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Evaluating the Effectiveness of Education Aid in Promoting Inclusive and Equitable Quality Education with a Specific Emphasis on the Gender Perspective

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Abstract

The primary objective of this study is to examine the relationship between education aid and different levels of schooling, specifically primary, secondary, and tertiary education, from a gender perspective, with a particular focus on Sustainable Development Goal (SDG) four. The study is structured into three main parts: the analysis of female outcomes, the analysis of male outcomes, and conducting a comparative analysis of results between females and males. Firstly, the study analyzes the impact of education aid on completion rates for females and males at the primary level, net enrolment rates for females and males at the secondary level, and gross enrolment rates for females and males at the tertiary level. Subsequently, a comparative analysis of the female and male outcomes is conducted. The study drew data from a 19-year panel (2002−2020) of fifty low and lower-middle-income countries. The system GMM (One-step GMM and Two-step GMM) was utilized for the analysis. Both methods demonstrated a favorable correlation between education aid and primary and secondary education. However, the results suggest that males benefit more from education aid than females at primary and secondary levels. Additionally, the findings for the tertiary level demonstrate that the relationship between tertiary education aid and tertiary education is not optimal. The primary contribution of this study lies in its focused examination of the impact of a specific level of educational aid on particular educational outcomes, with a special emphasis on gender considerations within a comprehensive framework aligned with SDG four.

Keywords: aid effectiveness, education aid, foreign aid, gender perspective, primary education, secondary school, tertiary level

1. Introduction

Education boost-up human capital (Lucas, 1988; Rebelo, 1991; Romer, 1994) and facilitates the process of innovation and knowledge creation, ultimately affecting the long-run economic growth and development patterns of the country, region, or the world (Barro, 1991; Benhabib & Spiegel, 1994). Foreign aid has been linked with the education sector since the 1960s. Earlier stage education aid focused mainly on higher education. However, the paradigm of education aid shifted to primary and secondary education levels in the late 1980s. Previous and current international and national development programs such as the World Conference on Education for All (EFA) of Jomtien, and Dakar of 1990 and 2000, respectively; the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) have also been given high priority in these levels (Heyneman & Lee, 2016; World Bank, 1980; Petrakis & Stamatakis, 2002; Pascharopoulos & Patrinos, 2004; Asiedu & Nandwa, 2007; UNESCO, 2007).

Aid in the education sector has been booming sharply for the last several decades. Total committed aid to education increased from US$ 2.8bn in 1995 to US$ 16.42bn in 2020 (OECD/CRS, 2022). Similarly, the total committed aid (in constant 2020, US$), from 1995 to 2021, to the primary, secondary, and tertiary levels, increased significantly by 928, 785, and 742 percent, respectively (OECD/CRS, 2022). Another side, previous studies such as Michaelowa (2004), Michaelowa & Weber (2007a, 2007b), Dreher et al. (2008), Christensen et al. (2011), d'Aiglepierre & Wagner (2013), Birchler & Michaelowa (2016), Eskander & Mukherjee (2017) claimed that there is a positive relationship between education aid and education outcome and education aid enhancing education sector in the developing countries. However, globally, 129 million girls are still out of school,

including 32 million of primary age and 97 million of secondary school age (UNICEF/GDC, 2023).

Moreover, primary completion rates for girls are lower in low-income countries; only 63 percent of female primary school students complete primary school, and 36 and 21 percent in the secondary and upper secondary levels, respectively (World Bank/WDI, 2022). Therefore, a noticeable surge in aid allocation towards the education sector has been subjected to academic scrutiny. These examinations have revealed that aid directed toward education can positively impact the educational outcomes of recipient nations. However, it is imperative to acknowledge that despite the increased aid allocation, education indicators and the current state of the education sector in developing countries present some confusion regarding the efficacy of aid in this domain. It challenges academics, development partners (DPs), and recipients. This statement of problem motivates this study for further investigation in this domain. Because currently, the world is focusing on the Sustainable Development Goals (SDGs). Goal four of the SDGs emphasizes "ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all" (SDGs, 2020). Thus, the timely investigation of the relationship between education aid from a gender perspective will contribute to developing new policy measures and providing comprehensive guidelines to DPs and recipients. Additionally, by effectively mobilizing education aid in the developing world, those measures will facilitate the successful implementation of SDG four.

The study aims to investigate the effectiveness of education aid in promoting the schooling of developing countries from gender prospects on various education levels. The operational objectives to achieve the main aim are to compare education aid outcomes from the female and male point of view and to find the proper policy measures to enhance the gender equality point of view in the education sector. The following research questions address the objective: 1) Does primary education aid in heightening female and male basic education (primary education)? 2) Does secondary-level education aid successfully enhance the secondary school net enrolment rate in the developing world from a gender perspective? Moreover, 3) How far is the tertiary education aid helpful in boosting female and male education outcomes in the developing world? It is hypothesized that the primary, secondary, and tertiary education aid has a statistically significant positive relationship with enhancing female and male education outcomes on respective levels.

Previous studies have demonstrated the mixed impact of education aid on educational outcomes. However, these studies have certain limitations. Firstly, most of them have utilized aggregated measures of education aid without specifically examining its components. Additionally, some studies have relied on general foreign aid measures, which may not capture the true essence of education aid. To the best of this study's knowledge, no previous studies have explored the gender perspective in depth. Furthermore, many previous studies have focused on narrow aspects of education levels, neglecting a comprehensive analysis. Moreover, the lack of adequate control variables to account for the structural characteristics of the education system poses another limitation in these studies. In contrast, this study distinguishes itself from prior research by concentrating specifically on primary, secondary, and tertiary levels of education aid. By doing so, it achieves a comprehensive understanding of the subject matter. This study also incorporates robust control variables encompassing relevant school, economic, and governance characteristics. Moreover, the study's significant contribution lies in examining gender perspectives, aligning with SDG four. This comprehensive approach has not been adequately addressed in previous studies, further highlighting the uniqueness and importance of this research. Overall, this study overcomes the limitations of prior research, making a substantial contribution to the field of education aid analysis.

The study employs the System Generalized Method of Moments (GMM) to analyze the relationship between education aid and education outcomes across different levels. The study utilizes 19 years of panel data from fifty developing countries. The findings reveal that education aid is a robust contributor to enhancing the primary and secondary education systems in both male and female analyses, albeit with a more substantial effect observed among males. However, the effectiveness of education aid at the tertiary level is not statistically significant for both female and male analyses.

The organization of the remaining part of this paper is as follows. Section 2 describes the study's literature and significance; Section 3 describes the data, variables selection, methodology, and estimation strategy; Section 4 presents the estimation results and discussion; Section 5 draws the conclusion and some policy measures.

2. Literature and Significance of the Study

Aid effectiveness is considered one of the most controversial topics in development economics (Asra et al., 2005). The overall aid effectiveness literature is divided into three waves based on the previous cross-country studies. The first wave was led by a negative perspective, including Griffin (1970), Weisskopf (1972), Areskoug (1976), Mosley et al. (1987), Dowling & Hiemenz (1982), Boone (1994), Rajan & Subramanian (2005) found

that foreign aid has a negative impact on economic growth. The Second wave was led by a positive perspective, including the early studies of the 1970s and 1980s; for instance, Gupta (1975), McGowan & Smith (1978), and Bradshaw (1985) have found that there is a positive relationship between foreign aid and economic growth. Correspondingly, most of the studies after the mid-1990s and then after (Durbarry et al., 1998; Dalgaard & Hansen, 2000; Hansen & Tarp, 2000, 2001; Lensink & White, 2001; Dalgaard et al., 2004; Morrissey, 2001) have found a positive relationship between foreign aid and economic growth. And the third wave advocates a conditional perspective, including a study by the World Bank (1998) that concluded: "aid works in a good policy environment." Later most academics also supported this argument; for instance, Burnside & Dollar (2000).

Regarding the relationship between education aid and education outcomes in the preliminary stage, very few scholars, including Michaelowa (2004), Michaelowa & Weber (2007a, 2007b), Wolf (2007), as well as Dreher et al. (2008), contributed to analyzing the effect of education aid. Later various academics such as Arndt et al. (2011), Christensen et al. (2011), d'Aiglepierre & Wagner (2013), and Gyimah-Brempong & Aziedu (2008) enlarge this study area. In a brief summary of the existing literature on the impact of aid on education outcomes, multiple studies show the positive effects of aid on education outcomes. Bhaumik (2005) found that World Bank aid positively influenced primary education completion in African countries. Wolf (2007) reported a positive effect on primary completion rates, while Gyimah-Brempong & Asiedu (2008) established a positive association of education aid with primary completion rates. Ziesemer (2011) reinforced aid's importance in improving literacy, and Pickbourn &Ndikumana (2013) identified a positive impact on education outcomes. However, contrasting findings exist. Fielding et al. (2006) found a statistically insignificant but favorable impact of overall aid on schooling, while Findley et al. (2010) reported a negative effect on primary enrollment.

More specifically, Eskander & Mukherjee (2017) examined the effect of education aid on primary schooling in developing countries by focusing on the two primary schooling variables- gross primary school enrollment and completion rates. The main purpose of their study is to assess the effectiveness of foreign aid in promoting the schooling of males and females in developing countries. They found a positive and statistically significant relationship between education aid and gross enrolment rate in both categories. However, education aid does not favorably affect the completion rate for either males or females. The study of d'Aiglepierre & Wagner (2013) also focuses on the gender equality aspects of educational outcomes and found that aid for primary education has a strong positive effect on primary school enrolment and gender equality. Birchler & Michaelowa (2016) and Michaelowa & Weber (2007b), who focused on the primary education outcome, found a positive relationship between education aid and education outcome at the primary level. Christensen et al. (2011) conducted a study focusing on the influence of bilateral and multilateral primary education aid on primary school enrollment. The findings revealed that bilateral aid directly targeted primary education positively and significantly affected primary enrollment. In contrast, the impact of multilateral aid was found to be insignificant.

