

## Article

# Impact of Universal Primary Education Policy on the Schooling of Girls and Children with Disabilities in Uganda

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**Abstract:** Utilizing the nationally representative Demographic and Health Survey dataset from 2016 and using the difference-in-difference technique, we compare the effect of the Universal Primary Education (UPE) policy on the educational attainment between girls and children with disabilities in Uganda. Although UPE is effective in bridging gender gaps, we observed no significant gaps between children with and without disabilities in poor households, indicating the difficulty parents with financial constraints face in investing in education regardless of disability. Additionally, for disabled samples, we observed a positive effect of UPE on years of schooling for full and female samples but not for poor households, indicating that simply waiving tuition fees as part of the UPE policy is not sufficient to increase access to education.

**Keywords:** universal primary education policy; gender; disability; Uganda



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## 1. Introduction

Despite the significant improvement in access to schooling worldwide due to countries' collective efforts, children with disabilities still face challenges in access to schooling and academic achievement. Out of a total estimated 122 million primary school-age children worldwide being out of school in 2011 [1], almost 50% of persons with disabilities (PwDs) are out of school, and among them, 85% never enroll in schools [2], which is evidence of how big the educational attainment gap between children with and without disabilities is.

The MDG framework completely overlooks disability issues in its goals, targets, and indicators. This lack of attention to disability has posed difficulties in making efforts toward meeting MDG and Education For All goals [2]. By learning the lesson from MDGs, organizations of PwDs and people in academia strongly advocated their governments, and, therefore, the Sustainable Development Goals (SDG) adopted in September 2015 recognized disability as one of the factors that influence equity and inclusive development. Goal 4, in general, and Goal 4.5, in particular, of the SDGs have clearly incorporated the education of vulnerable children, including those with disabilities [3].

While 2015 marked the end of both the MDGs and Education for All (EFA), the EFA Global Monitoring Report 2013–2014 indicated which countries were expected to achieve each goal and which were not [4]. While the majority of countries were assessed as having reached or being close to the goals, access to quality education for PwDs is yet to be achieved, particularly in low- and middle-income countries. While access to school for children with disabilities is an important component of inclusive development, their lower access to, and achievements in, education, particularly in the developing world, indicates the likelihood of less emphasis being placed on increasing access, which, consequently, provides lower quality education [2,5–7]. Despite initiatives such as the Universal Primary Education (UPE) policy, the education of children with disabilities may be compromised, particularly with respect to households in poverty.

Reliable information on the number and educational status of children with disabilities is scarce due to a lack of standardized and detailed questions on disability in household

surveys [8]. In the absence of internationally comparable data, efforts to evaluate the impact of disability on key educational parameters such as attendance are disrupted, and governments rarely possess the necessary evidence required to design appropriate policy adaptations and enhancements to improve the situation of children with disabilities [9].

Therefore, in this paper, using an internationally tested and comparable measure of disability, we examined and compared the effect of the UPE policy on educational attainment between PwDs and people without disabilities (non-PwDs) in a developing country, namely, Uganda. We use a nationally representative large Demographic and Health Survey [10] dataset of 2016, from Uganda, which collected information on educational status and administered the Washington Group Short Set (WGSS) of disability screening questions introduced by the Washington City Group on Disability Statistics (WG) [11].

In this study, we look into two key issues. First, we assess if there are consistent improvements in school attendance based on UPE for children with disabilities. Second, because education is an important determinant of future income and more broadly well-being for individuals, this study also tries to understand why there are educational disparities between children with and without disabilities despite the implementation of UPE. Our reason for focusing on Uganda is that it was one of the first sub-Saharan African (SSA) countries to adopt the UPE policy, which occurred in 1997, and it is considered to be strongly progressing toward achieving the EFA goals but far from achieving UPE and disability parity in primary education. By this study, we aim to partially fill the existing lacuna by comparing the effect of UPE on PwDs and non-PwDs. We evaluate the effect of UPE on these groups by comparing the pre- and post-UPE cohorts. By doing so, we are able to observe which groups are more vulnerable in education and which groups require more targeted strategies to improve their educational attainment. We focus our discussion particularly on the following research questions: What is the difference in educational attainment between male and female PwDs and non-PwDs? What factors are associated with the educational attainment of PwDs? Is there any gap within the group of disabilities (e.g., any gender gaps) within PwDs?

This study is a preliminary attempt, given the situation that, to date, to the best of our knowledge, no research has been undertaken to compare the overall impact of UPE on the educational access and achievements of PwDs in Uganda. By this study, we intend to help the government of Uganda as well as bilateral and multilateral agencies design policies that mitigate the educational gap between PwDs and non-PwDs. The originality of this research lies in the nationally representative DHS dataset that includes a short set of questions on disability recommended by the WG. Collated data were analyzed using quantitative techniques such as the difference-in-differences (DID) model. These techniques help identify the effect of UPE, focusing more on gender and severity of disability. The structure of this paper is as follows: Section 2 discusses the related literature and Uganda; Section 3 discusses the study context and conceptual framework; in Section 4, the dataset is described; Section 5 presents the empirical strategy; Section 6 presents the results and discussion; and Section 7 presents concluding remarks.

## 2. Related Literature

Educational attainment in SSA countries has been stagnant for a long period of time. The gross enrollment ratio (GER) in primary education was 76.1% in 1985 and, surprisingly, fell back for a decade, dropping to 73.9% in 1995 [12]. Since around 2000, there has been significant progress because of the introduction of the UPE policy in some SSA countries [13,14]. This policy abolished school fees for public primary education. Avenstrup et al. (2004) reported that enrollment increased 68 percent in Uganda, rising from 3.4 to 5.7 million in one year, bringing the gross enrollment rate to 123 percent [15]. Enrollment rose 240 percent over six years in Uganda, with free primary education having a positive effect on the poor. However, despite Uganda adopting the UPE policy in 1997, early among SSA countries, Ref. [4] shows that the Ugandan GER diminished by 18 percentage points between 1999 and 2012.

Although ample literature has examined the cost of education for both developed and developing countries, studies focusing on the impact of UPE are rare in developing countries. We found two recent and important review articles on UPE in SSA countries, which explored how key aspects of the dominant political economy influence the implementation of UPE policy [13,14]. These studies argued that the lack of progress to date in attaining UPE in SSA can only be properly understood by focusing on the wider impact on primary education attainment levels of the combined social, political, and economic forces and processes that characterize a new political economy in the majority of SSA countries. Similarly, in a review of the literature on disability, Ref. [16] determined the legacy of inequality generated by colonialism and sustained through unequal global progress as the cause of why the majority of children and youth with disabilities and their families in the Global South exist in severe conditions of inequity in education and healthcare.

Likewise, for Uganda, we found numerous important studies examining the impact of UPE on school attendance and educational attainment [17–23]. Refs. [17,19] found a clear association between UPE and a dramatic increase in primary school attendance and claimed a reduction in gender, income, and regional inequalities in attendance. However, Ref. [17] also found decreased school fees paid by parents at the primary level but not necessarily at the secondary level. Additionally, by using the data of 940 rural households, Ref. [18] estimated the effect of the UPE policy in Uganda on primary education attainment and found its impact on decreasing delayed enrollment and increasing grade completion rates up to the fifth grade. The same study also found a strong association between UPE and girls' enrollment, particularly in the case of poor households. Additionally, using census data and applying the logit model, Ref. [23] examined predictors of access to secondary education for children in Uganda. The paper found that only 22% of children aged 13–18 were enrolled in secondary school and that demand- and supply-related predictors are moderated by the socio-economic status of households to influence schooling outcomes. Utilizing a predictive model, although they have shown lower educational attainment for PwDs, their framework differed from statistical causal inference for the effects of the education policy; therefore, they did not examine the exact effect of UPE on the educational attainment of out-of-school children.

