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Does Education Aid Promote Educational Development in Lower-Middle-Income Countries?

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A research report submitted in partial fulfillment of the requirements for the degree of Master of Arts in the Field of e-Science

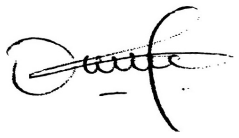
in the

School of Social Sciences
University of the Witwatersrand, Johannesburg

9 May 2023

Declaration

I, Nnaemeka Ohamadike (2018689), declare that this research is my own, unaided work. It is being submitted for the degree of Master of Arts in the Field of e-Science at the University of the Witwatersrand, Johannesburg. It has not been submitted for any degree or examination at any other university.



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9 May 2023

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Acknowledgements

I would like to extend my sincere gratitude to Professor Rod Alence and Dr Ekeminiabasi Eyita-Okon for their guidance and valuable input throughout the investigation. I emerged from this experience with strong academic and technical knowledge.

I would also like to thank my reader, Mr Michael O'Donovan, for his insightful feedback which greatly assisted in the development of the research methodology.

The support of the DSI-NICIS National e-Science Postgraduate Teaching and Training Platform (NEPTTP) towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at, are those of the author and are not necessarily to be attributed to the NEPTTP.

I am also grateful to Dr Helen Robertson for her valuable contributions to the intellectual foundations of this project and for generously providing the LaTeX template used to write this report.

Lastly, I would like to extend my appreciation towards Ms Casey Sparkes for her invaluable contributions in the management of the programme and the NEPTTP.

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List of Abbreviations

CDF	**C**omprehensive **D**evelopment **F**ramework
CRS	**C**reditor **R**eporting **S**ystem
EI	**E**ducation **I**ndex
EYS	**E**xpected **Y**ears of **S**chooling
FE	**F**ixed **E**ffects
GDP	**G**ross **D**omestic **P**roduct
IMF	**I**nternational **M**onetary **F**und
LMICs	**L**ower **M**iddle **I**ncome **C**ountries
MDG	**M**illennium **D**evelopment **G**oals
MICs	**M**iddle **I**ncome **C**ountries
MYS	**M**ean **Y**ears of **S**chooling
ODA	**O**fficial **D**evelopment **A**ssistance
OECD	**O**rganization for **E**conomic **C**ooperation and **D**evelopment
OLS	**O**rdinary **L**east **S**quares
OLSR	**O**rdinary **L**east **S**quares **R**egression
RE	**R**andom **E**ffects
SDG	**S**ustainable **D**evelopment **G**oals
WDI	**W**orld **D**evelopment **I**ndicators
WGI	**W**orld **G**overnance **I**ndicators
UNDP	**U**nited **N**ations **D**evelopment **P**rogramme
UNESCO	**U**nited **N**ations **E**ducational **S**cientific and **C**ultural **O**rganization

Chapter 1

Introduction

1.1 Background

Low literacy levels, inadequate access to education, and poor learning facilities are some of the educational problems that confront developing countries in the new millennium. However, there have been considerable improvements in some of these problems since world leaders signed the Millennium Declaration[1] at the United Nations General Assembly in September 2000 – a pledge to liberate our women, children, and men from the dehumanising condition of illiteracy, amongst other things, by way of development assistance (United Nations General Assembly, 2000). Over the last decade in developing countries, for example, there have been improvements in all levels of educational access and school enrolment rates, especially for females (United Nations, 2022). In other words, the levels of poor educational access in these countries have decreased since 1999 through expanded social policies aimed at improving education services – including those targeting women and girls (United Nations Development Programme, 2021).

The preceding shows improvement in educational outcomes in developing countries. It also shows that progress was made in the actualisation of goals 2 and 3 of the Millennium Development Goals and continued progress in the actualisation of

[1]The Millennium Declaration birthed the Millennium Development Goals, since 2015 known as Sustainable Development Goals, which reflects an important endorsement of the central objectives of educational development.

goal 4 of the Sustainable Development Goals which all border on educational development. Motivated by the weak governing capacity[2] in most developing countries and the Millennium Declaration, the OECD and donor agencies such as the IMF and World Bank have had such improvement in education, amongst others, at the centre of their development policies in the new millennium. As a result, these agencies have increasingly been providing developing countries with development aid to foster educational development in these countries.

Official Development Assistance represents the largest single component of such aid and is defined by the Organization for Economic Co-operation and Development (2022a) as "government aid, including grants and soft loans, to developing countries and territories with the promotion of welfare in the recipient country as the main objective." The impact of such assistance, vis-à-vis the subject matter, varies. On the one hand, development aid can prove effective for countries experiencing difficulties improving educational access and literacy levels through good education services. On the other hand, it can be counterproductive and a failure. Whichever outcome depends on how aid is being disbursed and utilised. The effectiveness of aid largely depends on robust accountability mechanisms in donor and domestic institutions – aid tends to be ineffective when such mechanisms are absent.

It is this differing impact of development aid on educational development in the recipient countries that have created the polarised arguments on the subject matter. While some development economists like Michaelowa and Weber (2006, 2008) and Sachs (2005) posit that development aid is essential for increasing educational access and fostering quality education, others like Easterly (2002, 2006), Moyo (2009), and Ramalingam (2013) argue that aid is not only inessential for educational development but also creates dependency and as such, should be gradually reduced before ultimately discontinued (Moyo, 2009). It is partly in this light that the research aimed to discern whether, and under what conditions, educational aid catalyses educational development in lower-middle-income countries (LMICs).

The investigation used panel data for 55 LMICs[3] from 2000 to 2019 to ascertain

[2]Governments with insufficient budget to ensure educational development, amongst other things.

[3]Countries included in the sample were listed and mapped in Chapter 3

whether variations in education aid have had any significant positive impact on variations in three dimensions of educational development: the education index and its component measures which are the mean years of schooling of adults, and expected years of schooling of children. The rest of this chapter detailed the research questions and hypothesis, the purpose of the study, the research significance, limitations, ethical issues, and lastly, the structure of this time-series-cross-sectional study.

1.2 Research Questions

The following questions were addressed by the research findings:

- What impact has education aid had on educational outcomes in lower middle-income countries since the Millennium Declaration?

  Where the specific measures of educational outcomes are:

  UNDP's Education Index (EI) and its component measures:

  The Mean Years of Schooling (MYS); and

  The Expected Years of Schooling (EYS)

- What has been the state of educational development in lower-middle-income countries since the Millennium Declaration?

The first question, which is the main research question, inquires the extent to which variations in education aid have positively impacted variations in educational outcomes in LMICs since the Millennium Declaration was signed. In other words, this question queries whether education aid has catalysed educational outcomes in LMICs measured by variations in EI, EYS, and MYS. The second research question, which is the sub-research question, ties to the first one. This question mainly aided the interpretation of the findings from the first question. This question queries the nature of educational development in LMICs since the Millennium Declaration was signed. This was determined through a trend analysis of the education index and its component measures for 55 LMICs from 2000 to 2019.

1.3 Research Hypothesis

Based on existing literature and arguments on this topic, it was expected that there would be a positive relationship between education aid and educational outcomes in LMICs. Specifically, it was expected that education aid would have a positive impact on educational outcomes given that the main aim of such aid is to promote educational development – the acquisition of knowledge and skills that result in improved living conditions, better employment, prosperity, and social inclusion (Organization for Economic Co-operation and Development, 2022b). Therefore, the research hypothesised that controlling for other potentially causal factors, education aid has had a positive impact on specific measures of educational development in lower-middle-income countries since the Millennium Declaration. The existence of a positive and significant relationship between education aid and educational outcomes was the most important driver of whether the null version of this hypothesis was rejected. Chapter 3 went into further detail on how the research hypothesis was tested.

To answer the first research question, the following hypotheses were formulated. The null hypothesis stands as H_0 while the alternate hypothesis is presented as H_a.

- H_0 - Controlling for other potentially causal factors, education aid has had no positive impact on specific measures of educational development in lower-middle-income countries since the Millennium Declaration.
- H_a - Controlling for other potentially causal factors, education aid has had a positive impact on specific measures of educational development in lower-middle-income countries since the Millennium Declaration.

1.4 Purpose of the Study

The research investigated whether, and under what conditions, education aid has catalysed educational development in LMICs since the Millennium Declaration. The study focused on the time following the Millennium Declaration because existing literature on the subject, as the literature review chapter suggests, has mostly included the period of structural adjustment when aid was largely geared towards economic growth. In a broader sense, this research aimed to understand whether

the contemporary neoliberal, collaboratory aid regime is the way forward for improved educational access in LMICs or the gradual reduction and the ultimate discontinuation of aid flows touted by dependency analyses.

To do this, three indicators of educational development in LMICs constructed by the UNDP were adopted. These indicators/variables were then predicted using the education aid data compiled by the OECD on its Creditor Reporting System (CRS), with control variables from the World Bank included in the models. In other words, given the control variables, the research tested whether variations in education aid shaped variations in the education index and its component measures across 220 observations. The statistical modelling techniques used in broadly achieving the above aims and specifically testing the hypothesis highlighted in this chapter include the pooled OLS, fixed and random effects regression models. To aid the interpretation of the regression results, the research also determined the nature of educational development in LMICs by examining the education index and its components: mean years of schooling and expected years of schooling.

1.5 Significance of the Study

The research findings contributed to the existing body of knowledge about how education aid shapes educational outcomes in developing countries. The argument in the existing literature on the impact of aid on human and educational development is polarised, with the enthusiasts arguing that aid is essential in enhancing human capabilities (Birchler & Michaelowa, 2016; Michaelowa & Weber, 2006, 2008; Sachs, 2005) while the sceptics argue that aid is inessential and such be gradually reduced before ultimately discontinued (Easterly, 2002, 2006; Moyo, 2009; Ramalingam, 2013). The results of this primarily quantitative research inclined towards the body of knowledge on aid ineffectiveness, particularly education aid, in LMICs since the Millennium Declaration was signed. Had the study found a positive impact of education aid on educational development, it would have added to the existing literature on aid effectiveness in developing nations. The research did not, however, argue for the reduction and ultimate discontinuation of aid but rather emphasised the importance of robust accountability mechanisms in aid processes.

More importantly, the significance of this research bordered on the increase in education aid to LMICs since the Millennium Declaration was signed (see Figure 2.1). This was presumably due to the introduction and implementation of the Comprehensive Development Framework (CDF) that marked a shift from the focus on the economic growth of structural adjustment to a new focus on poverty and human development, exemplified in the prevalence of the MDGs and SDGs. This increase in education aid to LMICs since the Millennium Declaration was signed made it vital to determine whether aid has contributed to educational outcomes since the signing of this agreement. The foregoing could also be worth considering for other developing countries or income groups. Since the data and data sources used in this investigation are public, and the methods used are replicable, the research could serve as a model for future studies examining the relationship between education aid and educational outcomes in similar contexts.

Lastly, given the potentially key importance of education aid in promoting educational development in recipient countries (Sachs, 2005), the study's findings could assist policymaking having identified what economic, political, and social factors/conditions can result in education aid catalysing educational outcomes in LMICs.

1.6 Limitations

The study relied on secondary data from the World Bank, OECD, and UNDP. This study's most notable limitation relates to the years included in the research time series. While the focus of the study was from the year the Millennium Declaration was signed to the year with the most recent data (2000 to 2019), the data available on the OECD's Creditor Reporting System only contained flows from 2002 to 2020. This is because the data for official aid flows before 2002 is limited, with coverage below 60%, but has improved to near 100% starting with 2007 flows, making data on commitments before 1995 and disbursements before 2002 unavailable (Organization for Economic Co-operation and Development, 2022c).

As such, the five-year averages used in circumventing the time lag issue for panel data only calculated the average for years 2002, 2003, and 2004 for the 1999 to 2004

group.[4] This, however, did not pose huge limitations to the analysis given that from 2000 to 2001, the CDF was still at its "testing" stage which involved planning and initial implementation of the framework. Additionally, while including the year 2020 could benefit the research, the 2020 data for the educational indicators used in the main models were yet to be made available by the UNDP at the time of writing and analysis.

Other limitations of the study include missing values in variables besides population size and mean years of schooling. After the calculation of average change, 117 to 119 out of 220 observations were available for the regression analyses. Rather than using imputation techniques to fill in missing values and risk introducing bias, these observations were used for the analysis as they were deemed sufficient for inferential statistics.

1.7 Ethical Considerations

In accordance with the ethical standards set out by the School of Social Sciences, University of the Witwatersrand, it should be noted that the study used secondary data from the OECD, World Bank, and UNDP, which are open sources. Thus, there were no ethical issues regarding the data sets used in this study since they were publicly available. As such, the research required no official ethical clearance. However, an ethics waiver with a waiver number of WINTR2022/07/34 was obtained for the research from the School of Social Sciences Ethics Committee.

1.8 Report Structure

There were six chapters in this report. This chapter, the introductory chapter, sketched, among other things, a background to the study, research questions, and purpose of the study. Chapter 2 introduced the study's theoretical framework and relevant literature in this field of study. The review of related literature focused on the polarised arguments on aid effectiveness and ineffectiveness in developing countries, the importance of mutual accountability in aid processes, and trends in education

[4] Chapter 3 provides more details on the calculation of the period averages.

aid to LMICs. Chapter 3 featured a discussion of the study's research methodology with emphasis on the research design, data or variables used for the research, their sources and preparation, and the hypothesis testing procedure. The study's primary findings were presented in Chapter 4, and Chapter 5 discussed them along with their implications for the research hypothesis, policymaking, and previous studies on the subject. Finally, Chapter 6 summarised the study's main findings and made recommendations on frontiers for future research on the impact of education aid on educational outcomes in developing countries.

Chapter 2

Review of Related Literature

2.1 Introduction

In this chapter, debates, and scholarship on the subject matter of education aid and its impact on educational development were presented, especially as it relates to LMICs. The ensuing debates exposed important dimensions linked to the effectiveness and ineffectiveness of aid in developing countries. The chapter began with the presentation of the theoretical framework guiding this study – the capability theory. This was followed by debates on education aid and its impact on educational development. To better understand the relationship between education aid and educational development, the role of mutual accountability was highlighted and explained in the third section. The chapter concluded with trends in education aid flows to LMICs.

2.2 Theoretical Framework

The capability theory is the analytical framework adopted in this study. At the centre of the capability theory is a focus on human capabilities – what people can do and be. The theory posits that people's capabilities are not limited to what they can do or what they have, but also encompass what they can be, and what opportunities they can access. This means that people's capabilities are not just defined by their current circumstances, but also by their potential for growth and development. The theory holds that people have a right to lead lives that are fulfilling and meaningful, and that development policies should aim to create opportunities for people

to realise their full potential. As human beings are the centre of all endeavours, development should be centred on enhancing their capabilities, achievements, and freedoms; thus, it is the lives that human beings lead that are vital, not their income or assets (Anand & Sen, 1994). A person's income level, for example, does not reveal their educational capabilities – whether he or she can escape illiteracy.

The capability theory has its roots in the work of philosopher and economist Amartya Sen. According to Sen, development should be viewed not as a narrow economic goal of increasing gross domestic product (GDP), but as a broader goal of expanding human capabilities and freedoms (Anand & Sen, 1994). The capability approach emphasises the importance of empowering people to participate fully in economic, social, and political life, and to have the ability to make choices that are meaningful to them (Anand & Roope, 2016).

The capability approach also emphasizes the importance of social justice and equity in development policies. According to Sen, inequalities in capabilities and opportunities are a key source of injustice, and development policies should aim to address these inequalities. This requires a focus on redistributive policies that promote greater equality in income, wealth, and access to opportunities, as well as policies that address social exclusion and discrimination.