Similarly, the study of Dreher et al. (2008) found a positive relationship between education aid and primary school enrolment in 100 sample developing countries. The empirical evidence of Michaelowa (2004) shows the positive impact of educational aid on primary education gross enrolment rate. In absolute terms, the study found that a one-million increase in education aid increases 0.7 percent primary education gross enrolment rates. A comprehensive survey by Michaelowa & Weber (2007a) examines aid effectiveness in primary, secondary, and tertiary education in 100 low and lower-middle-income countries. The results show a positive effect of aid on all three levels on primary completion rate and secondary and tertiary gross enrolment rate. However, the study indicated that the impact of education aid on education outcomes is not very substantial.

The existing body of literature presents mixed findings regarding the impact of education aid on education outcomes. A comprehensive examination of the limitations inherent in previous studies is provided after this paragraph. However, when analyzing the literature from a female perspective, it becomes evident that there is a lack of thorough analysis in this specific domain. Consequently, there is a clear need for a more comprehensive investigation into the impact of education aid on female education, as highlighted by the literature. Addressing this research gap is crucial for a complete understanding of the role of education aid across various levels of girls' education. These observations and considerations contribute to the development of the conceptual framework for this study.

Previous studies in this field are subject to criticism and scrutiny when examined in detail, and there are still areas that warrant improvement within the existing literature. In terms of methodology, many earlier studies, including Eskander & Mukherjee (2017), Hudson (2015), Yogo & Mallaye (2014), Ziesemer (2011), d'Aiglepierre & Wager (2013, 2010), Wolf (2007), Bhaumik (2005), Masud & Yontcheva (2005), Gross (2003), Boone (1996), employed OLS, fixed effects, random effects, Two-Stage Least Squares (2SLS), and instrumental variables models. The issue of endogeneity is a significant concern in examining aid effectiveness, which has

been acknowledged by prominent scholars like Burnside & Dollar (2000), Hansen & Trap (2001), and Collier & Dollar (2002). Therefore, it is doubtful that previous studies adequately addressed endogeneity issues using the estimation mentioned above methods. On the other side, some studies, such as d'Aiglepierre & Wager (2013, 2010) and Boone (1996), have employed the instrumental variable (IV) method to address the endogeneity issues in the aid-education relationship. However, it is a well-known fact that finding a suitable IV is challenging, and if the IV is weak or invalid, it can lead to misleading regression results (Herzer, 2019; Clemens et al., 2012).

When it comes to education-specific aid, earlier studies cannot effectively assess education-specific aid's impact on education outcomes. For instance, many of these studies used overall aid as the primary independent variable, including Ziesemer (2011), Wolf (2007), Fielding et al. (2006), Bhaumik (2005), Gross (2003), and Boone (1996). This approach introduces a bias in the results since specific sector aid should provide more accurate insights into its impact on a particular sector rather than considering aid in its entirety.

Similarly, most of the studies have taken committed aid, as seen in studies conducted by d'Aiglepierre & Wagner (2013), Dreher et al. (2008), Michaelowa & Weber (2007a), and Michaelowa (2004). However, it is unclear whether the committed aid entirely translates into actual flows, as committed aid may not always be fully disbursed, leading to potential bias in findings. Furthermore, few studies examined education aid from a gender perspective, including Eskander & Mukherjee (2017) and d'Aiglepierre & Wagner (2013). But the study area is very narrow; both studies only focused on primary education. Likewise, Eskander & Mukherjee's (2017) study have not taken sufficient control variable that covers the structural characteristics of the education system, such as the student-teacher ratio, the government's expenditure on the education sector, and so on.

Correspondingly, some studies, for example, Michaelowa (2004) and Eskander & Mukherjee (2017), have taken gross primary education enrolment as one main dependent variable. Still, most academics strongly consider the net primary education enrolment rate shows an accurate enrolment position at the primary level. The earlier studies have not comprehensively compared the effect of specific education aid on females and males on particular education outcomes, i.e., primary, secondary, and tertiary levels. To address these shortcomings, this study examines the effects of specific education aid on both males and females at all levels of education, including primary, secondary, and tertiary. The study uses sound-dependent and explanatory variables, focusing on a broad analysis area, and applies the system GMM method (one-step GMM and two-step GMM) to control for endogeneity, omitted variables bias, unobserved panel heterogeneity, and data measurement errors.

This study significantly contributes to the existing literature on education aid effectiveness in multiple ways. Firstly, it adopts a gender perspective, providing valuable insights into how education aid impacts different genders (female and male). Secondly, within a single study, it stands out as a comprehensive study examining the effectiveness of primary, secondary, and tertiary education aid on females and males. This approach offers the reader a holistic understanding of the various scenarios concerning the effects of education aid at multiple levels of schooling. Additionally, the study focuses specifically on SDG4, with particular attention. The study applies sound methodologies, including one- and two-step system GMM, to ensure robust analysis.

Furthermore, including a wide range of education, economic, and governance structural characteristics variables enhances the study's comprehensive framework. Lastly, the research is based on a new set of recent data, ensuring the relevance and timeliness of the findings. Overall, this study significantly contributes to the literature by providing insights into the effectiveness of education aid while considering gender perspectives, specific SDGs, robust methodologies, and comprehensive variables within the context of up-to-date data.

3. Data, Variables Selection, Methodology, and Estimation Strategy

3.1 Data and Variables Selection

This study employs a dynamic panel analysis to investigate the impact of education aid on various levels of education concerning gender point of view. The study utilizes 19 years of panel data ranging from 2002 to 2020. It focuses on a sample of 50 low-income and lower-middle-income counties from sub-Saharan Africa (24 countries), Asia (16 countries), Latin America and the Caribbean (4 countries), and the Middle East and North Africa (6 countries). The sample countries were selected based on three criteria: the Development Assistance Committee (DAC) aid recipient member country, the country that belongs to low-income and lower-middle-income countries as per the World Bank classification, and most importantly, the availability of data.

The Primary School Completion Rate of females and males (PCRF & PCRM, in %); Secondary School Net Enrolment Rate of females and males (Serfner & Sermner, in %); and Tertiary Gross Enrolment Rate of females and males (Terfgro & Termgro, in %) are considered as the main dependent variables for primary level,

secondary level, and tertiary level, respectively. PCR is carried out because it represents the outcome of primary schooling, and the secondary school net enrolment rate is considered the intermediate output of the PCR. Similarly, the tertiary gross enrolment rate indicates the higher education scenario in each nation. Hence, these three variables are the primary dependent variables for a particular level. Earlier studies, such as Michaelowa & Weber (2007a), have taken these variables as the dependent variable.

Primary School Education Aid per capita (eAidPriP), Secondary School Education Aid Per Capita (eAidSecP), and Tertiary Education Aid Per Capita (eAidTerP) are taken as the main explanatory variables for all three levels, respectively. Aid data are available either in terms of commitments or in terms of disbursements. The commitments may only partially translate into actual flows. It means commitments may not be fully disbursed and gives biasedness on finding; thus, this study has decided to take the gross disbursement of education aid. The aid is taken per capita of the recipient country's population because it is believed that the larger countries need more resources to enhance education coverage than small countries (Birchler & Michaelowa, 2016), and the study expects that it has a positive relationship with primary completion, net secondary enrolment, and tertiary gross enrolment rate. Aid variables are taken as a logarithm term for normalizing the data.

The study includes other control variables for each level, such as the Lagged Primary School Female and Male Completion Rate, Net Primary Enrolment Rate (NER, in %), Primary Pupil-Teacher Ratio (PTR), and Primary Education Female Teachers (PeduTeaF, in %) for the primary school level; lagged Secondary Female and Male Net Enrolment Rate, Primary Completion Rate, Secondary Pupil-Teacher Ratio (PTRsec), and Secondary Education Female Teacher (SecEduTeaF, in %) for the secondary level; and lagged Tertiary Female and Male Gross Enrolment Rate and Tertiary Pupil-Teacher Ratio (PTRter) for the tertiary level. These variables represent the structural characteristics of the education system. Maintaining an optimal Pupil-Teacher Ratio (PTR) helps increase education outcomes because it gives a conducive environment in the classroom and the education arrangement. On the other hand, once PTR increases, the education outcomes will decrease because the crowded environment of classrooms decreases the quality of education and the monitoring and supervision capacity of teachers in class. Thus, pupils start to drop out or leave school before completion. Earlier studies such as Michaelowa (2004), Michaelowa & Weber (2007a & 2007b), Dreher et al. (2008), d'Aiglepierre & Wagner (2013), and Birchler & Michaelowa (2016) also take PTR as a control variable in their studies. Female Teachers as a percentage of total teachers of a particular level is taken as a control variable because female teachers may advocate more in society regarding the importance of education and the future benefits of literacy. In addition, female teachers provide a conducive classroom environment and facilitate other educational activities (Card et al., 2022; Kirk, 2006; Wahsheh et al., 2015).

The study has included several common control variables for all three levels, including GDP per capita (GDPcap, constant 2015 US$) as a logarithmic term for data normalization, Government expenditure on education (EDUCEXP, in % of GDP), Inflation (INF, in annual%), Control of Corruption (CC), and Government Effectiveness (GE). These variables signify the economic and good governance dimensions of the selected countries. In the late 1990s, the debate on aid effectiveness started sharply due to the study of the World Bank on aid effectiveness, which concluded that aid work in a sound good governance environment (World Bank, 1998). Later, several empirical investigations have focused on this area. For example, the study by Burnside & Dollar (2000) emphasized it and concluded that the positive effect of aid on growth could be significant wherever good governance is prevailing. One of the major arguments behind this logic of the researchers is the fungibility of aid. The recipient countries suffering from bad governance may have diversified the assistance to the unproductive sector, such as the purchase of arms or increasing consumption, which creates barriers to aid ineffectiveness for economic development (Michaelowa & Weber, 2007b). Based on this theoretical and empirical assumption, earlier studies on aid-education effectiveness have taken the economic and good governance factor as a control variable (Michaelowa & Weber, 2007a, 2007b; Birchler & Michaelowa, 2016). This study also considers good governance a highly sensitive control variable for aid effectiveness. The World Bank has published the six broad dimensions of governance of over 200 countries since 1996 (WGI, World Bank, 2023). The study has decided to take two major governance indicators out of six: Government Effectiveness (GE) and Control of Corruption (CC), as good governance control variables. Additionally, other economic control variables were included because they are linked to the size of the economy and depend on the country's economic activities.