While these studies indicate the effectiveness of the UPE policy in improving access to primary education for children of poor families by removing tuition for public primary education, none of them examined whether any gaps exist between those with UPE experience and those who were enrolled before the UPE policy, particularly for poor and non-poor households. Likewise, despite the growing realization of the barriers faced by PwDs to complete primary school with better learning outcomes, it remains unclear whether the UPE policy is equally effective in improving access to quality education for children with disabilities in Uganda who may suffer from financial constraints and attitudinal as well as environmental barriers.

In addition, except for that by Ref. [23], another plausible limitation of these studies is that they did not capture the educational attainments of PwDs; they also did not examine school progression beyond primary schooling. This limitation prevents us from observing the clear effect of UPE on educational attainment. Importantly, as stated earlier, we are not aware of any empirical studies that explicitly compare the effect of UPE on school attendance and educational attainment between PwDs and non-PwDs.

### 3. Conceptual Framework and Study Context

Decisions of parents to send their children to school can be analyzed through a standard human capital investment framework with supply and demand factors [24]. Ref. [2] states that both the quantity of schools (e.g., distance to the nearest school) and the quality of schools (e.g., teacher's attendance and training, adequate school supplies/facilities) can be considered from the perspective of the supply side, whereas on the demand side, the parents' decision to send their children to school is affected by the intrinsic value of schooling to them, the direct cost of schooling (e.g., tuition, transportation), the opportunity

cost of schooling (e.g., foregone earnings from child labor), their time discount factor, and the expected return from schooling [2]. As for disability and education, they also state that some schooling environments may reduce learning for children with disabilities due to factors such as inaccessible educational materials and teachers not being trained to teach students depending on the type of disability. Consequently, despite the clearly measurable multifaceted benefits of education, and the impactful yet unmeasurable positive effects, which are known as “other externalities”, PwDs are deprived of access to education itself and, more clearly, to receiving quality education due to several interconnected yet poorly understood factors.

Since the decision to enroll in school and to continue education is primarily made by parents, understanding how parents make investment decisions in the education of children with and without disabilities is critical to identifying where the problems are located in relation to school participation of those with disabilities [25]. Similar to Ref. [25], referring to the case of Mexico, Ref. [26] argued that gaps in schooling for PwDs can be partially explained by parental responses to children’s disabilities. Ref. [26] further states that parents might invest differently in the education of children with and without disabilities depending on whether parental behavior is driven by efficiency or equality concerns. If parental decision making is driven by efficiency concerns, then parents will allocate resources in order to maximize the total expected earnings of their children [27]. In this case, parents may provide more resources to children with higher expected returns from education, and therefore they may invest less in those with disabilities than those without disabilities, believing that investment in the education of PwDs gives no or fewer benefits [25]. However, Ref. [26] argues that if parental decisions are driven by equality concerns, then parents will allocate resources in order to reduce differences in endowments between their children. Contrarily, he further predicts that if the cost of parental inputs is higher for PwDs than for those without disabilities, even inequality-averse parents might provide more resources to non-PwDs than to those with disabilities.

Given the circumstances above, for an investment in an educational context, disability may influence the parents’ schooling decision in different ways. For instance, Ref. [25] states that household financial constraints, combined with discriminatory attitudes on the part of parents, may negatively affect their decision to invest in the education of PwDs, in part, resulting from the predicted lower returns from the education of those with disabilities due to mistaken beliefs about their capabilities, or actual lower returns due to barriers in the labor market.

This scenario is likely in the context of UPE policy in Uganda. This is because, although amended later in 2003 to cover all children, in 1997, the government pledged to meet the costs of schooling for only four children per family, and this initial legal provision might have encouraged families to place less priority on their children with disabilities if they had more than four children. Although Ref. [15] claimed that in Uganda, the government first agreed to provide free primary education for up to four children per family in the form of a capitation grant to the school. In families that included both boys and girls, at least two of the four children had to be girls, and children with special educational needs were given priority over other children. Even if that had been the case, children with disabilities could still be deprived in the households that have four girl children. This could particularly be the case for households living in poverty. Because the UPE policy requires parents to cover the costs of school uniforms, meals, and exercise books [28,29], parents with financial constraints who cannot meet these obligations may not be able to send their children to school. This likelihood for parents of children with disabilities is higher in low- and middle-income countries where PwDs and their families often live under both income poverty and multidimensional poverty [30–39] and do not place faith in the benefit of education for their children with disabilities [5]. Furthermore, other than uniforms, textbooks, and assistive devices, inaccessible roads to school or school buildings may require additional transportation costs on the part of parents to send their children with disabilities to school [2]. As the UPE policy normally subsidizes only tuition fees, leaving

other direct and indirect costs to be borne by parents and families, it is likely that PwDs are left behind for the very reason of disparity in household investment strategies. Therefore, equality and equity in education remain a concern under the UPE policy [18]. In contrast, education of PwDs has been shown to have far-reaching benefits. Considering a Nepal case, Ref. [39] found the returns on investment in education for PwDs to be 19.2–25.6%, which is two or three times higher than non-PwDs, as reported by Ref. [40].

While looking at the disability prevalence rate in Uganda, the statistics are somewhat consistent with the global estimate of 15 percent of the population having some form of disability [41]. According to the 2002 Population and Housing Census in Uganda, almost 16% of the total population has some form of disability. This rate is consistent with the 2011 DHS, which indicates an almost 20% prevalence. The National Population Census, 2015, stated that 15 percent of women and 10 percent of men were disabled in Uganda. In this regard, of the total population of 47,249,585 [42], approximately 7 million people live with some form of disability. In Uganda, we find some laws and policies pertaining to PwDs' rights, such as Article 21 of the Constitution 1995, which prohibits discrimination against PwDs. Additionally, the PwDs Act of 2006 has created provisions for equal opportunities by eliminating all forms of discrimination against them together with the Business, Technical, Vocational Education, and Training Act, No. 12, 2008, promoting equal access to education and training for all disadvantaged groups, including PwDs. Moreover, Uganda ratified the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) and its optional protocol in September 2008. Article 24 of the UNCRPD guarantees equal rights to education for children with disabilities.

#### 4. Dataset

The datasets used in this study were adopted from the nationally representative Ugandan Demographic and Health Survey (UDHS) collected in 2016 [10]. The UDHS comprises information on women aged 15–49 years and men aged 15–54 years. The survey included questions on individual- and household-level characteristics, such as education, employment, household socioeconomic characteristics, and health.

Importantly, the survey included questions identifying people's disability status based on a short set of questions recommended by the WG [11]. These questions categorize disabilities into six types: seeing, hearing, walking, remembering, self-care, and communicating. The definition and measure of disability recommended by the WG has been one of the widely accepted and internationally tested tools. The WGSS2 uses a four-level scale (no, some, or a lot of difficulty; cannot do entirely) to capture individuals' degrees of functional ability in the aforementioned six basic physical and mental domains. The possible response options are as follows: 1 = "no difficulty", 2 = "yes, some difficulty", 3 = "yes, a lot of difficulty", and 4 = "cannot do at all". The questionnaire is provided in Appendix A. Detailed information on the survey design, data collection procedures, validity of the data obtained, and sampling methods can be found in Ref. [10].

Hence, the questions on disability not only determine whether a person has a disability or not but also indicate its severity. In this study, participants with some or a lot of difficulty are classified as having moderate disability, while those reporting not being able to do much at all are classified as having severe disability. Participants reporting no difficulty are categorized as non-disabled. In this study, we are particularly interested in exploring potential disparities in the impact of UPE based on the severity of disability. Therefore, in addition to comparing the effects of UPE on male and female populations and those with and without disabilities, the analysis also focuses on the disability samples. A key variable, "Severe Disability" is constructed to identify respondents with severe disabilities. We have assigned a value of one if the participant has a severe disability and zero otherwise. The analysis estimates the effect of UPE on people with severe disabilities using only respondents with disabilities, as discussed in detail in Section 6.2.

