net participation rate in primary and junior secondary schools in Nigeria since the adoption of the UBE program;
2. Determine the effect of the UBE policy on school enrolment; and
3. Ascertain the extent to which age-specific enrolment status has changed since the adoption of the program.

2. Methodology

2.1. Study Area

Nigria is a country in the West African sub-region. It is bordered by Niger in the North, Chad in the Northeast, Cameroon in the East, Benin in the West and about 850 km of the Atlantic Ocean stretched over the southern border. Nigeria comprises a Federal Capital Territory (FCT-Abuja) and 36 States grouped into six regions/zones: North-Central, Northeast, Northwest, Southeast, South-South and Southwest. Education in Nigeria is the shared responsibility of the federal, state, and local governments, and the education sector is divided into three sub-sectors—Basic, Post-Basic, and Tertiary—which are provided by both public and private bodies. Basic education is the education given to children aged 0–15 years, which consists of Early Childhood Care Education (0–5 years), and nine (9) years of formal schooling [11]. This formal schooling is composed of primary education for children aged 6–11 years, and junior secondary education (3-year post-primary) for children between the age of 12 and 14. This completes the summary of the basic education structure which this study is interested in.

2.2. Data

This study used Nigeria Education Data Survey (NEDS), which is one of the most comprehensive surveys on education. Two streams of this survey—before UBE policy implementation [12] and after the UBE policy has taken course [12]—are most appropriate. The NEDS are, in principle, a subset of its preceding Nigeria Demographic and Health Surveys (NDHS) (i.e., [13]), such that eligible households of the NEDS are the same as the households of the previously conducted NDHS sample for

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which interviews were completed, with the addition of other households within the same clusters to accommodate attritions.

The sample frame for the NDHS is representative of populations residing in the various dwelling units of the country. The 2003 NDHS used as a sampling frame the list of enumeration areas (EAs) developed for the 1991 population census from which 365 clusters were derived and then a representative probability sample of 7864 households was selected, accounting for the national, zonal, and state levels. Eligibility of households for choice in the following NEDS (i.e. [12] is based on the presence of target children of school age in the previous EAs. Hence, National Population Commission (NPC) & RTI International [12] derives from same EAs as National Population Commission (NPC) & RTI International [12] with additions of households and increase in households' members. This implies that the National Population Commission (NPC) & RTI International [12] and 2015 datasets could assume a panel and this study explores that advantage (absent an actual panel of this rich dataset). Data collections from households were based on four well-structured questionnaires, namely, Household Questionnaire, Parent/Guardian Questionnaire, Eligible Child Questionnaire, and Independent Child Questionnaire (these were explored in the analysis). The NEDS sample is designed to provide national, urban-rural, regional, and state-level information for decision-making about education for children, especially in relation to the basic education category.

2.3. Method of Data Analysis

2.3.1. Descriptive Statistics

To present the effect of the education reform on schooling outcome, tabular and graphical approaches were used to present the descriptive statistics. Net participation rates (Net Enrolment Rates, NER) for the 2004 and 2015 datasets were compared for both the primary and junior secondary categories; rates computed connote changes in enrolment 10 years after establishment of free basic education in 2004 (bearing in mind that implementation started in the 2005/2006 school year). Furthermore, a paired sample test was conducted to check if the differences were statistically significant between the years for the two levels. Next, we computed the age-specific school enrolment rate, which was compared for the years 2004 and 2015.

2.3.2. Estimating the Impact of the UBE Policy

Following the method of Asankha and Takashi [14] we considered school enrolment of children aged between 6 and 15. Children in this age category should be in either primary or junior secondary classes according to the UBE and NPE standard for Nigeria. However, within this age bracket (6–15 years), one could find children who are: not-attending school; in pre-primary school; in primary school; in junior secondary school; in senior secondary school; and even in higher education in a few cases. Therefore, there are about six (6) categories of children aged 6–15 years: not enrolled in school; enrolled in pre-primary school; enrolled in primary school; enrolled in junior secondary school; enrolled in senior secondary school; and enrolled in higher education. Pooling household data from the NEDS for the years before the policy (i.e., [12]) and the years after the policy (i.e., [12], one can estimate an ordered logit regression using the model below (Equation (1)):

$$\Pr(a_{ijt} = c) = \alpha + \beta C_{ijt} + \delta X_{jt} + \phi Y_{2015} + \gamma X_{jt} Y_{2015} + e_{ijt}, \quad (1)$$

Where;

c = 1, 2, 3, 4, 5, 6 (t = 2004, 2015),

a_{ijt} = 1 if student i from household j is not enrolled in any school in year t,

a_{ijt} = 2 if student i from household j is enrolled in any pre-primary school in year t,

a_{ijt} = 3 if student i from household j is enrolled in any primary school in year t,

a_{ijt} = 4 if student i from household j is enrolled in any junior secondary school in year t,

a_{ijt} = 5 if student i from household j is enrolled in any senior secondary school in year t,

a_{ijt} = 6 if student i from household j is enrolled in higher education in year t.

