



# Navigating the Impact of Foreign Aid: A Holistic View of Educational Aid Disbursements in Developing Nations

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## Abstract

**Background:** Foreign aid is a fundamental instrument of international cooperation, intended theoretically to ameliorate the disparities in saving-investment dynamics, knowledge acquisition, and foreign exchange within developing nations. Despite over half a century of endeavours to evaluate its efficacy, the ongoing discourse on whether aid engenders predominantly positive outcomes in recipient countries remains inconclusive. Consequently, the nuanced impact of foreign aid on addressing challenges in developing nations remains a topic necessitating comprehensive and rigorous analysis.

**Objective:** The primary aim of this study is to augment the existing body of knowledge within the domain of foreign aid by scrutinising the impact of education aid on improving educational achievements, particularly at the primary and secondary education tiers, by focusing on the overall, gender-wise, income level-wise, and donor-wise effect. This study focuses on delineating the influence of aid on the Primary Completion Rate (PCR), recognising its role as a precursor to shaping the Secondary School Level Net Enrollment Rate (SERNet).

**Method:** This study utilised recent data on education aid disbursements across 50 low—and lower-income countries over 19 years (2002-2020). It specifically examined the cross-sector effects of this aid within the education sector, focusing on its impact on both the PCR and the SERNet. The analysis was conducted using the two-stage least squares methodology using the instrumental variables (IV-2SLS).

**Result:** The findings revealed a statistically significant and positive correlation between education aid and the PCR, while no substantial relationship was observed with the SERNet. This discrepancy indicates that aid to improve primary school completion may not necessarily lead to enhancements in secondary school enrollments. Additionally, the analysis demonstrated that economic factors, governance, and school-related structural variables also play crucial roles in improving educational outcomes in developing countries.

**Conclusion:** These outcomes suggest that the efficacy of foreign aid exhibits variance across different scenarios. The challenges concerning PCR and SERNet likely diverge, implying that assessing aid impacts singularly might be inadequate. Tailoring an aid to address specific issues could yield more favourable outcomes.

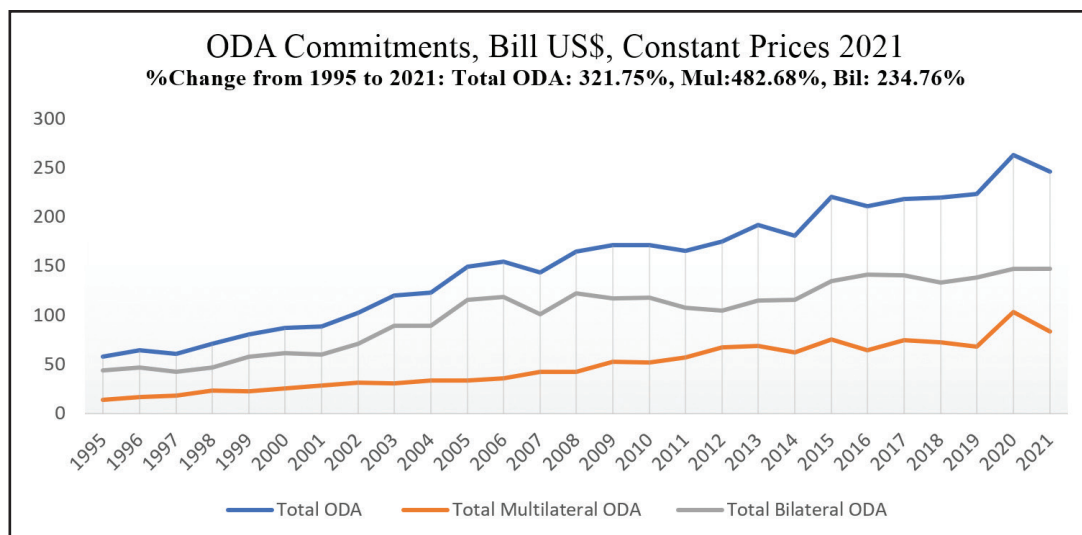
**Keywords:** Aid Effectiveness, Education Aid, Good Governance, Primary Level, Secondary Level

**Paper Type:** Research Paper

## Introduction

Foreign aid is a key international cooperation instrument, theoretically designed to bridge the gap between saving-investment, knowledge, and foreign exchange in developing nations (Harrod, 1939; Chenery, 1966; Bacha, 1990; Lekhak, 2023b, 2023c). Research indicates a substantial uptick in aid provision over the past six decades, notably from 1995 to 2021, revealing a remarkable 321.75 per cent real-term increase in committed Official Development Assistance (ODA) (OECD/CRS, 2022, Figure 1). Despite its considerable value, altruistic intentions, and extensive efforts, studies underscore the mixed success of foreign aid in achieving sustainable economic growth, balanced and inclusive development, and poverty alleviation (Asra et al., 2005). Efforts to assess the effectiveness of foreign aid span more than 50 years (Michaelowa & Weber, 2007a). However, the debate regarding whether aid yields overall positive outcomes in recipient countries remains unsettled (Asra et al., 2005).

**Figure 1: ODA Commitment, Bill US\$, Constant Prices 2021**



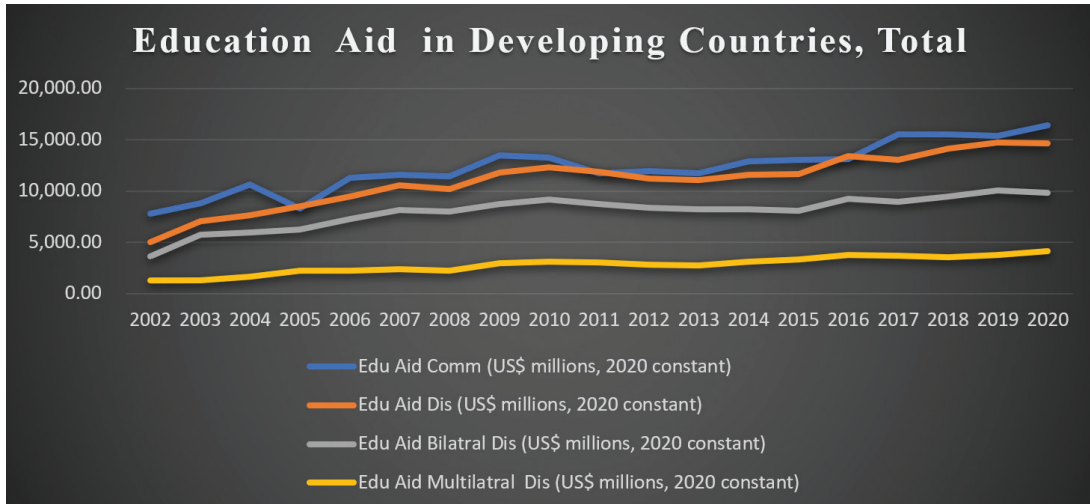
(Source: Prepared by the Author)

Foreign aid holds considerable significance within the education sector, representing a foundational element for comprehensive economic development and national prosperity. It catalyses nurturing human capital, a fundamental driver for a nation's economic advancement and overall well-being (Lekhak, 2023a; Ammermueller et al., 2006; Card, 1999; Lucas, 1998; Cohn & Addison, 1998; Romer, 1994; Rebelo, 1991; Becker et al., 1990; Mincer, 1974; Arrow, 1973; Spence, 1973; Becker, 1962; Schultz, 1961). Initially focused on higher education, foreign aid within the education domain shifted its focus to primary and secondary levels in the late 1980s (Lekhak, 2023b). Historical and ongoing international and national development initiatives—such as the World Conference on Education for All in Jomtien and the Dakar Framework of 1990 and 2000, alongside the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs)—have accorded significant priority to this sector (Lekhak, 2023a, 2023b; Heyneman & Lee, 2016; Heyneman, 2004a, 2009, 2010; UNESCO, 2007; Asiedu & Nandwa, 2007; Psacharopoulos & Patrinos, 2004; Petrakis & Stamatakis, 2002; Psacharopoulos et al., 1986; Psacharopoulos, 1981; World Bank, 1980.)