Although DHS captures information on respondents' disability status, there are still some limitations. One of these limitations is the lack of information at the onset of the

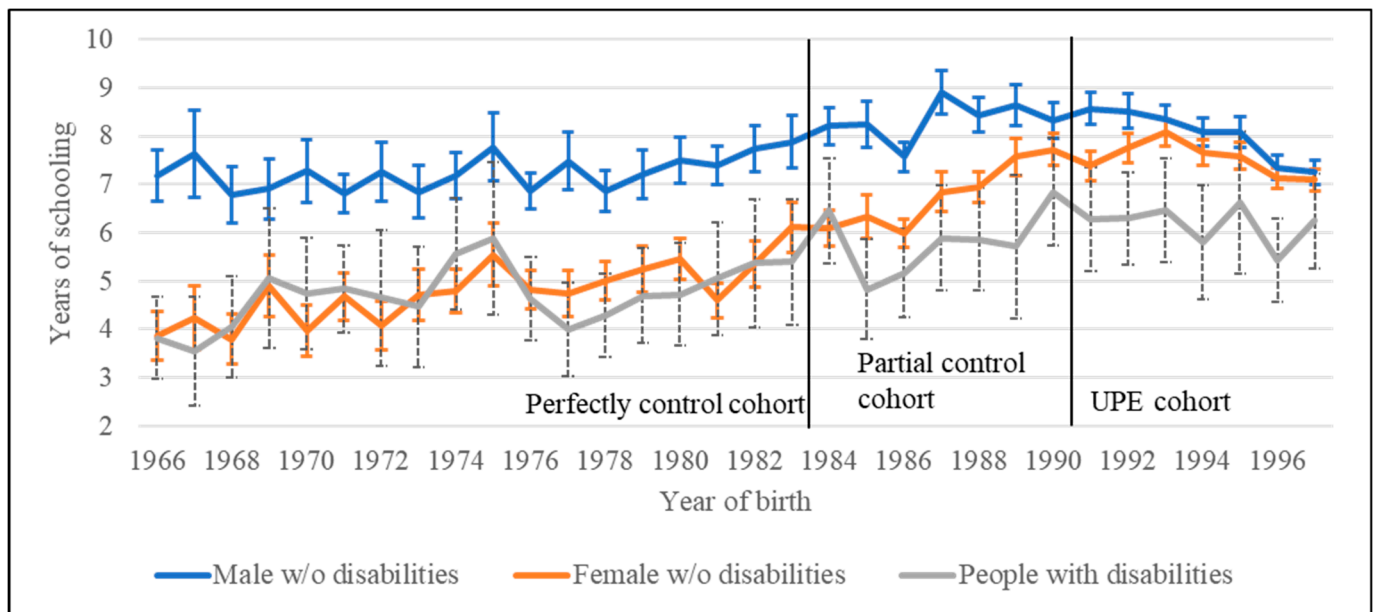


disability, which could pose a challenge for studies like ours. For example, there may be an assumption that any disability found in individuals at the age at which they are responding is the same disability they faced during primary school. Consider a person born in the 1956 cohort who would have been 60 years old in 2016 while responding to the Washington group. If this person were to answer positively to the question: Do you suffer from remembering? This indicates that they currently suffer from remembering. However, the assumption could be that they were not having difficulty in remembering while in school. This issue could be easily addressed if DHS captured the onset of the disability of the participant. Although we cannot resolve this issue completely without having the information at the onset of disability, earlier studies on the existence of disability have given some ideas on this issue. Studies have found that children and people in low- and middle-income countries experience disability at an early age, and it is possible that due to poverty, they may find it difficult to receive a diagnosis and therefore remain disabled. According to the Uganda National Population and Housing Census conducted in 2014, disabilities can develop during childhood due to various factors, including malnutrition, disease, and injury. The same Population and Housing Census states that there were over 1.6 million people living with disabilities in the country, with approximately 2% of the population aged 0–14 years having a disability [42]. Numerous studies have shown that disabilities can develop during childhood. According to research conducted by the Centers for Disease Control and Prevention (CDC), approximately one in four children in the United States has a disability [43]. Other studies by organizations such as the National Institute of Child Health and Human Development (NICHD) and the American Academy of Pediatrics (AAP) have also reported high rates of disabilities among children [44,45]. Similarly, Child Trends, a research organization focused on improving outcomes for children, reports that disabilities are more prevalent among children from low-income families, with up to 20% of these children having a disability [46].

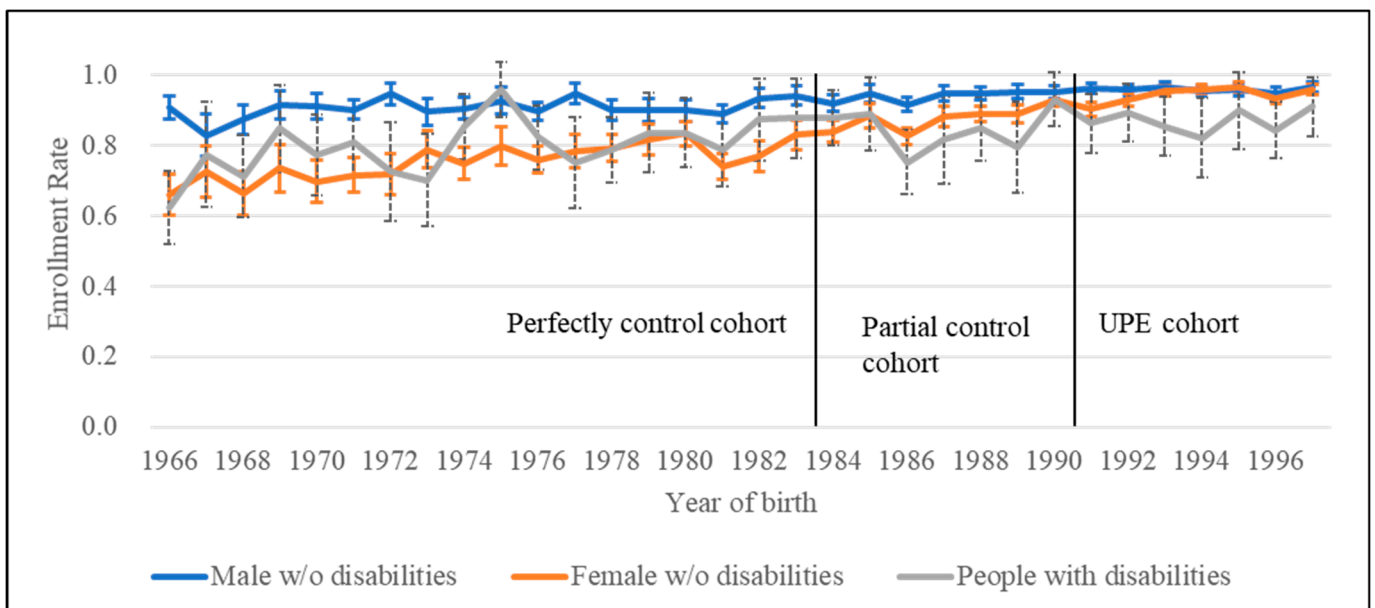
## 5. Empirical Strategy

We used data on household members born between 1977 and 1997. As UPE started in 1997, household members born between 1991 and 1997 (0–6 years old in 1997) benefitted from the policy when they were in primary school or before enrollment. Thus, we defined people who were born between 1991 and 1997 as a UPE cohort (treatment group). For the control group, we considered two cohorts: a partial control cohort, which comprises people born during 1984–1990 (7–13 years old in 1997), and a perfect control cohort, which includes people who were born during 1977–1983 (14–20 years old in 1997). (The different generational backgrounds may lead to different household behavior. This problem appears as biases in parameters. To solve this bias issue, we adopted the DID based on the idea of regression discontinuity (RD) and controls for generational and regional characteristics utilizing fixed effects. Structurally, the results using the partial cohort are estimated by RD, and the results using the perfect cohort are estimated by DID.) To account for the possibility of delayed entry into school, two study cohorts were established. The “partial control” cohort represents the age group closest in age to that of the treatment group, but with the potential for delayed entry. Conversely, the “perfect control” cohort consists of individuals who are beyond the typical age of school entry and thus have an extremely low probability of experiencing delayed entry.