The data are collected from the World Development Indicators (World Bank/WDI, 2022) of the World Bank; The World Bank's Worldwide Governance Indicators (WGI, World Bank, 2023); and the Creditor Reporting System (CRS) of the Organization for Economic Co-operation and Development/Development Assistance Committee (OECD/CRS, 2022). The summary of variables is given in Appendix A.

3.2 Methodology and Estimation Strategy

The study employed the System GMM with One-Step and Two-Step System GMM. The endogeneity issue is the main problem behind examining the aid effectiveness. Thus, earlier eminence scholars; such as Burnside & Doller (2000), Hensen & Trap (2001), and Collier & Dollar (2002); have also considered this fact in their studies. It is wieldy accepted that GMM controls the problem of endogeneity, omitted variables bias, unobserved panel heterogeneity, and data measurement errors; thus, the study has decided to use GMM. In addition, the earlier studies regarding education aid effectiveness, such as Birchler & Michaelowa (2016), Michaelowa & Weber (2007b), Dreher et al. (2008), and Michaelowa & Weber (2007a) have utilized GMM to examine the effect. The System GMM addresses correct endogeneity by introducing more instruments and transforming the instruments to make them uncorrelated (exogenous) with fixed effects, which was initially introduced by Arellano & Bover (1995) and Blundell & Bond (1998), respectively. To ensure the robustness of the findings, this study employed both the one-step and two-step system GMM. The result of GMM estimation is diagnostics by the three methods. Hence, the study has done three diagnostic tests. The first one is Hansen (1982) *J* test and Sargan (1958) test of over-identifying restrictions; the second one is a test for autocorrelation/serial correction of the error term, mainly focusing AR(2), and the third test, the number of instruments should be less or equal to the number of groups (i.e., $Z \leq N$).

The basic estimation equation is as follows:

$$\mathbf{Y_{it} = \beta_0 + \beta_1 Y_{it-1} + \beta_2 X'_{it} + \beta_3 Z'_{it} + d_t + \varepsilon_{it}} \quad (1)$$

Where Z´ represents the control variables, X´ represents the explanatory variables, d_t denotes the year dummy, and ε_{it} indicates the error term. Whereas the subscript $_i$ represents each country in year $_t$.

Based on the above estimation equation, the detailed final model for each level is given below.

1) For Primary Female and Male Completion Rate

$PCRF_{it}$ or $PCRM_{it} = \beta_0 + \beta_1 PCRF_{it-1}$ or $\beta_1 PCRM_{it-1} + \beta_2 lneAidPriP_{it} + \beta_3 lneAidPriP_{it-1} + \beta_4 lneAidPriP_{it-2} + \beta_5 NER_{it} + \beta_6 NERlag_{it} + \beta_7 PTR_{it} + \beta_8 PTR_{it-1} + \beta_9 PTR_{it-2} + \beta_{10} PeduTeaF_{it} + \beta_{11} lnGDPcap_{it-1} + \beta_{12} CC_{it-1} + \beta_{13} GE_{it-1} + d_t + \mu_{it}$

2) For Secondary School Female and Male Net Enrolment Rate

$Serfner_{it}$ or $Sermner_{it} = \beta_0 + \beta_1 Serfner_{it-1}$ or $Sermner_{it-1} + \beta_2 lneAidSecP_{it} + \beta_3 lneAidSecP_{it-1} + \beta_4 lneAidSecP_{it-2} + \beta_5 PCR_{it-1} + \beta_6 PTRsec_{it} + \beta_7 SecEduTeaF_{it} + \beta_8 INF_{it} + \beta_9 lnGDPCaplag_{it} + \beta_{10} CC_{it-1} + \beta_{11} GE_{it-1} + d_t + \mu_{it}$

3) For Tertiary Female and Male Gross Enrolment Rate

$Terfgro_{it}$ or $Termgro_{it} = \beta_0 + \beta_1 Terfgro_{it-1}$ or $Termgro_{it-1} + \beta_2 lneAidTerP_{it} + \beta_3 lneAidTerP_{it-1} + \beta_4 lneAidTerP_{it-2} + \beta_5 PTRter_{it} + \beta_6 EDUCEXP_{it} + \beta_7 lnGDPCaplag_{it-1} + \beta_8 CC_{it-1} + \beta_9 GE_{it-1} + d_t + \mu_{it}$

4. Estimation Results and Discussion

4.1 Result

The study developed and analyzed six models for the primary level and five models each for the secondary and tertiary levels to assess the robustness of the findings. Model six is the primary model for the primary level, while model five is the primary model for both the secondary and tertiary levels. The study used Akaike Information Criterion (AIC) to determine the lag structure of the model. The study investigates the effects of education aid with a two-year lag at all levels. Given that education aid is multifaceted and encompasses diverse aspects such as education policy, administrative management, training, research, and infrastructure development, it takes considerable time to realize its impact on education outcomes.

Furthermore, the study examines the effects of the PTR on educational outcomes in developing countries over a two-year lagged period. This analysis aims to determine the duration of the impact of the pupil-teacher balance on education outcomes. Additionally, the study utilizes lagged NER, as primary education is adversely affected by the issue of pupils' repetition, and the lagged analysis captures this phenomenon. The study also incorporates the lagged GDP per capita to examine its effect on a country level since it takes at least one year to manifest its impact.

Similarly, the lagged CC is included because the previous year's corruption scenario significantly affects the current year's results. The study employs lagged GE because government policies and strategies require at least one year to produce results. Lastly, the study has utilized lagged PCR to investigate how the PCR of the previous academic year contributes to improving the secondary net enrolment rate for the current year. The descriptive statistics of variables are presented in Appendix B.

4.1.1 The Effect of Education Aid on Female and Male Education

1) Effect on the Primary Female and Male Education

The result of both estimations (Tables 1–2) showed that the effect of second-period lagged primary school education aid (lneAidPriPlag2) on the primary school female and male completion rate (PCRF & PCRM) is positive and significant in all models. One percent increase in primary school education aid (eAidPriP) is associated with a 0.975% and 0.727% increase in primary school female completion rate on the final model at the five percent level. However, the coefficient of the one-step GMM is higher than the two-step GMM. Correspondingly, a one percent increase in primary school education aid (eAidPriP) is associated with a 0.988% and 0.952% increase in primary school male completion rate on the final model at the ten percent level. Nevertheless, the coefficient of the one-step GMM is higher than the two-step GMM. But both estimations showed that primary school education aid and primary completion rate of females and males are positively associated. The lagged Primary School Female and Male Completion Rate (PCRF and PCRM) is statistically significant. The net enrolment rate (NER) is positive and statistically significant in all models at a one percent level on female analysis.

Conversely, the Net enrolment rate (NER) has shown statistically significant results under One-Step GMM but not statistically significant under Two-Step GMM, raising questions about its impact on male completion rates. The PTR is negatively statistically significant in all models in both analyses. The AR (2) and Hansen Statistic result indicates no second-order serial correction and no problem with over-identifying restrictions, respectively. And the number of instruments is less than the number of groups. Based on both analyses under both estimations, the study concluded that primary education aid efficiently boosts the primary female and male completion rates in developing countries.

Table 1. The effect of education aid on primary school female and male completion rate (PCRF & PCRM)

Dependent Variable: Primary School Female and Male Completion Rate (PCRF & PCRM)