Despite a substantial influx of foreign aid directed towards education, its efficacy within the sector presents a mixed picture. Over recent decades, education aid has experienced a sharp upward trajectory (Lekhak, 2023b). Between 1995 and 2020, the total committed aid in constant 2020 US dollars soared by an impressive 594 per cent, escalating from US\$ 2.8 billion in 1995 to US\$ 16.42 billion in 2020

(OECD/CRS, 2022, Figure 2). However, this surge in funding hasn't translated into remarkable progress within the education sector. Globally, the stark reality persists, with 258 million children and youth out of school in 2018, three-quarters of whom resided in sub-Saharan Africa and South Asia (unstats/SDGs, 2020). Notably, in 2018, approximately 5.5 million primary school-age children were out of school, with a higher proportion of girls than boys (Unstats/ SDGs, 2020). Examining primary school completion rates among students from the poorest households reveals 34.3 per cent in low-income and 68.4 per cent in lower-middle-income countries, indicating significant disparities and challenges (unstats/SDGs, 2020). These statistics underscore the pressing need for a deeper exploration of the challenges affecting the effectiveness of education aid.

**Figure 2: Education Aid in Developing Countries, Total**



(Source: OECD, CRS Data, Prepared by Author)

Conversely, academic studies have demonstrated the potential for education-focused aid to positively influence the educational outcomes of recipient nations (Lekhak, 2023a, 2023b; Eskander & Mukherjee, 2017; Birchler & Michaelowa, 2016; d'Aiglepiere & Wagner, 2013; Christensen et al., 2011; Dreher et al., 2008; Michaelowa & Weber, 2007a, 2007b; Michaelowa, 2004). Nevertheless, it remains crucial to acknowledge that despite heightened aid allocation, discrepancies persist within education indicators and the present state of the education sector in developing countries, casting uncertainty on the effectiveness of aid in this sphere. These discrepancies challenge academics, development partners (DPs), and recipients. Hence, the substantial increase in aid directed to the education sector has attracted academic attention. This statement of problem drives the motivation for further investigation within this domain in this study.

The primary aim of this study is to augment the existing body of knowledge within the domain of foreign aid by scrutinising the impact of education aid on improving educational achievements, particularly at the primary and secondary education tiers, by focusing on the overall, gender-wise, income level-wise, and donor-wise effect. This study focuses on delineating the influence of aid on the PCR, recognising its role as a precursor to shaping the SERNet.

This study addresses the overarching objective by exploring the following research inquiries: 1) Does a correlation exist between education aid and the Primary Completion Rate (PCR) in developing nations? 2) Do these correlations vary concerning gender, income disparities, and differing aid contributors? 3) What is the relationship between education aid and outcomes at the secondary school level?

Given the global focus on achieving the SDGs, particularly Goal 4, which underscores the significance of “ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all” (SDGs, 2020), investigating the link between education aid and educational outcomes is critical. This timely examination intends to furnish fresh insights that can assist in crafting novel policy measures and offer comprehensive guidelines to DPs and recipient nations. Ultimately, this endeavour seeks to contribute substantively to enhancing education policies and practices globally.

This study employs a rigorous analytical approach, specifically the two-stage least squares (2SLS) with instrumental variable (IV) methodology, to examine the nuanced relationship between education aid and educational outcomes across multiple levels. Utilising a comprehensive dataset spanning 19 years from fifty developing countries, this study unveils robust evidence indicating that education aid significantly enhances the PCR while exhibiting no substantial association with the SERNet. Furthermore, the study sheds light on the persisting challenges within various structural aspects of educational systems in these developing nations, notably in metrics such as the pupil-teacher ratio (PTR).

This study significantly contributes to the existing literature by focusing on the impact of disbursed education aid, specifically in primary and secondary education, while examining the overall effect, gender-based effect, income level effect, and donor-specific impacts within developing countries. Emphasising the alignment with SDGs, particularly SDG-4, the findings underscore the importance of targeted interventions to enhance educational outcomes in these regions, detailed further in the subsequent sections.

The subsequent structure of this paper unfolds in the following manner: Section 2 describes a review of the literature with the research gap and contribution of this study; Section 3 delineates the data sources, variables, and the econometric methodology employed. Section 4 presents the empirical analysis results, comparing them with previous findings for a comprehensive evaluation. Finally, in Section 5, conclusions are drawn based on these analyses, accompanied by suggested policy measures for consideration.

## Literature Review and Significance of the Study

The debate surrounding the effectiveness of foreign aid has traditionally centred on its correlation with economic growth (Ziesemer, 2016). In the education sector, in the initial stages of examining the correlation between education aid and educational outcomes, only a handful of scholars, notably Michaelowa (2004), Michaelowa & Weber (2007a, 2007b), Wolf (2007), and Dreher et al. (2008), delved into analysing the impact of education aid. Subsequently, an expanded exploration of this research domain was conducted by several academics, such as Gyimah-Brempong & Aziedu (2008), Arndt et al. (2011), Christensen et al. (2011), d’Aiglepierre & Wagner (2013), Maiga (2014), Yogo (2017), Musa et al. (2021), Sara (2021) and Lekhak (2023a, 2023b).

Lekhak’s comprehensive study (2023b), utilising the Generalised Method of Moments (GMM), revealed a positive correlation between disbursed primary, secondary, and tertiary education aid and those education levels’ outcomes. The findings indicated that a one per cent increase in per capita aid for primary, secondary, and tertiary education led to a respective increase of 0.762 per cent in primary completion rate (PCR), 0.705 per cent in secondary net enrollment rate (SERNet), and 0.729 per cent in tertiary, gross enrollment rates within recipient nations.

Moreover, Lekhak’s gender-specific analysis (2023a), also employing the GMM, highlighted that a one per cent increase in per capita disbursed education aid for primary and secondary education resulted in a rise of 0.952 per cent for males and 0.727 per cent for females in primary completion rate, 0.955 per cent for males and 0.736 per cent for females in secondary net enrollment rate. However, this study found no statistically significant relationship between tertiary education aid and tertiary gross enrollment rates. The analysis revealed that males benefit more than females from education aid.

Musa et al. (2021) conducted a comprehensive analysis of the influence of educational aid on enhancing educational outcomes in Nigeria, with a particular emphasis on primary school enrollment and completion rates. Utilising data from 1980 to 2019, the study employed dynamic and fully modified ordinary least squares and vector autoregressive model estimators. The findings indicate that educational aid significantly improves Nigeria's primary school enrollment and completion rates.

Similarly, Sara (2021) examined the impact of educational aid on various primary education outcomes, using data from 1970 to 2013 across 169 aid-recipient countries. Employing the fixed effects method, the study identified a statistically significant correlation between higher per capita educational aid and increased primary enrollment and completion rates. The research further concluded that an additional \$1,000 per capita in educational aid is associated with a 1% increase in enrollment rates and a 2% increase in students reaching the final grade and graduating from primary education.