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To obtain the marginal effects of the primary and junior secondary school enrolment, a post-estimation must be conducted from the ordered logit regression. This introduces interpretable direct change effects into the relationships within the regression: C_{ijt} is a set of child i characteristics of household j in year t, X_{jt} is a set of household characteristics in year t, Y_{2015} is a year dummy variable which is 1 if from 2015 and 0 if from 2004, and e_{ijt} is the error term. In the ordered logit model, $a_{ijt} = 1$ (students not enrolled in any school) was considered as a base group; β and δ give the impact estimates of child characteristics and household characteristics, respectively; ϕ gives the estimated impact of time trend in 2015, that is, the impact of the year 2015 dummy on the probability of outcomes. In the same way, γ gives an estimate for the impact of household characteristics in 2015 on the probability of outcomes. The model was estimated separately for boys and girls to avoid gender bias.

2.4. Variables

In the above-mentioned framework for impact estimation, the variables used are as follows: Dependent variable (a_{ijt}) is defined by c according to the individual's school enrolment status in year, t. The other variables are the age of child, and a set of household characteristics which consists of household ownership of assets (refrigerator), household expenditure on child schooling (lump sum of money), parents' education (highest completed education), parents' survival (father/mother alive), school availability (distance in minutes to school), type of location (rural), geopolitical zones (regions), and religion (Christian/Islam). These variables are defined in the econometric analysis as follows: x1 = age of child, d1 = dummy for interview year 2015, d2 = dummy signifying the type of location, x2 = log of the real cost or expenditure for child's school year, x3 = interaction variable between household schooling expenditure and year 2015 dummy variable (x2*d1), d3 = dummy for ownership of refrigerator (asset of household measure), x4 = interaction variable between the asset measure of household and year 2015 dummy variable (d3*d1), (d4 = pg_primary level, d5 = pg_secondary level and d6 = pg_higher level) = dummy for highest level of parent/guardian (PG) education, x5 = distance in minutes to the closest primary school, x6 = distance in minutes to closest secondary school, x7 = Dad is Alive, x8 = Mom is Alive, (d7 = Northeast, d8 = Northwest, d9 = Southeast, d10 = Southwest, d11 = South-South) = dummy variables for household (HH) region, and (d12 = Christian and d13 = Islam) = religion dummies for household.

3. Results

3.1. Descriptive Statistics Results

Table 2 shows the mean age of children based on their level of school enrolment. Thus, the average primary school enrolled pupil is about 9 years old, which is a reasonable representative of the age bracket for primary education in Nigeria. Also, the mean age of the junior secondary school enrollees is 13 years, which is reflective of the fact that the outliers are not considering the standard so much. Note that the age bracket for junior secondary school is extended by a year to 15 years to account for eventualities which might hinder a child's efficient transition through school.

Table 2.
Summary of school child age by school enrolment.

Child Enrolment	Mean	Standard Deviation	Frequency
Not Enrolled	9.66	2.92	15,638
Pre-Primary	6.73	1.09	2979
Primary	9.27	2.29	40,239
Junior Secondary	13.20	1.43	11,171
Senior Secondary	14.44	0.84	2989
Higher Education	14.67	0.71	9
Total			73,025

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Table 3 shows a tabulation of the enrolment status for children of primary school age, comparing the two survey years. A good number (more than two-thirds) of children are appropriately enrolled in primary school in this age category, with the year 2004 having the edge (less than 2%) over the year 2015 in primary enrolment. A disaggregation by gender may give more information to the groups that either improved or otherwise.

Table 3.
Current school child enrolment rates by year of survey (age 6–11)

Number of Children							
Year	**Not Enrolled**	**Pre-Primary**	**Primary**	**Junior Secondary**	**Senior Secondary**	**Higher**	**Total**
2004	1135	290	3503	107	4	0	5039
	(22.52%)	(5.76%)	(69.52%)	(2.12%)	(0.08%)	(0.00%)	(100%)
2015	9722	2673	29,075	1183	24	0	42,677
	(22.78%)	(6.76%)	(68.13%)	(2.77%)	(0.06%)	(0.00%)	(100%)

Table 4, which presents the enrolment status of the junior secondary child age group, also shows that about 40% of the sampled children were enrolled in junior secondary school in the period after the policy, a significantly larger figure compared to less than the third (31.60%) appropriately enrolled in junior secondary school for the year before the policy reform (2004). Furthermore, one can easily notice the large difference in the proportion of the junior secondary-aged children lagging in primary school in 2004 (40.69%), compared to that of 2015 (28.97%). This could mean that the reform improved the transition rate of the school children quite well. The share of the not enrolled here seems to get better in the years after (i.e., 2015) by about 15%.