VARIABLES	**Sym. One-step GMM (Model 1) (PCRF)**	**Sym. One-step GMM (Model 2) (PCRF)**	**Sym. One-step GMM (Model 3) (PCRF)**	**Sym. One-step GMM (Model 4) (PCRF)**	**Sym. One-step GMM (Model 5) (PCRF)**	**Sym. One-step GMM (Model 6) (PCRF)**	**Sym. One-step GMM (Model 1) (PCRM)**	**Sym. One-step GMM (Model 2) (PCRM)**	**Sym. One-step GMM (Model 3) (PCRM)**	**Sym. One-step GMM (Model 4) (PCRM)**	**Sym. One-step GMM (Model 5) (PCRM)**	**Sym. One-step GMM (Model 6) (PCRM)**
PCRFlag	0.348*	0.332	0.460**	0.338*	0.336*	0.335*	----	----	----	----	----	----
	(0.174)	(0.206)	(0.213)	(0.192)	(0.174)	(0.190)						
PCRMlag	----	----	----	----	----	----	0.211	0.210*	0.277**	0.209	0.205	0.208*
							(0.142)	(0.117)	(0.121)	(0.151)	(0.122)	(0.122)
lneAidPriP	0.898	1.475	1.357	1.003	1.084	1.092	2.524	2.170	2.315	2.558	2.445	2.475
	(1.902)	(2.149)	(2.449)	(1.921)	(2.081)	(2.169)	(3.426)	(3.268)	(2.879)	(3.506)	(3.618)	(3.713)
lneAidPriPlag1	-0.701	-0.991	-0.905	-0.760	-0.807	-0.810	-2.342	-2.213	-2.148	-2.347	-2.357	-2.330
	(1.515)	(1.729)	(1.761)	(1.482)	(1.630)	(1.665)	(2.613)	(2.458)	(2.117)	(2.621)	(2.676)	(2.672)
lneAidPriPlag2	**0.943****	**1.022****	**0.791***	**0.973***	**0.971****	**0.975****	**0.991***	**0.952***	**0.961***	**1.010***	**0.968***	**0.988***
	(0.402)	**(0.390)**	**(0.523)**	**(0.509)**	**(0.382)**	**(0.406)**	**(0.535)**	**(0.565)**	**(0.505)**	**(0.565)**	**(0.537)**	**(0.541)**
NER	0.991***	1.113***	1.049***	1.005***	1.025***	1.029***	0.817**	0.731**	0.698*	0.827**	0.769**	0.807**
	(0.281)	(0.314)	(0.371)	(0.308)	(0.269)	(0.318)	(0.351)	(0.332)	(0.356)	(0.385)	(0.331)	(0.390)
NERlag1	-0.304	-0.339	-0.430**	-0.300	-0.309	-0.309	-0.0717	-0.0426	-0.0533	-0.0726	-0.0567	-0.0670
	(0.190)	(0.203)	(0.199)	(0.193)	(0.194)	(0.195)	(0.245)	(0.244)	(0.232)	(0.245)	(0.248)	(0.253)
PTR	-0.975***	-0.857**	-0.692*	-0.974***	-0.960***	-0.962***	-1.271**	-1.425***	-1.268**	-1.247**	-1.328**	-1.298**
	(0.342)	(0.374)	(0.349)	(0.346)	(0.337)	(0.347)	(0.510)	(0.495)	(0.515)	(0.544)	(0.515)	(0.525)
PTRlag1	0.352	0.341	0.589	0.329	0.339	0.339	0.174	0.172	0.416	0.157	0.142	0.160
	(0.381)	(0.440)	(0.439)	(0.388)	(0.401)	(0.404)	(0.432)	(0.354)	(0.431)	(0.477)	(0.360)	(0.363)
PTRlag2	0.074	-0.093	-0.407	0.084	0.051	0.050	0.629	0.824	0.338	0.617	0.754	0.679
	(0.521)	(0.603)	(0.597)	(0.520)	(0.514)	(0.513)	(0.753)	(0.629)	(0.688)	(0.758)	(0.620)	(0.665)
PeduTeaF	0.030	-0.086	-0.056	0.021	----	-0.004	-0.0662	0.0334	-0.00530	-0.0740	----	-0.0509
	(0.108)	(0.122)	(0.190)	(0.128)		(0.109)	(0.152)	(0.142)	(0.183)	(0.176)		(0.204)
lnGDPCaplag1	-0.295	0.293	0.150	-0.201	-0.155	-0.133	3.772	3.282	1.810	3.854	3.614	3.780
	(2.022)	(2.210)	(2.520)	(2.141)	(2.001)	(2.200)	(2.416)	(2.084)	(2.291)	(2.660)	(2.183)	(2.368)
CClag	2.197**	----	----	2.269**	1.615	1.579	-1.767	----	----	-1.741	-1.043	-1.493
	(1.062)			(1.123)	(1.732)	(1.953)	(1.205)			(1.165)	(2.414)	(3.537)
GElag	----	2.112	----	----	0.699	0.734	----	-1.580	----	----	-0.689	-0.312
		(1.376)			(2.024)	(2.293)		(1.259)			(2.776)	(3.610)
EDUCEXP	----	----	0.646	-0.146	----	----	----	----	-0.513	-0.132	----	----
			(1.190)	(1.071)					(1.067)	(1.137)		
INF	----	----	0.058	----	----	----	----	----	0.010	----	----	----
			(0.091)						(0.122)			
Observations	750	750	750	750	750	750	750	750	750	750	750	750
Number of Group	50	50	50	50	50	50	50	50	50	50	50	50
Number of Instruments	45	45	45	45	45	45	45	45	45	45	45	45
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AR (1)	0.001	0.002	0.004	0.005	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
AR (2)	0.281	0.159	0.112	0.277	0.255	0.255	0.684	0.405	0.405	0.709	0.473	0.585
Hansen Statistic	0.604	0.723	0.662	0.535	0.638	0.582	0.435	0.437	0.300	0.445	0.486	0.504

Note. Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1.

Source: Author's own computation using system GMM.

Table 2. The effect of education aid on primary school female and male completion rate (PCRF & PCRM)

Dependent Variable: Primary School Female and Male Completion Rate (PCRF & PCRM)

VARIABLES	Sym. Two-step GMM (Model 1)	Sym. Two-step GMM (Model 2)	Sym. Two-step GMM (Model 3)	Sym. Two-step GMM (Model 4)	Sym. Two-step GMM (Model 5)	Sym. Two-step GMM (Model 6)	Sym. Two-step GMM (Model 1)	Sym. Two-step GMM (Model 2)	Sym. Two-step GMM (Model 3)	Sym. Two-step GMM (Model 4)	Sym. Two-step GMM (Model 5)	Sym. Two-step GMM (Model 6)
PCRFlag	0.421**	0.442**	0.529***	0.428**	0.409**	0.428**	----	----	----	----	----	----
	(0.162)	(0.177)	(0.159)	(0.162)	(0.179)	(0.176)						
PCRMlag	----	----	----	----	----	----	0.314***	0.342***	0.320**	0.310**	0.319***	0.306**
							(0.117)	(0.115)	(0.143)	(0.137)	(0.111)	(0.131)
lneAidPriP	0.351	0.866	0.251	0.637	0.791	0.506	-0.608	-0.948	-0.351	-0.480	-0.397	-0.345
	(1.561)	(2.028)	(2.021)	(1.858)	(1.947)	(1.942)	(2.482)	(2.631)	(2.981)	(2.671)	(2.579)	(2.523)
lneAidPriPlag1	-0.225	-0.622	-0.0802	-0.528	-0.551	-0.365	0.229	0.371	-0.000619	0.174	0.0610	0.0839
	(1.351)	(1.797)	(1.838)	(1.616)	(1.652)	(1.643)	(2.049)	(2.096)	(2.301)	(2.122)	(2.036)	(2.009)
lneAidPriPlag2	**0.750****	**0.713****	**0.615***	**0.722***	**0.768****	**0.727****	**0.925***	**0.859***	**1.063***	**1.071***	**1.004****	**0.952***
	(0.305)	**(0.299)**	**(0.372)**	**(0.399)**	**(0.310)**	**(0.303)**	**(0.476)**	**(0.469)**	**(0.586)**	**(0.559)**	**(0.375)**	**(0.509)**
NER	1.018***	1.039***	1.013***	1.021***	1.064***	1.012***	0.639	0.567	0.645	0.682	0.666*	0.671
	(0.286)	(0.250)	(0.254)	(0.263)	(0.291)	(0.287)	(0.417)	(0.431)	(0.461)	(0.443)	(0.393)	(0.425)
NERlag1	-0.417	-0.452*	-0.514*	-0.428	-0.428	-0.427	-0.111	-0.117	-0.136	-0.131	-0.135	-0.118
	(0.265)	(0.254)	(0.289)	(0.263)	(0.258)	(0.263)	(0.304)	(0.307)	(0.304)	(0.301)	(0.301)	(0.295)
PTR	-0.381***	-0.381***	-0.347**	-0.366***	-0.402***	-0.388***	-0.996**	-1.139**	-1.020*	-0.924*	-0.986*	-0.933*
	(0.140)	(0.123)	(0.142)	(0.123)	(0.122)	(0.125)	(0.488)	(0.461)	(0.539)	(0.526)	(0.512)	(0.539)
PTRlag1	0.132	0.148	0.307	0.125	0.110	0.126	0.518*	0.612**	0.496	0.447	0.500	0.473
	(0.392)	(0.409)	(0.383)	(0.422)	(0.420)	(0.417)	(0.306)	(0.287)	(0.395)	(0.371)	(0.311)	(0.360)
PTRlag2	-0.135	-0.165	-0.344	-0.122	-0.129	-0.123	0.0193	0.0975	0.0459	-0.00983	0.00784	-0.0152
	(0.518)	(0.497)	(0.509)	(0.539)	(0.511)	(0.518)	(0.172)	(0.168)	(0.218)	(0.206)	(0.166)	(0.228)
PeduTeaF	0.041	0.023	0.016	0.051	----	0.044	0.0182	0.109	0.0484	-0.0108	----	-0.0162
	(0.087)	(0.093)	(0.112)	(0.091)		(0.087)	(0.158)	(0.158)	(0.263)	(0.200)		(0.221)
lnGDPCaplag1	0.668	0.727	-0.0983	0.838	1.052	0.681	2.633	1.595	2.066	3.070	2.672	2.941
	(2.431)	(2.349)	(2.210)	(2.521)	(2.390)	(2.517)	(2.040)	(1.651)	(2.795)	(2.271)	(1.685)	(2.364)
CClag	0.809	----	----	0.824	0.434	0.798	-1.551	---	----	-1.469	-2.325	-2.500
	(1.095)			(1.225)	(1.959)	(1.855)	(1.355)			(1.341)	(2.148)	(3.253)
GElag	----	0.776	----	----	0.497	0.0735	----	-1.139	----	----	0.668	0.970
		(1.474)			(2.313)	(2.201)		(1.176)			(1.926)	(3.008)
EDUCEXP	----	----	0.153	-0.0003	----	----	----	----	-0.630	-0.485	----	----
			(0.911)	(0.952)					(1.218)	(0.936)		
INF	----	----	0.009	----	----	----	----	----	0.026	----	----	----
			(0.073)						(0.098)			
Observations	750	750	750	750	750	750	750	750	750	750	750	750
Number of Group	50	50	50	50	50	50	50	50	50	50	50	50
Number of Instruments	46	46	46	46	46	46	45	45	45	45	45	45
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AR (1)	0.007	0.000	0.001	0.005	0.007	0.007	0.001	0.002	0.004	0.005	0.001	0.001
AR (2)	0.073	0.088	0.056	0.078	0.096	0.086	0.281	0.159	0.112	0.277	0.255	0.255
Hansen Statistic	0.299	0.398	0.417	0.279	0.330	0.270	0.604	0.723	0.662	0.535	0.638	0.582

Note. Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1.