Yogo (2017) investigated the effects of educational aid in 35 sub-Saharan African countries to ascertain its impact on primary education. The study concluded that educational aid is crucial for achieving universal primary education in these regions. Furthermore, it emphasised the potential of educational aid as a policy tool to achieve the fourth Sustainable Development Goal (SDG) in sub-Saharan Africa. During the same year, the study of Eskander & Mukherjee (2017), which examined the impact of education aid on primary education's gross enrollment and completion rates, presented a nuanced perspective. While they found a positive impact of education aid on enrollment, they did not identify a significant increase in the primary completion rate. Birchler & Michaelowa (2016) supported these assertions, noting a positive effect of education aid on primary enrollment where a one per cent increase in education aid correlated with a 0.06 percentage point rise.

In a related study, Maiga (2014) focused on the role of disbursed aid between 2002 and 2011 in reducing gender inequality in developing countries, specifically examining the gender parity index (GPI) at the primary, secondary, and tertiary levels. Utilising the GMM, the study found that while aid did not significantly impact the GPI at the primary level, it had a statistically significant and robust effect on reducing gender disparities at the secondary and tertiary education levels in developing countries. Similarly, d'Aiglepieire & Wagner's (2013) research reaffirmed aid's robust and positive impact on primary education, particularly educational achievement.

Continuing this line of inquiry, Dreher et al. (2008) conducted an extensive analysis, employing 2SLS, FE, and the GMM to cover data from nearly 100 countries spanning 1970 to 2004. Their findings linked higher per capita aid for education to a substantial increase in achieving universal primary school enrollment. Subsequently, Michaelowa & Weber (2007a) delved into primary, secondary, and tertiary education, reporting a favourable impact of aid across all levels by applying the GMM and FE. Their analysis indicated that a one per cent increase in aid relative to recipient countries' GDP led to a 2.5 per centage point increase in PCR.

Correspondingly, the study of Michaelowa & Weber (2007b) utilised the GMM and found that aid positively impacts primary education outcomes in developing countries, affecting enrollment and completion rates. Their study highlighted a crucial aspect: the effectiveness of education aid significantly hinges on recipient nations' political and institutional landscape. They found that in poor governance cases, aid's influence on enrollment takes an adverse turn. Equally, Michaelowa (2004) examined data from 80 low-income nations and found a positive correlation between educational aid and primary education using FE and RE methods. Specifically, the study revealed that a one-million-dollar increase in education aid was associated with a 0.7 per cent rise in PCR.

The diversity of findings underscores the complexity inherent in the relationship between education aid and its outcomes. Positive and negative findings highlight that this connection remains an open and evolving study area. These contrasting results emphasise the necessity for further nuanced investigations and the importance of considering contextual factors in determining aid effectiveness.

However, previous studies are subject to criticism due to several shortcomings. One notable issue revolves around the primary independent variable perspective, as highlighted in studies by d'Aiglepieerre & Wagner (2013), Dreher et al. (2008), Michaelowa & Weber (2007a), and Michaelowa (2004), which predominantly consider committed education aid. There remains uncertainty regarding whether committed aid entirely translates into actual flows, as it may not always be fully disbursed. This discrepancy could introduce biases in the findings (see Figure 2).

Another critique centres on the perspective of structural characteristic variables. Some studies, such as Eskander & Mukherjee (2017), have been criticised for insufficiently incorporating control variables that adequately capture the structural aspects of the education system, such as variables like the pupil-teacher ratio (PTR).

Similarly, from the standpoint of the dependent variable, certain studies, like Eskander & Mukherjee (2017), have utilised the primary gross enrollment rate. However, many academics argue that the net primary education enrollment rate offers a more accurate reflection of enrollment at the primary level.

One of the most significant critiques involves the comprehensive study approach. None of the existing studies have adopted a holistic approach that thoroughly investigates the effects of education aid by examining its overall impact, gender-specific effects, income-level effects, and donor-related effects within a single study.

These observations and considerations are instrumental in moulding the conceptual framework for this study, facilitating the formulation of new policy measures, and offering comprehensive guidelines to both development partners (DPs) and recipients.

To address these limitations, this study aims to comprehensively examine the impact of education aid on PCR and SERNet. This investigation focuses on its overall effect, gender-based impact, influence concerning income levels, and variations across different donors. Employing robust dependent and explanatory variables, the study encompasses a broad analytical scope. The 2SLS method, augmented with instrumental variable (IV) methodology, addresses potential endogeneity issues. This study contributes to the existing literature on education aid effectiveness by considering disbursed aid and methodological rigour, drawing from recent datasets. This analysis provides a novel perspective by offering a holistic view of the effects of education aid on PCR and SERNet, examining it comprehensively across various dimensions (overall, gender, income levels, and donor impacts). This approach fosters a deeper understanding of the multifaceted impact of education aid across different levels of schooling and perspectives. Additionally, this study's specific focus on SDG-4 adds a layer of significance and relevance.

## **Data, Variables Selection, and the Econometric Approach**

### ***Data Sources and Variables Selection Bases***

This panel data analysis centres on scrutinising the impact of education aid on both primary completion and secondary net enrollment rates spanning 19 years from 2002 to 2020. The dataset utilised in this study draws from various reputable sources, including the World Development Indicators (WDI, 2022) published by the World Bank and the Creditor Reporting System (CRS) established by the Organisation for Economic Cooperation and Development/Development Assistance Committee (OECD/DAC) (refer to Appendix 2). A cohort of 50 countries classified as low-income and lower-middle-income was selected for this analysis. These countries represent distinct regions: 24 from sub-Saharan Africa, 16 from Asia, four from Latin America and the Caribbean, and six from the Middle East and North Africa. The selection was based on three criteria: membership in the Development Assistance Committee (DAC), classification as aid recipient countries according to the World Bank, and data availability.

The study includes sub-Saharan Africa (SSA) and South Asia (Asi) as regional indicators. These regions grapple with distinct challenges characterised by elevated poverty levels, burgeoning population growth, and a dearth of fundamental services such as healthcare, education, water supply, and sanitation. Furthermore, both areas experience sluggish economic growth, deficient governance, and fragile political stability, impeding the efficacy of aid interventions. The analysis anticipates a more pronounced challenge in SSA relative to South Asia. This expectation is rooted in compelling statistics highlighting the daunting realities of SSA: an annual population growth rate of 2.6 per cent (2020), with 38.3 per cent living below the national poverty line (2018), 54 per cent of the urban population residing in slums (2018), and a 7.7 per cent unemployment rate within the total labour force (2020). Moreover, SSA grapples with a significant prevalence of undernourishment, impacting 20 per cent of its population (2019), and exhibits a life expectancy at birth of 62 years (2020) (WDI, 2022).

Aid disbursed specifically for the education sector is meticulously documented within the CRS managed by the OECD/DAC, presented in constant 2020 US dollars. This aid data is typically recorded in two formats: commitments and disbursements. However, there's an inherent uncertainty regarding whether commitments entirely materialise into realised financial transactions (shown in Figure 2). This discrepancy can introduce bias into findings, as commitments might not be fully disbursed as intended. Consequently, to ensure a more accurate and unbiased representation in this study's analysis, the focus is solely on the gross disbursement of education aid.