In practice, the capability approach has been used in a range of policy areas, including education, health, gender equality, and poverty reduction. The approach has also been used to critique traditional measures of development such as GDP, arguing that these measures do not capture the full range of factors that contribute to human wellbeing. The main driving force behind this theory is the failure of private or national income to adequately account for crucial aspects of life quality and standards of living such as infrastructure, environment, health, education, and law and order (Anand & Sen, 1994). The life that people lead is given primacy in this theory. Do they possess the capacity for lengthy life? Are they free from preventable morbidity? Can they prevent infant and child mortality? Do they not experience hunger or malnutrition? Can they escape illiteracy? Do they have freedom and personal liberty? (Anand & Sen, 1994).

These are the core components of wellbeing that spill from centring development on human beings. Enhancing peoples' capabilities to function in the following ways

is central to human development. While peoples' welfare cannot be ascertained by cardinal measures or policies, it is safe to say that improving their capability will enable them to reach their goals (Anand & Sen, 1994). Overall, the capability theory offers a powerful framework for understanding human development and wellbeing (Anand & Roope, 2016). By placing human capabilities at the center of development policies, the capability approach offers a more holistic and inclusive vision of development that prioritizes human flourishing and social justice.

2.2.1 Criticisms of the Capability Theory

While the capability approach has gained widespread recognition as a valuable framework for understanding human development and wellbeing, it is not without its criticisms. Some of the main criticisms of the capability approach include:

Difficulty in operationalization: One of the key criticisms of the capability approach is that it can be difficult to operationalize in practice (Alkire, 2005; Sugden, 1993). While the capability approach offers a valuable conceptual framework for understanding human development, it can be challenging to translate these concepts into practical policies and interventions. For example, how do we measure and quantify capabilities, and how do we design policies and programs to promote them?

Lack of attention to power dynamics: Another criticism of the capability approach is that it does not sufficiently account for power dynamics and social structures that shape people's capabilities and opportunities (Deneulin & Stewart, 2002). While the capability approach recognizes that people's capabilities are influenced by broader social and economic structures, it does not provide a clear framework for analysing or addressing power imbalances and structural inequalities.

Limited attention to the environment: Another criticism of the capability approach is that it does not adequately account for the environmental dimensions of human wellbeing (Egdell & Robertson, 2021; Schleicher et al., 2018). While the approach recognises the importance of environmental sustainability, it may not fully account for the ways in which environmental factors shape people's capabilities and opportunities.

Limited attention to politics: Finally, some critics have argued that the capability approach does not sufficiently account for the political dimensions of human well-being (Nussbaum, 1998; Shanmugaratnam, 2001). While the approach recognises the importance of political freedoms and participation, it may not fully account for the ways in which political processes and structures shape people's capabilities and opportunities.

In summary, while the capability approach has gained significant recognition as a valuable framework for understanding human development and wellbeing, it is not without its criticisms. Critics have pointed to challenges in operationalising the approach, as well as limitations in its ability to account for power dynamics, cultural diversity, environmental sustainability, and political processes. Despite these criticisms, the capability approach remains a valuable framework for understanding human wellbeing and promoting social justice.

2.3 Development Aid and Impact on Educational Development: Help or Hindrance to Developing Countries?

A report by the United Nations Educational Scientific and Cultural Organisation (2019) shows that from 1995 to 2010, total aid to education in developing countries rose 360% from $2.9 billion to $13.3 billion. In 2017, total aid for education was $12 billion, a 4% drop from 2010 (United Nations Educational Scientific and Cultural Organisation, 2019). Aid for basic education, which includes support for pre-primary, primary, adult education and literacy programs, was $5.2 billion in 2017, a 6% decline from 2010 (United Nations Educational Scientific and Cultural Organisation, 2019). Secondary education received $2.2 billion in 2017, making up 19% of total aid for education (United Nations Educational Scientific and Cultural Organisation, 2019).

The impact of such an increase in education aid on educational outcomes in developing countries has been highly debated over the years, especially since the Millennium Declaration and the shift in global development framework and policy away from economic growth to a new focus on poverty and human development

through the CDF. While the enthusiasts in this debate argue that such aid can play an important role in improving educational access and better learning in developing countries, the critics dismiss this submission and argue instead that such aid presents dangers.

Easterly (2002, 2006), a former senior research economist at the World Bank, is a strong voice in the aid-critic camp. Easterly acknowledges that aid from donors is neither essential nor adequate for increasing the standard of living in the developing world. It is not essential because living standards have been raised in numerous countries without a 'big push'[5] and it is inadequate because despite substantial aid flows, many countries remain trapped in poverty (Easterly, 2006).

Easterly emphasises that in the past five decades, donor countries have provided USD 2.3 trillion in aid to developing countries, but at the end of this period, hunger, starvation, illiteracy, and diseases were still rampant (Ikenberry & Mastanduno, 2019). Easterly offers reasons *Why the West's Efforts to Aid the Rest Have Done So Much Ill and So Little Good*, most of which borders on accountability. According to him, aid bureaucrats and economists aim to satisfy donor's millennium agreement to improve living conditions in the 'Global South' instead of simply alleviating poverty levels in those countries (Easterly, 2006). This is further worsened by the West's conceptualisation of the Rest since colonialism which motivates its provision of aid to 'gangsters' governing some of the poor countries on the one hand and the ineffectiveness of multilateral institutions who lend repeatedly to failed governments with low levels of accountability, on the other (Easterly, 2006). The latter is exemplified in the case of General Mobutu in DRC where no fewer than eleven IMF loans were repeatedly awarded to a notoriously corrupt government; thus, reducing the effectiveness of aid (Ikenberry & Mastanduno, 2019).

Moyo (2009) and Ramalingam (2013) extend Easterly's argument by arguing for the elimination of development aid. Moyo (2009) attributed the overall dysfunction in the African continent to foreign aid and argues that official aid is easy money that not only promotes corruption but also creates dependency and economic fatigue. She supports these conclusions by exploring literature on aid effectiveness and presenting results of analyses conducted by previous authors on the subject matter

[5]By this, Easterly refers to the recommendation by Sachs (2005) that a big aid push could end poverty in developing countries.

which shows how aid is a failure and a 'silent killer of growth' in Africa. Moyo recommends that the gradual reduction and ultimate discontinuation of aid, given its failure, will see nations focus on international trade and the international capital markets as alternative means of development financing. This, however, appears contradictory as both alternatives, like official aid, thrive heavily on dependency amongst nations.

Bringing the discussion closer to the research subject matter, Easterly, Moyo, and Ramalingam's conclusions on aid ineffectiveness find support in the findings by Findley et al. (2010) whose empirical analysis of the sector-by-sector effectiveness of foreign aid to developing countries revealed that increased education aid does not improve educational outcomes. A similar study by Christensen et al. (2010) using aid data for less-developed countries from 1975-2005 shows a negative effect of education aid on school enrolment. They attributed this to the wrong or non-usage of aid in the education sector by the receiving countries. Similarly, Ogbebor et al. (2018) analysis of aid impact on educational development in West Africa from 1974 to 2014 also found that aid has a significant negative impact on educational development.

Easterly's conclusions, however, do not support an end to aid flows. He instead, in disagreement with Sachs (2005), argues that donors should create more specialised aid programmes and ensure strong feedback and accountability from national and international officials in aid processes.

Jeffrey Sachs, who is likely the most well-known publicly outspoken economist in support of development aid, largely counters Easterly's foregoing position on aid. Sachs, in contrast to Easterly, argues that a new grand design[6] could significantly aid in eradicating poverty in developing countries (Ikenberry & Mastanduno, 2019). Sachs, however, agrees with Easterly that aid can help fight poverty and that profound corruption in developing countries can impede aid effectiveness and development. Sachs makes his case for development assistance using arguments for the "poverty trap" and the "financing gap." He argues that a country is caught in a poverty trap whereby the extremely poor in the country are too poor to save and thereby accumulate the capital per person they require to escape poverty (Sachs,

[6]By this, Sachs refers to the MDGs, currently SDGs.

2005). Sachs' argument in this sense is thus: capital investment is needed for development to occur and investment is only possible with saving. When a country or its citizens has an income outside that required for survival, savings can then materialise (Sachs, 2005).

The foregoing, according to Sachs, is the case for developing countries; thus, aid is vital to ensure capital accumulation and development in these countries (Sachs, 2005). Easterly, however, disagrees with the poverty trap argument because there is no proof that initially underdeveloped nations have a development disadvantage once good governance is controlled. He rejects the financing gap argument because the connection between investment and related output is unstable and secondly because, in most countries, data do not show a positive relationship between investment and aid.

In the context of educational development, Sachs' findings are echoed by Michaelowa and Weber (2006) who, in analysing the impact of education aid on primary enrolment rates for 80 low-income countries from 1975 to 2000 and 1993 to 2000 found a positive relationship between increased education aid and improvements in primary enrolment rates. Their regression analysis further revealed that the effectiveness of education aid increased when it was combined with good governance – a similar result was obtained in this research. Other studies by Michaelowa and Weber (2008) and Birchler and Michaelowa (2016) equally found evidence that increased education aid by donors to developing nations significantly aided increases in primary, secondary, and tertiary enrolment rates. Similarly, an investigation by Christensen et al. (2012) found aid effectiveness on school enrolments for 109 low and lower-middle-income countries from 1975 to 2005. In a similar vein, Dreher et al. (2008)'s empirical analysis of over 96 low and middle income countries from 1970 to 2004 revealed that increased education aid improves primary school enrolment rate but government spending does not.

To conclude this sub-section, it has been observed so far in the review the dichotomy existing in literature on the research subject matter. The literature by Christensen et al. (2010) which is more closely related to the research topical issues reveals aid ineffectiveness on school enrolments for less-developed countries from 1975 to 2005. It is, however, worth noting that the period for the aforementioned

study includes the era of structural adjustment – a period where development policy was largely geared towards economic growth. By focusing on LMICs since the Millennium Declaration, the research built on the authors' study to find out how aid has impacted educational development since the shift in development policy to a focus on poverty in 2000.

2.4 Development Aid and Impact on Educational Development: Assessing the Role of Mutual Accountability

There exists an interrelation between the reception of development aid and the existence of accountable, domestic political institutions in achieving aid effectiveness on educational outcomes. While Winters (2010) presents evidence to show that aid is more effective where governments are more democratic and accountable and the rule of law prevails, it is worth noting that a country can have strong, accountable domestic institutions without 'democracy' as understood in the liberal tradition.[7] However, being that accountability is a key feature of the democratic system of government, its role in ensuring aid effectiveness is better assessed in the light of democratic values.

Democracy as a concept suffers definitional crisis but central to its definitions is a focus on individuals or the citizenry – government originating from and exercised by the people in their interest (Becker & Raveloson, 2008). A similar definition of the concept by Dahl (2000) as a government by the people, carried out in their interest and as such, makes for higher accountability by public officeholders appears to have more bearing on the research topical issues. Democracy is based on implementing values such as citizen participation in government, freedom of expression, equality, liberty, and civil access to public service in the exercise of power. The implementation of these values would, in turn, make for transparency, rule of law, efficacy, responsibility, enhanced governing capacity, and efficiency of domestic institutions. These principles also guarantee domestic accountability – government accountability to the citizenry (Dahl, 2000).

[7] Some of the so-called developmentalist states in Asia and Latin America lay credence to this.

Nonetheless, there is a need to complement these values with an environment where real processes, principles, accountability thrives, and the opinions of the minority are appreciated. It is the actualisation, respect, and consolidation of these key democratic values in the relevant society that allows mutual accountability to thrive in development aid (Ohamadike, 2022). Hudson and GOVNET (2009) acknowledge that the components of accountability in development aid involve the key concepts of transparency which entails citizens' access to information about government activities and finances; answerability, which denotes that citizens can ask the government to justify its acts and operations; and enforceability, which means that if the government fails to uphold particular standards, citizens can sanction them.

Accountability in development aid is a complex issue, and studies on the topic have mostly centred on state institutions as recipients. However, ODA involves a wider network of actors beyond state institutions, including donors and non-state actors such as NGOs, Public-Private Partnerships, multilateral institutions, research institutes, and private entities. A comprehensive approach to accountability in ODA must take into consideration all these actors. Mutual accountability in development aid ensures that all these bodies keep to their commitments in aid processes. Put differently, mutual accountability entails that both donors and partner countries and institutions are jointly responsible for development aid results, as well as being accountable to each other and to their constituencies in ensuring aid effectiveness (Swedish Agency for Development Evaluation, 2012). Mozambique, for example, can be seen as a forerunner in developing mechanisms for mutual accountability, and the resultant overall aid effectiveness and coordination which is partly because a large number of donors have been active for a long time in the country (Swedish Agency for Development Evaluation, 2012).

The central ethical concern around accountability in aid is that state and non-state actors may not effectively use aid for its intended purpose, which brings the question of how development aid can be managed in a manner that ensures mutual accountability. In this sense, Hudson and GOVNET (2009) and Organization for Economic Cooperation and Development (2007) emphasise enhancing the capabilities of key institutions in political accountability such as the media, civil society organisations, the parliaments, and political parties but neither offers a list of tangible processes to achieve that. The International Financial Institutions Anti-Corruption

Task Force (2006) offers a guide on investigating corruption and punishing offenders but said little about preventing it. Winters (2010) recommends, from a public participation perspective, the creation of incentives and mechanisms by donors with which the end-users can use to effectively monitor the execution of aid programs but does not specify how to create these.

In sum, while these various debates differ in their recommendations, they all agree that accountability is key to aid effectiveness. Development aid in the framework of accountability is better aid. In the same vein, development aid projects which incorporate accountability mechanisms are better projects. Hence, donors need to ensure the presence of such mechanisms for development aid to work in developing countries.

2.5 Education Aid and Educational Development in Lower-Middle-Income Countries

The LMICs grouping is made up of 55 countries based on the World Bank's classification. Middle-Income Countries (MICs) are a varied group based on income level, population, and size. As classified by the World Bank, LMICs include those countries with a GNI per capita of $1,036 to $4,045 while upper middle-income economies include countries with a GNI per capita of $4,046 to $12,535 (World Bank, 2020). Middle-Income countries are important growth drivers in the global economy since nearly a third of the world's GDP comes from this grouping (World Bank, 2020). At the same time, they house 75% of the global population and 62% of the world's impoverished (World Bank, 2020). Thus, MICs, especially lower-income ones, are a priority for development aid to provide welfare services to the end-users.

As some pro-aid scholars have argued, educational development is vital for human and economic development (Aremu, 2010; Sachs, 2005; World Bank, 2020). It is, therefore, no surprise that since the Millennium Declaration was signed, donors and donor agencies such as the World Bank has continued to develop their relationship with LMICs, working with them as clients, shareholders, and global actors to

help in the improvement of educational access and services. To help facilitate educational development in these countries, donors and donor agencies have increasingly been providing aid – loans, risk management products, guarantees, knowledge and advisory services (including on a reimbursable basis) – to LMICS since the Millennium Declaration was signed (World Bank, 2020).