Table 4.
Current school child enrolment rates by year of survey (aged 12–15)

Number of Children							
Year	**Not Enrolled**	**Pre-Primary**	**Primary**	**Junior Secondary**	**Senior Secondary**	**Higher**	**Total**
2004	612	4	1141	886	159	2	2804
	(21.83%)	(0.14%)	(40.69%)	(31.60%)	(5.67%)	(0.07%)	(100%)
2015	4169	12	6520	8995	2802	7	22,505
	(18.52%)	(0.05%)	(28.97%)	(39.97%)	(12.45%)	(0.03%)	(100%)

The cross-tabulation of Tables 5 and 6 will add up to 100% down the column if we consider the children within this age bracket (6–15 years old) enrolled in other levels (i.e., pre-primary, senior secondary and higher). However, for the purpose of this research, the focus is just on the three categories presented.

Table 5.
School enrolment rates by household wealth quintile (boys, aged 6–15).

Wealth Quintile						
Year	**Enrolment Status**	**Poorest**	**Poorer**	**Middle**	**Richer**	**Richest**
2004	Not enrolled	34.68%	28.34%	15.76%	8.70%	1.96%
	Primary	56.60%	59.68%	67.12%	67.70%	62.80%
	Junior Secondary	5.34%	9.11%	11.82%	16.09%	25.17%
2015	Not enrolled	59.96%	25.63%	8.34%	4.10%	1.64%
	Primary	33.27%	55.39%	64.21%	64.13%	61.34%
	Junior Secondary	3.95%	12.40%	18.23%	20.99%	23.47%

We looked at the enrolment rate based on economic status of households using the wealth quintile values (poorest to richest). For boys' enrolment status, the share of those not enrolled among the poorest worsened by about 73%, whereas in the primary, the poorest class enrolment reduced by 41%

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from 2004 to 2015 (Table 6). The poorer and middle-class groups showed improvements in the junior secondary enrolment in the years after the reform (2015).

Table 6.
School enrolment rates by household wealth quintile (girls, aged 6–15).

Wealth Quintile						
Year	**Enrolment Status**	**Poorest**	**Poorer**	**Middle**	**Richer**	**Richest**
2004	Not enrolled	47.52%	36.03%	27.76%	11.51%	3.07%
	Primary	45.04%	53.33%	54.27%	65.34%	60.44%
	Junior Secondary	4.71%	7.05%	13.19%	14.63%	23.21%
2015	Not enrolled	62.02%	29.82%	10.05%	4.46%	1.64%
	Primary	32.03%	53.33%	62.78%	62.15%	59.14%
	Junior Secondary	3.73%	9.74%	18.09%	21.95%	25.85%

For the girls' category (see Table 6) the poorest class had a worse enrolment status in the share of not enrolled and across all levels. The poorer class of citizens improved only in junior secondary enrolment (7.05% to 9.74%) from 2004 to 2015. The economic middle class, however, positively increased significantly across the shares of enrolment in the years after.

Religion seems a strong factor in children's basic educational enrolment in Nigeria, as shown in Table 7. Christianity and Islam are the two most common religious beliefs, with over 99.5% of sampled individuals belonging to either of these groups. There is an almost equal share of people sampled in these two faiths. Taking a cross-tabulation of religion against the enrolment status of the children in the households shows that larger shares of non-enrollees were found in the Islamic religion across the years. The share of enrolment in the primary for both Christians and Muslims alike reduced by more than (6% and 11%, respectively) from 2004 to 2015, whereas that of enrolment in the junior secondary schooling amongst these groups increased across the years by about (13% and 34%, respectively). Overall, belonging to the Christian religion seemed a better prospect in basic education enrolment compared to Islam.

Table 7.
Enrolment status by religion for school-age children (6–15).

Religion					
Year	**Enrolment Status**	**Christianity**	**Islam**	**Others**	**Traditional**
2004	Not enrolled	5.29%	37.57%	0.00%	27.08%
	Primary	67.61%	51.44%	75.00%	54.17%
	Junior Secondary	18.16%	7.67%	0.00%	12.50%
2015	Not enrolled	4.72%	39.28%	9.09%	52.94%
	Primary	62.93%	45.57%	54.55%	37.25%
	Junior Secondary	20.55%	10.25%	27.27%	5.88%

Table 8.
Enrolment status by geopolitical zone of school-age children (boys, 6–15).