In the variable and model selection process, this study adhered to recommendations from previous scholarly works. Some studies advised controlling for variables associated with the structural attributes of the education system, including the pupil-teacher ratio, government expenditure in the education sector, and the demographic composition encompassing children and youths aged 0-14 years (Michaelowa & Weber, 2007a, 2007b; Michaelowa, 2004). Regarding the dependent variable, varied recommendations emerged across studies, with some advocating for the gross primary education enrollment rate, others for the net primary school enrollment rate, and certain studies advocating for the primary completion rate (Eskander & Mukherjee, 2017; Birchler & Michaelowa, 2016; Michaelowa & Weber, 2007b). Notably, aid per capita of the recipient country's population was adopted as a metric, reflecting the belief that larger countries necessitate greater resources to augment educational coverage than smaller nations (Birchler & Michaelowa, 2016).

Drawing from theoretical frameworks and empirical evidence, most studies investigating aid's effectiveness in education have employed good governance as a crucial instrumental variable (Birchler & Michaelowa, 2016; Michaelowa & Weber, 2007a & 2007b; Weber, 2004). Previous research has extensively examined good governance, bifurcating it into economic aspects and broader political and institutional environments, scrutinising these facets separately. Under the economic purview of good governance, earlier studies have focused on three key indicators from Burnside & Dollar's (2000) policy index: budget surplus, inflation, and trade openness. Similarly, the amalgamation of political rights and civil liberties means from the Freedom House Index (FREE) has been utilised to represent the political governance aspects of these studies.

This study emphasises good governance as a pivotal determinant of aid effectiveness, prompting the construction of the Good Governance Index (GGI) as an instrumental variable (IV). The World Bank has consistently provided a comprehensive governance assessment across more than 200 countries since 1996, delineating six fundamental indicators. It would be inadequate to discuss the correlation between aid effectiveness and good governance without centring on these six key indicators: Voice and Accountability (VA), Political Stability and Absence of Violence (PV), Government Effectiveness (GE), Regulatory Quality (RL), Rule of Law (RL), and Control of Corruption (CC). These indicators form a crucial foundation for evaluating and understanding the dynamics of good governance concerning aid effectiveness.

The magnitude of an economy, gauged by the gross domestic product (GDP), is notably influenced by the six governance indicators. Consequently, after conducting regressions correlating the annual growth rate of GDP per capita with these six indicators, the GGI has been meticulously crafted as an instrumental variable, detailed within the econometric approach section. The World Bank (1998) underscored that aid thrives in conjunction with favourable policies, robust economic management, and a robust institutional framework. The GGI, formed by synthesising these six governance indicators and their correlation with the annual growth rate of GDP per capita, encapsulates a representation of policies fostering good governance, proficient economic administration, and institutional integrity. Earlier studies predominantly dissected political and economic facets of governance in isolation. Therefore, introducing the GGI is a novel addition to empirical research on aid effectiveness, consolidating economic and political dimensions into a unified metric.

The study has included the Pupil-Teacher Ratio (PTR) as a control variable. The optimal PTR is believed to foster increased PCR and SERNet by fostering a conducive classroom environment and effective educational arrangements. Conversely, increased PTR may inversely impact PCR and SERNet, attributed to crowded classrooms that compromise educational quality and diminish teachers' capacity for effective monitoring and supervision. Consequently, a higher PTR often leads to increased dropout rates or premature school exits before completion.

Moreover, Primary Education Female Teachers (PeduTeaF, in %) are included as a control variable due to the potential advocacy role of female teachers within society. Their influence extends to advocating the importance of education, particularly for females, and emphasising the future benefits of literacy. Female teachers contribute significantly to cultivating a conducive classroom environment and facilitating various educational activities, thereby exerting direct and indirect effects on PCR and SERNet. The study predicts a positive relationship between PeduTeaF and PCR, acknowledging the significant impact female teachers can have on fostering higher completion rates in primary education.

### ***Variable Specification and Definition***

The primary dependent variables in this study encompass the Primary School Completion Rate (PCR, in %), Female Primary School Completion Rate (PCRf, in %), and the Secondary School Level Net Enrollment Rate (SERNet, in %). PCR signifies the culmination of primary education, while SERNet is regarded as an intermediary measure leading to PCR attainment. Anticipations for this study posit a positive correlation between aid disbursement and PCR and SERNet, suggesting that increased aid fosters improvements in these educational metrics.

The comprehensive definition and sources of the variables used in this study are provided in Appendix 2. The explanatory variables encompass Education Aid per capita (EDUCAIDp), Multilateral Education Aid per capita (EDUCAIDmp), and Bilateral Education Aid per capita (EDUCAIDbp). To ensure data normalisation, all aid variables are logarithmically transformed. Lagged dependent variables such as PCRlag1, PCRf1, and SERNetlag1 help mitigate potential biases stemming from time-varying omitted variables. Additionally, the Net Primary Enrollment Rate (NER, in %) is integrated as a control variable, as sustained and heightened NER is believed to influence PCR positively. The study anticipates a positive correlation between NER and both PCR and PCRf. Year (Time) serves as another control variable, enabling the assessment of recent trends and changes in the effect of aid on PCR and SERNet. Regional indicator variables are incorporated to address socio-political and economic disparities among regions. Specifically, the investigation focuses on SSA and Asia (Asi), considering the prevalence of foreign aid reception among countries within these regions. These control variables collectively enhance the model's robustness and enable a more comprehensive analysis of the aid's impact on education metrics.

Additional control variables pertain to the fundamental structural aspects of the education system, namely GDP per capita (GDPcap, constant 2015 US\$), PTR, and PeduTeaF. GDP per capita is included



to control for the general income level of recipient countries. A higher GDP per capita is often associated with increased government investment possibilities in the education sector, thereby potentially bolstering both PCR and SERNet. Moreover, when GDP per capita rises or remains reasonable, individuals may have greater opportunities to focus on augmenting human capital. Consequently, it is anticipated that GDPcap will exhibit a positive correlation with both PCR and SERNet. The logarithmic transformation of GDPcap aids in normalising the data, facilitating more effective analysis and comparison.

### ***The Econometric Approach***

The study employs the 2SLS method to assess the effectiveness of educational aid. Addressing endogeneity stands as a pivotal challenge in scrutinising aid effectiveness. Esteemed scholars like Burnside & Dollar (2000), Hansen & Tarp (2001), and Collier & Dollar (2002) have refrained from treating aid as an exogenous variable, acknowledging its endogenous nature. Their stance is rooted in the understanding that aid's efficacy is intricately entwined with various recipient country variables, including institutional or governance frameworks, population size, temporal factors, GDP per capita, and more (d'Aiglepierre & Wagner, 2013).

The study employs an instrumental variable (IV) regression strategy to navigate this complexity. Specifically, instrumental variables used to address the endogeneity of educational aid encompass GGI. Leveraging this instrument enables a more robust determination of the aid's genuine impact and effectiveness, bypassing the endogeneity challenges in the analysis.

The following model is considered for the study.

$$\text{PCR or SERNet} = f(\text{EDUCAIDp}, \mathbf{X}) + \mathbf{U}$$

where  $\mathbf{X}$  represents the other control variables in the regression, and  $\mathbf{U}$  is the idiosyncratic error term. The details of the model are presented below.