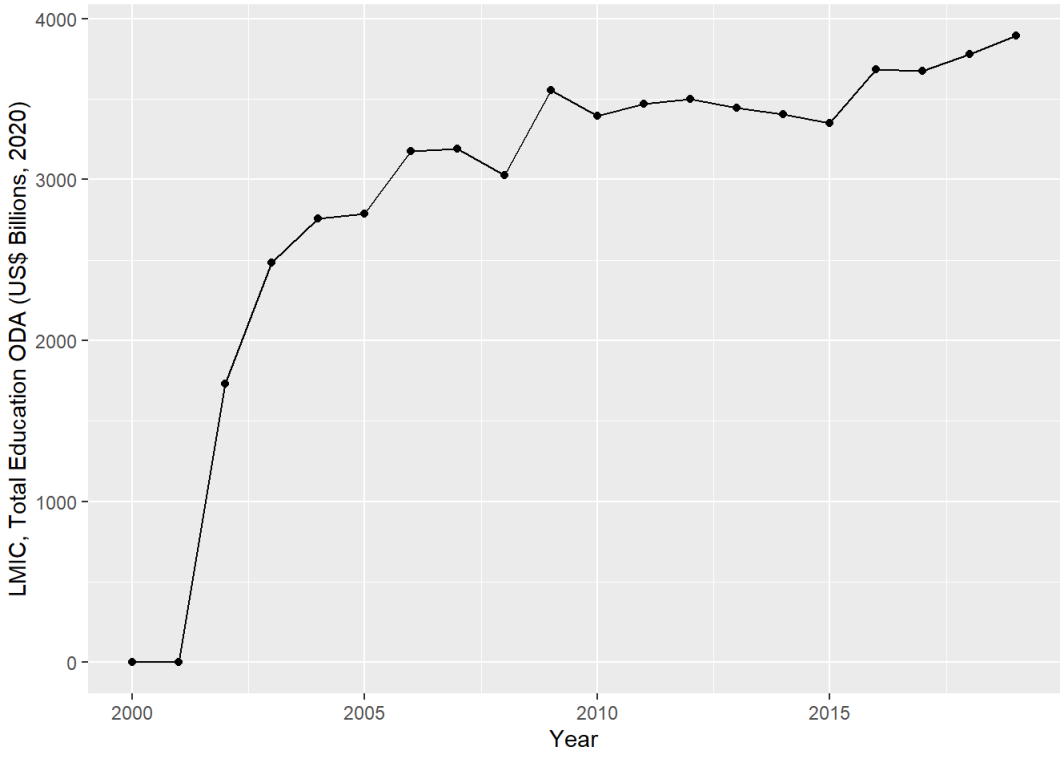


FIGURE 2.1: Total Education Aid to LMICs (2000 - 2019)

As seen in Figure 2.1, education ODA to these countries maintained an uptrend from the $1.7 billion that was disbursed in 2002 to the $3.9 billion in 2019 – an increase of 125 per cent. Education ODA first peaked at $3.6 billion in 2009 but took a slight downturn until 2016 when the previous peak of 2009 was surpassed. Education ODA maintained an uptrend thereafter until 2019.

Overall, there has been an increase in education aid to LMICs since the Millennium Declaration was signed. Some pro-aid scholars argue that such an increase can assist in combating educational problems. Sachs, for example, contends that such a big aid push is important for development, educational development in this case, in

recipient countries (Sachs, 2005). It is partly in this sense that this research aimed to ascertain whether the increased education aid to LMICs has catalysed educational development.

2.6 Conclusion

As the literature review shows, the study on aid effectiveness on educational outcomes has been fraught with challenges and polarisation in debates. With the increased availability and reliability of education aid data particularly on the OECD and World Bank databases, an increasing corpus of academic work has attempted to explain the influence variations in education aid have had on variations in educational outcomes in broadly developing countries. However, these studies have generally included the structural adjustment era, a period when aid was largely geared towards economic development as opposed to human development. In short, since the Millennium Declaration was signed, there have been very few quantitative studies that have attempted to investigate this relationship with a timeline focusing on this remarkable agreement. This is a relevant concern because of the increased focus on human development (education, healthcare, income, poverty reduction) exemplified in the growing popularity of the MDGs and SDGs and the attendant increase in aid to developing countries. The study thus contributes to addressing a major blind spot in the academic literature on the impact of education aid on educational outcomes. In the next chapter, the research methodology was discussed.

Chapter 3

Research Methodology

3.1 Introduction

The research methods used in understanding whether, and under what conditions, education aid shapes particular educational outcomes in LMICs were discussed in this chapter. The chapter began by providing details on the study's research design. The chapter thereafter focused on the investigation sample, the data, and data sources, where the variables and sources of variables used for the research were detailed, and the data preparation procedure. Finally, this chapter presented a summary of the methods used to test and assess the research hypothesis presented in Chapter 1.

3.2 Research Design

3.2.1 Overall Research Design

The study integrated statistical, sampling, and hypothesis-led methods using observational data. The methods entail hypothesis testing and results analysis based on identifiable relationship between two or more variables. The methods were chosen as a means of testing the research hypothesis outlined in Chapter 1. In quantitative research, emphasis is laid on measuring, predicting, and drawing conclusions based on the relationship between statistical variables. In this study, therefore, the focus was on examining the relationship between education aid and educational outcomes in LMICs since the Millennium Declaration (2000-2019). The

statistical techniques used in testing the research hypothesis were detailed in this section. Pooled OLS regression models were built using the main data set, which included 220 observations and represented average change data for the different LMICs from 2000 to 2019. The fixed and random effects models served to complement the pooled OLS regression model.

3.2.2 Pooled OLS Regression Model

One of the pillars of statistical modelling is the pooled OLS regression model. A pooled OLS regression model is a statistical model that assumes a constant slope and intercept across the data and is analysed using the ordinary least squares regression technique. This means that the model assumes that the relationships between the variables are the same across all groups. This model was used in the research since the three educational indicators, which are the dependent variables, are panel data sets that are continuous in nature. The education index and its two component measures, the mean years of schooling (of adults), and the expected years of schooling (of children), make up these three dependent variables. The pooled OLS regression model, therefore, examined the degree of changes in each dependent variable brought about by the predictor variables in the models (Fox & Weisberg, 2019). The education aid variable served as the primary predictor variable in the research's pooled OLSR models, while a particular indicator of educational development served as the primary dependent variable.

The pooled OLSR model had five control variables that contributed to stripping away parts of the spurious components of the relationship between education aid and educational outcomes. These variables include government expenditure on education, voice and accountability, trade, GDP per capita, and population size.[8] The research data sets were, therefore, analysed using the linear model of the R statistical analysis software and complemented with the fixed and random effects models discussed below. Using "squares" under the linear model reduced the error in the prediction and prevented the issue of signs; thus, negative and positive prediction errors were given equal prominence.

[8]The parts that follow in this chapter went into greater detail about the dependent and independent variables used in this research.

3.2.3 Fixed and Random Effects Models

Clemens et al. (2012) argue that once group-level effects by country and time have been considered, regressions relating to the effectiveness of aid for growth can be viewed as more or less unbiased. Therefore, to account for country-specific factors which might confound the results, and in line with other scholars (Angrist & Pischke, 2008; Gibson et al., 2015; Ogbebor et al., 2018), fixed and random effects models were included. These models were employed to complement the pooled OLSR model.

The main distinction between the FE and RE models and the pooled OLSR model is that the former controls for the countries included in the analysis at the group level (Desai, 2021). The intercepts in both the fixed and random effects approaches are not pooled, meaning that both approaches have varying intercepts. However, the main difference between both approaches is that the fixed effects model controls for group-specific differences while the random effects model treats group differences as a source of random, interchangeable variation.

The country control variable in the research's FE and RE models was measured at a "higher," grouping variable level compared to other predictor variables in the models because it took into account whether the variation, if any, caused by the country where a data point was located is substantive (Desai, 2021). This is important since the pooled OLSR model does not consider heterogeneity across groups. In this research, both the FE and RE models considered the likelihood that observations from the same LMIC may be more comparable than observations from other LMICs. Thus, the fact that the FE and RE models consider country groupings is a significant benefit of the approaches over the pooled OLSR model (Fox & Weisberg, 2019). For this study, the country variable included in the FE and RE models considered varying intercepts by country for the 55 LMICs at group level.

3.2.4 Robustness Check Procedure

As part of testing the research hypothesis, the robustness check models used other measures of educational development from the World Bank as dependent variables. The indicators used in this model include net primary, secondary, tertiary school enrolment rates, and net total enrolment rate. For the main research models (pooled

OLSR, FE, and RE), the study measured educational development using the mean years of schooling of adults and expected years of schooling of children variables which both make up the UNDP's education index. In simple terms, educational development was measured in the main models by how many years adults aged 25 and above and children aged 5 to 24 spend or are expected to spend in school based on UNDP's goalposts. Contrastingly, the robustness check models measured educational development in a more disaggregated form focusing on school enrolments that are not age-specific. This is considering that donors have often emphasised the multidimensionality of their educational objectives (Dreher et al., 2008).

Primary school enrolment is simply the entire number of students enrolled in public and private primary education institutions regardless of age or gender (World Bank, 2022b). Secondary school enrolment on the other hand is the totality of students enrolled at both private and public secondary educational institutions that are not age-specific nor gender-specific (World Bank, 2022b). Tertiary enrolment is the total number of students (of any age or gender) enrolled at both public and private tertiary education institutions (World Bank, 2022b). Lastly, total school enrolment was calculated by summing up primary, secondary, and tertiary education. These variables were estimated as net enrolments (divided by population size) to adjust for country size. They were also calculated in terms of average change before their inclusion in the robustness check models.[9]

Since there is insufficient data on disaggregated education aid focusing on all levels of school enrolment, and consistent with other scholars such as Asiedu (2014), Dreher et al. (2008), and Ogbebor et al. (2018), aggregated education aid, as in the main models, was used in the robustness check models. For both the robustness check models and the main models, the data reflected education aid (per capita) and educational development values for LMICs from 2000 to 2019, with relevant control variables included in the models.

3.2.5 Time Lags

It is worth noting that before employing these models, and consistent with other scholars such as Birchler and Michaelowa (2016), Dreher et al. (2008), and Ogbebor

[9]The calculation of average change was covered in more detail in the subsequent sections in this Chapter.

et al. (2018), the possibility of considerable lags between receiving aid and seeing changes in the educational indicators was accounted for by averaging the variables over five-year intervals. As such, the data was grouped into the following time frames: 1999 to 2004, 2004 to 2009, 2009 to 2014, and 2014 to 2019, reducing the number of observations from 1100 to 220. This calculation was performed before expressing the variables in terms of change.

Time lags were also considered for the control variables to account for initial conditions – that is, the conditions before the period in which education aid affects the educational indicators. The control variables chosen to capture initial conditions were the average change versions of GDP per capita, government expenditure (% of GDP), and population. These were selected as they were deemed to have a stronger relationship with education aid and the educational indicators, and were more likely to change over time based on the data. The choice of these control variables was made to ensure that the model accurately captures the underlying relationships and trends in the data.

Additionally, time lags were considered for the educational outcomes to eliminate potential endogeneity or reverse causality, which is the possibility that the educational outcomes could impact the allocation of education aid. For example, a country with a poor record on education might be more likely to receive education aid, not because the aid is causing improvements in the education sector, but because the poor education system has attracted the attention of aid donors. However, as the results of such models were not substantially different from the main results, they were not reported in the research to conserve space, given the numerous regression tables included. The control variables for initial conditions were measured in the second period as data for the first period was lost having calculated the variables in terms of change.

3.2.6 Regression Equation

To guide the regression analysis and to better explain the research models, a simple pooled OLSR model equation is formed below:

$$y_j = \alpha + \beta X_j + \epsilon_j \tag{3.1}$$

Since the the fixed and random effects models (with varying intercepts by country) are an extension of the pooled OLSR model, they are represented by the following equation:

$$y_j = \alpha_{i[j]} + \beta X_j + \epsilon_j \tag{3.2}$$

Where in both models:

y = the dependent variable

X = the predictor variables

α = the intercept

i = the country grouping

ϵ = the error term

j = the smallest units

3.3 Investigation Sample

In total, there were 55 LMICs included in this study. These countries are Algeria, Angola, Bangladesh, Belize, Benin, Bhutan, Bolivia, Cabo Verde, Cambodia, Cameroon, Comoros, Congo Republic, Cote D'Ivoire, Djibouti, Egypt, El Salvador, Eswatini, Ghana, Haiti, Honduras, India, Indonesia, Iran, Kenya, Kiribati, Kyrgyz Republic, Lao PDR, Lesotho, Mauritania, Micronesia, Mongolia, Morocco, Myanmar, Nepal, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Philippines, Samoa, Sao Tome and Principe, Senegal, Solomon Islands, Sri Lanka, Tajikistan, Tanzania, Timor-Leste, Tunisia, Ukraine, Uzbekistan, Vietnam, West Bank and Gaza, Zambia, and Zimbabwe.

Figure 3.1 maps the countries included in the research sample. To be chosen as a sample nation for this research, a country needed to be classified as an LMIC based on the World Bank's 2020 classification of countries based on income (World Bank, 2020). The map shows that most of the countries in the sample are found in Africa and Asia, very few in Europe, Australia, and North America, and none in South America.

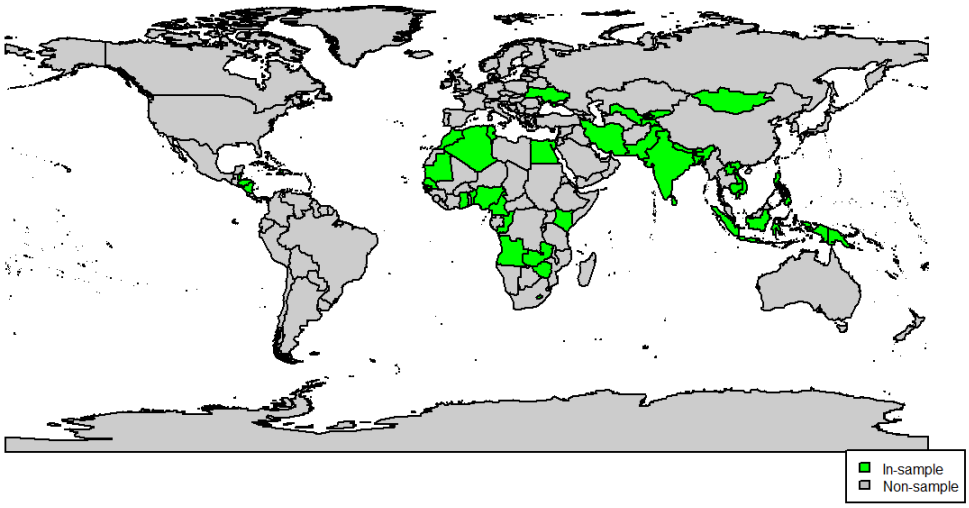


FIGURE 3.1: Map of Sample

The period 2000 to 2019 was chosen as the sample period for the study since the Millennium Declaration, which ushered in a development policy focusing on human development, was signed in 2000. The year 2019, on the other hand, was the most recent year (at the time of writing) with available data on the UNDP for the educational indicators used in this study. The study was, therefore, a time-series-cross-sectional study that analysed how the educational aid-educational development relationship changed over time for 55 LMICs.

3.4 Data Preparation

The main tool used for this study's data preparation, statistical modelling, data visualisation, and map construction was the R statistical software version 4.2.1,

within the RStudio development environment.[10] The "cleaning" and subsequent integration of the UNDP, OECD, and World Bank data sets constituted the primary data preparation tasks. The countries that were irrelevant for the analysis (not on the World Bank's list of LMICs) were deleted using base R "merge" function during the cleaning and data preparation process. All non-sample years in the time series were also removed from the data set during the merge.

For the control variables, the relevant data sets were downloaded from the World Bank's WGI and WDI databases. Since the LMIC classification was done by the World Bank, this provided a base for combining all the data sets in R using the WDI data set from the World Bank. In other words, with this base, it was possible to combine all data sets by the 55 LMICs and the 20-year period in the WDI data set. To do this, iso3c country codes were created in all the data sets (including the WDI data set) using the *countrycode* package (Arel-Bundock et al., 2018). This was done to establish a common country-level feature for all the data sets with which R could use in executing the merge instruction. After that, the data sets were combined by year and country codes with all the values in the WDI data set as TRUE.