Geopolitical Zone							
Year	**Enrolment Status**	**North-Central**	**Northeast**	**Northwest**	**Southeast**	**South-South**	**Southwest**
2004	Not enrolled	8.26%	35.72%	32.46%	4.19%	5.05%	4.33%
	Primary	71.50%	54.10%	57.46%	70.86%	64.66%	64.96%
	Junior Secondary	13.05%	8.67%	7.46%	16.11%	19.22%	22.44%
2015	Not enrolled	11.64%	48.13%	44.73%	2.21%	2.79%	3.83%
	Primary	61.76%	39.90%	43.47%	68.21%	62.66%	61.99%
	Junior Secondary	17.21%	8.52%	8.64%	18.10%	21.95%	21.49%

Enrolment rate for boys in the six geopolitical zones showed a decrease in the share of primary school enrollees from 2004 to 2015, and the status of non-enrollees grew worse for the northern

regions, whereas all the southern regions improved by 2015 (Table 8). The junior secondary share of enrolment showed an increasing outcome in all regions except for the Northeast and Southwest, which both declined slightly.

Table 9.
Enrolment status by geopolitical zone of school-age children (girls, 6–15).

Geopolitical Zone							
Year	**Enrolment Status**	**North-Central**	**Northeast**	**Northwest**	**Southeast**	**South-South**	**Southwest**
2004	Not enrolled	13.96%	45.63%	49.72%	2.84%	4.91%	5.97%
	Primary	67.91%	45.02%	43.89%	68.79%	61.75%	58.19%
	Junior Secondary	11.80%	6.31%	4.18%	17.97%	24.36%	21.68%
2015	Not enrolled	12.58%	48.82%	50.63%	2.14%	2.99%	3.89%
	Primary	61.51%	39.22%	39.60%	65.31%	61.87%	60.14%
	Junior Secondary	16.48%	8.16%	7.10%	20.01%	22.75%	22.87%

Similar to the boys, the share of the non-enrollees among the girls became poorer in the North (with the exception of the North-Central) and largely improved in the southern regions by 2015 (Table 9). Also, the primary enrollees decreased in almost all the regions, except in the South-South and Southwest. Girls' share of enrolment in junior secondary schools generally increased and only decreased among those in the South-South.

3.1.1. Net Enrolment Rates

Table 10 summarizes the NER in the geopolitical regions and Nigeria, as sampled. The regions are summaries of the various states within them. The table shows that, generally, the primary school NER reduced by 2015, and this reduction is owing to the negative percentages observed in all the northern regions, as the rate remains positive in all the southern regions. The low NER observed in most northern states is a result of the large number of school-age children not enrolled (about 50% in 2015). As indicated by Humphreys and Crawfurd [15] most of the out-of-school population in the North is enrolled in some kind of Islamic schooling. For junior secondary school NER, there seems to be an overall improvement across all the regions, although the enrolment rate remains very low (less than 25% in the northeastern and northwestern zones). Most Muslim parents (predominantly in the North) believe that government schools are too westernized and un-Islamic, and so prefer the Islamiyyah, Qur'anic, and Tsangaya Education (IQTE) schools and other nomadic forms of schooling [15]. It is interesting to note that this lower value is a result of non-enrollees, JSS-aged enrollees in senior secondary school, and especially JSS-aged children stuck in primary school (about 30% on average).

Table 10.
Net enrolment rate in primary and junior secondary school in Nigeria.

					Change in Net Enrolment Rate (from 2004 to 2015)	
	Primary		**Junior Secondary**		**Primary**	**Junior Secondary**
	2004	2015	2004	2015		
Nigeria	69.41	68.10	31.55	39.95	−1.31	8.40
Geopolitical Zone						
North-Central	80.78	76.13	31.87	42.16	−4.65	10.29
Northeast	58.44	45.78	20.17	23.59	−12.66	3.42
Northwest	55.29	47.84	17.01	23.44	−7.45	6.43
Southeast	81.72	84.72	39.12	48.99	3.00	9.87
South-South	81.57	83.42	47.41	51.56	1.85	4.15
Southwest	80.75	83.06	48.26	51.34	2.31	3.08

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3.1.2. Age Specific Enrolment Rates

Figure 1 is a visual presentation of the average ASER across the levels of interest (primary and junior secondary school) and the average figures for non-enrollees. The bars show a positive trend in that the average rate of non-enrolment among school-age children reduced (from 22.27% to 21.31%), as it increased for junior secondary enrolment (from 12.66% to 15.61%). The primary category, however, signals a decrease in the average ASER. This may also mean that, even as the basic education school-aged children improved in terms of the rate at which they enrolled in school by 2015, the reform policy may have worked better in getting the appropriate-aged children into or back to junior secondary school level.