#### **For Primary Completion Rates (PCR)**

$$\text{PCR}_{it} / \text{PCR}_{it-1} = \beta_0 + \beta_1 \text{PCR}_{it-1} / \text{PCR}_{it-1} + \beta_2 \ln \text{EDUCAIDp}_{it} / \ln \text{EDUCAIDmp}_{it} / \ln \text{EDUCAIDbp}_{it} + \beta_3 \text{NER}_{it} + \beta_4 \text{PTR}_{it} + \beta_5 \ln \text{GDPcap}_{it} + \beta_6 \text{PeduTeaF}_{it} + \beta_7 \text{Time}_{it} + \beta_8 \text{SSA}_{it} + \beta_9 \text{Asi}_{it} + \beta_{10} \text{GGI}_{it} + \beta_{11} \text{EDUCAIDpGGI}_{it} / \text{EDUCAIDmpGGI}_{it} / \text{EDUCAIDbpGGI}_{it} + \beta_{12} \text{EDUCAIDp}^2_{it} + \beta_{13} (\text{EDUCAIDp}_{i(t-n)} \times \text{GGI}_{i(t-n)}) + \mu_{it}$$

#### **For Secondary School Level Net Enrollment Rates (SERNet)**

$$\text{SERNet}_{it} = \beta_0 + \beta_1 \text{SERNet}_{it-1} + \beta_2 \ln \text{EDUCAIDp}_{it} + \beta_3 \text{PTRsec}_{it} + \beta_4 \ln \text{GDPcap}_{it} + \beta_5 \text{Time}_{it} + \beta_6 \text{SSA}_{it} + \beta_7 \text{Asi}_{it} + \beta_8 \text{GGI}_{it} + \beta_9 \text{EDUCAIDpGGI}_{it} + \mu_{it}$$

#### **The Model for Good Governance Index (GGI)**

$$\text{GGI} = \text{constant term} + \text{coefficient of VA} \times \text{VA series} + \text{Coefficient PV} \times \text{PV series} + \text{Coefficient GE} \times \text{GE series} + \text{Coefficient RQ} \times \text{RQ series} + \text{Coefficient RL} \times \text{RL series} + \text{Coefficient CC} \times \text{CC series}$$

where  $i$  indexes' countries,  $t$  indexes time, and  $\mu$  is the error terms.

Numerous tests were conducted to ensure the robustness and validity of the estimated results. The study performed a Wu-Hausman endogeneity test (Cameron & Trivedi, 2009; Greene, 2008; Davidson, 2000), where both the Wu-Hausman 'F' statistic and the Durbin (score) 'chi-square' (chi2) p-values strongly rejected the null hypothesis of no endogeneity. Additionally, an analysis of overidentifying restrictions indicated the absence of any overidentifying restrictions, affirming the appropriateness of all instrumental variables in the model.

The study also executed a first-stage regression, which led to rejecting the null hypothesis (weak instruments). The pair-wise correlation coefficient test was applied to address potential multicollinearity concerns between variables. Moreover, a thorough assessment of variance-inflation factors (VIFs) across all regressions was conducted. The VIFs, ranging from 1 to 4 for the covariates, indicated no significant issue with multicollinearity (Cameron & Trivedi, 2009).

These comprehensive estimations collectively support utilising the IV-2SLS regression approach and affirm the study's methodological soundness, ensuring confidence in the validity and reliability of the analytical method employed.

## Finding and Discussion

The descriptive statistics about the variables are available in Appendix 1. In empirical analysis, this study delves into comparing the impact of the PCR on the SERNet. Additionally, the study analyses the effect of education aid on PCR across gender, income brackets, and donor categories. Details regarding the rationale behind this multifaceted analysis are elaborated in appendices 4, 5, and 6, respectively. Previous studies have typically honed in on specific aspects, whereas this study takes a comprehensive approach, presenting a novel contribution to analysing the aid-education relationship.

In the first step, the study utilised regression coefficients from Table 1 to construct the Good Governance Index (GGI), the findings of which are outlined below. This index is an amalgamation of factors derived from the regression analysis, which is used as an instrument variable (IV) to determine the relationship between aid effectiveness in the education sector.

**Table 1: Good Governance Index (GGI)**

Dependent Variable Sample VARIABLES	Annual growth rate in GDP per capita 50 Countries (2002-2020) OLS
CC	-1.761*** (0.532)
GE	2.396*** (0.583)
PV	0.753*** (0.216)
RQ	-1.135** (0.464)
RL	0.890 (0.669)
VA	-0.607** (0.266)
Constant	2.823*** (0.232)
Observations	922
Prob > F	0.000
R-squared	0.051

Note: Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

(Source: Author's own computation)

$$GGI = 2.823319 - .6066705*VA \text{ series} + 7532787*PV \text{ series} + 2.3957*GE \text{ series} - 1.134795*RQ \text{ series} + 8896644*RL \text{ series} - 1.760728*CC \text{ series}$$

Then, including the GGI in the database, the study runs the 2SLS regression.

**Finding**

The outcomes of the econometric analysis are outlined in Table 2. The empirical findings indicate a positive and statistically significant relationship between disbursed education aid and primary education. The study underscores the effectiveness of education aid in bolstering the rate of PCR. This significant relationship holds across the entire period studied (2002-2020), across gender-specific analyses, within lower-middle-income regions, and through the bilateral aid mechanism. These findings align with the conclusions drawn by Michaelowa & Weber (2007a, 2007b) and Lekhak (2023a, 2023b), further corroborating the positive impact of aid on primary education, as previously identified in scholarly work.

The positive and statistically significant relationship between disbursed education aid and the female primary school completion rate (PCRF) carries significant implications. It underscores that investments in education aid can yield tangible educational outcomes for girls, thereby promoting gender equality in education. This finding also aligns with international agendas such as the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs), particularly Goal 4 (Quality Education) and Goal 5 (Gender Equality), thereby highlighting the practical relevance of this research (Lekhak, 2023b).

The analysis of SERNet reveals a positive but non-statistically significant relationship between education aid and SERNet. This aligns with the earlier findings of Eskander & Mukherjee (2017), highlighting that while aid has contributed to primary schooling, its impact on secondary schooling enrollment remains inconclusive.

**Table 2: The Effect of Education Aid on Primary School Completion Rate (PCR) and Secondary School Level Net Enrollment Rate (SERNet)**

Dependent Variables	PCR	PCRF	PCR	PCR	PCR	SERNet
	50 Countries (2002-2020)					
Sample	Entire Effect (2000-2020)	Gender-Wise Effect	Multilateral Effect	Bilateral Effect	Lower-Middle-Income Effect	Secondary Level Effect
Effect	(1)	(2)	(3)	(4)	(5)	(6)
<b>VARIABLES</b>	<b>2SLS</b>	<b>2SLS</b>	<b>2SLS</b>	<b>2SLS</b>	<b>2SLS</b>	<b>2SLS</b>
lnEDUCAIDp	4.873*	3.581**			3.201**	0.431
lnEDUCAIDmp	(2.529)	(1.754)	6.128 (6.248)		(1.499)	(0.440)
lnEDUCAIDbp				3.842* (2.097)		
PCRLag1	0.443*** (0.026)		0.441*** (0.028)	0.469*** (0.028)	0.407*** (0.030)	