Figures 1–3 show the mean values of three educational outcomes (years of schooling, enrollment rate, and completion rate) for non-PwDs and PwDs males and females, respectively. Figure 1 indicates the change in years of education, and the values of non-PwD females and PwDs are at the same level in the perfect control cohort (aged 33–50 years).



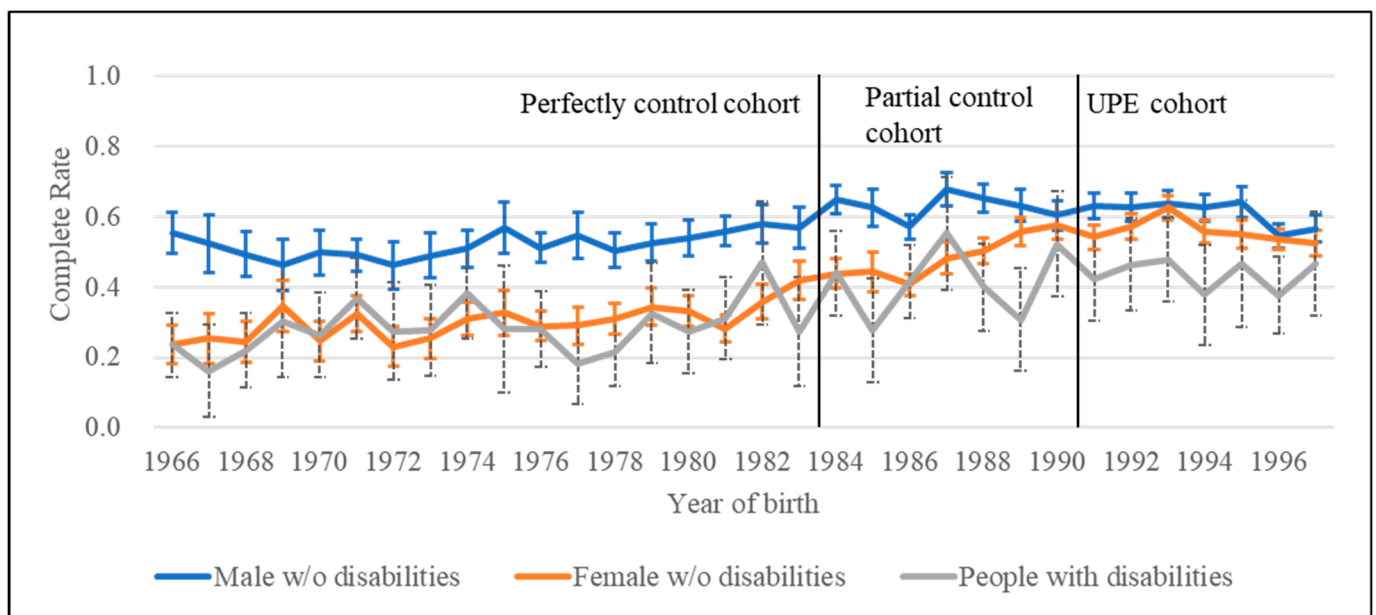
**Figure 1.** Mean values and 95% CIs of years of schooling.



**Figure 2.** Mean values and 95% CIs of enrollment rate.

In the partial control cohort, only females without disabilities showed increasing values, and their educational levels were almost the same as males without disabilities in the UPE cohort. We observed the same trend in enrollment (Figure 2) and completion rate (Figure 3).

We employed a DID estimation model as a basic identification strategy to identify the effects of the UPE policy on out-of-school children. We constructed three variables:  $UPE_i$ , which takes the value of one if a household member experienced the UPE policy when he/she was a primary student, and zero, otherwise;  $Female_i$ , which takes one if a household member is female; and  $Disability_i$ , which takes one if a household member reported one or more disabilities, and zero, otherwise. ( $Disability_i$  takes one if the respondent answers option 3 or 4 for any of the six difficulties. The respondent who answers option 4 for any of the six difficulties is defined as severely disabled, as discussed in detail in Section 6.2.)



**Figure 3.** Mean values and 95% CIs of complete rate.

We analyzed the effect of the UPE policy on educational outcomes using ordinary least squares (OLS) and logistic estimations as follows:

$$y_{ijt} = \alpha + \beta_1 UPE_{it} \times Disability_i + \beta_2 UPE_{it} \times Female_i + \gamma X_{ijt} + \delta_j + \theta_t + \varepsilon_i \quad (1)$$

where subscripts  $i$ ,  $j$ , and  $t$  indicate respondent, region, and birth year, respectively.  $y_{ijt}$  is the educational outcome (years of schooling, primary enrollment, and primary completion).  $X_{ijt}$  is a vector for the characteristics of a respondent ( $Disability_i$ ,  $Female_i$ ,  $UPE_t$ , type of residence, and wealth index) and household head (female, age, and years of schooling).  $\delta_j$  and  $\theta_t$  are the region and birth year fixed effects, respectively.  $\beta_1$  and  $\beta_2$  are the parameters to be estimated.  $\varepsilon_i$  is an error term. The parameter of the interaction term between UPE and  $Disability$  ( $\beta_1$ ) refers to the effects of UPE policy on PwDs, and the interaction term between UPE and  $Female$  ( $\beta_2$ ) is the effect on females. These parameters allow us to test whether the UPE policy reduced the educational gap. Table 1 presents the descriptive statistics for total samples.

Table 1 shows the characteristics of the respondents for the UPE and partial control cohorts. The female-to-male ratio was approximately 55%, and the ratio of having disabilities was approximately 4%. Respondents were about 25 years old on average, and 28% of respondents lived in urban areas. In terms of household heads, only 23% were female, and they had 7.4 years in school on average. The difference in mean characteristics in the UPE and non-UPE cohorts (Column (4)) indicates that, on average, the household heads of respondents in the UPE cohort tended to be female, and there were few differences in the rate of having disabilities.

Likewise, Table 2 shows the main outcome variables (years of schooling, primary enrollment ratio, and primary completion ratio) for the UPE and control cohorts and for PwDs and non-PwDs. We tested whether any difference existed in the mean educational outcomes of both PwD and non-PwD respondents. In terms of all outcomes, regardless of the UPE policy, PwDs are less likely to be educated, compared to non-PwDs. However, after the UPE policy, both PwDs and non-PwDs had better educational attainments.



**Table 1.** Descriptive Table (Respondent characteristics).

Variable	Full	Non-UPE	UPE	Difference
	Sample	Cohort	Cohort	
	(1)	(2)	(3)	(4) = (3) – (2)
N	18,183	8061	10,122	
Respondent is female; 1 = female, 0 = male	0.546 (0.004)	0.540 (0.006)	0.550 (0.006)	0.009 (0.009)
Respondent has disabilities; 1 = yes, 0 = no	0.041 (0.002)	0.045 (0.003)	0.038 (0.003)	−0.007 + (0.004)
Age of respondent	25.038 (0.040)	28.958 (0.024)	21.963 (0.024)	−6.995 *** (0.033)
Type of residence; 1 = Urban, 0 = rural	0.285 (0.010)	0.298 (0.011)	0.276 (0.010)	−0.022 * (0.009)
Household head is female; 1 = female, 0 = male	0.236 (0.005)	0.216 (0.006)	0.252 (0.007)	0.036 *** (0.008)
Age of household head	36.658 (0.225)	35.460 (0.194)	37.598 (0.307)	2.134 *** (0.277)
Years of schooling of household head	7.431 (0.094)	7.669 (0.114)	7.244 (0.096)	−0.425 *** (0.090)
Wealth index	0.230 (0.032)	0.249 (0.036)	0.215 (0.032)	−0.035 (0.022)

Note: Robust standard errors in parentheses. \*\*\*, \*, + mean significant level at 0.1%, 5%, 10%.