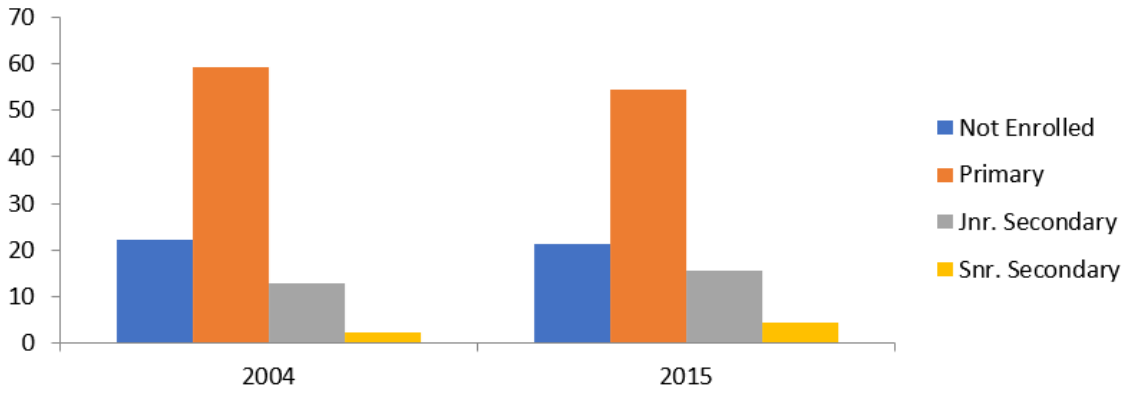

Figure 1.
Column bar chart showing the average age specific school enrolment rate (ASER) for cohorts of 2004 and 2015.

3.2. Econometric Analysis

The regression result in Table 11 helps us to know whether the characteristic variables have positive or negative relationships with any of the alternative outcomes of the dependent variable. Also, it gives us the level of significance for each of the variables included in the model. It is evident that the year 2015 (dummy), representing the time after the reform policy initiative, had no significant effect on the primary and junior secondary enrolment for both genders. Likewise, the asset dummy refrigerator had no statistically significant level of effect. The marginal effects ordered logit post-estimations give a better interpretation of the probability of choice of any of the alternative outcomes—see Tables 12 and 13.

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Table 11.
Determinants of primary and junior secondary school enrolment.

Ordered Multinomial Logit Estimates				
	Primary School Age (6–11)	**Primary School Age (6–11)**	**Junior Secondary (12–15)**	**Junior Secondary (12–15)**
Variable	**Boys**	**Girls**	**Boys**	**Girls**
x1	0.9796 ***	1.0373 ***	1.0166 ***	0.9951 ***
	(31.45)	(30.33)	(31.27)	(29.28)
d1	2.5741	−0.2840	−0.0755	−0.0166
	(1.53)	(−0.18)	(−0.07)	(−0.02)
d2	−0.1209	−0.3217 ***	−0.1159 *	−0.1715 **
	(−1.61)	(−4.02)	(−1.65)	(−2.35)
x2	0.4733 **	0.0651	0.3898 ***	0.4514 ***
	(2.29)	(0.32)	(2.80)	(3.67)
x3	−0.4494 **	−0.0276	0.0182	−0.0336
	(−2.16)	(−0.13)	(0.13)	(−0.27)
d3	−0.2545	−0.0000	0.2488	−0.0298
	(−0.48)	(−0.00)	(0.72)	(−0.09)
x4	0.5712	0.1441	−0.1445	0.3852
	(1.06)	(0.26)	(−0.41)	(1.12)
d4	−0.2184 **	−0.2053 **	0.0250	0.2955 ***
	(−2.26)	(−2.00)	(0.28)	(3.17)
d5	−0.0677	0.1714	0.3013 ***	0.5422 ***
	(−0.68)	(1.62)	(3.17)	(5.42)
d6	0.4430 ***	0.6825 ***	0.5615 ***	0.7112 ***
	(4.09)	(5.87)	(5.65)	(6.84)
x5	−0.0076 **	−0.0078 **	−0.0038	−0.0054 *
	(−2.40)	(−2.35)	(−1.28)	(−1.75)
x6	0.0007	−0.0001	0.0032	0.0020
	(0.29)	(−0.04)	(1.37)	(0.82)
x7	0.0458	−0.1282	−0.2123 *	−0.1479
	(0.30)	(−0.82)	(−1.93)	(−1.31)
x8	0.1850	−0.0914	−0.0338	0.1544
	(0.79)	(−0.35)	(−0.19)	(0.80)
d7	−0.0668	−0.2697 **	−0.0578	−0.1858
	(−0.55)	(−2.01)	(−0.53)	(−1.61)
d8	0.2536 *	−0.1016	−0.1188	−0.1810
	(1.90)	(−0.69)	(−0.91)	(−1.25)
d9	−0.1390	−0.2722 *	−0.2870 **	−0.2242 *
	(−1.06)	(−1.95)	(−2.22)	(−1.74)
d10	0.0774	0.1324	0.0084	−0.0616
	(0.66)	(1.06)	(0.08)	(−0.54)
d11	0.2285 **	0.0454	0.0982	0.2657 ***
	(2.36)	(0.45)	(1.06)	(2.75)
d12	1.3399 **	−0.5695	2.0214 ***	1.3963 *
	(2.33)	(−0.66)	(3.45)	(1.82)
d13	1.0709 *	−0.7610	1.6579 ***	1.1446
	(1.86)	(−0.88)	(2.82)	(1.49)
Constant cut1	6.9465 ***	1.9798	13.4342 ***	13.2977 ***
	(3.86)	(1.08)	(9.84)	(9.88)
Constant cut2	9.5414 ***	4.5046 **	13.4954 ***	13.3927 ***
	(5.30)	(2.47)	(9.89)	(9.95)
Constant cut3	16.7166 ***	11.8849 ***	17.5792 ***	17.1744 ***
	(9.19)	(6.44)	(12.85)	(12.74)