NER	0.484*** (0.032)	0.447*** (0.036)	0.500*** (0.041)	0.463*** (0.033)	0.579*** (0.043)	
Time	-0.0793 (0.072)	-0.133* (0.080)	-0.096 (0.077)	-0.057 (0.074)	0.023 (0.091)	-0.010 (0.026)
PTR	-0.356*** (0.042)	-0.317*** (0.047)	-0.339*** (0.043)	-0.344*** (0.043)	-0.249*** (0.049)	
lnGDPcap	2.674*** (0.659)	1.747** (0.760)	2.445*** (0.643)	2.442*** (0.686)	3.597*** (0.862)	0.147 (0.224)
PeduTeaF	0.0201 (0.019)	0.052** (0.021)	0.004 (0.023)	0.040* (0.022)	0.075*** (0.023)	
SSA	1.930 (1.216)	2.021 (1.359)	0.871 (1.212)	2.968** (1.366)	-0.227 (1.359)	0.057 (0.423)
Asi	4.603*** (1.164)	3.324*** (1.225)	4.138*** (1.145)	5.006*** (1.248)	5.094*** (1.283)	1.285*** (0.391)
GGI	0.813 (0.563)	0.437 (0.375)	0.333 (0.704)	0.029 (0.336)	-0.438 (0.366)	0.090 (0.116)
EDUCAIDpSQ	0.003* (0.001)					
EDUCAIDpGGI	-0.192* (0.105)	-0.078** (0.036)			-0.064** (0.032)	-0.003 (0.008)
EDUCAIDplag1 GGIlag1	0.031 (0.031)					
EDUCAIDplag2 GGIlag2	-0.080*** (0.030)					
EDUCAIDplag3 GGIlag3	0.031 0.020					
PCRFlag1		0.530*** (0.027)				
EDUCAIDmpGGI			-0.437 (0.509)			
EDUCAIDbpGGI				-0.103** (0.048)		
SERNetlag1						0.978*** (0.008)
PTRsec						0.021 (0.016)
Constant	-13.36* (7.563)	-11.36 (7.444)	-8.264 (7.817)	-11.20 (6.884)	-29.25*** (10.11)	-0.594 (2.085)
Observations	580	470	585	585	431	250
R-squared	0.902	0.917	0.901	0.897	0.866	0.995

Note: Standard errors in parentheses \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$  (Source: Author's own computation)

The lagged PCR exhibits a positive and statistically significant relationship across the period analysed and within multilateral and bilateral aid mechanisms, as well as gender-specific and income-specific analyses. Similarly, the lagged SERNet demonstrates a positive and statistically significant relationship in these contexts. These insights underscore the persistent significance of past primary completion rates and prior secondary school enrollment rates in influencing subsequent educational outcomes within the studied parameters.

The net enrollment rate (NER) shows a positive and statistically significant relationship with the primary completion rate (PCR) in overall, gender-wise, donor-wise, and income-wise analyses. This indicates that higher NER contributes to enhancing PCR in developing countries. Earlier literature by Lekhak (2023a, 2023b) supports this finding. However, the impact of time exhibits a negative relationship across most categories, although not statistically significant, except in the context of female PCR. In lower-middle-income countries, the relationship with time is positive but lacks significance.

The PTR at primary level emerges as a significant factor, showcasing a negative and statistically significant association with PCR across all categories at a one per cent level, aligning with the conclusions drawn by Lekhak (2023a, 2023b), Birchler & Michaelowa (2016), d'Aiglepiere & Wagner (2013), Dreher et al. (2008), Michaelowa & Weber (2007a, 2007b), and Michaelowa (2004). The GDP per capita demonstrates a positive and statistically significant correlation with the PCR, aligning with the findings of Lekhak (2023a, 2023b) and Michaelowa & Weber (2007a, 2007b). It shows that the recipient's economic situation is important in enhancing education outcomes in developing countries.

The involvement of female teachers at the primary level (PeduTeaF) reflects a positive relationship with PCR. However, statistical significance is observed only in gender-specific, income-specific, and bilateral aid analyses at five, ten, and one per cent. It conveys that female teachers play a vital role in enhancing education outcomes at the primary level through various strategic mechanisms. The positive and statistically significant relationship between the presence of female teachers and the female primary completion rate (PCR<sub>F</sub>) further emphasises their important contribution to improving PCR<sub>F</sub>. This finding is consistent with and reinforces existing literature, as seen in numerous studies, including Lekhak (2023a, 2023b).

The regional effects yielded varied outcomes: sub-Saharan Africa (SSA) did not display statistically significant results, contrasting with the noteworthy positive and statistically significant relationships found in Asia (Asi) across all categories at a one per cent level. These findings align with the study's initial expectations, demonstrating diverse impacts across regions and factors influencing aid effectiveness in education.

Examining the square term (EDUCAIDpSQ) for education aid aimed to evaluate the potential diminishing returns of aid on primary education. Surprisingly, the results unveiled a positive and statistically significant relationship at a ten per cent level, suggesting that increased aid may continue positively impacting primary education without encountering diminishing returns within this context. This finding supports the conclusions drawn by Eskander & Mukherjee in their 2017 study.

Exploring the interaction between education aid and the GGI (EDUCAIDpGGI, EDUCAIDmpGGI, EDUCAIDbpGGI) revealed intriguing findings. The interaction term showcased a consistently negative association across various analyses. This negative relationship was statistically significant for the analysed period, female PCR, income-specific effects, and bilateral aid mechanisms. However, this significance was not observed within multilateral aid mechanisms and for SERNet.

The results unveiled nuances when considering the lagged effects of interaction terms (EDUCAIDplag1GGIlag1, EDUCAIDplag2GGIlag2, EDUCAIDplag3GGIlag3) at the primary level. The first and third periods of lagged interaction displayed a positive but non-statistically significant relationship. However, the second-period lagged interaction demonstrated a negative and statistically significant relationship at a one-per cent level, indicating a notable shift in the interaction's impact over time within this context.

## *Discussion*

This study explored the impact of education aid on two critical educational outcomes. It revealed a noteworthy and positive correlation specifically with the PCR, while no significant association was observed with the SERNet. The substantial and positive relationship between education aid and PCR may stem from aid program designs strategically targeting barriers in primary education. In essence, this finding suggests that previous mechanisms and strategies—such as initiatives emphasising female education, the Education for All (EFA) campaign, the movement of Millennium Development Goals (MDGs), and concerted efforts directed toward low and lower-middle-income nations—employed by development partners (DPs) to channel aid into the education sector were effective and aligned with enhancing primary schooling. This underscores the effectiveness of education aid in bolstering primary education, validating the direction and impact of past aid mobilisation efforts in this sphere. The data corroborates this observation. For instance, between 1990 and 2018, sub-Saharan Africa and South Asia saw substantial increases in primary enrollment rates, rising from 53% to 78% and 73% to 88%, respectively. Likewise, during the same period, both regions exhibited notable progress in PCR, ascending from 54% to 71% and 64% to 92%, respectively (World Bank, WDI-2022). Lekhak (2023a, 2023b) underscored this perspective in their studies.

Regarding SERNet, from the aid architecture point of view, the absence of a significant association between education aid and the SERNet likely arises from a structural divergence in aid allocation between primary and secondary education. From the recipient's point of view, several factors contribute to this lack of statistical significance in the relationship between education aid and SERNet.

Primarily, the developing world grapples with multifaceted challenges spanning poverty, unemployment, illiteracy, entrenched socio-cultural barriers, inadequate rule of law, weak infrastructure, and insufficient social welfare and justice programs. Furthermore, the prevalence of both new and chronic diseases further compounds these difficulties. This intricate web of issues creates obstacles at the secondary education level, contributing to the observed lack of significance in the relationship between education aid and SERNet. Prior studies by Durowaiye (2017) and Tarekegne (2015) corroborate this perspective.

The challenges affecting secondary school enrollment stem from diverse sources. Insufficient guidelines and parental oversight often divert school-age children towards non-educational pursuits. Moreover, inadequate government capacity in the developing world perpetuates the demand for enhanced educational infrastructure, leading to shortages in teachers, classrooms, and essential learning materials. Weak governance systems aggravate this situation. Earlier research by Lekhak (2023a, 2023b), Shiddike (2019), and Chaudhury et al. (2006) accentuates these challenges.