**Table 2.** Descriptive Table (Educational outcomes compared between with/without disability).

Variable	Full	Non-UPE	UPE	Difference
	Sample	Cohort	Cohort	
	(1)	(2)	(3)	(4) = (3) – (2)
N	18,183	8061	10,122	
Years of schooling				
Full sample	7.798 (0.083)	7.673 (0.112)	7.895 (0.075)	0.222 ** (0.087)
With Disability (a)	6.266 (0.181)	5.967 (0.241)	6.542 (0.279)	0.574 (0.381)
Without Disability (b)	7.864 (0.083)	7.754 (0.113)	7.949 (0.076)	0.196 ** (0.089)
Diff. in mean (a) – (b)	−1.597 *** (0.192)	−1.786 *** (0.252)	−1.408 *** (0.288)	0.389 (0.386)
Primary enrollment ratio				
Full sample	0.940 (0.003)	0.917 (0.005)	0.958 (0.003)	0.041 *** (0.004)
With Disability (a)	0.872 (0.013)	0.855 (0.019)	0.887 (0.018)	0.033 (0.026)
Without Disability (b)	0.943 (0.003)	0.920 (0.005)	0.960 (0.003)	0.041 *** (0.004)
Diff. in mean (a) – (b)	−0.071 *** (0.014)	−0.065 *** (0.019)	−0.073 *** (0.018)	−0.008 (0.026)
Primary completion ratio				
Full sample	0.590 (0.008)	0.573 (0.010)	0.603 (0.008)	0.030 *** (0.009)
With Disability (a)	0.462 (0.020)	0.438 (0.031)	0.484 (0.027)	0.047 (0.043)
Without Disability (b)	0.595 (0.008)	0.579 (0.010)	0.608 (0.008)	0.029 *** (0.009)
Diff. in mean (a) – (b)	−0.133 *** (0.020)	−0.142 *** (0.031)	−0.124 *** (0.028)	0.018 (0.043)

Note: Robust standard errors in parentheses. \*\*\*, \*\*, mean significant level at 0.1%, 1%.

In addition, Table 3 shows the same variables for gender. We can see that although educational outcomes for females increased significantly in the year of UPE implementation, they still did not meet the same level as their male counterparts. For male respondents, there was no clear change in any outcomes between the UPE and control cohorts.

**Table 3.** Descriptive Table (Educational outcomes compared between genders).

Variable	Full	Non-UPE	UPE	Difference
	Sample	Cohort	Cohort	
	(1)	(2)	(3)	
N	18,183	8061	10,122	
Years of schooling				
Full sample	7.798 (0.083)	7.673 (0.112)	7.895 (0.075)	0.222 * (0.087)
Female (a)	7.429 (0.092)	7.064 (0.129)	7.711 (0.083)	0.647 *** (0.105)
Male (b)	8.240 (0.089)	8.389 (0.123)	8.121 (0.095)	−0.269 * (0.124)
Diff. in mean (a) − (b)	−0.811 *** (0.072)	−1.325 *** (0.116)	−0.410 *** (0.092)	0.915 (0.150)
Primary enrollment rate				
Full sample	0.940 (0.003)	0.917 (0.005)	0.958 (0.003)	0.041 *** (0.004)
Female (a)	0.926 (0.004)	0.892 (0.006)	0.953 (0.004)	0.061 *** (0.006)
Male (b)	0.956 (0.004)	0.946 (0.006)	0.963 (0.004)	0.017 *** (0.005)
Diff. in mean (a) − (b)	−0.029 *** (0.004)	−0.055 *** (0.007)	−0.010 ** (0.005)	0.045 *** (0.008)
Primary completion ratio				
Full sample	0.590 (0.008)	0.573 (0.010)	0.603 (0.008)	0.030 *** (0.009)
Female (a)	0.555 (0.009)	0.515 (0.012)	0.586 (0.010)	0.070 *** (0.012)
Male (b)	0.631 (0.009)	0.640 (0.012)	0.624 (0.010)	−0.017 (0.013)
Diff. in mean (a) − (b)	−0.076 *** (0.009)	−0.125 *** (0.013)	−0.038 *** (0.011)	0.087 *** (0.017)

Note: Robust standard errors in parentheses. \*\*\*, \*\*, \*, mean significant level at 0.1%, 1%, 5%.

## 6. Results and Findings

### 6.1. Main Results

The results of the estimation model are presented in Table 4. (The sample sizes used in the main analysis (Table 4) and regression models derived from the main analysis (Tables 5–10) were validated based on Cohen’s d and were found to be acceptable. Tables 4–9 meet the required sample sizes for estimating the R-squared and effect size of 0.02 for the model [47]. It is inappropriate to compare Table 11 with other equations since Table 11 is the result of the analysis with propensity score matching, which is a different framework from the main analysis. Only Table 10 fails to meet the sample size requirements for estimating the effect size of 0.02, but it does meet the sample size requirements for estimating R-squared.) This table shows the effect of UPE on females, compared to the partial control cohort. The coefficients for females who benefitted from UPE (UPE cohort  $\times$  Female) were significantly positive for all outcomes. Compared to males, we find that the UPE policy increased girls’ years of schooling, school enrollment, and school completion by 0.769, 3.7, and 7.2%, respectively. In terms of males, the coefficients for UPE cohorts are significant in Columns (2), (5), and (8), indicating that the UPE policy changed only the enrollment rates of males. These results suggest that educational attainment for male students was consistently high

before the introduction of the UPE policy, and not surprisingly, the same trends continued after UPE with increased enrollment rates. On the other hand, the impact of UPE on the improvement of the extreme gender gap is consistent given the fact that one of the major goals of introducing UPE was to increase girls' participation in schooling [18].

In contrast, although UPE was effective in reducing gender gaps, we did not observe the same positive effects for the education of PwDs. Despite the fact that the introduction of UPE was aimed at increasing the schooling of all underserved population groups, results in all columns show that the coefficients for PwDs who benefitted from UPE are not significant. Regardless of the UPE policy, we also observe disparities between PwDs and non-PwDs; in particular, the coefficients for disability are significantly negative for all outcomes. Again, these findings lead us to interpret that the UPE policy aimed at increasing access to education has not been effective in improving PwDs' school enrollment. This can be linked to several factors. Given that the parents' financial situation is generally important in educating their children, and given the resource-poor situation of the families in this case, the lower level of education for PwDs may be partly driven by shifts in parental investment strategies that may give priority to their children without disabilities over their children with disabilities [25]. Additionally, an environmental barrier with insufficient facilities may make the situation even worse for those with disabilities as more costs are required on the part of the parents. Although UPE in Uganda provides free tuition, additional costs, such as for uniforms and educational materials, are not covered. Along with these costs, which must be borne by their parents, PwDs may incur additional costs to address other institutional barriers that are possibly not included in the UPE policy. Based on the above findings, we argue that despite initiatives such as UPE, the education of children with disabilities may be compromised, particularly in households experiencing poverty.

## 6.2. Disability, Poverty and Education

It is plausible that people with low socioeconomic status face more difficulties than wealthier people, as studies show that there is a strong correlation between disability and socioeconomic status [35,48,49]. Therefore, to understand this issue more clearly, and to address endogeneity, we divided the samples into poor and non-poor households and regressed them using each sample.

As observed in Table 4, the UPE policy has a positive effect on all outcomes for girls, as shown in Table 5 for the poor household samples. However, the coefficients for PwDs experiencing UPE were not significant, indicating that the UPE policy had no effect on disability and only affected girls in poor households. There were no gaps between PwDs and non-PwDs in poor households, suggesting that parents facing financial difficulties in covering other educational expenses may not be able to support their children's education regardless of disability status. The consistent finding on disability indicates that UPE had no effect on PwDs, who are among the most vulnerable and underserved population groups for human capital accumulation.