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Constant cut4	20.7688 ***	15.8166 ***	21.0437 ***	20.6398 ***
	(11.15)	(8.43)	(15.21)	(15.12)
Constant cut5			28.2041 ***	26.8181 ***
			(16.48)	(18.01)
Observations	7707	7180	4334	3977

Note: z-statistics in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

3.2.1. Marginal Effects of School Enrolment

The marginal effects evaluated at the mean estimate the size and the direction of the coefficients as they relate to the choice alternative (dependent variable).

3.2.2. Primary School Enrolment

The age of a child is highly significant across genders, and enrolment in school increases (by about 3% and 2% for boys and girls, respectively) per unit increase in age (Table 12). Rural location is very significant for girls, as a movement from an urban area to a rural area decreases girls' enrolment in primary school by 0.7%. Schooling expenditure is significant at 5% level (for boys) and, as expected, increases enrolment as the household invests in child education; however, with the introduction of the policy reform (interaction with the y2015 variable), there was a negative statistically significant value for the expenses made for boys' schooling during the period after reform. This suggests that the period under review offers less expenditure on primary school enrolment for households. Parent/guardians' education, especially at the tertiary level, increased child enrolment in primary school by about 1%. Being resident in the northeastern part of the country reduces the possibility of girl child enrolment, whereas residency in the northwestern and southwestern regions increases boy child primary school enrolment by a similar proportion of about 0.7%. Child membership of a Christian religious household increases enrolment by 3% more than when a child belongs to the Islamic faith.

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Table 12.
Marginal effects outcome for primary school aged children (6–11)

	Primary School Enrolment	
	Boys	**Girls**
Variable	**dy/dx**	**dy/dx**
x1	0.0329414	0.0230396
	(0.000)	(0.000)
d1	0.335295	−0.0044703
	(0.394)	(0.765)
d2	−0.0041112	−0.0074863
	(0.114)	(0.000)
x2	0.0159155	0.001445
	(0.023)	(0.749)
x3	−0.0151128	−0.0006135
	(0.032)	(0.893)
d3	−0.00932	-8.21×10^{7}
	(0.661)	(1.000)
x4	0.0154896	0.0030032
	(0.173)	(0.782)
d4	−0.0080776	−0.0051211
	(0.039)	(0.074)
d5	−0.0023392	0.003476
	(0.508)	(0.077)
d6	0.0121167	0.0094978
	(0.000)	(0.000)
x5	−0.0002549	−0.0001735
	(0.017)	(0.021)
x6	0.0000239	-2.09×10^{6}
	(0.774)	0.971)
x7	0.001595	−0.0024945
	(0.774)	(0.340)
x8	0.0071712	−0.001836
	(0.486)	(0.694)
d7	−0.0023421	−0.0074417
	(0.600)	(0.096)
d8	0.0071091	−0.002467
	(0.020)	(0.528)
d9	−0.0051091	−0.0075301
	(0.329)	(0.108)
d10	0.0024886	0.0026563
	(0.487)	(0.237)
d11	0.0071044	0.0009893
	(0.011)	(0.644)
d12	0.0595026	−0.0106986
	(0.073)	(0.426)
d13	0.0295091	−0.0210611
	(0.023)	(0.470)

Note: N.B.: dy/dx is a discrete change for dummy variables from 0 to 1 *p*-values in brackets.

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3.2.3. Junior Secondary School Enrolment

A unit increase in the age of a child more than doubles the enrolment rate increase in junior secondary compared to primary. The rural location decreases girls' enrolment in junior secondary school by about 1%. Increase in expenditure for schooling items increases enrolment in school for both boys and girls alike by about 3%; however, the years after the reform do not show statistically significant change for junior secondary-aged children enrolled in junior secondary. As expected, postgraduate education improves the enrolment rate for both genders, although PG primary education level is not significant for boys. School availability (time/distance travelled to the closest school) is significant at a 10% level for the girl child, with a negative effect on enrolment for every minute increase in distance walked to (any primary) school. The presence of the father affects boy child school enrolment more than it does girl child. Whereas residency in the southeastern part of the country reduces boy child enrolment, living in the southwestern part increases the chances of enrolment of a girl child by more than 1%. Children of Christian religious background are still more likely to enroll (3 times more for boys in JSS) in school than their Muslim counterparts.