After combining the variables, the education aid and all the school enrolment rates variables used for the robustness check were divided by the population variable to adjust for country size. Period averages were thereafter calculated by a five-year interval to circumvent the lag issue with panel data. This saw the total observations drop from 1100 to 220. After that, the variables were calculated in terms of change. It is worth noting, and consistent with Birchler and Michaelowa (2016), that instead of levels, the educational indicators in all models were calculated as percentage changes from one period to the next within countries. This is considering that Figures 4.4 to 4.6 as well as Figures C.1 to C.3 in Appendix C show clear, smooth, annual trends in the levels within countries for each educational indicator. This indicates that the time-series data are likely to be closely auto-correlated in their original form – that is, knowing the previous period's value strongly predicts

[10]The following R packages were used in the research: *countrycode* package (Arel-Bundock et al., 2018), *readxl* package (Wickham & Bryan, 2022), *car* package (Fox & Weisberg, 2019), *plyr* package (Wickham, 2011), *ggplot2* package (Wickham, 2016), *stargazer* package (Hlavac, 2022), *lme4* package (Bates et al., 2015), *corrplot* package (Wei & Simko, 2021), *maptools* package (Bivand, 2022), *ggthemes* package (Arnold, 2016), *dplyr* package (Wickham et al., 2018).

the current period's value. This, therefore, violates the linear regression assumption of independence.

The predictor variables were equally calculated as change variables to ensure uniformity in the variables. Specifically, GDP per capita, trade, and population size were calculated in terms of percentage changes while change in government expenditure and education aid were calculated by subtracting previous values from current values within countries. The subtraction technique was adopted to improve linearity in the models. Since voice and accountability was not measured at ratio level, change in the variable was equally calculated using the subtraction method.

3.5 Data and Data Sources

The study utilised secondary data, with a focus on panel data of 55 LMICs for statistical analysis. In this part of the methodology, the data and sources of data used in this study were discussed. This section began with a discussion of the dependent variables and subsequently the independent and control variables.

3.5.1 Dependent Variables: Educational Indicators

3.5.1.1 Overview

As indicated earlier in this Chapter, the mean years of schooling (of adults), expected years of schooling (of children), and the education index are the three educational indicators used in the main research models. Data for these indicators were obtained from the United Nations Development Programme (2022). The education index was calculated by taking the unweighted arithmetic mean of the expected years of schooling index and the mean years of schooling index on a scale from 0 to 1. The mean years of schooling and expected years of schooling were within the bounds of 0 to 15 and 0 to 18, respectively. As already noted, all educational indicators were calculated as average change due to time lag issues and possible autocorrelation. The rest of this sub-section provided details on how each indicator was sourced, created and what they measure.

Dependent Variable	Minimum value	Maximum Value/Aspirational Target
Mean years of schooling (years)	0	15
Expected years of schooling (years)	0	18
Education index	0	1

3.5.1.2 Mean Years of Schooling (MYS)

The study adopted mean years of schooling (MYS) as a dependent variable. MYS is part of the Education Index (EI), which is one of the components of the Human Development Index (HDI). The mean years of schooling of a country's population aged 25 years and older is a measure of educational attainment and access. It indicates the average number of educational years spent by "adults" in a country's population in their lifetime. Put simply, this indicator measures the average number of years spent in school for those in the 25+ age group and therefore, shows the contemporary schooling level of the population (Smits & Permanyer, 2019).

A relatively high figure on this measure suggests a successful educational system and indicates larger proportions of educational attainment for the adult population based on the highest level of education acquired or completed (United Nations Educational, Scientific and Cultural Organization, 2022). The aspirational target for this indicator for the year 2025 is 15 years; thus, the indicator is measured on a scale of 0 to 15 and the higher the value, the better a country performs on the scale (Smits & Permanyer, 2019; United Nations Development Programme, 2022).

To calculate the education index, the mean years of schooling was first expressed as an index within the bounds of 0 to 1. In standardising this component indicator, the goalposts (0 to 15) served as "the natural zeros" and "aspirational aims", respectively (United Nations Development Programme, 2022). The mean years of schooling index was, thus, calculated using the following formula:

Dimension Index = (actual value – minimum value) / (maximum value – minimum value) (3.3)

According to United Nations Development Programme (2022), the data for the mean years of schooling was obtained from surveys, census and calculations conducted by the UNESCO Institute for Statistics (2020), Barro and Lee (2018), OECD

(2019), ICF Macro Demographic and Health Surveys (2008-2020), and UNICEF Multiple Indicator Cluster Surveys (2008- 2020). Using these multiple sources, therefore, improves the reliability of the indicator.

3.5.1.3 Expected Years of Schooling (EYS)

Expected years of schooling, on the other hand, is also one of the components of the education index as part of the broader Human Development Index. It is the number of years a child of school entrance age (ages 5-24) is anticipated to spend in school or university, including years spent on repetition, should enrolment rates remain the same for the duration of the child's life (United Nations Development Programme, 2022; World Bank, 2022c). It is the total of the enrolment ratios for primary, secondary, post-secondary non-higher, and tertiary education that are age-specific (World Bank, 2022c).

This indicator has the advantages of being easy to calculate, not requiring standardisation in comparisons between countries with various age structures, and being a metric that takes into account both flow and stock dimensions in the educational system (Rigotti et al., 2013). The expected years of schooling is, therefore, an important component measure given that it captures the expected educational attainment of "non-adults" considering prevailing patterns of age-specific enrolment rates.

The aspirational aim for this indicator is 18 years. The indicator is, thus, measured on a scale of 0 to 18 – the higher the value, the better a country performs on the scale (Smits & Permanyer, 2019; United Nations Development Programme, 2022). In an identical manner to the mean years of schooling indicator, this measure was first expressed as an index within the bounds of 0 to 1 to calculate the education index. The goalposts act as "the natural zeros" and "aspirational targets" from which this component indicator was standardised (see equation 3.5.1.2) (United Nations Development Programme, 2022). The expected years of schooling index was calculated using the same formula as in equation 3.5.1.2.

The data for this indicator, as highlighted by the United Nations Development Programme (2022), was gotten from surveys, census and calculations conducted by UNICEF Multiple Indicator Cluster Surveys, the UNESCO Institute for Statistics

(2020), ICF Macro Demographic and Health Surveys, and OECD (2019). The multiplicity of sources, therefore, makes for reliability.

3.5.1.4 Education Index (EI)

To ensure uniformity between the two measures of educational development, the simple average of the two indicators expressed as an index was obtained by scaling with the corresponding maxima (Saisana, 2014; United Nations Development Programme, 2022). By using the expected years of schooling of children aged 5 to 24 and the mean years of schooling of adults aged 25 and older, this index encompassed the relevant school-age population in the sample for this study. In other words, this index measured the level of educational attainment for adults and the expected level of educational attainment for children in the sample population starting from the year 2000. This year marks increased focus on education as part of human development following the Millennium Declaration.

For the education index, equation 3.5.1.2 was first applied to each of the two component measures to obtain their indexes, and then the arithmetic mean of the two resulting indices was taken. The unweighted arithmetic mean of the two component measures allows for the expected years of schooling and the mean years of schooling to be perfectly substituted (United Nations Development Programme, 2022). This was done since many developing nations have poor educational attainment for their adult populations but are very eager to achieve universal enrolment in primary and secondary education for school-age children (United Nations Development Programme, 2022). The calculated index was within the bounds of 0 to 1 and the formula used for calculating the education index is thus:

Education Index = (mean years of schooling index + expected years of schooling index) / 2 (3.4)

For this research, however, the two component measures were predicted separately from the education index to determine how their regression results differ from the results obtained from that of the education index.

3.5.2 Independent Variable: Education Aid (per capita)

Education aid is the independent variable employed in this study. It is a measurement of how much money is disbursed to developing countries in the form of aid for educational development. As previously stated, the data for this variable was obtained from the OECD.

The OECD maintains a database (the Creditor Reporting System (CRS)) of the total annual amount disbursed by donors to the education sectors of developing countries to promote educational development. This is called Official Development Assistance (ODA) to Education. The CRS considers disbursement through various conduits like the public sector, private sector institutions, civil societies and NGOs, Public-Private Partnerships, think-tanks or research institutes, teaching institutions, and multilateral organisations (Organization for Economic Co-operation and Development, 2022c). The types of aid considered for this research include budget support, scholarships, debt relief, core contributions and pooled programmes and funds, administrative costs, project-type interventions, experts and other technical assistance (Organization for Economic Co-operation and Development, 2022c). For this research also, education aid was measured in constant US Dollars, Millions, 2020.

Education aid was calculated as average change by subtracting previous period averages from current period averages within countries, except in the cross-sectional model. It was also normalised for country size by dividing by population before expressed as average change.

3.5.3 Control Variables

Control variables that explain the impact of per capita education aid on educational outcomes were included in the models to strip away the parts of the spurious components of the association between education aid and the educational indicators. The control variables were obtained from the World Bank's World Development Indicators (WDI) and World Governance Indicators (WGI) databases. The WDI are a collection of important, excellent, and globally comparable data on world development and the struggle against poverty while the WGI offer country-level governance indices based on the opinions of numerous businesses, citizens, and expert

poll respondents in developed and developing nations (World Bank, 2022a). It is worth noting that apart from the voice and accountability control variable which was drawn from the WGI, the rest of the control variables were from the WDI.

3.5.3.1 Government Expenditure on Education (% of GDP)

The first control variable used in the research models was total government expenditure on education as a percentage of GDP. It comprises educational expenditure funded by international sources (World Bank, 2022a). This variable was included in the research models due to research linking government spending on education with educational outcomes and education aid (Ogbebor et al., 2018). This variable controlled for governments' annual spending on the education sector given that the bulk of education aid goes to the government, especially in the form of budget support. It also controlled for donors' aid disbursement behaviour as the disbursement of education aid is often dependent on the size of a country's budget as well as how much they have spent on their educational sector in previous years.

3.5.3.2 Voice and Accountability

The second control variable, voice and accountability, is vital, and consistent with other scholars such as Easterly (2006), was included in the research models. Accountability levels as discussed in Chapter 2 is vital in determining how successful education aid performs on educational outcomes. This variable covers opinions on how much a nation's residents can engage in their government, as well as opinions about freedom of association, free press, and freedom of expression on a scale from -2.5 to 2.5 (World Bank, 2022a). A higher value on the scale depicts better voice and accountability levels.

This measure, although based on perceptions, was employed in the data analysis to control for the level of accountability which could influence the disbursement and usage of education aid for educational development in LMICs. It is not unlikely for donors and donor agencies to consider accountability levels or the quality of governance in recipient countries while disbursing development aid (Birchler & Michaelowa, 2016). Further, scholars have often found a strong relationship between strong accountability mechanisms and educational development (Asiedu, 2014; Dreher et al., 2008). This variable, thus, measures, *inter alia*, the extent to

which citizens' voices are present in the mainstream of government activities as well as media freedom in reporting government malfeasances.

3.5.3.3 GDP per capita (constant 2015 US$)

GDP per capita was used as a control variable in the models to account for the average income earned by individuals in a country, which can impact educational sponsorship and the disbursement of education aid – countries with lower GDP per capita levels are more likely to receive more educational aid. The variable provides an idea of the economic well-being of the country's population. GDP per capita has also been found to have a significant positive effect on educational outcomes and consistent with other scholars was included in the models (Asiedu, 2014; Dreher et al., 2008; Ogbebor et al., 2018). GDP per capita was calculated as gross domestic product divided by midyear population (World Bank, 2022a). GDP, on the other hand, is a measure of national income and is calculated as the total gross value of all finished goods and services produced within an economy, plus any applicable product taxes, minus any unaccounted-for subsidies (World Bank, 2022a). GDP per capita was estimated without considering the deterioration and depletion of natural resources or the depreciation of fabricated assets (World Bank, 2022a). The 2015 constant dollar was used for the calculation of this variable.

3.5.3.4 Trade (% of GDP)

Trade as a share of GDP is also important in stripping away parts of the spurious components of the relationship between education aid and the educational indicators. The trade variable according to the World Bank (2022a) is the total of goods and service exports and imports expressed as a percentage of the gross domestic product. The variable was included in the research models as a proxy for economic openness. This was due to external factors largely shaping the economies of developing countries and a relationship between economic openness and increased education aid disbursement. Studies have shown that more open economies are more likely to receive more education aid compared to closed economies (Asiedu, 2014; Eregha & Oziegbe, 2016; Ogbebor et al., 2018). The trade variable explains

how successfully trade performs in a country and was proxied for economic openness as trade is the most-robust form of economic collaboration under the neoliberal arrangement.

3.5.3.5 Population Size

Population size was included in the models to control for demographic changes in the selected countries over the 20 years. This variable was also controlled for in the models given that research has shown linkages between development aid and population size. In other words, donors often consider the size of the population in recipient countries before aid disbursement (Dreher et al., 2008; Gibson et al., 2015). The variable was calculated based on the de facto definition of population, which includes all residents regardless of citizenship or legal status (World Bank, 2022a). It is worth noting that the figures in the variable only reflect midyear projections (World Bank, 2022a).

3.5.3.6 Country

Only the fixed and random effects models had the last control variable, which is country. The variable merely controlled for the 55 LMICs that make up the study's sample at group level. The variable's operational application was to determine if the link between education aid and educational outcomes in the 55 LMICs is influenced by a country-level effect.

3.5.3.7 Summary

In sum, using these control variables stripped away parts of the spurious components of the association between education aid and the educational indicators; thus, allowing the discernment of the true impact of education aid on educational outcomes in LMICs. The causal relationship between the control variables and the dependent and independent variables is depicted in Figure 3.2. The figure also acknowledges the possibility of reverse causality or endogeneity – the possibility that the educational outcomes could impact the allocation of education aid. This is depicted by the causal arrow running from education outcomes to aid allocations. Reverse causality was addressed in the regression analysis by including the initial values (the second period) of the educational outcomes as control variables.

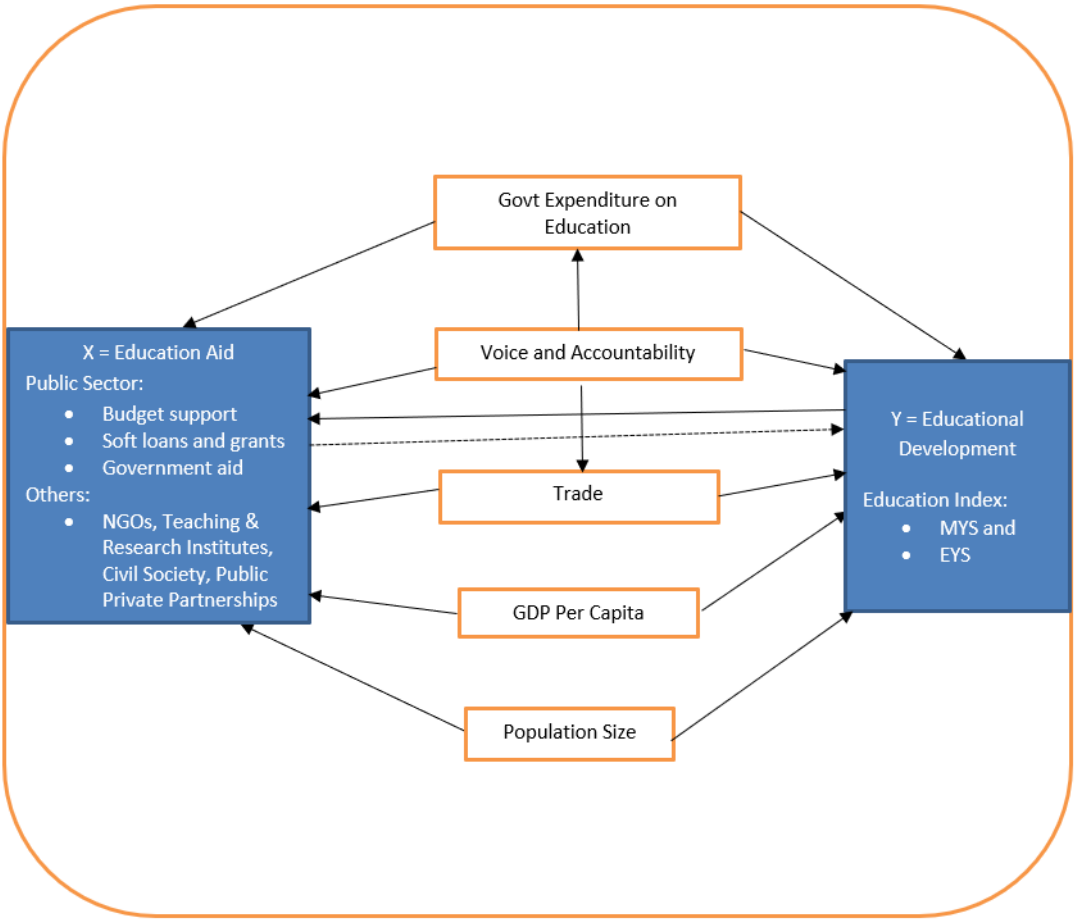


FIGURE 3.2: Causal Pathways: Educational Aid and Educational Development

However, as the results showed no substantial difference from the main results, and to conserve space considering the numerous regression tables included in the research, the results of the reverse causality models were not reported in this research. All monetary variables were adjusted for inflation, that is, measured in constant US dollars.