The coefficients for the UPE cohort dummy in columns (2) and (8) in Table 5, respectively, for poor male samples are not significant, indicating that male students in poor households already had access to education before the introduction of the UPE policy. This finding suggests that UPE is successful in increasing access to education for girls of poor households, but the same is not observed for PwDs. Ref. [48] noted a significant education deficit in children in households in Uganda headed by PwDs, linking this factor with the limited or reduced ability of the household to afford school fees due to the direct costs of disability.

The inability of UPE to cover the additional cost required to accommodate the needs arising from disability, such as making school infrastructure and roads from home to school accessible and providing educational materials in alternative modes, such as textbooks in Braille or assistive devices for different impairment groups, is a key factor contributing to the lack of impact on PwDs. Poor families with a member with a disability may also struggle with social stigma in the community, and poverty could prevent them from

investing heavily in their children's education. When coupled with factors such as intra-household resource allocation biases in education based on a child's disability, funding on the part of the government should be increased to meet the additional needs of individuals with disabilities for schooling.

**Table 4.** Marginal Effects of UPE on Educational Attainments (Main Results).

	Years of Schooling			Enrollment Rate			Complete Rate		
	Full	Male	Female	Full	Male	Female	Full	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
UPE cohort × Disability	0.155 (0.314)	0.061 (0.531)	0.224 (0.340)	−0.008 (0.025)	−0.019 (0.035)	−0.003 (0.034)	0.002 (0.038)	−0.000 (0.056)	0.007 (0.045)
UPE cohort × Female	0.769 *** (0.108)			0.037 *** (0.008)			0.072 *** (0.014)		
UPE cohort	−0.149 (0.149)	−0.310 + (0.177)	0.896 *** (0.200)	0.059 *** (0.012)	0.059 *** (0.015)	0.097 *** (0.016)	−0.013 (0.020)	−0.016 (0.028)	0.078 ** (0.026)
With Disabilities	−1.003 *** (0.169)	−0.866 *** (0.227)	−1.122 *** (0.238)	−0.056 ** (0.019)	−0.044 + (0.024)	−0.066 ** (0.025)	−0.074 ** (0.026)	−0.073 * (0.036)	−0.076 * (0.033)
Female Dummy	−1.498 *** (0.083)			−0.053 *** (0.007)			−0.137 *** (0.011)		
Urban dummy	0.381 *** (0.111)	0.340 ** (0.131)	0.392 ** (0.135)	0.004 (0.008)	0.003 (0.009)	0.006 (0.009)	0.054 *** (0.014)	0.051 ** (0.017)	0.054 ** (0.016)
HH head is female	1.170 *** (0.076)	1.488 *** (0.155)	1.009 *** (0.083)	0.009 + (0.005)	0.012 (0.008)	0.009 (0.006)	0.097 *** (0.009)	0.132 *** (0.018)	0.078 *** (0.011)
Age of HH head	0.033 *** (0.003)	0.038 *** (0.005)	0.027 *** (0.003)	0.000 * (0.000)	0.000 (0.000)	0.001 ** (0.000)	0.003 *** (0.000)	0.003 *** (0.000)	0.003 *** (0.000)
Years of schooling of HHH	0.479 *** (0.010)	0.624 *** (0.016)	0.359 *** (0.012)	0.012 *** (0.001)	0.012 *** (0.001)	0.011 *** (0.001)	0.042 *** (0.001)	0.056 *** (0.002)	0.031 *** (0.001)
Wealth index	0.767 *** (0.060)	0.416 *** (0.070)	1.081 *** (0.068)	−0.003 (0.004)	−0.011 * (0.005)	0.004 (0.004)	0.062 *** (0.007)	0.021 * (0.010)	0.098 *** (0.008)
Region FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Birth Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	18,183	8261	9922	18,183	8261	9922	18,183	8261	9922
R-squared	0.490	0.554	0.464	0.182	0.167	0.197	0.284	0.311	0.286

Note: Robust standard errors in parentheses. \*\*\*, \*\*, \*, + mean significant level at 0.1%, 1%, 5%, 10%.

**Table 5.** Marginal Effects of UPE on Educational Attainments (Poor Household Sample).

	Years of Schooling			Enrollment Rate			Complete Rate		
	Full	Male	Female	Full	Male	Female	Full	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
UPE cohort × Disability	−0.130 (0.373)	0.505 (0.699)	−0.824 + (0.468)	−0.005 (0.041)	0.044 (0.053)	−0.073 (0.064)	−0.039 (0.057)	−0.006 (0.082)	−0.051 (0.078)
UPE cohort × Female	0.920 *** (0.143)			0.064 *** (0.016)			0.058 * (0.022)		
UPE cohort	0.640 ** (0.196)	0.350 (0.238)	1.810 *** (0.250)	0.125 *** (0.024)	0.129 *** (0.028)	0.186 *** (0.032)	0.020 (0.033)	−0.013 (0.044)	0.111 ** (0.039)
With Disabilities	−0.612 * (0.239)	−0.731 * (0.328)	−0.445 (0.301)	−0.072 * (0.032)	−0.091 * (0.041)	−0.056 (0.044)	−0.024 (0.037)	−0.035 (0.056)	−0.011 (0.046)
Female Dummy	−1.856 *** (0.114)			−0.100 *** (0.013)			−0.184 *** (0.018)		
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Birth Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	7278	3296	3982	7278	3296	3982	7278	3296	3982
R-squared	0.404	0.548	0.318	0.284	0.287	0.291	0.220	0.328	0.149

Note: Robust standard errors in parentheses. \*\*\*, \*\*, \*, + mean significant level at 0.1%, 1%, 5%, 10%.

Ref.'s [14] argument that only the segments of the poor who do not need additional support for primary education could have benefitted from UPE supports our findings that children with disabilities who might incur additional costs beyond tuition fee waivers are not positively affected by UPE in Uganda. Overall, while UPE has successfully increased access to education for girls in poor households, it has not been successful in addressing the education deficit in children in households headed by PwDs, highlighting the need for additional support to meet the unique needs of PwDs.

Additionally, Table 6 displays the results for non-poor households, which differ from the previous tables. Notably, while the coefficient for females with UPE experience is still positively significant, it is smaller than in the full sample and poor household results. This

suggests that the UPE policy had less impact on the schooling and completion rate of girls from wealthier families. In terms of PwDs, we obtained the same results as for poor households. In contrast, the gap in years of schooling between PwDs and non-PwDs is larger in Table 6 than in Table 5. For females specifically, all coefficients were significant at the 1% level but lower than those in the previous tables. In summary, there are gender gaps in years of schooling and completion, but they are more prominent in poor households. The UPE policy has been effective in reducing these gaps for poor households, but it has not significantly improved the educational attainment of PwDs.

**Table 6.** Marginal Effects of UPE on Educational Attainments (Non-Poor Household Sample).

	Years of Schooling			Enrollment Rate			Complete Rate		
	Full	Male	Female	Full	Male	Female	Full	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
UPE cohort × Disability	0.317 (0.422)	−0.326 (0.722)	0.739 (0.463)	−0.020 (0.030)	−0.077 + (0.042)	0.019 (0.040)	0.026 (0.048)	0.022 (0.078)	0.029 (0.057)
UPE cohort × Female	0.693 *** (0.139)			0.022 ** (0.007)			0.084 *** (0.018)		
UPE cohort	−0.623 ** (0.203)	−0.797 *** (0.233)	0.375 (0.274)	0.019 (0.014)	0.011 (0.015)	0.049 ** (0.017)	−0.039 (0.025)	−0.047 (0.036)	0.066 + (0.034)
With Disabilities	−1.274 *** (0.233)	−0.879 ** (0.306)	−1.502 *** (0.326)	−0.043 * (0.020)	0.005 (0.017)	−0.074 * (0.030)	−0.109 *** (0.033)	−0.102 * (0.050)	−0.113 * (0.044)
Female Dummy	−1.287 *** (0.111)			−0.026 *** (0.007)			−0.108 *** (0.014)		
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Birth Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	10,905	4965	5940	10,905	4965	5940	10,905	4965	5940
R-squared	0.417	0.494	0.377	0.049	0.054	0.053	0.207	0.245	0.198

Note: Robust standard errors in parentheses. \*\*\*, \*\*, \*, + mean significant level at 0.1%, 1%, 5%, 10%.