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Table 13.
Marginal effects outcome for junior secondary-aged children (12–15).

	Junior Secondary School Enrolment	
	Boys	**Girls**
Variable	**dy/dx**	**dy/dx**
x1	0.0800916	0.0556582
	(0.000)	(0.000)
d1	−0.0055029	−0.000908
	(0.942)	(0.986)
d2	−0.0091534	−0.0098662
	(0.102)	(0.026)
x2	0.0307116	0.0252482
	(0.006)	(0.001)
x3	0.0014325	−0.0018805
	(0.897)	(0.789)
d3	0.0173827	−0.0016927
	(0.409)	(0.931)
x4	−0.0121648	0.0164893
	(0.700)	(0.112)
d4	0.001943	0.0126597
	(0.779)	(0.000)
d5	0.0195248	0.0163391
	(0.000)	(0.000)
d6	0.0286442	0.0159509
	(0.000)	(0.000)
x5	−0.0003026	−0.0003011
	(0.202)	(0.085)
x6	0.0002555	0.0001128
	(0.174)	(0.411)
x7	−0.013573	−0.0067336
	(0.014)	(0.096)
x8	−0.0025762	0.0105631
	(0.846)	(0.498)
d7	−0.0047555	−0.0125414
	(0.613)	(0.171)
d8	−0.0103206	−0.0125191
	(0.405)	(0.294)
d9	−0.0280835	−0.0159111
	(0.062)	(0.152)
d10	0.0006588	−0.0036629
	(0.939)	(0.610)
d11	0.007383	0.0122042
	(0.267)	(0.001)
d12	0.2155373	0.1222944
	(0.002)	(0.156)
d13	0.0665602	0.0277109
	(0.000)	(0.002)

Note: N.B.: Variables and *p*-values definitions are the same as in primary school enrolment.

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3.3. Discussion

The age of a child seems to significantly increase the chances of school enrolment across genders, especially for junior secondary. There is a positive relationship between the household's expenditure on schooling and school enrolment, both in primary and junior secondary. However, the results for the year 2015 variable (i.e., the years after the reform) showed that there was a negative relationship with household expenditure on education, which signifies that, with public financial investment in education (UBE), households are gradually spending less and less to drive the enrolment and training of their wards in primary schools. This agrees with the work of Jackson, et al. [16] which argues that with school-finances reforms, public school spending is enhanced to improve the outcome for the education of consumers. Rural location compared to urban areas reduces the chances of child enrolment in school, probably because of the better infrastructural development and access to relatively more schools by urban dwellers.

Parent/guardian education (PG education), especially at the tertiary level, fosters child enrolment in primary school. This agrees with the findings of Bahrs and Siedler [17] that the academic background of either parent of the child influences the decision to enroll in school, as expected *a priori*. Similarly, the analysis showed that PG education has a positive effect on enrolment in junior secondary, as Méndez-Errico and Ramos [18] finds that parental education matters most for the children's education selection at an early stage of secondary schooling. Presence of the father-figure promotes enrolment of boy children in junior secondary school better than it does for girl children. This reflects the importance of own-gender effects in education between parents and their children; Méndez-Errico and Ramos [18] found that the father's education matters the most for male children and the mother's education matters the most for female children. School availability proxy time distance travelled to the closest school has a negative effect on junior secondary enrolment of households.

Residency in the Northeast reduces the chances of girl child enrolment in primary due to the violence-prone situation there and the cultural/religious affiliations of people in the region (relative to the North-Central zone). It is unsurprising that the Southwest encourages school enrolment (especially for the boy child); this must be owing to the antecedent laid down by the famous Awolowo from the First Republic days of Nigeria. Again, residency in the Southwest increases the chances of child enrolment in junior secondary, whereas Southeast residency disfavors this enrolment for male children. Perhaps this is a situation whereby the opportunity cost of schooling increases with child age typical of Sub-Saharan Africa (SSA), where the minimum age for the labour market was ratified in International Labour Organization (ILO) [19] to be between 14 and 16. It follows the idea of Méndez-Errico and Ramos [18] that where there is higher opportunity cost of education relative to gainful employment, the boy child drops out of school—bearing in mind that the Southeast is the commercial hub of Nigeria. It can be deduced from analysis that Christian families are more likely to enroll their boy child in primary school than Muslim families. This may also be related to the religious-ethnic inclinations involving the widespread practice of Islam in the North, where wards are preferably registered with Islamic and Almajiri schools at the earlier stages of life. Ethnicity has a significant role in the schooling outcomes at secondary level, especially for girls [18, 20]. Therefore, barriers hindering a girl child's education, particularly in northern Nigeria as observed in this study, should be eliminated. Eliminating the barriers will contribute to the achievement of sustainable development in Nigeria. This is in line with Target 5 of Sustainable Development Goal 4, which aims at "eliminating gender disparities in education and ensuring equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations by 2030".