3.5.4 Summary of Variables and Data Sources

Variable Name	Variable Type	Models Used	Data Source
Mean Years of Schooling (MYS)	Dependent Variable	Pooled OLSR, FE, RE	(UNDP, 2022)
Expected Years of Schooling (EYS)	Dependent Variable	Pooled OLSR, FE, RE	(UNDP, 2022)
Education Index (EI)	Dependent Variable	Pooled OLSR, FE, RE	(UNDP, 2022)
Education Aid	Independent Variable	Pooled OLSR, FE, RE, Robustness Check	(OECD, 2022c)
Government Expenditure on Education	Control Variable	Pooled OLSR, FE, RE, Robustness Check	(World Bank, 2022a)
Voice and Accountability	Control Variable	Pooled OLSR, FE, RE, Robustness Check	(World Bank, 2022a)
GDP per capita	Control Variable	Pooled OLSR, FE, RE, Robustness Check	(World Bank, 2022a)
Trade	Control Variable	Pooled OLSR, FE, RE, Robustness Check	(World Bank, 2022a)
Population Size	Control Variable	Pooled OLSR, FE, RE, Robustness Check	(World Bank, 2022a)
Country	Control Variable	FE, RE, Robustness Check	(World Bank, 2022a)
Primary School Enrolment	Dependent Variable	Robustness Check	(World Bank, 2022a)
Secondary School Enrolment	Dependent Variable	Robustness Check	(World Bank, 2022a)
Tertiary School Enrolment	Dependent Variable	Robustness Check	(World Bank, 2022a)
Total Enrolment	Dependent Variable	Robustness Check	(World Bank, 2022a)

TABLE 3.1: Summary of Variables, Models and Data Sources

3.6 Hypothesis Testing Procedure

The research hypothesis presented in Chapter 1 was tested based on the output of the statistical models in Chapter 4. The research hypothesis presupposed that controlling for other potentially causal factors, education aid has had a positive impact on specific measures of educational development in LMICs since the Millennium Declaration. This is particularly considering that the main aim of such aid is to promote educational development in developing countries.

The pooled OLS regression model was used in ascertaining the ratio, direction, and significance of the impact education aid has had on educational outcomes in LMICs since the Millennium Declaration was signed. The results of the fixed and random effects models were also deemed important since they contributed to determining whether the results obtained from the pooled OLSR models were sustained when country-level effects are accounted for. The robustness check models were used in determining the validity of results when other educational indicators are used as dependent variables.

In all models, special consideration was given to whether there was a positive and significant relationship between education aid and the educational indicators. This

was accomplished by examining the sign and size of the coefficients and determining whether the association was positive and statistically significant at the 90 per cent ($p<0.1$), 95 per cent ($p<0.05$), and 99 per cent ($p<0.01$) confidence levels. The null hypothesis was to be rejected if the positive association was strong at these levels.

3.7 Conclusion

This chapter's emphasis has been on the methodology of this investigation on the impact of education aid on three educational outcomes: the Mean Years of Schooling (MYS), Expected Years of Schooling (EYS), and the Education Index (EI). At the outset of this chapter, the research design employed in this study was discussed, with a focus on the regression models used in testing the research hypothesis and the approach to the issue of time lags peculiar with panel data. The chapter then covered the investigation's sample as well as the data and data sources used in the study. This included an explanation of the sources, construction, and measurements of the variables used in this study. Thereafter, the data preparation process was discussed, and lastly, the processes involved in testing the research hypothesis were detailed. The research results were presented in the next chapter.

Chapter 4

Results and Analysis

4.1 Introduction

The research results were presented in this chapter. It included analysis in tables, figures, regression, and other mathematical representations of data. The chapter was broadly divided into two sections. Section A addressed the central research question on what impact education aid has had on educational outcomes in LMICs since the Millennium Declaration while Section B addressed the sub-research question on the state of educational development in LMICs since the Millennium Declaration. It was in this chapter that the research hypothesis was tested and findings from the hypothesis were established. The chapter concluded with a summary of the findings.

4.2 Section A: Main Research Question

This section was divided into six parts. The section started with a univariate analysis which provided summary statistics of the dependent and independent variables to examine for any severe deviations from unbounded, and symmetric distributions, including outliers. This was followed by a bivariate analysis using bivariate regression, and the correlation coefficient to detect possible collinearities, severe non-linearities, and influential observations. Analysis in this part and subsequent parts were performed using the average change versions of the variables. The third

part involved the presentation of results from the main regression models. The results of the regression model with government expenditure as the dependent variable was presented in the fourth part. The fifth part featured the results of the robustness check models and regression diagnostics results were discussed in the sixth part.

4.2.1 Univariate Analysis: Summary Statistics

TABLE 4.1: Summary Statistics for each Variable

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Education Index	1,083	0.5	0.1	0.2	0.4	0.5	0.6	0.8
Mean Years of Schooling	1,083	6.2	2.3	1.9	4.5	5.9	7.5	11.8
Expected Years of Schooling	1,100	10.8	2.1	2.9	9.5	11.1	12.4	15.1
Primary Enrolment	829	5,744,608.0	18,544,402.0	13,758.0	360,756.0	1,469,495.0	4,070,182.0	145,802,543.0
Secondary Enrolment	650	5,296,158.0	18,500,229.0	6,753	108,767.5	732,981.5	2,842,559.0	132,161,359
Tertiary Enrolment	608	1,205,990.0	4,188,215.0	190.0	47,994.0	183,143.5	550,120.8	35,148,118.0
Total Enrolment	453	14,725,115.0	48,615,723.0	44,219.0	759,461.0	2,681,541.0	7,176,743.0	310,355,702.0
Education Aid	969	60.2	65.4	0.2	15.5	36.0	82.5	387.3
Voice & Accountability	1,045	−0.4	0.7	−2.2	−1.0	−0.4	0.1	1.1
GDP per capita	1,086	2,079.7	1,086.8	310.0	1,224.0	1,835.1	2,827.0	5,658.0
Trade	1,007	78.4	36.8	11.9	49.8	73.5	100.7	348.0
Population Size	1,100	52,001,570.0	166,955,973.0	84,405	2,055,120.0	10,295,784	33,855,554.0	1,366,417,756
Government Expenditure	745	4.6	2.3	0.9	2.9	4.2	5.8	13.5

Table 4.1 shows the summary statistics for each variable across the 1100 observations which represent the original values of the variables used in this analysis. As the table shows, the three educational outcomes which are the dependent variables for the main models in this study are all within their relevant scales as discussed in the previous chapter. Of the two component indicators of the education index, and as discussed in Section B, it is clear that across the sample, the mean years of schooling (MYS) is the worst performing indicator with a mean of 6.2 and a median of 5.9 which are below the midpoint (7.5) of the aspirational target of 15 years.

By contrast, the mean and median for the expected years of schooling (EYS) are higher than the indicator's scale's mid-point of 9. This indicates that across the 55-country sample, citizens aged 5 to 24 years are more likely to have better educational access and attainment than those aged 25 years and above and that the driver of "good" performance on the education index is the expected years of schooling indicator.

In the original version, the EYS contained 1100 observations, the MYS had 1083 observations, and the education index had 1083 observations due to missing values in the MYS variable. However, following the calculation of average change, as seen in Table 4.2, the MYS and education index has 163 observations (out of 220) while EYS has 165 observations. This is due to data loss for the first averaged period (1999–2004) across the panel having calculated the variables in terms of change. This also applied to every other variable used in the analysis after they had been expressed as change variables.

Moreover, the original versions of variables such as population size, education aid, and trade in Table 4.1 show very high standard deviations with means quite greater than the median, signalling possible deviations from a normal distribution. This, therefore, indicates that in their original states, the variables would possibly make for non-linearity with possibly high values dominating the regression results. This would in turn violate the assumption of homoscedasticity. This therefore partly validates the decision to apply the relevant change calculations (percentage and difference) within the countries following the calculation of period averages as discussed in Chapter 3. As seen in Table 4.2, the average change versions of these variables are closer to multivariate normality – lower standard deviation with mean and median values that are in close range. This reduces the risk of extreme values disproportionately impacting the regression outputs.

TABLE 4.2: Summary Statistics for Average Change Variables

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Education Index	163	8.2	5.5	−2.7	4.1	7.2	12.2	25.7
Mean Years of Schooling	163	9.9	7.4	−2.0	4.9	8.8	13.0	50.0
Expected Years of Schooling	165	7.6	7.6	−5.5	2.4	6.1	11.5	41.4
Primary Enrolment	143	−2.0	11.9	−26.4	−7.5	−2.8	3.8	79.4
Secondary Enrolment	111	12.7	20.7	−29.1	0.2	10.0	22.7	93.4
Tertiary Enrolment	111	38.6	52.5	−28.9	5.1	24.1	56.4	215.8
Total Enrolment	84	1.6	9.0	−16.1	−5.2	0.7	6.5	33.3
Education Aid	161	−0.004	7.3	−44.3	−0.9	0.1	0.9	52.9
Voice & Accountability	165	0.04	0.2	−0.4	−0.1	0.03	0.1	0.9
GDP per capita	163	15.3	13.5	−32.3	6.1	14.0	23.7	75.5
Trade	151	0.9	22.3	−43.3	−13.0	−0.2	10.7	139.2
Population Size	165	9.2	4.6	−3.6	6.2	8.9	13.1	20.0
Government Expenditure	128	0.02	1.1	−4.3	−0.5	0.1	0.6	3.3

4.2.2 Bivariate Analysis

Having made the requisite fixes to the variables, a correlation matrix was constructed to detect possible severe non-linearities, collinearities, outliers, and influential observations.

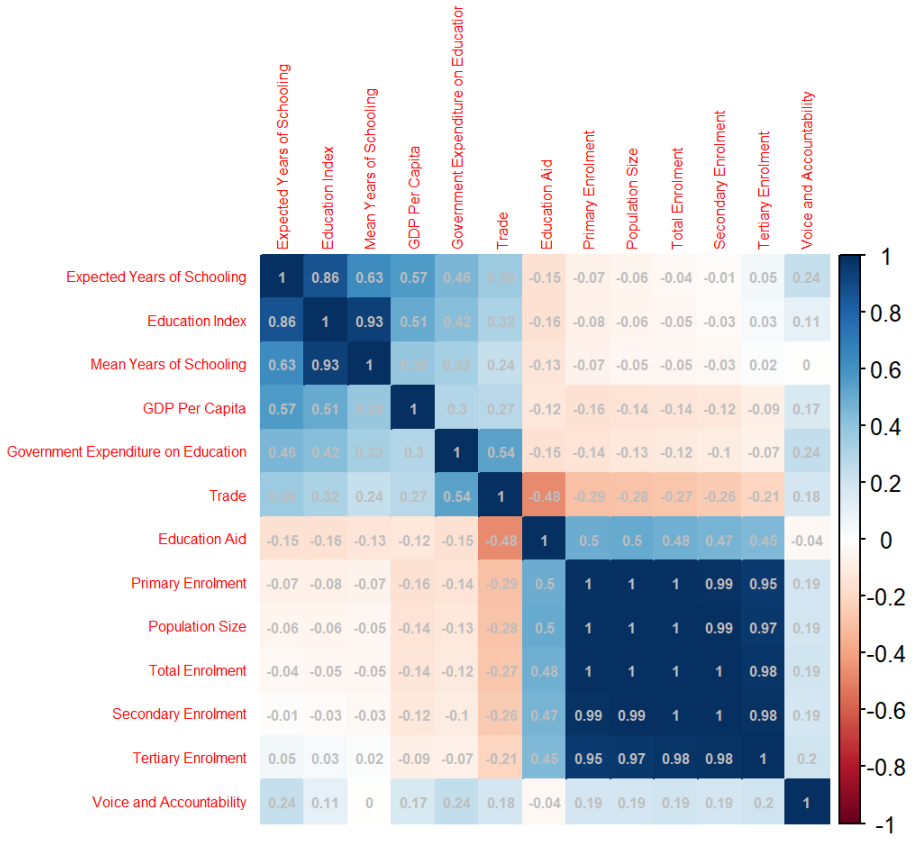


FIGURE 4.1: Correlation between Variables

The correlation coefficient is the first element of the bivariate analysis in this study as shown in Figure 4.1. The correlations between the study's variables are depicted in this figure. One of the most interesting features of the results is that education aid is negatively correlated with the education index and its component measures. Albeit subject to further confirmation, this signals that increased education aid is not strongly linked with the educational indicators. This finding possibly violates the assumption of a relationship between education aid and each of the outcome variables outlined in the research hypothesis in Chapter 1. This result is somewhat

unexpected since the main aim of aid is the promotion of educational development. The result is, however, in line with some literature on the topic as discussed in Chapter 2 (Christensen et al., 2010; Easterly, 2006; Moyo, 2009; Ogbebor et al., 2018; Ramalingam, 2013).

Contrastingly, however, education aid has a strong positive correlation with the school enrolment indicators used in the robustness check models; thus, indicating that education aid may be linked with non-age-specific measures of educational development. The results also show a negative correlation between the age-specific measures of educational development used in the main models and the non-age-specific school enrolment indicators used in the robustness check models, except for tertiary enrolment. This suggests that these two groups of indicators capture different aspects of educational development, particularly in relation to age, and underscores the significance of conducting a robustness check.

It is also crucial to look at how closely the predictor variables employed in this study are correlated. This is considering the potential for multicollinearity due to high correlation among predictor variables, which could result in inflated standard errors in the models used in this study (Desai, 2021). Inflated standard errors would indicate that the model has structural anomalies (Fox & Weisberg, 2019). The correlation figure shows that education aid is not heavily correlated with the control variables.

Overall, it can be observed that there are no collinearities in the bivariate relationships. The collinearities depicted in dark blue in Figure 4.1 are between the groups of dependent variables used in the main models and robustness check models, respectively. Since these dependent variables all had separate regression models, the collinearity does not call for concern. On the other hand, the only potentially severe non-linearity is between trade and education aid with a negative correlation of -0.48. A positive correlation would be expected between these two variables since, as explained in Chapter 3, countries with more open economies are known to receive more aid than less-open ones (Asiedu, 2014; Ogbebor et al., 2018).

Table 4.3 shows the results of the bivariate regression analysis between per capita education aid, and each of the three indicators of educational development used in the main models. The results of the bivariate regression echo the findings from

TABLE 4.3: Summary of Bivariate Regression Models[a]

	Dependent variable:		
	EI	EYS	MYS
	(1)	(2)	(3)
Education Aid (per capita)	−0.051	−0.046	−0.055
	(0.060)	(0.083)	(0.080)
Constant	8.249***	7.727***	9.839***
	(0.437)	(0.605)	(0.585)
Observations	159	161	159
R^2	0.005	0.002	0.003
Adjusted R^2	−0.002	−0.004	−0.003
Residual Std. Error	5.509	7.676	7.378
F Statistic	0.718	0.303	0.473
Note:	*p<0.1; **p<0.05; ***p<0.01		

[a] All variables in this research, except for the predictor variables in the cross-sectional model, were expressed in terms of average change. All monetary variables were adjusted for inflation.

the correlation analysis. In each of the three bivariate models, variations in education aid is not positively and significantly linked with variations in educational outcomes in LMICs since the signing of the Millennium Declaration. Put differently, education aid is not a significant predictor at the 90%, 95% and 99% confidence levels. Although subject to further confirmation, the finding would possibly make it difficult to reject the research's null hypothesis which asserts that no significant relationship exists between education aid and educational outcomes in LMICs since the Millennium Declaration.