Source: Author's own computation using system GMM.

2) Effect on Secondary Female and Male Education

The results (Tables 3–4) showed a positive relationship between Secondary School Education Aid (eAidSecP) and Secondary School Female and Male Net Enrolment Rates (Serfner & Sermner). However, males benefited one year earlier than females. The effect of second-period lagged Secondary School Education Aid (lneAidSecPlag2) on the Secondary School Female Net Enrolment Rate is positive and significant in all models. A one percent increase in Secondary School Education Aid is associated with a 0.736% and 0.793% increase in Secondary School female Net Enrolment Rate on the primary model at the ten and five percentage levels on both methods, respectively. Similarly, the effect of first-period lagged Secondary School Education Aid (lneAidSecPlag1) on the Secondary School Male Net Enrolment Rate is positive and significant in all models. A one percent increase in Secondary School Education Aid is associated with a 0.955% and 0.637% increase in

Secondary School Male Net Enrolment Rate on the primary model at the five-percentage level on both estimations. The lagged Secondary School Female and Male Net Enrolment Rate is partially statistically significant under one step.

In contrast, it is statistically significant in all two-step models on both genders. The lagged Primary Completion Rate (PCRlag) is statistically significant in all models at both methods on both categories. It shows that PCR helps to increase the secondary net enrolment rate of females and males. The Secondary PTR (PTRsec) is significantly negative in all models on females and males analysis. The impact of Secondary Education Female Teachers (SecEduTeaF) showed mixed results. It is statistically significant on the females' side on both estimation methods. The finding conveys that female teachers provide a conducive classroom environment and facilitate other educational activities. The lagged GDP per capita is positive and statistically significant in both genders on both methods. It gives the message that the economic position of the recipient is a matter of aid effectiveness. The result of AR (2) indicates no second-order serial correction. Similarly, the result of the Hansen Statistic showed no problem with over-identifying restrictions. Based on the finding, the study concluded that secondary education aid efficiently helps to enhance secondary female and male education in developing countries.

Table 3. The effect of education aid on secondary school female and male net enrolment rate (Serfnet & Sermnet)

Dependent Variable: Secondary School Female and Male Net Enrolment Rate (Serfnet & Sermnet)

VARIABLES	**Sym. One-step GMM (Model 1) (Serfnet)**	**Sym. One-step GMM (Model 2) (Serfnet)**	**Sym. One-step GMM (Model 3) (Serfnet)**	**Sym. One-step GMM (Model 4) (Serfnet)**	**Sym. One-step GMM (Model 5) (Serfnet)**	**Sym. One-step GMM (Model 1) (Sermnet)**	**Sym. One-step GMM (Model 2) (Sermnet)**	**Sym. One-step GMM (Model 3) (Sermnet)**	**Sym. One-step GMM (Model 4) (Sermnet)**	**Sym. One-step GMM (Model 5) (Sermnet)**
Serfnetlag	0.190***	0.078*	0.057	0.056	0.056	----	----	----	----	----
	(0.045)	(0.041)	(0.041)	(0.041)	(0.041)					
Sermnetlag	----	----	----	----	----	0.406***	0.243***	0.196**	0.084	0.084
						(0.069)	(0.088)	(0.079)	(0.068)	(0.067)
lneAidSecP	-0.219	-0.065	-0.016	-0.023	-0.026	-0.895*	-0.869	-0.816*	-0.669	-0.685
	(0.767)	(0.526)	(0.544)	(0.548)	(0.529)	(0.487)	(0.525)	(0.482)	(0.511)	(0.530)
lneAidSecPlag1	-0.634	-0.341	-0.411	-0.418	-0.417	**1.072****	**1.189****	**1.032****	**0.957****	**0.955****
	(0.574)	(0.566)	(0.519)	(0.525)	(0.525)	**(0.447)**	**(0.525)**	**(0.455)**	**(0.464)**	**(0.466)**
lneAidSecPlag2	**0.690****	**0.738***	**0.743****	**0.736***	**0.736***	-0.529	-0.478	-0.383	0.149	0.150
	(0.289)	**(0.395)**	**(0.366)**	**(0.369)**	**(0.368)**	(0.456)	(0.566)	(0.513)	(0.499)	(0.500)
PCRlag	0.372***	0.144**	0.163**	0.159**	0.159**	0.362***	0.297***	0.323***	0.463***	0.465***
	(0.052)	(0.063)	(0.0552)	(0.063)	(0.064)	(0.058)	(0.089)	(0.082)	(0.085)	(0.083)
PTRsec	-1.138***	-0.717***	-0.840***	-0.828***	-0.827***	-0.492***	-0.239	-0.363**	-0.654***	-0.654***
	(0.097)	(0.121)	(0.116)	(0.141)	(0.139)	(0.075)	(0.149)	(0.152)	(0.145)	(0.146)
SecEduTeaF	------	0.669***	0.452***	0.472***	0.473***	------	0.405**	0.189	-0.216	-0.216
		(0.135)	(0.107)	(0.162)	(0.158)		(0.178)	(0.193)	(0.197)	(0.197)
INF	------	0.122	0.287	0.289	0.288	------	0.157	0.347*	0.343	0.338
		(0.234)	(0.223)	(0.223)	(0.215)		(0.222)	(0.184)	(0.211)	(0.208)
lnGDPCaplag1	------	------	3.849**	3.626*	3.632*	------	------	4.314*	10.31***	10.370***
			(1.735)	(2.029)	(2.061)			(2.371)	(2.623)	(2.720)
CClag	------	-----	-----	0.325	0.400	------	-----	-----	-7.865***	7.482**
				(1.827)	(2.560)				(1.936)	(3.230)
GElag	------	-----	-----	-----	-0.099	------	-----	-----	-----	-0.550
					(3.057)					(3.294)
Observations	800	800	800	800	800	750	750	750	750	750
Number of Group	50	50	50	50	50	50	50	50	50	50
Number of Instruments	49	49	49	49	49	49	49	49	49	49
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AR (1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR (2)	0.656	0.382	0.192	0.198	0.198	0.034	0.022	0.068	0.520	0.508
Hansen Statistic	0.140	0.161	0.211	0.168	0.134	0.191	0.159	0.157	0.363	0.354

Note. Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1.

Source: Author's own computation using system GMM.

Table 4. The effect of education aid on secondary school female and male net enrolment rate (Serfnet & Sermnet)

Dependent Variable: Secondary School Female and Male Net Enrolment Rate (Serfnet & Sermnet)

VARIABLES	Sym. Two-step GMM (Model 1) (Serfnet)	Sym. Two-step GMM (Model 2) (Serfnet)	Sym. Two-step GMM (Model 3) (Serfnet)	Sym. Two-step GMM (Model 4) (Serfnet)	Sym. Two-step GMM (Model 5) (Serfnet)	Sym. Two-step GMM (Model 1) (Sermnet)	Sym. Two-step GMM (Model 2) (Sermnet)	Sym. Two-step GMM (Model 3) (Sermnet)	Sym. Two-step GMM (Model 4) (Sermnet)	Sym. Two-step GMM (Model 5) (Sermnet)
Serfnetlag	0.169***	0.075***	0.060**	0.061***	0.060**	----	----	----	----	----
	(0.026)	(0.027)	(0.028)	(0.028)	(0.029)					
Sermnetlag	----	----	----	----	----	0.399***	0.257***	0.202***	0.110***	0.109***
						(0.029)	(0.039)	(0.039)	(0.035)	(0.035)
lneAidSecP	-0.953**	-0.142	-0.299	-0.249	-0.255	-1.006***	-0.944***	-1.008***	-0.521	-0.528
	(0.421)	(0.355)	(0.366)	(0.381)	(0.388)	(0.267)	(0.285)	(0.267)	(0.364)	(0.364)
lneAidSecPlag1	-0.045	-0.591*	-0.370	-0.367	-0.361	**0.724****	**0.758*****	**0.663****	**0.644****	**0.637****
	(0.342)	(0.345)	(0.315)	(0.334)	(0.349)	**(0.274)**	**(0.259)**	**(0.269)**	**(0.299)**	**(0.299)**
lneAidSecPlag2	**0.642*****	**0.859*****	**0.804*****	**0.799*****	**0.793****	-0.110	0.202	0.249	0.398*	0.357
	(0.158)	**(0.264)**	**(0.254)**	**(0.258)**	**(0.269)**	(0.190)	(0.86)	(0.193)	(0.234)	(0.239)
PCRlag	0.382***	0.158***	0.161***	0.163***	0.162***	0.364***	0.282***	0.302***	0.466***	0.467***
	(0.032)	(0.031)	(0.033)	(0.037)	(0.040)	(0.028)	(0.041)	(0.040)	(0.047)	(0.047)
PTRsec	-1.141***	-0.780***	-0.898***	-0.896***	-0.896***	-0.467***	-0.250***	-0.362***	-0.620***	-0.611***
	(0.061)	(0.071)	(0.063)	(0.069)	(0.070)	(0.040)	(0.070)	(0.077)	(0.078)	(0.079)
SecEduTeaF	-----	0.615***	0.439***	0.433***	0.434***	-----	0.405***	0.214**	-0.192*	-0.190
		(0.062)	(0.060)	(0.080)	(0.080)		(0.068)	(0.088)	(0.102)	(0.102)
INF	-----	0.089	0.240*	0.229*	0.227	-----	0.216	0.391***	0.226*	0.217
		(0.129)	(0.126)	(0.129)	(0.131)		(0.131)	(0.105)	(0.127)	(0.127)
lnGDPCaplag1	-----	-----	3.346*	3.360**	3.344**	-----	-----	4.738***	8.865***	9.560***
			(1.289)	(1.341)	(1.362)			(1.736)	(1.501)	(1.681)
CClag	-----	-----	-----	-0.191	-0.273	-----	-----	-----	-8.836***	-7.385***
				(1.170)	(1.911)				(1.219)	(2.011)
GElag	-----	-----	-----	-----	0.135	-----	-----	-----	-----	-1.895
					(2.367)					(2.093)
Observations	800	800	800	800	800	800	800	800	800	800
Number of Group	50	50	50	50	50	50	50	50	50	50
Number of Instruments	49	49	49	49	49	49	49	49	49	49
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AR (1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR (2)	0.683	0.399	0.194	0.205	0.204	0.032	0.023	0.061	0.358	0.363
Hansen Statistic	0.140	0.161	0.211	0.168	0.134	0.133	0.192	0.147	0.253	0.245

Note. Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1.