These findings reveal that UPE policy has some shortcomings that need to be addressed. The first issue is that there are educational disparities between boys without disabilities and other children. As illustrated in Table 5, girls from poor households with disabilities receive the same educational level as those without disabilities. However, boys with disabilities experience significantly lower educational attainment than those without disabilities. This finding confirms the educational gap between boys without disabilities and the rest of the children, which is consistent with previous studies [50–52].

The second issue is that the UPE policy has an impact on the educational level of girls, but it does not seem to have the same impact on PwDs. As shown in Table 4, PwDs may incur additional costs compared to those without disabilities, including healthcare and education costs, as well as costs for people who support them and opportunity costs [2,48,53,54]. While financing is a major factor for accessing education in general, household and community attitudes may discourage families from investing in education for PwDs, failing to recognize its importance [25]. Additionally, Ref. [23] quantitatively assessed access to secondary education and concluded that proximity to schools affects educational attainment. However, PwDs face profound challenges and barriers to accessibility due to physical infrastructure inaccessibility, including roads and buildings. To address this disparity, additional costs must be covered, such as support for commuting to school and the paving of roads. This policy inadequacy of UPE is equally problematic for households with and without disabilities who encounter significant difficulties in attending school.

### 6.3. Robustness Checks

In the previous sections, we compared the UPE cohort to a partial control cohort. However, when using the regression discontinuity approach to analyze the effects, it is important to closely compare the treatment and control groups. The partial control cohort may have imperfectly benefited from the UPE policy, which could obscure the causal effects. To address this, we compared the UPE cohort to a perfect control cohort born between 1977 and 1983. Since these individuals were already older than the compulsory education age when UPE began in 1997, they are less likely to have experienced its effects. By using the



same equation to change the control group, we obtained estimation results in Tables 7–9. Unlike in the previous results, we cannot observe the effects on PwDs. However, the coefficients for females affected by UPE are larger than those in Tables 4–6, indicating that the UPE policy has a greater impact on increasing educational attainment for females than for older people. This tendency is consistent with the results shown in Figures 1–3.

**Table 7.** Marginal Effects of UPE on Educational Attainments Compared to the Perfect control cohort (Full sample).

	Years of Schooling			Enrollment Rate			Complete Rate		
	Full	Male	Female	Full	Male	Female	Full	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
UPE cohort × Disability	−0.036 (0.299)	−0.005 (0.516)	−0.142 (0.323)	−0.018 (0.032)	0.013 (0.047)	−0.050 (0.038)	0.022 (0.033)	0.040 (0.052)	0.004 (0.046)
UPE cohort × Female	1.493 *** (0.116)			0.084 *** (0.010)			0.156 *** (0.015)		
UPE cohort	0.308 + (0.176)	0.268 (0.200)	2.060 *** (0.240)	0.050 ** (0.015)	0.031 + (0.016)	0.152 *** (0.023)	0.069 ** (0.025)	0.074 * (0.035)	0.239 *** (0.032)
With Disabilities	−0.804 *** (0.159)	−0.766 *** (0.212)	−0.771 *** (0.214)	−0.044 + (0.025)	−0.072 * (0.036)	−0.017 (0.032)	−0.092 *** (0.021)	−0.111 *** (0.029)	−0.071 * (0.031)
Female Dummy	−2.248 *** (0.088)			−0.103 *** (0.010)			−0.223 *** (0.012)		
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Birth Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	15,626	7210	8416	15,626	7210	8416	15,626	7210	8416
R-squared	0.508	0.565	0.483	0.179	0.168	0.188	0.311	0.327	0.314

Note: Robust standard errors in parentheses. All equation includes the control variables and fixed effects as in Table 4. \*\*\*, \*\*, \*, + mean significant level at 0.1%, 1%, 5%, 10%.

**Table 8.** Marginal Effects of UPE on Educational Attainments Compared to the Perfect control cohort (Poor Household Sample).

	Years of Schooling			Enrollment Rate			Complete Rate		
	Full	Male	Female	Full	Male	Female	Full	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
UPE cohort × Disability	−0.019 (0.424)	0.207 (0.643)	−0.564 (0.467)	−0.019 (0.052)	0.000 (0.062)	−0.052 (0.079)	−0.006 (0.048)	0.007 (0.070)	−0.038 (0.074)
UPE cohort × Female	1.705 *** (0.157)			0.131 *** (0.020)			0.148 *** (0.024)		
UPE cohort	0.899 *** (0.224)	0.661 * (0.261)	2.920 *** (0.257)	0.088 ** (0.028)	0.032 (0.030)	0.264 *** (0.043)	0.064 + (0.035)	0.072 (0.049)	0.228 *** (0.040)
With Disabilities	−0.707 ** (0.230)	−0.412 + (0.221)	−0.714 * (0.349)	−0.053 (0.040)	−0.036 (0.046)	−0.076 (0.066)	−0.055 + (0.031)	−0.050 (0.041)	−0.022 (0.042)
Female Dummy	−2.668 *** (0.124)			−0.172 *** (0.018)			−0.276 *** (0.019)		
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Birth Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	6294	2891	3403	6294	2891	3403	6294	2891	3403
R-squared	0.449	0.575	0.381	0.277	0.285	0.274	0.244	0.342	0.171

Note: Robust standard errors in parentheses. All equation includes the control variables and fixed effects as in Table 4. \*\*\*, \*\*, \*, + mean significant level at 0.1%, 1%, 5%, 10%.

As shown in Table 10, focusing on severe disabilities utilizing the main analysis estimation method, the differences between the UPE and partial control cohorts are more significant than those in comparison to the perfect control cohort. We also found no effect on educational attainment for PwDs.

Eliminating the endogeneity problem completely can be a challenging task. Although, in this study, we assume that the probability of being born female is exogenous, it is possible that the assumption for PwDs may be violated, as it is correlated with their socioeconomic status. Additionally, there may be a similar concern regarding the correlation between the policy coming into effect and birth year as political bureaus may influence the birth rate and determine policy decisions. To increase the accuracy of our findings, we used propensity score matching. The variables used to estimate propensity scores are similar to those in Equation (1).

**Table 9.** Marginal Effects of UPE on Educational Attainments Compared to the Perfect control cohort (Non-Poor Household Sample).

	Years of Schooling			Enrollment Rate			Complete Rate		
	Full	Male	Female	Full	Male	Female	Full	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
UPE cohort × Disability	−0.013 (0.377)	−0.212 (0.713)	0.125 (0.444)	−0.013 (0.040)	0.020 (0.065)	−0.043 (0.044)	0.047 (0.044)	0.072 (0.072)	0.033 (0.062)
UPE cohort × Female	1.369 *** (0.156)			0.056 *** (0.011)			0.161 *** (0.020)		
UPE cohort	−0.005 (0.242)	0.087 (0.270)	1.508 *** (0.341)	0.028 (0.018)	0.029 (0.020)	0.086 *** (0.026)	0.072 * (0.034)	0.070 (0.046)	0.242 *** (0.045)
With Disabilities	−0.922 *** (0.227)	−0.936 ** (0.353)	−0.928 *** (0.272)	−0.046 (0.033)	−0.089 (0.054)	−0.009 (0.037)	−0.127 *** (0.031)	−0.148 ** (0.045)	−0.116 ** (0.041)
Female Dummy	−1.989 *** (0.120)			−0.062 *** (0.011)			−0.189 *** (0.017)		
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Birth Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	9332	4319	5013	9332	4319	5013	9332	4319	5013
R-squared	0.442	0.509	0.404	0.078	0.077	0.087	0.253	0.273	0.252

Note: Robust standard errors in parentheses. All equation includes the control variables and fixed effects as in Table 4. \*\*\*, \*\*, \* mean significant level at 0.1%, 1%, 5%.