It is clear from the extremely low R-Squared and the negative Adjusted R-Squared for each model that the bivariate models do not adequately account for the variation in the corresponding dependent variables. However, as the subsequent parts show, the inclusion of control variables strengthens the overall explanatory power of the models.

4.2.3 Main Results

The research's primary findings were presented in this part. The part began with the results from the pooled OLS regression model that incorporate the five control variables described in Chapter 3. The results of the fixed and random effects models which control for the 55 LMICs in addition to the five control variables were equally reported in this part. After this, the results of the model with government expenditure as the dependent variable, robustness check models, and regression diagnostics were presented. As already noted, all of the variables included in the study's regression analysis, except for those in the cross-sectional model, were expressed in terms of average change. This implies that period averages were calculated before expressing the variables in terms of change. These were done to circumvent the time lag issue with panel data and also avoid possible auto-correlation. Additionally, initial conditions were captured for certain control variables which showed higher levels of change and a close relation to education aid and educational indicators. Initial conditions were also captured for the educational indicators to eliminate possible endogeneity; however, the main results did not change. To conserve space, these regressions were not reported. The control variables for initial conditions were measured in the second period as data for the first period was lost having calculated the variables in terms of change.

4.2.3.1 Main Results: Pooled OLS Regression Models

Table 4.4 shows the results of the pooled OLSR model employed in determining the relationship between education aid and educational outcomes in LMICs since the Millennium Declaration. As previously mentioned, due to missing values in both the original and average change versions of the variables, there were fewer observations included in the pooled OLSR, fixed and random effects models. When compared to the findings of the bivariate regression, one interesting feature of the pooled OLSR models with control variables is that the addition of control variables did not strengthen the predictive effect that per capita education aid has on educational outcomes. However, in further comparison with the bivariate regression, the inclusion of control variables saw the models account for more variance in the educational indicators judging by the R-Squared for each model.

The "weakest" education aid coefficient (-0.079) is in Model 3, while the "strongest" coefficient (-0.019) is in Model 2. However, at the 90%, 95%, and 99% levels for each of the three models, education aid is not positively and significantly linked with the educational indicators. This suggests that there is no credible evidence in the data sets used in the models that education aid has catalysed educational outcomes in LMICs. This also presents possible challenges with rejecting the research's null hypothesis, which assumes no substantial association.

Observing the connections between the various control variables and the educational indicators is also useful. As the table shows, voice and accountability is not positively and significantly associated with any of the educational indicators. It is expected that improvements in the educational indicators (see Figures 4.4 to 4.6) would be linked with improvements in voice and accountability since it was established in Chapters 2 and 3 the importance of robust accountability mechanisms in educational development. Arguably, this suggests the existence of low levels of accountability in LMICs and partly explains why education aid is not linked with any of the educational indicators. The low levels of accountability is also reflected in the low voice and accountability mean of -0.4 (on a scale of -2.5 to 2.5) in the summary statistics Table 4.1. The same issues arise when examining the summary statistics and regression results of both trade and government expenditure.

GDP per capita on the other hand has a positive link with EI and EYS at the 90%

TABLE 4.4: Summary of Pooled OLS Regression Models[a]

	Dependent variable:		
	EI	EYS	MYS
	(1)	(2)	(3)
Education Aid (per capita)	−0.046	−0.019	−0.079
	(0.094)	(0.116)	(0.144)
Voice & Accountability	1.252	1.199	4.153
	(2.463)	(3.031)	(3.772)
Government Expenditure (% of GDP)	−0.462	−0.707	0.031
	(0.580)	(0.722)	(0.888)
GDP per capita	0.098*	0.123*	0.096
	(0.050)	(0.063)	(0.077)
Trade (% of GDP)	0.013	0.008	−0.003
	(0.023)	(0.028)	(0.035)
Population	0.283**	0.453***	−0.021
	(0.126)	(0.157)	(0.193)
Constant	2.953*	0.127	7.513***
	(1.638)	(2.038)	(2.509)
Observations	117	119	117
R^2	0.202	0.310	0.112
Adjusted R^2	0.127	0.246	0.028
Residual Std. Error	5.157	6.423	7.899
F Statistic	2.687***	4.850***	1.332
Note:			*p<0.1; **p<0.05; ***p<0.01

[a] This regression model and its fixed and random effects versions include control variables that capture initial conditions in GDP per capita, government expenditure (% of GDP), and population, but they were not displayed to highlight the results of the main variables. All variables are in average change to address lag issues and prevent possible autocorrelation in the panel data.

level. This indicates that rising income levels would guarantee improvements in educational outcomes. This also suggests that income per person has a stronger link with educational access and attainment in LMICs than aid and government expenditure on education.

Similarly, population size is positively and quite significantly linked with both EI and EYS, revealing that demographic changes shape educational outcomes when measured through EI and its EYS component. The next part focused on discerning how factors such as country-level predictors influence the functioning of the education-aid-educational-development relationship in LMICs since the Millennium Declaration.

4.2.3.2 Main Results: Fixed and Random Effects Models

The key distinction between the fixed and random effects models and the pooled OLS regression model is that the latter does not consider group factors (e.g., the sampled countries) while the former controls for group factors – the likelihood that observations from the same country have more commonalities than ones from different countries. Therefore, the results reported in Tables 4.5 and 4.6 introduce the control variable of country for the fixed and random effects approaches. As already noted, the fixed and random effects models both have varying intercepts by country but in the fixed effects model, the levels are completely distinct while they are not in the random effects model. The results of the varying intercepts by year models were presented in Appendix A to compare with the varying intercepts by country only results.

4.2.3.2.1 Main Results: Fixed Effects Models

The fixed effects model, with country-clustered standard errors, echoes the results from the previous model – education aid is not positively and significantly associated with the indicators of educational development. Education aid is positively associated with all educational indicators but these associations are not significant

TABLE 4.5: Summary of Fixed Effects Regression Models[a]

	Dependent variable:		
	EI	EYS	MYS
	(1)	(2)	(3)
Education Aid (per capita)	0.094	0.027	0.240
	(0.097)	(0.134)	(0.148)
Voice & Accountability	0.144	−1.741	4.024
	(2.767)	(4.049)	(4.231)
Government Expenditure (% of GDP)	−0.652	−0.729	−0.092
	(0.611)	(0.876)	(0.934)
GDP per capita	0.110*	0.079	0.186*
	(0.065)	(0.095)	(0.099)
Trade (% of GDP)	0.010	0.010	−0.015
	(0.027)	(0.039)	(0.042)
Population	−0.535	−0.871	−0.570
	(0.502)	(0.698)	(0.768)
Observations	117	119	117
R^2	0.918	0.845	0.881
Adjusted R^2	0.837	0.698	0.765
Residual Std. Error	3.989	5.855	6.099
F Statistic	11.357***	5.748***	7.550***
Note:			*p<0.1; **p<0.05; ***p<0.01

[a] Both the country and initial conditions control variables were omitted from this table and other fixed effects tables to highlight the results of the more important variables. All variables are in average change.

at the 90%, 95%, and 99% levels. Therefore, education aid is not a meaningful predictor of educational outcomes having accounted for country grouping with completely distinct levels. The results of voice and accountability, trade, and government spending are equally similar to those from the pooled OLSR model.

Under this model, however, only GDP per capita is positively and significantly associated with both EI and MYS at the 90% level while the positive and significant association of population size with both indicators has disappeared. This demonstrates that under this model, income per individual remains a more effective catalyst for educational outcomes in LMICs than education aid and government spending on education.

Moreover, the results show that a large portion of the variation in the dependent variables can be attributed to the countries, as the R-squared increases significantly from near 0 to nearly 0.9 when the country control variable is included. This implies that nearly all the variation is cross-national (not over time) and is possibly not explained by aid. To further investigate this, in Table A.1 in Appendix A, a single cross-sectional model – one observation per country – was executed for the entire period of the analysis by collapsing the data set by the 55 LMICs. The results confirm that education aid is not a significant predictor of the educational indicators at the 90%, 95%, and 99% levels and that GDP per capita is more strongly linked with the educational indicators than education aid and government expenditure.

4.2.3.2.2 Main Results: Random Effects Model

Under the random effects model, it is consistently true that there exists no credible evidence in the data to prove that education aid has catalysed improved educational outcomes in LMICs since the signing of the Millennium Declaration. This finding, while at odds with findings from studies with broader observations, such as those by Birchler and Michaelowa (2016), Dreher et al. (2008), and Michaelowa and Weber (2006, 2008), primarily shows a disconnect between education aid and its main of promoting educational development. Similar to earlier models, voice and accountability, trade, and government expenditure are still not positively and significantly linked with any of the educational indicators.

TABLE 4.6: Summary of Random-Effects Regression Models[a]

	Dependent variable:		
	EI	EYS	MYS
	(1)	(2)	(3)
Education Aid (per capita)	0.011	−0.020	0.082
	(0.084)	(0.112)	(0.127)
Voice & Accountability	0.121	−0.098	3.546
	(2.249)	(2.999)	(3.423)
Government Expenditure (% of GDP)	−0.473	−0.663	0.067
	(0.520)	(0.702)	(0.791)
GDP per capita	0.105**	0.116*	0.138*
	(0.049)	(0.064)	(0.075)
Trade (% of GDP)	0.013	0.012	−0.011
	(0.021)	(0.028)	(0.032)
Population	0.255*	0.429**	−0.019
	(0.144)	(0.169)	(0.222)
Constant	3.115*	0.505	6.868**
	(1.769)	(2.145)	(2.728)
Observations	117	119	117
Log Likelihood	−351.147	−386.363	−396.151
Akaike Inf. Crit.	728.295	798.727	818.302
Bayesian Inf. Crit.	764.203	834.855	854.210

Note: *p<0.1; **p<0.05; ***p<0.01

[a] The models include control variables for country and initial conditions in GDP per capita, government expenditure, and population, but these were omitted. All variables are in average change.

As one would expect, GDP per capita remains positively and significantly linked with the educational indicators. Since this has been the case for all models discussed thus far in this part, it can now be even much more confidently held that income per person is a stronger catalyst for educational development in LMICs than education aid and government expenditure on education. The positive and significant relationship between population size and both EI and EYS has however reappeared in this model, signalling that demographic changes have a strong role to play in variations in the educational indicators.

Overall, the results of the fixed and random effects models calculated across 55 LMICS since the signing of the Millennium Declaration confirm that it is not possible to reject the research's null hypothesis outlined in Chapter 1 in favour of the alternative hypothesis. In other words, the data is not consistent with the possibility that the increased education aid since the Millennium Declaration contributed to improved educational outcomes in LMICs. The research's null hypothesis presupposed that controlling for other potentially causal factors, no positive relationship exists between education aid and specific educational indicators in LMICs since the Millennium Declaration was signed. According to the findings so far in this chapter, in all instances, education aid had no positive and significant impact on educational outcomes when measured through the education index and its component measures. Since a large portion of education aid is given to governments, it is believed that the effect of aid will be felt mostly through government spending on education. The next section, therefore, examined the relationship between education aid and government expenditure on education.

4.2.4 Pooled OLSR, Fixed and Random Effects Models with Government Expenditure as the Dependent Variable

Presumably, the effect of aid on education outcomes works through national expenditure on education since, as already noted in Chapter 3, the bulk of education aid goes to governments through budget support which could lead to higher expenditure and better outcomes. Table 4.7 reports the pooled OLSR, FE, and RE models with government expenditure on education (per capita) as the dependent variable to better contextualise the foregoing results.

TABLE 4.7: Summary of Pooled OLSR, FE, and RE Models with Government Expenditure as Dependent Variable[a]

	Dependent variable:		
	Government Expenditure on Education (per capita)		
	(1)	(2)	(3)
Education Aid (per capita)	0.157	0.341	0.163
	(0.373)	(0.442)	(0.369)
Voice & Accountability	14.819	13.352	14.343
	(9.706)	(12.963)	(9.698)
GDP per capita	0.887***	1.347***	0.944***
	(0.200)	(0.313)	(0.204)
Trade (% of GDP)	−0.118	−0.025	−0.112
	(0.090)	(0.130)	(0.089)
Population	0.790	0.887	0.821
	(0.497)	(2.327)	(0.519)
Education Index	−0.350	−0.933	−0.382
	(0.446)	(0.676)	(0.451)
Constant	−9.140		−9.902
	(6.445)		(6.672)
Models	Pooled OLSR	Fixed Effects	Random Effects
Observations	116	116	116
R^2	0.253	0.711	
Adjusted R^2	0.182	0.433	
Log Likelihood			−502.002
Akaike Inf. Crit.			1,030.003
Bayesian Inf. Crit.			1,065.800
Residual Std. Error	20.320	18.879	
F Statistic	3.559***	2.552***	

Note: *p<0.1; **p<0.05; ***p<0.01

[a] This table presents the results of the main variables, omitting control variables such as GDP per capita, education index, and population that capture initial conditions to highlight the results of the more relevant variables. The fixed and random effects models include an additional control for country, but were also not shown. All variables are in average change.

It can be drawn from Table 4.7 that education aid is not positively and significantly linked with government expenditure across all models. This demonstrates that there exists no evidence in the data that government expenditure on education reflects the impact of education aid in LMICs, which possibly explains the results in the previous parts. This may be attributed to the erroneous application of education aid by the recipient LMICs. Since resources are fungible, it could be that education aid is diverted to other sectors which the countries consider to have better impact on living standards (Ogbebor et al., 2018). It could also be that such aid is being misappropriated by recipient countries due to low levels of accountability. In actuality, the results of the three models show that there is no significant relationship between government spending on education and the predictor variables, except for GDP per capita.

The sub-section below reported the results of the robustness check models which measured educational development through non-age-specific net school enrolments – primary, secondary, tertiary, and total enrolments – unlike the main models which measured educational development through age-specific educational attainment and access.

4.2.5 Robustness Check Models

All of the main models of this research measured the impact of education aid on educational development in LMICs since the Millennium Declaration using the UNDP's education index and its component measures: the mean years of schooling and expected years of schooling. These main models found no credible evidence in the data that increased education aid to LMICs has catalysed improvements in educational outcomes since the signing of the Millennium Declaration. Specifically, the relationships were not statistically significant at the 90%, 95% and 99% confidence levels.

As a robustness check on these primary findings, the results of the robustness check models were reported in this part. The negative correlation in Figure 4.1 between the age-specific measures of educational outcome used in the main models and non-age-specific measures used in the robustness check models indicates that these two groups of indicators measure different educational outcomes. While the indicators in the main models measure age-specific educational access and attainment,

the robustness check ones measure non-age-specific primary, secondary, and tertiary school enrolments in the 55 LMICs since the Millennium Declaration. The robustness check indicators were included considering that donors have repeatedly stressed the multidimensionality of their educational objectives (Dreher et al., 2008).

Table 4.8 reports the results of the robustness check pooled OLSR model while the fixed and random effects results were reported in Appendix A. The main models are preferred over the robustness check models since the robustness check models have more missing values in the dependent variables than the main models. In the main models, 117 to 119 observations were used in the analysis due to missingness in some predictors but in the robustness check models, there was a reduction in this number due to missing values across the dependent variables. Regardless, the robustness check models are valid for inferential statistics.