Additionally, various regions within fragile countries grapple with the intrusion of rebel groups, disrupting educational environments. Examples include Nigeria, Niger, Mali, Somalia, Sudan, Syria, Liberia, and Afghanistan. Studies by Moussa (2023), Shizha (2017), Ahmed (2015), and Machel (2000) underscore this disruptive impact on education.

Furthermore, in numerous developing nations, political leaders manipulate teachers for their political agendas, resulting in deep involvement in partisan politics, particularly in regions like South Asia and sub-Saharan Africa. This politicisation divides school management along political lines, hindering the cohesive functioning of the education system. Consequently, these multifaceted obstacles collectively afflict the entire educational framework in the developing world, significantly impacting secondary school enrollment rates amid these challenging circumstances. Previous research also supports this argument, like Chaudhury et al.'s (2006) study, which highlighted that approximately 19 per cent of teachers in Bangladesh, Ecuador, India, Indonesia, Peru, and Uganda were frequently absent, with higher rates observed in economically disadvantaged areas. Simultaneously, in his 2019 study, Shiddike concluded that teachers' involvement in partisan politics significantly impacts both students' learning outcomes and the professional performance of educators.

The results of the square-term analysis emphasise that while aid contributes to positive advancements in primary education, these benefits exhibit diminishing returns over time, a pattern supported by Eskander & Mukherjee (2017). When examining the interaction term, it becomes evident that many developing nations grapple with systemic issues related to good governance. These challenges encompass pervasive corruption, deficient law enforcement, inadequate accountability and responsibility structures, ineffective public service delivery, and feeble monitoring and supervision mechanisms. In such environments, the allocation and impact of aid might be influenced or hindered by these prevailing circumstances. The efficacy of aid in such contexts could be compromised or affected by the overarching governance challenges that persist in many developing countries. This viewpoint finds support from influential economists of the past. Figures like Peter Bauer and Nobel Laureate Milton Friedman vehemently criticised foreign aid, arguing that it serves as a catalyst for corruption, expands government bureaucracies, sustains ineffective governance, enriches the privileged few in impoverished nations, or simply ends up being squandered (Lekhak, 2011).

Education aid channels through diverse avenues, including initiatives targeting education policy, administrative management, institutional capacity building, curriculum and material development, teacher training, school infrastructure enhancement, and education research. However, the impact of these endeavours on educational outcomes often requires time to manifest (Lekhak, 2023a, 2023b). Consequently, this study conducted a comprehensive analysis considering three distinct periods of lagged interaction at the primary level. Examining various scenarios concerning the interaction term revealed a crucial conclusion: a country's efficiency significantly influences aid effectiveness, and the collective efficiency factors contribute to aid efficacy. Notably, the analysis of the three-period lagged interaction term is a novel and pivotal contribution of this study, representing a departure from the focus of earlier studies that did not explore aid effectiveness in this particular manner. This approach sheds new light on the temporal dynamics of aid impact, emphasising the importance of efficiency considerations in enhancing the effectiveness of aid interventions within the education sector.

The negative association observed between the Pupil-Teacher Ratio (PTR) and PCR suggests that overcrowded classrooms diminish the quality of education. This overcrowding impacts teachers' ability to effectively monitor and supervise students, leading to many pupils dropping out before completing their schooling. This finding aligns with and reinforces existing literature, as numerous studies, including Lekhak (2023a, 2023b), Birchler & Michaelowa (2016), d'Aiglepierre & Wagner (2013), Dreher et al. (2008), Michaelowa & Weber (2007, 2007b), and Michaelowa (2004), support this connection.

The positive correlation between Gross Domestic Product (GDP) per capita and PCR signifies that PCR also tends to increase as GDP per capita rises. This trend reflects the likelihood that individuals might prioritise investing in human capital as income levels elevate. Moreover, increased GDP per capita allows the government to allocate resources toward the education sector, potentially contributing to improved educational outcomes. The current finding is consistent with robust evidence presented by various studies, including Lekhak (2023a, 2023b), Birchler & Michaelowa (2016), Christensen et al. (2011), Michaelowa & Weber (2007a, 2007b), and Michaelowa (2004). Furthermore, Zhao & Glewwe's (2010) research highlights household income as a strong influencer of years of schooling, a conclusion further supported by Deme & Mahmoud (2020).

Additionally, the association found between the presence of female primary education teachers (PeduTeaF, in %) and PCR suggests that female educators play a pivotal role in fostering a conducive classroom environment and facilitating diverse educational activities within schools. Their presence often leads to enhanced educational experiences for students. Prior research conducted by Lekhak (2023a, 2023b), Card et al. (2022), Eble & Hu (2020), Lee et al. (2019), Gong et al. (2018), Xu & Li (2018), Muralidharan et al. (2016), Wahsheh & Alhawamdeh (2015), Paredes (2014), Kirk (2006), World Bank (2001b), Rugh (2000), Banerjee et al. (2000), and Herz et al. (1991), consistently

underscores the constructive impact of female educators on enhancing female educational outcomes in developing nations. This study contributes additional insights to the existing literature in this field.

The findings related to regional effects indicate that SSA continues to confront challenges in aid effectiveness. These challenges are attributed to various factors, including high poverty levels, rapid population growth, and inadequate access to fundamental services like health, education, water supply, and sanitation. Additionally, SSA grapples with low economic growth, widespread corruption, and deficient rule of law, limited accountability, responsibility, transparency, and fragile political stability. These multifaceted circumstances collectively hinder the effectiveness of aid interventions in SSA.

## Conclusions, Policy Measures, and Suggestions for Future Research

The study used the 2SLS (IV) methodology to determine the impact of disbursed education aid on primary and secondary school outcomes in fifty developing countries. The study's findings yield compelling insights into the impact of aid on educational accomplishments. The statistically significant and positive correlation between foreign aid and PCR suggests that aid catalyses positive developmental changes within developing countries. However, the absence of a substantial association between foreign aid and SERNet highlights a potential structural divergence. This discrepancy underscores that aid directed towards primary school completion might not inherently translate into improvements in secondary school enrollments. Similarly, the analysis highlighted that female teachers, the economic soundness of the recipient country, school structure-related variables such as pupil-teacher ratio (PTR), and sound governance mechanisms also play essential roles in enhancing educational outcomes in developing countries.

Based on this conclusion, some policy measures have come into play. Findings emphasise the necessity for donors and governments to meticulously tailor aid packages, specifically targeting and addressing distinct policy challenges. Such precision ensures the aid's efficacy across varying developmental levels. These findings also serve as invaluable insights for scholars researching the impact of aid on development, highlighting that aid's effects might manifest exclusively in targeted areas rather than diffusing uniformly across all levels of development. This underscores the importance of strategic and targeted aid interventions for effective and discernible developmental outcomes.

Furthermore, recipient countries need to focus on sound governance and economic mechanisms, improve school-related factors such as the pupil-teacher ratio (PTR), and emphasise female teachers more. Similarly, development partners should focus on aid harmonisation and align with the priorities of the recipient country. Most importantly, they must recognise that a one-size-fits-all approach is ineffective; therefore, aid mobilisation should be tailored on a case-by-case basis.

Regarding future research, the analysis of SERNet reveals a positive but non-statistically significant relationship between education aid and SERNet, highlighting a potential area for future research. It suggests that while aid has contributed to primary schooling, its impact on secondary schooling enrollment remains inconclusive, indicating the need for further investigation.