Source: Author's own computation using system GMM.

3) Effect on Tertiary Female and Male Education

Both estimation results (Tables 5–6) showed no statistically significant result between Tertiary Education Aid (eAidTerP) and Tertiary Female and Male Gross Enrolment Rates (Terfgro & Termgro) in sample countries. This raises questions regarding the effectiveness of tertiary education aid in enhancing education at the tertiary level for both female and male students. The lagged Tertiary School Female and Male Gross Enrolment Rate (Terfgrolag & Termgrolag) has shown mixed results. It is a statistically significant two-step method for both genders but not in the one-step method. Further, the Tertiary PTR (PTRter) was found to be significantly negative in the female analysis, and negatively associated with both methods of male analysis, only showing statistical significance in the two-step method. The lagged GDP per capita is positive and statistically significant in both genders at a one percent level in both methods. The control of corruption (CC) is negatively statistically significant in both female and male analysis methods. The finding of AR (2) and Hansen statistics of both methods gives a clear direction that there is no second-order serial correction and the problem of over-identifying restrictions in the calculation. In conclusion, based on both estimation methods, it is difficult to assert that Tertiary Education Aid effectively enhances the Tertiary Female and Male Gross Enrolment Rate in developing countries.

Table 5. The effect of education aid on tertiary school female & male gross enrolment rate (Terfgro & Termgro)

Dependent Variable: Tertiary School Female & Male Gross Enrolment Rate (Terfgro & Termgro)

VARIABLES	**Sym. One-step GMM (Model 1) (Terfgro)**	**Sym. One-step GMM (Model 2) (Terfgro)**	**Sym. One-step GMM (Model 3) (Terfgro)**	**Sym. One-step GMM (Model 4) (Terfgro)**	**Sym. One-step GMM (Model 5) (Terfgro)**	**Sym. One-step GMM (Model 1) (Termgro)**	**Sym. One-step GMM (Model 2) (Termgro)**	**Sym. One-step GMM (Model 3) (Termgro)**	**Sym. One-step GMM (Model 4) (Termgro)**	**Sym. One-step GMM (Model 5) (Termgro)**
Terfgrolag	0.656***	0.655***	0.276**	0.174	0.149	----	----	----	----	----
	(0.089)	(0.090)	(0.125)	(0.110)	(0.110)					
Termgrolag	----	----	----	----	----	0.582***	0.581***	0.321**	0.168	0.140
						(0.118)	(0.118)	(0.134)	(0.132)	(0.134)
lneAidTerP	0.910	0.909	1.325*	1.209	1.337	-0.060	-0.055	0.369	0.220	0.339
	(0.844)	(0.843)	(0.771)	(0.801)	(0.806)	(0.694)	(0.695)	(0.661)	(0.627)	(0.611)
lneAidTerPlag1	-0.425	-0.919	-0.152	-0.502	-0.518	0.721	0.733	1.002	0.454	0.419
	(0.920)	(0.731)	(0.933)	(0.786)	(0.775)	(0.715)	(0.714)	(0.691)	(0.541)	(0.525)
lneAidTerPlag2	0.0691	0.068	-0.665	0.171	0.175	-0.397	-0.396	-1.335	-0.237	-0.229
	(0.492)	(0.492)	(0.936)	(0.541)	(0.543)	(0.357)	(0.357)	(0.843)	(0.412)	(0.413)
PTRter	-0.134***	-0.131***	-0.099**	-0.097*	-0.106*	-0.091***	-0.094***	-0.064	-0.055	-0.061
	(0.036)	(0.037)	(0.048)	(0.050)	(0.053)	(0.033)	(0.035)	(0.041)	(0.045)	(0.046)
lnGDPCaplag	-----	-----	8.440***	10.25***	9.844***	-----	-----	5.276***	7.192***	6.816***
			(1.835)	(1.916)	(1.958)			(1.327)	(1.501)	(1.525)
EDUCEXP	-----	0.087	-0.060	0.097	0.219	-----	-0.108	-0.307	-0.179	-0.081
		(0.199)	(0.311)	(0.372)	(0.432)		(0.154)	(0.276)	(0.297)	(0.331)
CClag	-----	-----	-----	-4.187**	-6.733*	-----	-----	-----	-4.374***	-6.609**
				(1.997)	(3.476)				(1.445)	(2.551)
GElag	-----	-----	-----	-----	3.480	-----	-----	-----	-----	3.003
					(3.081)					(2.069)
Observations	800	800	750	800	800	800	800	750	800	800
Number of Group	50	50	50	50	50	50	50	50	50	50
Number of Instruments	49	49	49	49	49	49	49	49	49	49
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AR (1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR (2)	0.052	0.052	0.076	0.106	0.128	0.026	0.026	0.031	0.040	0.148
Hansen Statistic	0.129	0.106	0.421	0.270	0.278	0.225	0.200	0.430	0.204	0.220

Note. Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1.

Source: Author's own computation using system GMM.

Table 6. The effect of education aid on tertiary school female & male gross enrolment rate (Terfgro & Termgro)

Dependent Variable: Tertiary School Female & Male Gross Enrolment Rate (Terfgro & Termgro)

VARIABLES	Sym. Two-step GMM (Model 1) (Terfgro)	Sym. Two-step GMM (Model 2) (Terfgro)	Sym. Two-step GMM (Model 3) (Terfgro)	Sym. Two-step GMM (Model 4) (Terfgro)	Sym. Two-step GMM (Model 5) (Terfgro)	Sym. Two-step GMM (Model 1) (Termgro)	Sym. Two-step GMM (Model 2) (Termgro)	Sym. Two-step GMM (Model 3) (Termgro)	Sym. Two-step GMM (Model 4) (Termgro)	Sym. Two-step GMM (Model 5) (Termgro)
Terfgrolag	0.670***	0.674***	0.329***	0.205***	0.178***	----	----	----	----	----
	(0.033)	(0.033)	(0.037)	(0.029)	(0.030)					
Termgrolag	----	----	----	----	----	0.602***	0.604***	0.328***	0.213***	0.166***
						(0.035)	(0.035)	(0.039)	(0.039)	(0.041)
lneAidTerP	0.300	0.300	0.634*	0.671*	0.696*	-0.203	-0.196	0.386	-0.011	0.230
	(0.361)	(0.358)	(0.365)	(0.364)	(0.373)	(0.272)	(0.267)	(0.315)	(0.282)	(0.302)
lneAidTerPlag1	-0.116	-0.048	0.237	-0.388	-0.325	0.711***	0.748***	1.102***	0.280	0.230
lneAidTerPlag2	(0.285)	(0.317)	(0.305)	(0.329)	(0.362)	(0.221)	(0.229)	(0.223)	(0.210)	(0.231)
	0.032	-0.001	-0.887	0.208	0.166	-0.360**	-0.387**	-1.672***	-0.424	-0.380
	(0.221)	(0.228)	(0.412)	(0.252)	(0.247)	(0.155)	(0.165)	(0.376)	(0.234)	(0.255)
PTRter	-0.129***	-0.126***	-0.085***	-0.097***	-0.096***	-0.072***	-0.075***	-0.043**	-0.039*	-0.049**
	(0.016)	(0.016)	(0.020)	(0.023)	(0.023)	(0.015)	(0.015)	(0.021)	(0.020)	(0.023)
lnGDPCaplag	----	----	7.850***	9.841***	9.872***	----	----	4.386***	5.972***	6.433***
			(0.746)	(0.843)	(0.857)			(0.726)	(0.881)	(1.022)
EDUCEXP	----	0.138	0.212	0.121	0.155	----	-0.029	-0.068	-0.010	0.206
		(0.107)	(0.176)	(0.146)	(0.167)		(0.090)	(0.135)	(0.155)	(0.195)
CClag	----	----	----	-3.972***	-4.771***	----	----	----	-3.959***	-6.652***
				(1.030)	(1.712)				(0.819)	(1.370)
GElag	----	----	----	----	1.092	----	----	----	----	2.470*
					(1.937)					(1.429)
Observations	800	800	750	800	800	800	800	750	800	800
Number of Group	50	50	50	50	50	50	50	50	50	50
Number of Instruments	49	49	49	49	49	49	49	49	49	49
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AR (1)	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001
AR (2)	0.072	0.072	0.116	0.155	0.177	0.041	0.040	0.058	0.063	0.165
Hansen Statistic	0.129	0.106	0.421	0.270	0.278	0.225	0.200	0.430	0.204	0.381

Note. Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1.

Source: Author's own computation using system GMM.

4.1.2 Comparison between the Effect of Education Aid on Female and Male Education

1) Comparison Result of the Effect of Education Aid on Primary School Female and Male Completion Rate

On both estimation methods (Tables 1–2), the effect of second-period lagged primary school education aid (lneAidPriPlag2) on the primary school female and male completion rate (PCRF, PCRM) is positive and statistically significant in both categories. The result has shown that it is more effective in the male category. On the one-step GMM method, a one percent increase in primary school education aid (eAidPriP) is associated with a 0.988% increase in the primary school male completion rate (PCRM) on the final model. At the same time, it has increased by 0.975% in the female category. Under the two-step GMM method, a one percent increase in primary school education aid (eAidPriP) is associated with a 0.952% increase in the primary school male completion rate (PCRM) on the final model. It has increased by 0.727% in the female category. The lagged Primary School Female and Male Completion Rate (PCRF & PCRM) and Net Enrolment Rate (NER) are statistically significant in both categories. The PTR is negatively statistically significant in both categories. However, its effect is more in the male category compared to the female type.