Under this model, per capita education aid is not positively and significantly associated with secondary, tertiary, and total enrolments at the 90%, 95%, or 99% levels but has a significant positive association with primary enrolment at the 95% level. This implies that rising education aid per capita tends to promote educational development in LMICs only when measured through net primary enrolment rate. According to the findings, for each additional dollar of education aid per capita, net primary enrolments can improve by up to 0.42 percentage points. Similar results were obtained in the random effects robustness check model in Appendix A but not in the fixed effects one. Thus, donors can claim that the improvements towards universal primary education (and its attendant MDG/SDG goal) in LMICs is due to their increased financial support since the Millennium Declaration.

Caution is, however, required in interpreting the above result since government expenditure, which in causal terms should reflect education aid, shows no significant positive link with primary enrolment. The finding on the relationship between aid and primary enrolment is similar to findings in studies such as those by Birchler and Michaelowa (2016), Dreher et al. (2008), and Michaelowa and Weber (2006, 2008). However, contrary to Michaelowa and Weber (2008), aid is not effective on secondary and tertiary enrolments in LMICs since the Millennium Declaration, plausibly because greater portions of education aid goes towards the achievement of universal primary education (Birchler & Michaelowa, 2016).

TABLE 4.8: Summary of Pooled OLS Robustness Check Regression[a]

	Dependent variables[b]			
	Total	Primary	Secondary	Tertiary
	(1)	(2)	(3)	(4)
Education Aid (per capita)	0.070	0.415**	0.411	−1.831
	(0.212)	(0.198)	(0.534)	(1.397)
Voice & Accountability	4.761	11.290***	8.090	−1.140
	(4.659)	(4.278)	(11.095)	(27.691)
Government Expenditure (% of GDP)	−0.341	−1.083	−1.931	−11.292
	(1.192)	(0.974)	(2.942)	(6.967)
GDP per capita	0.150	0.040	0.116	0.743
	(0.099)	(0.091)	(0.237)	(0.551)
Trade (% of GDP)	−0.005	0.002	−0.027	0.074
	(0.060)	(0.039)	(0.100)	(0.252)
Population	0.927***	0.674***	1.732***	2.521*
	(0.241)	(0.217)	(0.570)	(1.401)
Constant	−11.059***	−10.762***	−7.992	−6.709
	(2.914)	(3.016)	(7.417)	(18.615)
Observations	64	101	80	85
R^2	0.322	0.320	0.233	0.227
Adjusted R^2	0.194	0.245	0.122	0.123
Residual Std. Error	7.462	8.402	20.002	50.160
F Statistic	2.515**	4.238***	2.093**	2.179**

Note: *p<0.1; **p<0.05; ***p<0.01

[a] The table displays the results for the key variables, excluding the control variables that capture the initial conditions of GDP per capita, government expenditure, and population. The fixed and random effects versions of the model in Appendix A include an additional control for country, but these results were also not displayed. All variables are in average change.

[b] The dependent variables were measured in net enrolment rate – that is, normalised for population.

Moreover, under the pooled OLSR model, voice and accountability is equally positively and significantly associated with primary enrolment rates at the 99% level. The random effects version of the model in Appendix A shows similar results. Table A.4 in Appendix A also shows that the removal of the voice & accountability predictor variable from the pooled OLSR and random effects models weakened the coefficient and predictive power of education aid on primary school enrolment rate. The implication is then that education aid moves with voice and accountability to catalyse educational development in LMICs. Similar results were found in the studies by Christensen et al. (2012) and Michaelowa and Weber (2006) on the impact of education aid on school enrolment rates. On the other hand, population size as with the previous models also has a strong positive association with all dependent variables.

The primary implication of the robustness check model results is that they confirm that in most cases, there exists no credible evidence in the data that increased education aid to LMICs has catalysed educational outcomes since the Millennium Declaration was signed. These findings add to the body of evidence to prove that the research's null hypothesis cannot be confidently rejected. This is because education aid is not positively and significantly associated with most of the indicators of educational development across all models. The only significant positive association was between aid and primary enrolment rate out of all the models included in the research.

4.2.6 Regression Diagnostics

In this part, the regression residuals were diagnosed to detect unusual data as well as error variance: heteroscedasticity and variance inflation. The diagnostics were performed using residual plots, leverage plots, Cook's distance plots, fitted values plots, and theoretical quantile plots. As the diagnostic plots of the rest of the models used in the research, like the ones presented in this part, were all healthy, only the diagnostic plots for the pooled OLSR models were reported in this research. This is particularly considering the large number of models that were reported in this study. Furthermore, since the education index model was considered the "main" pooled OLS regression model because it includes both the mean years of schooling and the expected years of schooling variables, only the diagnostic plots for this

model were presented in this part. However, the diagnostic plots for the pooled OLSR models of MYS and EYS were reported in Appendix B.

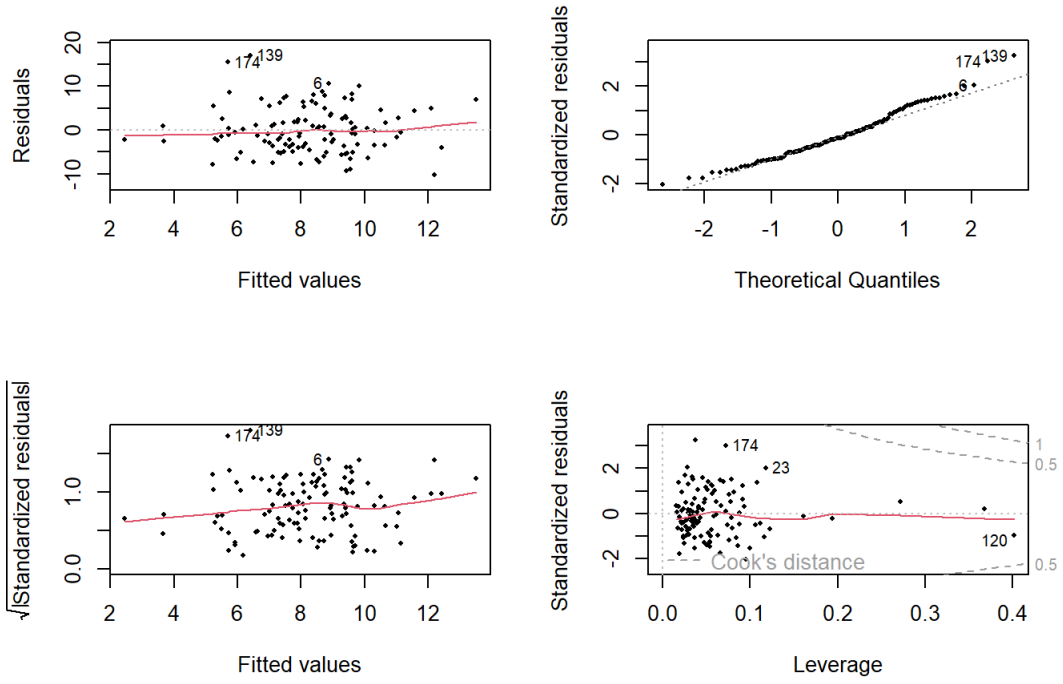


FIGURE 4.2: Residual Plots: EI

Figure 4.2 shows that the red lines in the fitted values were closely tracking the dotted lines, signalling the absence of unusually distributed residuals. The theoretical quantile values were also closely tracking the dotted line with slight deviations in the upper right and lower left. These are, however, not severe deviations as most of the residuals laid along the dotted lines. The leverage plot was also closely tracking the dotted lines, signalling that there exists no severe deviations from constant residual variance.

Figure 4.3 provides more details of the residual variance by plotting the Pearson residuals against each of the predictors in the model as well as the fitted values. An examination of the plots reveals that apart from minor deviations in the residual plots for trade and GDP per capita, the residuals in each of the plots laid along the dotted lines. In other words, the curves were null, i.e., close to flat. The fitted value

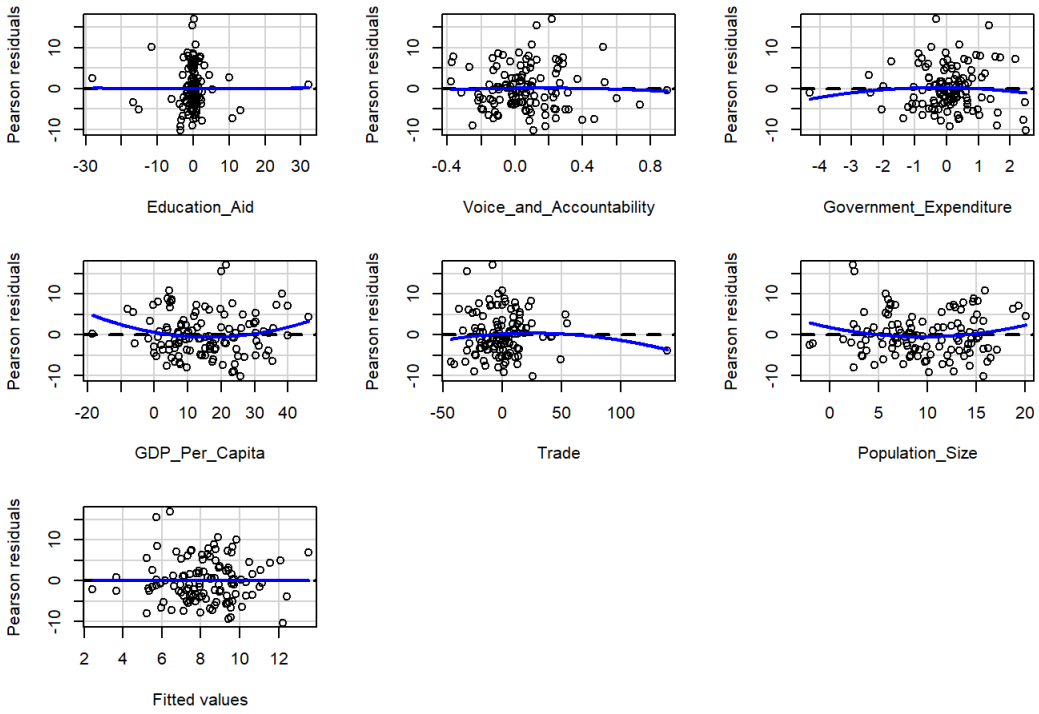


FIGURE 4.3: Pearson Residual Plots: EI

plot shows the overall fit of the regression residuals. As depicted in this plot, the fitted values were closely tracking the dotted lines suggesting the absence of non-constant residual variance. Overall, the plots look healthy as there were no severe deviations from equal variance in the residuals. In other words, the model is in tandem with the distributional assumptions of linear regression and is therefore fit and relevant for prediction.

4.2.7 Brief Implication of Results

The study has found so far that based on the data and methods used, in most cases, education aid was not positively and significantly linked with educational outcomes. In other words, there exists no strong evidence to confidently reject the research's null hypothesis. It should however be noted that failing to reject the null hypothesis does not necessarily imply that the "true" effect is zero. It only suggests

that the data and methods used in this analysis do not provide strong enough evidence to support the alternative hypothesis. There may be other factors that could be affecting the relationship that were not included in this analysis, such as cultural, economic or political factors, differences in educational systems, or changes in aid policies. Additionally, the lack of statistical significance may also be due to limitations in the sample size or measurement errors. Therefore, while the findings do not provide conclusive evidence of a relationship between education aid and educational outcomes, they do not rule out the possibility of an effect. Further research with more robust data and methods may be needed to better understand the relationship between education aid and education development in LMICs.

4.3 SECTION B: Sub-Research Question

In this section, the state of educational development for LMICs was ascertained. As mentioned in Chapter 1, this helped in interpreting the findings from the previous section. This was determined by describing the trends of the aggregated mean years of schooling (MYS), the expected years of schooling (EYS) and the broader education index (EI) for these countries in each year in the sample.[11] The unweighted arithmetic mean was employed in aggregating the 55 LMICs in each year within the 20-year period. In other words, the arithmetic mean of the educational scores for all the countries under the three variables in each year included in the sample was taken to construct an index for each variable. A time series plot was, thereafter, made from the constructed indexes. It should be noted that since this section was more descriptive than analytical, the section did not detail what factors cause the variations over time. This was rather treated in Section A above.

4.3.1 Mean Years of Schooling (MYS)

As highlighted in Chapter 3, the mean years of schooling indicator measures the average number of years spent in school for those in the 25+ age group. It bears mentioning that the aspirational target/maximum value for this indicator as set by the UNDP is 15 years and the raw values mentioned below are in years.

[11] Appendix C contains the disaggregated versions of the plots for each educational indicator.

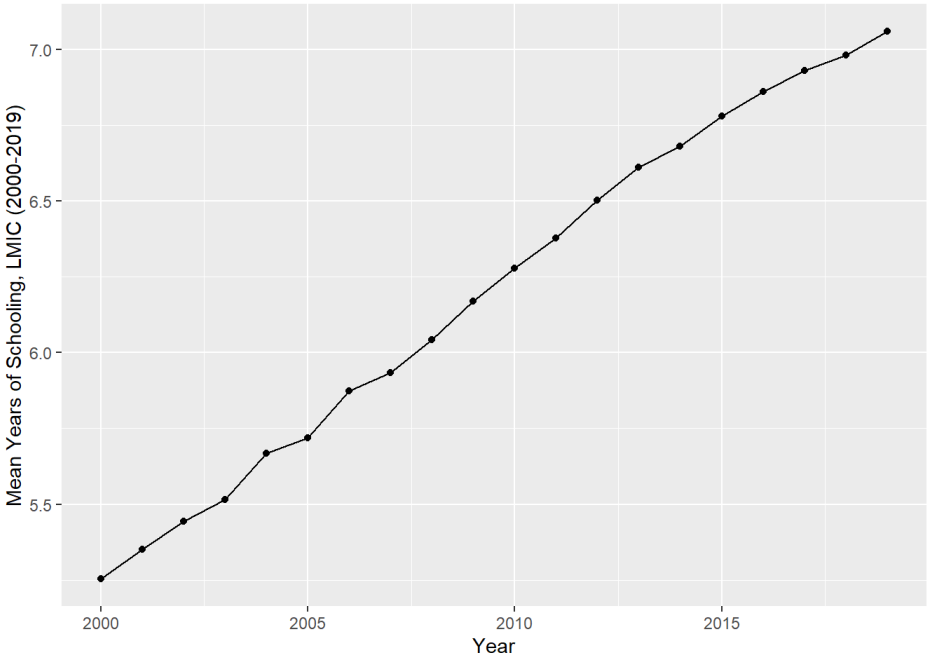


FIGURE 4.4: Aggregated MYS for LMICs (2000 - 2019).

As Figure 4.4 shows, between 2000 and 2005, the mean years of schooling for LMICs, as part of the broader education index, increased from 5.25 to 5.67, an 8 per cent increase. In 2010, the mean years of schooling stood at 6.28, increasing by 11 per cent from 2005. In other words, the highest increase in the mean years of schooling for LMICs within the five-year period as depicted in the time-series plot was between 2005 to 2010. The mean years of schooling continued to trend upward from 2010 to 2015, increasing from 6.28 to 6.78, an 8 per cent increase. It is worth noting that the percentage increase within this period tied with that of 2000 to 2005. This thus suggests that the lowest increase in the mean years of schooling in LMICs in the five-year period outlined in the graph was between 2000 to 2005 and 2010 to 2015. In 2019, the mean years of schooling for LMICs stood at 7.06, increasing again by 4 per cent from 2015.

Overall, it can be discerned from the trend plot that the mean years of schooling in LMICs have maintained an upward trend since the Millennium Declaration was signed. This progress is, however, insufficient as 7.06 years, which is the mean years of schooling value for LMICs in 2019, is below the scale's midpoint of 7.5. In other

words, the score is not halfway to 15 years which is the aspirational aim for this measure as calculated by the UNDP. Nevertheless, given the uptrend maintained for the aggregated mean years of schooling for LMICs since the Millennium Declaration was signed, it can be safely concluded that the mean years of schooling have improved within the studied period. Figure C.1 shows how each LMIC performed on this indicator over time.