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## Appendices

### Appendix 1: Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Primary School Completion Rates (PCR, in %)	845	77.173	21.677	20.467	121.722
Female Primary School Completion Rates (PCRF, in %)	715	75.984	23.713	16.472	125.384
Secondary School Net Enrollment Rate (SERNet, in %)	403	46.815	21.912	4.136	91.037
Education Aid per capita (EDUCAIDp, constant 2020 US\$)	950	6.779	10.205	.0888	122.130
Net Primary Enrollment Rate (NER, in %)	822	82.748	14.680	14.680	99.923
Time	950	10	5.480	1	19
Pupil-Teacher Ratio, primary (PTR)	799	35.721	12.195	13.978	72.115
Pupil-Teacher Ratio, secondary (PTR)	477	23.792	8.173	9.823	54.390
GDP per capita (GDPcap, constant 2015 US\$) (Log)	928	7.216	.7102	5.559	8.633
Primary Education Female Teachers (PeduTeaF, in %)	763	52.507	21.758	9.428	98.781
Good Governance Index (GGI)	943	2.517	.974	-.640	5.623

(Source: Prepared by the Author)

### Appendix 2: Variable Definitions and Sources

SN	Variable Name	Definition	Data Source
<b>Dependent Variables</b>			
1.	Primary School Completion Rates (PCR, in %)	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.	WDI, The World Bank, 2022
2.	Female Primary School Completion Rates (PCRF, in %)	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.	WDI, The World Bank, 2022
3.	Secondary School Net Enrollment Rate (SERNet, in %)	The secondary school 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.	WDI, The World Bank, 2022

<b>Explanatory Variables</b>			
4.	Education Aid per Capita (EDUCAIDp)	Education Aid per capita (EDUCAIDp) is a gross disbursement of foreign aid to the education sector. Per capita is calculated as the total gross disbursement of education sector foreign aid provided by the Official Donors to individual countries divided by the total population of the recipient country.	CRS, OECD/DAC, in constant 2020 US\$.
5.	Multilateral Education Aid per Capita (EDUCAIDmp)	Total gross disbursement of education sector foreign aid provided by the Multilateral Donors to individual countries divided by the total population of the individual country.	CRS, OECD/DAC, in constant 2020 US\$.
6.	Bilateral Education Aid per Capita (EDUCAIDbp)	Total gross disbursement of education sector foreign aid provided by the Bilateral Donors to individual countries divided by the total population of the individual country.	CRS, OECD/DAC, in constant 2020 US\$.
<b>Control Variables</b>			
7.	Net Primary Enrollment Rate (NER, in %)	The net primary enrollment rate is the ratio of children of official school age enrolled to the corresponding official school-age population.	WDI, The World Bank, 2022
8.	Pupil-Teacher Ratio, primary (PTR)	The primary school pupil-teacher ratio is the average number of pupils per teacher in primary school.	WDI, The World Bank, 2022
9.	Pupil-Teacher Ratio, secondary (PTR)	The secondary school pupil-teacher ratio is the average number of pupils per teacher in secondary school.	WDI, The World Bank, 2022
10.	GDP per Capita (GDPcap, constant 2015 US\$)	GDP per capita's annual percentage growth rate is based on constant price. It reflects the size of the economy.	WDI, The World Bank, 2022
11.	Primary Education Female Teachers (PeduTeaF, in %)	Female teachers comprise a percentage of primary education teachers, including full-time and part-time teachers.	WDI, The World Bank, 2022
12.	Population, total (POPT)	Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates.	WDI, The World Bank, 2022
14.	Good Governance Index (GGI)	The combination of six World Governance Indicators of the World Bank with regression on the annual growth rate of GDP per Capita.	Worldwide Governance Indicators (WGI), the World Bank, 2022

(Source: - Prepared by the Author)

### **Appendix 3: List of Sample 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.

### **Appendix 4: Why Income-wise Analysis**

The study primarily concentrated on the lower-middle-income (LMC) category in its income-wise analysis due to the significant representation of 39 out of 50 countries within this group, as per the World Bank classification, which includes 55 economies. LMC nations grapple with various challenges: poverty, population expansion, limited access to fundamental services, low Human Development Index (HDI) levels, governance issues, and political instability. Notably, data indicates a 2.7 per cent annual population growth rate for LMC as of 2020, with 10.9 per cent of the populace living below the poverty line of \$1.90 a day in 2018 (WDI, 2022). Moreover, the Human Development Index for LMC remains below 0.55 as of 2020.

Economically, LMC showed a gross saving of 26.44 per cent of Gross National Income (GNI) in 2018, with exports of goods and services constituting 22.4 per cent of GDP in 2020. In 2020, LMC received foreign aid equal to 0.61 per cent of GNI (WDI, 2022). These figures underscore the struggle LMC faces in achieving substantial economic development. Despite concerted efforts from development partners (both bilateral and multilateral) focusing on various sectors within this region, concerns persist regarding the region's economic advancement. Hence, the study aims to evaluate the efficacy of foreign aid, specifically in the realm of basic education within this context.

### **Appendix 5: Why Gender-wise Analysis**

Prior studies like Browne and Barrett (1991) highlighted the dual role of female education: advancing human development and contributing to economic progress. Globally, emphasis on girls' education has intensified in order to foster gender equity, empower women, promote gender-inclusive economic growth, and address climate change.

This concerted attention has led to worldwide initiatives such as the Convention on Elimination of all Forms of Discrimination against Women (CEDAW) and the Beijing World Conference on Women in 1995. Frameworks like the Dakar Framework for Action, Millennium Development Goals (MDGs), and Sustainable Development Goals (SDGs) underscore the focus on eliminating gender disparities in education.

Development partners advocate strategies to enhance female education, as evidenced by initiatives from the United Nations (UN), UNICEF, and bilateral efforts like Japan's "BEGIN: Basic Education for Growth Initiative." Recipient countries also prioritise gender education, as seen in India's "Beti Bachao, Beti Padhao" campaign and Nepal's distribution of bicycles to schools under the same campaign. Movements like South Africa's "Girls' Education Movement (GEM)" further this cause.

Despite these efforts, data reveals persisting challenges in girls' education, notably with millions of children, especially primary school girls, remaining out of school, particularly in Sub-Saharan Africa. Questions arise concerning the efficacy of foreign aid and development partners' strategies, urging a thorough analysis to align interventions with Sustainable Development Goals (SDGs). Consequently, this study aims to scrutinise the impact of educational aid on female education in light of these circumstances.

## **Appendix 6: Why Donor-wise Analysis**

Multilateral and bilateral development partners have directed considerable attention to the education sector, employing diverse mechanisms (see Table 1). The World Bank, a leading multilateral donor, currently finances 415 education projects across 115 countries, committing a total of US\$ 28.17 billion (WB, 2022). Similarly, the Asian Development Bank (ADB) has devoted over 50 years to enhancing education in Asia and the Pacific, allocating US\$ 15 billion in loans and grants to the sector (ADB, 2022).

Specific multilateral donors, notably UNESCO, have specifically focused on education. Key initiatives like the Education for All program and the World Education Forum Dakar, led by UNESCO and the World Bank, exemplify concerted efforts toward educational advancement. The United Nations' Millennium Development Goals (MDGs) in 2000 and subsequent Sustainable Development Goals (SDGs) in 2015 underscored education as a pivotal aspect.

In parallel, bilateral donors actively contribute to the education sector in developing countries through varied mechanisms. Germany, France, the United States, the United Kingdom, and Japan emerged as top bilateral contributors in 2020 (Donor Tracker, 2020).

However, the impact of this multilateral and bilateral support in the education sector hinges on its effectiveness. Consequently, this study aims to undertake a donor-focused analysis to evaluate the efficacy of their contributions.