**Table 10.** Marginal Effects of UPE on Educational Attainments of People with Severe Disabilities.

	Years of Schooling			Enrollment Rate			Complete Rate		
	Full	Male	Female	Full	Male	Female	Full	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<b>Panel A: UPE cohort vs. partial control cohort</b>									
UPE cohort	−0.593 (0.707)	−1.002 (1.175)	−0.348 (0.713)	−0.132 * (0.051)	−0.165 * (0.073)	−0.124 + (0.064)	−0.022 (0.085)	0.048 (0.124)	−0.063 (0.091)
× Severe Disability				0.045 (0.050)			0.072 (0.069)		
UPE cohort × Female	0.913 (0.579)			0.077 (0.057)	0.164 * (0.067)	0.057 (0.077)	0.148 (0.097)	0.284 * (0.116)	0.136 (0.127)
Severe Disability	0.553 (0.654)	1.151 (0.974)	1.247 (0.809)	0.055 (0.057)	0.050 (0.067)	0.077 (0.077)	0.076 (0.097)	0.033 (0.116)	0.092 (0.127)
UPE cohort	0.542 (0.400)	0.826 (0.632)	0.338 (0.505)	0.055 (0.035)	0.050 (0.041)	0.077 (0.052)	0.076 (0.051)	0.033 (0.081)	0.092 (0.066)
Female Dummy	−1.721 *** (0.339)			−0.082 * (0.036)			−0.152 ** (0.047)		
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Birth Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	744	332	412	744	332	412	744	332	412
Adj R-sq	0.392	0.330	0.481	0.139	0.231	0.184	0.302	0.303	0.359
<b>Panel B: UPE cohort vs. perfect control cohort</b>									
UPE cohort	0.557 (0.759)	0.873 (1.287)	0.044 (0.785)	0.044 (0.086)	0.068 (0.112)	−0.056 (0.104)	0.070 (0.084)	0.160 (0.125)	0.014 (0.102)
× Severe Disability				0.019 (0.054)			0.065 (0.066)		
UPE cohort × Female	1.136 * (0.513)			0.111 (0.074)	0.060 (0.086)	0.185 + (0.103)	0.240 * (0.096)	0.199 (0.127)	0.329 ** (0.124)
Severe Disability	1.028 (0.676)	0.748 (0.975)	2.396 ** (0.736)	0.111 (0.074)	0.060 (0.086)	0.185 + (0.103)	0.240 * (0.096)	0.199 (0.127)	0.329 ** (0.124)
UPE cohort	−0.582 (0.485)	−1.163 (0.747)	0.093 (0.558)	−0.106 (0.073)	−0.190 * (0.092)	0.028 (0.095)	−0.019 (0.053)	−0.093 (0.070)	0.029 (0.070)
Female Dummy	−2.052 *** (0.341)			−0.065 (0.047)			−0.155 *** (0.042)		
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Birth Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	719	340	379	719	340	379	719	340	379
Adj R-sq	0.439	0.430	0.510	0.133	0.240	0.166	0.354	0.369	0.405

Note: Robust standard errors in parentheses. \*\*\*, \*\*, \*, + mean significant level at 0.1%, 1%, 5%, 10%.

The outcomes for the three educational categories are presented in Table 11. The estimations for female non-persons with disabilities are provided in Columns (1), (3), and (5), while those for persons with disabilities are shown in Columns (2), (4), and (6). The table also contains the results for both the partial and perfect control cohorts. Our observations suggest that UPE has a clear impact on females in all outcomes. However, the coefficients were slightly smaller than the main results.

**Table 11.** Effects of UPE on Educational Attainment (Propensity Score Matching).

	Years of Schooling		Enrollment Rate		Complete Rate	
	Female w/o Disabilities	People with Disabilities	Female w/o Disabilities	People with Disabilities	Female w/o Disabilities	People with Disabilities
	(1)	(2)	(3)	(4)	(5)	(6)
Difference between UPE cohort vs. Partial control cohort	0.509 *** (0.113)	0.174 (0.402)	0.052 *** (0.009)	0.044 (0.036)	0.055 *** (0.013)	−0.040 (0.049)
Matched Pairs	5366	379	5366	379	5366	379
Difference between UPE cohort vs. Perfect control cohort	0.986 *** (0.192)	0.307 (0.364)	0.092 *** (0.012)	0.008 (0.034)	0.109 *** (0.019)	0.062 (0.062)
Matched Pairs	5366	379	5366	379	5366	379

Note: Abadie–Imbens robust standard errors in parentheses. All equation includes the control variables and fixed effects as in Table 4 except for year variables. \*\*\* mean significant level at 0.1%.

## 7. Conclusions

In this study, we used a large and nationally representative 2016 DHS dataset from Uganda to compare the impact of the UPE policy on the years of schooling, school enrollment, and school completion rates of girls and children with disabilities. To estimate the effectiveness of UPE more systematically, we applied a DID model. Our results indicate that while UPE has been effective in reducing gender gaps in education, we could not observe the same level of impact on reducing gaps for PwDs.

We found that PwDs still face challenges in accessing UPE, and our results highlight that the UPE policy alone cannot increase enrollment, years of schooling, or completion rates for PwDs, in general, and girls with significant disabilities, in particular, without proper support provisions in place to accommodate their individual needs. Therefore, policy interventions with reasonable accommodation provisions, as stated in Article 2 of the CRPD, are required.

Furthermore, while UPE makes school fees free, families must still manage other costs, such as uniforms and educational materials, including textbooks. Negative income shocks resulting from these costs are likely to discourage families from sending their children with disabilities to school.

Our findings suggest that while UPE is an ambitious initiative, it cannot succeed without first identifying and addressing the difficulties that children with disabilities and their parents face. The lack of support provisions and inaccessible schools hinder the education of PwDs, who face difficulties when efforts fail to accommodate their individual needs by removing disabling barriers.

Therefore, our study highlights the need for complementary policy interventions, such as targeted subsidies including policy interventions lowering the credit constraints households face through a scholarship program and conditional cash transfers for poor families. However, strategies like these alone are insufficient to increase access for children with disabilities in school due to issues such as the inaccessibility of infrastructure. To address this, additional funding should be allocated to resolve the inaccessibility of infrastructure.

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**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study. More details regarding DHS data and ethical standards are available at: <http://goo.gl/ny8T6X> (accessed on 18 August 2023).

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## Appendix A. Questionnaire about Disabilities in DHS

The questionnaire in DHS follows the recommendations made by the Washington Group on Disability Statistics. There are six questions regarding the type of disability and five uniform answer options.

### Questions

1. Because of a physical, mental or, emotional health condition. . . . Does (NAME) have difficulty seeing even if he/she is wearing glasses?
2. Because of a physical, mental or, emotional health condition. . . . Does (NAME) have difficulty hearing even if he/she is using a hearing aid?
3. Because of a physical, mental or, emotional health condition. . . . Does (NAME) have difficulty walking or climbing steps?
4. Because of a physical, mental or, emotional health condition. . . . Does (NAME) have difficulty remembering or concentrating?
5. Because of a physical, mental or, emotional health condition. . . . Does (NAME) have difficulty with self care such as washing all over, dressing, feeding, toileting?
6. Because of a physical, mental or, emotional health condition. . . . Does (NAME) have difficulty communicating forexample understanding others or being understood by others?

### Answers

- 1 = NO—NO DIFFICULTY  
 2 = YES—SOME DIFFICULTY  
 3 = YES—A LOT OF DIFFICULTY  
 4 = CANNOT DO AT ALL  
 8 = DON'T KNOW

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