2) Comparison Result of the Effect of Education Aid on Secondary School Female and Male Net Enrolment Rate

Both estimation methods (Tables 3–4) indicate a positive and statistically significant effect of Secondary School Education Aid (eAidSecP) on the Secondary School female and male Net Enrolment Rate (Serfnet & Sermnet). Under the one-step GMM method, the result has shown that it is more effective in the male category because a one percent increase in Secondary School Education Aid is associated with a 0.955% increase in the Secondary School Male Net Enrolment Rate on the final model. In comparison, it has increased by 0.736% in the female category. Similarly, on the two-step GMM method, a one percent change in Secondary School Education Aid is

associated with a 0.793% increase in the Secondary School Female Net Enrolment Rate on the final model. At the same time, it has increased by 0.637% in the male category. The coefficient of males is less compared then females under the two-step GMM method. Still, males benefited one year earlier than females from the Secondary School Education Aid in both methods. The lagged Primary School Female and Male Completion Rate (PCRF & PCRM) is statistically significant in both categories in both methods. Under the one-step GMM method, the result has shown that it is more effective in the male category because a one percent increase in male PCR is associated with a 0.465% increase in the secondary school male net enrolment rate on the final model. In comparison, it has increased by 0.159% in the female category.

Similarly, under the two-step GMM method, the result has shown that it is more effective in the male category because one percentage increase in the male PCR is associated with a 0.467 percent increase in the secondary school male net enrolment rate on the final model. At the same time, it has increased by 0.162 percent in the female category. It gives a clear message that most female pupils cannot join secondary school for various reasons after their primary school completion. The Secondary PTR is negatively statistically significant in both categories in both methods. However, its effect is more in the female category compared to the male category.

3) Comparison Result of the Effect of Education Aid on Tertiary School Female and Male Gross Enrolment Rate

From the comparison study (Tables 5–6), the effect of Tertiary Education Aid (eAidTerP) on the Tertiary Female and Male Gross Enrolment Rate (Termgro) is not statistically significant in all models on both analyses under both methods. However, it is statistically significant in models three, four, and five at a one percent level under the two-step GMM method on the female side but not statistically significant on the male side. The study assumes that if the results of both methods are statistically significant, the finding is robust; otherwise, there is some uncertainty about the finding. Based on this assumption, it is challenging to determine the effectiveness of tertiary education aid in improving tertiary education outcomes. The Tertiary PTR (PTRter) is negatively statistically significant in both categories. However, its effect is more in the female category compared to the male category. The lagged GDP per capita is positive and statistically significant in both analyses. It shows a clear picture that the recipient's economic size matters. The control of corruption (CC) is negatively statistically significant in both analyses. It means the governance factor is a matter of aid effectiveness. Overall, the empirical study of the tertiary level suggests a pessimistic scenario regarding the effectiveness of tertiary education aid in the developing world.

4.2 Discussion

The findings indicate a significant positive relationship between education aid and primary and secondary levels, while no significant association was found with the tertiary level. This aligns with a previous study by Michaelowa & Weber (2007a) that reached a similar conclusion. The significant and positive relationship between education aid and primary and secondary level may be due to the design of the aid program activities targeting overcoming barriers to those levels. Broadly say, the significant and positive relationship of education aid at primary and secondary levels shows that the earlier mechanisms, strategies, and efforts (such as focusing on the females for education, EFA, MDGs, and more empathizing with the low and lower-middle-nations) of DPs regarding mobilization of aid to the education sector were in the right direction. The evidence also supports this notion. For instance, approximately 105 million school-age children were out of school before the MDGs. However, by 2013, this number had decreased to 59 million. The most significant improvements were observed in South Asia and sub-Saharan Africa (UNESCO, 2015; Yoshida & Walt, 2018).

In contrast, the result shows that, on the secondary level, males benefited one year earlier than females from secondary education aid. There could be several reasons behind it. From the recipient point of view, for example: 1) The cultural and social norms in the developing world may have favored male education over female education, such as families prioritizing education for their sons compared to their daughters at the secondary level, 2) Gender disparities in education could have been exacerbated because of poverty, early marriage, and lack of access to educational facilities, and 3) Safety concerns, household responsibility, and the lack of access to transportation make lower enrolment rates among females in secondary education. The findings of previous studies, such as Bhagavatheeswaran et al. (2016), Leach et al. (2014), Chismaya et al. (2012), Nayar (2011), Roby et al. (2009), and Harber (2004), support these arguments. From the perspective of DPs, these findings suggest a potential gap in the design and implementation of secondary education aid, particularly regarding gender-sensitive approaches.

The comparison results of females and males at the primary level demonstrated that although primary education aid enhances both genders, the effect is more in males because the coefficient of males is higher than females on both methods; the finding is closely the same as the study of Eskander & Mukherjee's (2017). Several factors

could contribute to this pattern. Such as gender disparities in primary education could be one of the main reasons. Because in developing countries, girls face more barriers to accessing education than boys. It happened due to poverty, socio-culture attitudes toward girls' education, and safety concerns (harassment, violence, and sexual abuse). Previous studies' findings support these arguments and the pattern regarding barriers to girls' education. For example, Nayar (2011) shed light on the 'son preference' phenomenon, Bhagavatheeswaran et al. (2016) emphasized the significance of caste, and KHPT (2012c) focused on the issue of child marriage. Similarly, Harber (2004), Leach et al. (2014), and Chismaya et al. (2012) concentrated on the prevalent problems of harassment and rape. The study of Roby et al. (2009) found that the income level of the family, the distance from the school, girls' responsibilities for working at home, early marriage, and lack of political will are the main barriers to girls' education in Mozambique.

When considering tertiary education, numerous factors contribute to the ineffectiveness of tertiary education aid in the developing world. From the recipients' perspective, socioeconomic scenarios, governance conditions, and the government's effectiveness matter. More particularly: developing countries are facing the problem of lacking the institutional capacity to implement and monitor tertiary education aid programs effectively; weak governance in developing countries can undermine the effectiveness of aid programs, including tertiary education aid (the adverse statistically significant finding of the corruption variable also proves it); inadequate educational infrastructures and resources may effective tertiary education aid effectiveness in developing countries; gender disparities could be another reason because women in developing countries may face various barriers to accessing tertiary education; brain drain is another contributing factor, as a significant portion of the young population in developing countries tends to pursue education abroad, particularly after completing secondary education; political instability and conflict in recipient countries can create barriers to the smooth delivery of education aid and limit its effectiveness in the developing world. Furthermore, the entire education structure of the recipient country also affects the effectiveness of education aid at the tertiary level. From the perspective of DPs, one possible reason for tertiary education aid's inefficiency and limited impact is the lack of alignment with the recipient country's priorities. As a result, there may be inconsistencies and reduced effectiveness. Another factor is the unequal distribution of tertiary education aid. DPs often adopt a one-size-fits-all strategy for all developing countries, which may not be suitable in every case.

Regarding the PTR, the previous studies conducted by Connor et al. (2013), Cadima et al. (2010), Curby et al. (2009), and Hattie & Timperley (2007) have emphasized the importance of maintaining an optimal PTR. Similarly, some other studies have underscored the significance of PTR in improving education outcomes and have concluded that an optimal PTR positively impacts exam scores (Battaglia & Lebedinski, 2015; Urquiola & Verhoogen, 2009; Urquiola, 2006; Angrist & Lavy,1997). This study found that the effect of PTR in all education levels in both categories under both estimation methods showed a negative and statistically significant impact on educational outcomes. Several previous studies on the effectiveness of education aid, including Birchler & Michaelowa (2016), Michaelowa & Weber (2007b), Dreher et al. (2008), Michaelowa & Weber (2007a), Michaelowa (2004), and d'Aiglepierre & Wagner (2013), have reported consistent findings. It gives the clear message that developing countries are facing the problem of higher PTR, and it has adversely affected education outcomes at all education levels. There are some possible reasons why high PTR harms the quality of education, such as: 1) Higher PTR creates limited individual attention of the teachers for the student; as a result, the students fall behind and struggle to catch up with classroom teaching; 2) Higher PTR reduces the instruction time of teachers because teachers may spend more time to monitoring and managing the classroom environment; 3) Higher PTR can also limit the resources such textbooks, classroom materials, and other technical equipment as matter it reduces the quality of education. 4) Higher PTR causes teacher burnout; as a result, it reduces teaching motivation and energy of teachers; 5) Higher PTR makes teacher may not provide sufficient feedback and necessary assessment to each student, and it creates a limit to finding out the weak areas of students. These arguments are further supported by the finding of previous studies conducted by Wang & Eccles (2016), Waasdrop et al. (2011), Babad (2009), and Finn et al. (2003), which have concluded that maintaining an optimal PTR contributes to a positive emotional climate in the classroom.