A common pattern in some of the variables' relationship with school enrolment is that a boy child stands a better chance of staying in education than a girl child, such that the latter is disadvantaged. Although this is relative to the developing world and Africa—for instance, girls' transition from primary to secondary school is a major challenge observed in the Kenyan schooling system [21]—it affects the whole world. Molina, et al. [22] in their paper on a girl child's access to (higher) education,

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found that girls' school enrolment is mostly affected due to its high sensitivity to marginal costs of enrolment and lower expected returns to the household educational investment. Our study observed that there was increased enrolment and participation rates for male children than girl children, implying that more support and attention should be paid to the education of female children in Nigeria. This is in line with Target 1 of Sustainable Development Goal 4: "By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and Goal-4 effective learning outcomes".

As is clear from the econometric analysis, the year 2015 variable (representing the years after the educational reform) is not a significant determinant factor and did not have a significant effect on school enrolment outcomes. However, the variable representing the financial status of the households as regards the children's education (schooling expenditure) had a significant effect on positive enrolment after the reforms. Moreover, financial resources play a key role in education, as is also demonstrated by Azmat and Simion [23] who showed that the enrolment probability of students into higher education decreased due to reforms in the United Kingdom's system, which moved from free tuition to fee-paying to higher fees. Bahrs and Siedler [17] also found that the effect of paying tuition on people's intention to enroll in higher education noticeably reduces as the household grows poorer.

Nigeria adopted and implemented the UBE policy in 2004, hence making public primary and junior secondary school education free as a means of achieving the set goals of education for all and raising the poor status of the school enrolment rate in the country. Various authors [10, 24-31] found that similar policies in their country of study (i.e., the Free Primary Education (FPE) and the Free Secondary Education (FSE)) had a significant impact on increasing primary and/or secondary school enrolment rates. Xiao, et al. [31] developed the work of Chyi and Zhou [32] on the effects of tuition reforms on school enrolment in rural China, and they showed that the effects improve in the long run for individuals. Osili and Long [33] investigated the impact of this UBE reform, albeit concentrating on primary schooling (i.e., the FPE in Nigeria), and found positive outcomes of up to 1.5 years increase in education.

4. Conclusions

The UBE policy is categorically a public educational reform effort, channeled towards effectively providing basic education (primary and junior secondary) for most people in society, especially poorer households, by reducing the cost of enrolling children aged 6–15 years in school through the removal of tuition fees and the provision of other schooling needs of the children. It is indeed a general belief across the world that such policy measures will help promote inclusive human capital development by equipping all people with the basic minimum knowledge requirement to survive, thrive, and be engaged with the labour market. Financial resources are a major barrier to achieving this basic education and, as the United Nations Children's Fund (UNICEF) affirms, the risk of non-attendance or drop-out from school is not unrelated to the available resources in the family, at the school, and at the community levels [34].

This article addresses the effect of the free basic education policy on public schools' (primary and junior secondary) enrolment rates for Nigeria in the long term (i.e., more than 5 years after the policy reform). The policy reform variable reflected no significance across the various levels. This is not an uncommon outcome, as Garlick [35] argued that fee-elimination programs like the free UBE have only a very minimal effect on enrolment, grade progression, and per student school resources. Moreover, he argued that the price of education is insensitive to the demand for it in the form of enrolment. Meanwhile, various confounding factors give certain indications as to how the policy effect is absorbed into Nigeria.

Among other things, geo-political and religious factors played a significant role in school enrolment, as these affect the culture and traditions of the people. The northern region is dominated by Muslims, and their beliefs are less inclined to formal education, especially for girls. In the North, there are other

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kinds of education for the school-age child, such as the Qur'anic, Islamiyyah, Nomadic, Tsangaya, and Almajiri schools. The southern region, however, is populated with Christians, and the children are predisposed to attend the formal type of basic education, as the Christian missionary schools also adopt the basic education curriculum. Other factors, such as frequent crises in the North-Central, may also be responsible for their low turnout in basic education. The concentration of rural settings in places affects the enrolment rate (for instance, the FCT-Abuja NER seems like an outlier in the North-Central region with overall growth in both primary and junior secondary schools). Nasarawa State, which is also a part of the region, had poor enrolment rates by 2004 but had transformed evidently by 2015, and this could be a result of the teeming population of people doing business in the FCT-Abuja, whose activities (such as housing) have induced development and increased urban settlement in this state. There is also a need to have a detailed study of the actual modalities used in the implementation process and the regulation proceedings for the public schools in the adoption of the free UBE policy, as it can largely affect or derail the targeted goals of the program, hence the expected outcome.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Copyright:

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