The positive and statistically significant relationship between GDP per capita and education outcome means that the recipient's sound economic activities also play a vital role in improving the education sector and helping to aid effectiveness in developing countries. Previous studies (Christensen et al., 2011; Birchler & Michaelowa, 2016; Michaelowa & Weber, 2007a; Michaelowa & Weber, 2007b; Michaelowa, 2004) have consistently reported similar findings. Several ways sound GDP per capita can contribute to enhancing education outcomes in developing countries. First, it helps to increase government funding for the education sector, such as funding for schooling, education resources, and other school infrastructures. Second, higher GDP per capita also helps to

access the student's educational resources more comprehensively. It is because once family income goes up, they will think more about investing in the education sector for their kids. Third, it helps for better infrastructure such as roads, electricity, internet connection, and so on, allowing students easy access to school and other educational activities such as e-learning. Finally, higher GDP per capita enhances economic opportunities entirely, which ultimately helps in strengthening human capital in the developing world. The study shows that sound GDP per capita creates a virtuous economic and educational development cycle in developing countries. Hence, developing countries must improve economic activities through good fiscal and monetary policies. The previous studies conducted by Zhao & Glewwe (2010), Connelly & Zheng (2003), Hannum (2003), Brown & Park (2002), Hannum (1999), Knight & Li (1996), and Knight & Li (1993) have focused on the determines of school attainment in developing countries. These studies found that, out of other variables, household income and school infrastructure play a positive and vital role in school outcomes in developing countries. These studies' findings support the abovementioned arguments and emphasize the significance of GDP per capita in the school sector in developing countries.

The findings of this study, which highlight a positive relationship between female teachers and schooling outcomes, align with earlier research conducted by Card et al. (2022), Wahsheh & Alhawamdeh (2015), Kirk (2006), Rugh (2000), Banerjee et al. (2000), and Herz et al. (1991) regarding the impact of female teachers in education. The positive and statistically significant relationship between female teachers and education outcomes provides a strong message that female teachers can help to improve education outcomes in developing countries through various ways. For instance, female teachers create a safe and supportive environment in school because they emphasize nondiscrimination, harassment, and gender-based violence. Likewise, they provide a conducive classroom environment and facilitate other educational activities in school, which help create an inclusive schooling environment and ultimately help address the gender gap scenario. Similarly, they will promote girls' education by removing barriers that prevent it because they can advocate the importance and necessity of girls' education and its future benefits. In developing countries, girls face cultural barriers to accessing education and are mostly prioritized for domestic responsibility. In this scenario, female teachers are role models for society, provide positive examples of women's education, and help address traditional gender stereotypes and biases in the community. Some other previous studies conducted by Eble & Hu (2020), Lee et al. (2019), Gong et al. (2018), Xu & Li (2018), Muralidharan et al. (2016), and Paredes (2014) have also emphasized the positive impact of female teachers in improving the school outcome in developing countries.

5. Conclusion and Policy Measures

Based on the finding, the study concluded that education aid is more effective in enhancing primary and secondary education outcomes. However, it has no statistically significant relationship for tertiary education. The compared study showed that males benefit more from education aid mechanisms than females. PTR has a negative and statistically significant association with all three levels of outcomes. Nevertheless, female teachers have a more positive relationship with enhancing educational outcomes. The finding also suggests that recipients' economic and governance scenarios matter for effective education outcomes. In conclusion, this study contributes substantially to the literature by offering valuable insights into the effectiveness of education aid. It accomplishes this by considering gender perspectives, specific SDG4, robust methodologies, and comprehensive variables, all within the context of up-to-date data.

Based on the fundamental findings, the study has drawn some policy measures. First, from the recipients' perspective, education becomes society's responsibility. Therefore, developing nations' governments must advocate in the community about education's necessity and future benefits to tackling the social and cultural barriers against education. In addition, recipient countries must focus on better school infrastructure, materials such as textbooks, computers, school feeding programs, and trained teachers.

Regarding the gender point of view, recipient countries must take a comprehensive approach to address the various education barriers, such as improving access to education by allocating more budget for the education sector, promoting gender equality and girls' empowerment, and addressing safety concerns in and around schools, and focus the female teachers on promoting gender equality. Likewise, the recipients have to address the problem of high PTR by managing sufficient numbers of well-trained teachers and providing adequate support to the teacher with resources and professional development. Furthermore, higher GDP per capita can create a virtuous cycle of economic and educational development and helps to improve education outcomes. Hence, recipient countries must focus on sound economic activities through good fiscal and monetary policies. From DPs' perspective, DPs have to allocate the education aid to recipients' national priorities base and follow the harmonization of aid mechanism. These policy measures will propel the relationship between education aid and education outcomes towards new horizons, making a significant contribution to the advancement of the SDG

four target by 2030.

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Appendix A

Summary of Variables

Variable	Explanation
Dependent Variables	
Primary Female Completion Rate	The number of female students successfully completing the last year of (or graduating from) primary school in a given year is divided by the number of children of official graduation age in the population.
Primary Male Completion Rate	The number of male students successfully completing the last year of (or graduating from) primary school in a given year is divided by the number of children of official graduation age in the population.
Secondary School Female Net Enrolment Rate	The secondary school female net enrollment rate is the ratio of female children of official school age who are enrolled in school to the population of the corresponding official school age.
Secondary School Male Net Enrolment Rate	The secondary school male net enrollment rate is the ratio of male children of official school age who are enrolled in school to the population of the corresponding official school age.
Tertiary School Female Gross Enrolment Rate	The female tertiary gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of tertiary education shown.
Tertiary School Male Gross Enrolment Rate	The male tertiary gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of tertiary education shown.
Explanatory Variables	
Primary School Education Aid Per Capita	Primary School Education Aid per capita is a gross foreign aid disbursement into the primary education sector. Per capita is calculated as the total gross disbursement of primary education sector foreign aid provided by the Official Donors to individual countries divided by the total population of the recipient country.
Secondary School Education Aid Per Capita	Secondary School Education Aid per capita is a gross foreign aid disbursement into the secondary education sector. Per capita is calculated as the total gross disbursement of secondary education sector foreign aid provided by the Official Donors to individual countries divided by the total population of the recipient country.
Tertiary School Education Aid Per Capita	Tertiary School Education Aid per capita is a gross foreign aid disbursement into the tertiary education sector. Per capita is calculated as the total gross disbursement of tertiary education sector foreign aid provided by the Official Donors to individual countries divided by the total population of the recipient country.
Control Variables	
GDP per capita	GDP per capita is gross domestic product divided by midyear population. It reflects the size of the economy.
Primary School Completion Rate	The number of students successfully completing the last year of (or graduating from) primary school in a given year is divided by the number of children of official graduation age in the population.
Government expenditure on education	The government expenditure on education, both current and capital, on the percentage of GDP.
Inflation	The annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.
Control of Corruption	"Control of corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption." WGI, World Bank.
Government Effectiveness	Government Effectiveness (GE) captures: the quality of public service, the quality of civil service and how far it is independent of political pressures, the process and quality of policy formulation and implementation, the government's credibility and commitment to such policies.
Primary Net Enrolment Rate	Primary net enrollment rate is the ratio of children of official school age who are enrolled in school to the population of the corresponding official school age.
Primary Pupil-Teacher Ratio	Primary school pupil-teacher ratio is the average number of pupils per teacher in primary school.
Primary Education Female Teachers	Female teachers as a percentage of total primary education teachers includes full-time and part-time teachers.
Secondary Pupil-Teacher Ratio	Secondary school pupil-teacher ratio is the average number of pupils per teacher in secondary school.
Secondary Education Female Teacher	Female teachers as a percentage of total secondary education teachers includes full-time and part-time teachers.
Tertiary Pupil-Teacher Ratio	Tertiary pupil-teacher ratio is the average number of pupils per teacher in tertiary school.

Source: Prepared by the Author.

Appendix B

Descriptive Statistic

Variables	Explanation	Obs	Mean	Std. dev.	Min	Max
lneAidPriP	Primary School Education Aid Per Capita	950	13.13	1.93	0	16.70
lneAidSecP	Secondary School Education Aid Per	950	12.62	1.88	0	17.21
lneAidTerP	Tertiary School Education Aid Per Capita	950	13.61	1.424	8.13	17.97
NER	Primary Net Enrolment Rate	950	82.83	14.45	31.02	99.92
PCR	Primary School Completion Rate	950	77.94	21.09	21.11	121.7223
PCRF	Primary Female Completion Rate	950	76.15	23.77	16.47	125.38
PCRM	Primary Male Completion Rate	950	79.27	19.68	24.16	135.07
PTR	Primary Pupil-Teacher Ratio	950	35.27	12.83	13.97	69.28
lnGDPCap	GDP per capita	950	21.03	.70	19.41	22.44
INF	Inflation	950	15.66	7.31	9.24	51.86
CC	Control of Corruption	950	1.10	.563	-2.5	3.32
GE	Government Effectiveness	950	1.71	.51	-2.5	3.42
PeduTeaF	Primary Education Female Teachers	950	52.94	21.29	9.428	98.78
Serfnet	Secondary School Female Net Enrolment Rate	950	44.73	22.84	28.60	114.33
Serfmnet	Secondary School Male Net Enrolment Rate	950	46.58	21.48	48.51	115.80
Tremgro	Tertiary School Male Gross Enrolment Rate	950	15.76	12.29	26.66	78.91
Trefgro	Tertiary School Female Gross Enrolment Rate	950	15.49	15.52	29.45	82.00
PTRsec	Secondary Pupil-Teacher Ratio	950	24.30	8.25	28.14	54.39
SecEduTeaf	Secondary Education Female Teachers	950	37.33	20.78	13.11	122.89
EDUCEXP	Government expenditure on education, total	950	4.43	2.11	.62	12.90

Source: Author's own computation.

Appendix C

Name of Selected Countries

Belize, Benin, Bhutan, Bolivia, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Chad, Côte d'Ivoire, Djibouti, Egypt, El Salvador, Eritrea, Eswatini, Ethiopia, Gambia, Ghana, Guinea, Honduras, India, Indonesia, Iran, Kyrgyzstan, Lao, Lesotho, Mali, Mauritania, Mongolia, Morocco, Mozambique, Myanmar, Nepal, Niger, Pakistan, Philippines, Rwanda, Senegal, Sri Lanka, Tajikistan, Tanzania, Timor-Leste, Togo, Tunisia, Uzbekistan, Viet Nam, Yemen, Zambia, Zimbabwe.