4.3.2 Expected Years of Schooling (EYS)

The expected years of schooling is the number of years a child of school entrance age (ages 5-24) is anticipated to spend in school or university, including years spent on repetition should enrolment rates remain the same for the duration of the child's life (United Nations Development Programme, 2022). It is important to note that the UNDP considers 18 years to be the aspirational target/maximum value for this indicator, and the raw values listed below are in years.

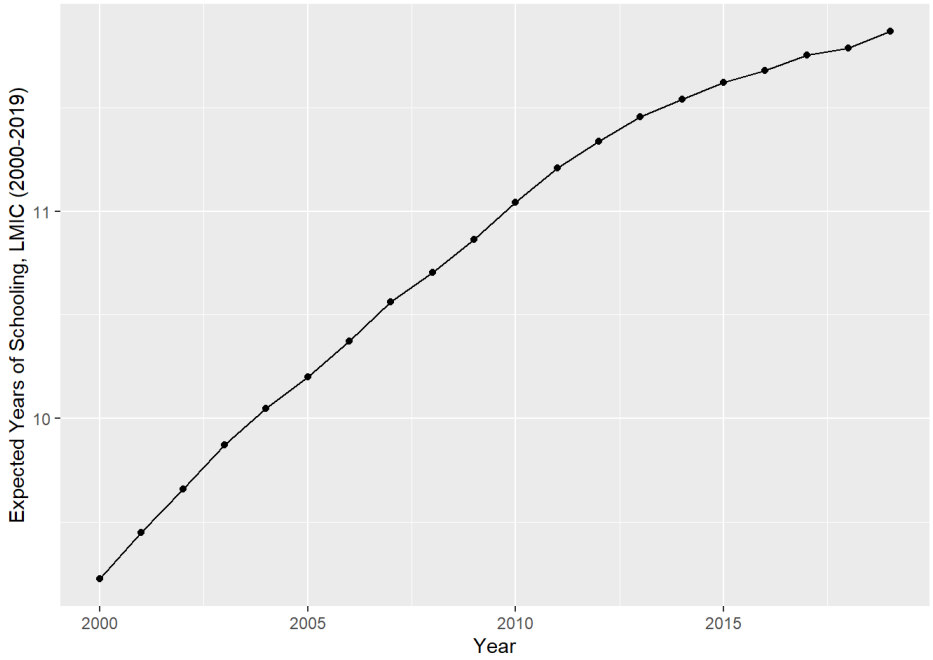


FIGURE 4.5: Aggregated EYS for LMICs (2000 - 2019).

Figure 4.5 shows that between 2000 and 2005, the expected years of schooling for LMICs, increased from 9.23 to 9.45, an increase of 2.4 per cent. In 2010, the expected

years of schooling for LMICs stood at 11.0, increasing by 16 per cent from 2005. As with the mean years of schooling, the highest increase in the expected years of schooling for LMICs within the five-year period as shown in the trend plot was between 2005 to 2010. In other words, the highest improvement in educational development for LMICs since the Millennium Declaration was signed was from 2005 to 2010. The expected years of schooling maintained an upward trend from 2010 to 2015, increasing from 11.21 to 11.62, a 3.7 per cent increase. This thus suggests that the lowest increase in the expected years of schooling in LMICs in the five-year period depicted in the graph was between 2000 to 2005. The expected years of schooling for LMICs stood at 11.87 in 2019, increasing 2.2 per cent from 2015.

Generally, the trend plot shows that the expected years of schooling in LMICs have been trending upward since the Millennium Declaration was signed. The analysis thus far also confirms that there have been more improvements in the expected years of schooling compared to the mean years of schooling in LMICs since the signing of the Millennium Declaration. This is considering that the 2019 value for EYS for LMICs, 11.87 (approximately 12 years), is closer to the aspirational target for this indicator (18 years) compared to what was obtained under MYS as discussed above. This also suggests that the population aged 5-24 in LMICs can expect to have better educational access and attainment compared to the population aged 25 and above. Figure C.2 shows how each LMIC performed on this indicator over time.

4.3.3 Education Index (EI)

As explained in Chapter 3, the education index is simply the unweighted arithmetic mean of the mean years of schooling and expected years of schooling both expressed as an index. The constructed education index was scaled within the bounds of 0 and 1 where a higher score on the scale is better.

As depicted in Figure 4.6, between 2000 and 2005, the education index for LMICs, increased from 0.43 to 0.47, a 9.3 per cent increase. In 2010, the education index for LMICs stood at 0.52, increasing by 10.6 per cent from 2005. In other words, the highest increase in the education index was between 2005 to 2010. This was expected given that the highest increase in both components of the index on a five-year interval was from 2005 to 2010. The education index maintained an uptrend from 2010 to 2015, increasing from 0.52 to 0.55, a 5.8 per cent increase. This, therefore,

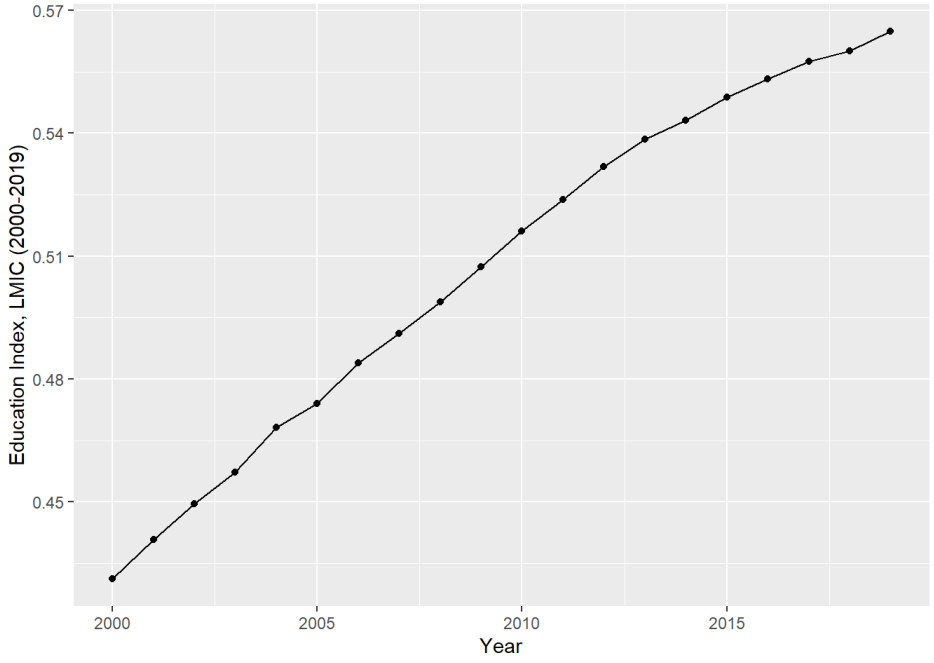


FIGURE 4.6: Aggregated Education Index for LMICs (2000 - 2019).

indicates that the lowest increase in the education index for LMICs in the five-year period as plotted in Figure 4.6 was between 2000 to 2005. This was also expected since the lowest increase in both component indicators of the education index was within this period. The education index value for LMICs as of 2019 was 0.56, a 1.9 per cent increase from 2015.

Overall, the education index graph reveals that the education index for LMICs has consistently trended upward since the Millennium Declaration was signed. This was also the case for the component indicators of this measure both of which maintained an upward trend in the period under study. However, while the 0.56 education index value in 2019 places LMICs in the medium category based on UNDP's classification (0.550–0.699), the value is still brittle and signals that more work needs to be done to enhance educational development in these countries. Nevertheless, given the uptrend maintained in the educational indicators since the Millennium Declaration was signed, it can be safely said that educational attainment and access have continuously improved within the studied period. Figure C.3 shows the disaggregated version of this indicator.

4.3.4 Summary

In sum, it can be drawn from the analysis so far in this section that there has been a clear uptrend in the three indicators of educational development in LMICs since the signing of the Millennium Declaration. In other words, there have been consistent annual improvements in educational outcomes for the school-age population in LMICs from 2000 to 2019. Based on the findings from the previous section, there was no credible evidence in the data that increased education aid has catalysed such improvements in educational outcomes.

4.4 Conclusion

This chapter presented the research results. It was found in the chapter that educational outcomes in LMICs have been improving since the Millennium Declaration was signed. However, the regression results revealed that in most cases, there was no credible evidence in the data to prove that education aid has catalysed improved educational outcomes since the Millennium Declaration was signed, after controlling for relevant variables. This result primarily showed a disconnect between the main aim of educational aid, which is the promotion of educational development. The result also deviated from the central tenets of the capability theory which suggests that the enhancement of human capabilities, via education aid in this sense, should the central to all human endeavours. The same issues emerged when looking at the results of government expenditure, voice and accountability, and trade in most of the models. Contrastingly, in most cases, GDP per capita and population size were positively and significantly associated with the educational indicators, signalling that they both play key roles in shaping educational outcomes in LMICs. These were all key in discussing the structures and institutions necessary for ensuring the effectiveness of education aid in LMICs. The next chapter engaged these results in more detail.

Chapter 5

Discussions and Implications

5.1 Introduction

In relation to the more general questions that motivated this study, this chapter examined the regression results that were reported in Chapter 4. The chapter started with an overview of the research questions and research hypothesis that were outlined in Chapter 1. The following section of the chapter covered how education aid impacts educational development in LMICs. The research findings and their implications for the existing body of scholarship on the research subject matter were discussed in the third section of the chapter. The chapter concluded with a brief discussion of the implications of the research for policymaking, particularly in LMICs.

5.2 Summary of Research Questions and Research Hypothesis Evaluation

The two research questions that the study's findings were intended to address were presented in Chapter 1. The main research question asked: "What impact has education aid had on educational outcomes in LMICs since the Millennium Declaration?" The sub-research question was: "What has been the state of educational development in LMICs since the Millennium Declaration?" To have a benchmark against which the research findings may be compared and used to address the research question, a research hypothesis was formulated. The research hypothesis assumed that controlling for other potentially causal factors, education aid has had a positive impact on specific measures of educational development in LMICs since

the Millennium Declaration. This was considering that the main aim of education aid is to promote educational development in developing countries.

The research null hypothesis could not be rejected in favour of the alternate hypothesis based on the regression results reported in Chapter 4. The results of the bivariate, the main pooled OLS, fixed and random effects regression models revealed that education aid was not positively and significantly associated with the education index and its component measures – the mean years of schooling and the expected years of schooling – in LMICs since the Millennium Declaration was signed. This, among other things, demonstrated a gap between education aid and its primary goal of promoting educational development. In the main pooled OLSR, fixed and random effects models, voice and accountability was also not positively and significantly associated with any of the educational indicators. This may be due to low levels of accountability in LMICs, as evidenced by the low mean value of the variable in summary statistics Table 4.1.

By contrast, GDP per capita was strongly linked with most of the educational indicators, signalling that the variable has a stronger role to play in educational outcomes in LMICs than aid and government expenditure on education. This was also the case for the population size variable. The results of the models which used government expenditure as a dependent variable to determine whether aid works through government spending on education indicated that such spending does not reflect education aid in LMICs based on the data. The results of the single, cross-sectional model – one observation per country – confirmed the main results that education aid is not typically associated with educational outcomes based on the data. The robustness check models, which used non-age specific net school enrolments as educational indicators, found limited evidence of education aid having a positive impact on educational outcomes in LMICs. The only exception was primary enrolment. Altogether, the patterns across the results of many models suggested that the null hypothesis that controlling for other potentially causal factors, education aid has had no positive impact on specific measures of educational development in LMICs since the Millennium Declaration could not be confidently rejected.

On the other hand, the sub-research question which aimed to discern the state of educational development in LMICs found consistent annual improvements in the three educational indicators (EI, MYS, and EYS). This suggests consistent progress

in educational access and attainment for school-age populations in LMICs since the Millennium Declaration was signed. The research, therefore, concluded that in most cases, there was no credible evidence in the data that the annual improvements in the educational indicators can be traced to increased education aid to LMICs since the signing of the Millennium Declaration.

5.3 Education Aid and Educational Indicators

Research findings were drawn from the results presented in the previous Chapter and were discussed in this section. The capability theory and the notion of accountability in development aid as reviewed in the related literature were most appropriate for this discussion.

The study found that educational outcomes in LMICs have been improving since the Millennium Declaration was signed but contrary to expectations, the results could not strongly confirm that the improvements could be traced to education aid received in the countries since the Millennium Declaration. That is, in most cases, there was no credible evidence in the data that increased education aid to LMICs was linked to improvements in educational access and attainment for the school-age population in the 55 LMICs since the Millennium Declaration was signed. This does not only contravene the key tenets of the capability theory which suggests that the enhancement of human capabilities, via education aid in this sense, should be central to all human endeavours but also shows a disconnect between education aid and its main aim of promoting educational development in LMICs. It was expected that education aid would enhance other educational outcomes in LMICs, apart from primary enrolment, as the main aim of education aid is to drive educational development (Organization for Economic Co-operation and Development, 2022b) and these countries have received substantial education aid since the signing of the Millennium Declaration (see Figure 2.1).

The predictive power of some of the control variables included in the study offered possible explanations for this. Particularly, GDP per capita in LMICs was linked with most of the educational indicators in both the main and robustness check models. This indicated that income per individual is more likely to catalyse educational outcomes in LMICs since the Millennium Declaration than education aid

and government expenditure on education, since both variables were not meaningfully linked with the educational indicators in most cases. This is despite the fact that GDP per capita levels in LMICs have not been particularly robust since the Millennium Declaration (see summary statistics Table 4.1). As such, both aid and government expenditure would be expected to be more strongly linked with improvements in educational outcomes since they both aim to catalyse such improvements. Furthermore, since aid works through government expenditure on education in the causal sense, a strong positive relationship between education aid and government expenditure on education was expected. However, as Table 4.7 showed, there was no positive and significant relationship between both variables.

A plausible explanation for the foregoing results is the low levels of accountability in LMICs since the Millennium Declaration (see summary statistics Table 4.1). The role of robust accountability mechanisms in ensuring the effectiveness of education aid in LMICs and developing countries at large cannot be overemphasised. It is the poor accountability levels across the 55 LMICs that may have resulted in aid being used for other purposes or in other sectors of the countries. Since aid is fungible, it is not unlikely for developing countries to channel development aid to infrastructural development such as rail and road construction, medical infrastructure, military equipment, etc. which the countries consider to have better effects on living standards (Ogbebor et al., 2018). Another possible explanation for the ineffectiveness of education aid is the misappropriation of such aid by officials given low accountability levels and weakened domestic institutions (Heyneman & Lee, 2016; Ogbebor et al., 2018) in LMICs, as demonstrated in the summary statistics Table 4.1.

This line of argument is also supported by the observation that no significant positive linkage exists between both education aid and voice and accountability and most of the educational indicators. It was expected that the educational indicators would be linked with both voice and accountability and education aid considering that in the causal sense, increased educational access and attainment have often been meaningfully linked with increased aid and better institutional quality (Birchler & Michaelowa, 2016; Christensen et al., 2012; Michaelowa & Weber, 2006). This was the case in Table 4.8 where both voice and accountability and education aid had a significant positive relationship with primary school enrolment rate. This model,

with its random effects version, were also the only models, among all other models included in the analysis, where both variables were meaningfully linked (with a positive and significant association) with an educational indicator.

It can then be inferred that education aid moves with accountability – that is, better accountability would enhance the impact of education aid in LMICs. This inference is further supported by the findings in Table A.4 in Appendix A which indicate that the association between education aid and primary school enrolment rate is strengthened when accountability is taken into account. This highlights the importance of accountability in aid processes, as noted in several studies (Easterly, 2006; Hudson & GOVNET, 2009; Michaelowa & Weber, 2006; Organization for Economic Cooperation and Development, 2007; Winters, 2010).

5.4 Implications for Existing Body of Literature

The results of this research provided further support for the body of literature already available on the broad subject of the impact of development aid on human development in developing countries. This study aimed to fill a gap in the body of existing knowledge by utilising quantitative techniques to specifically discern whether education aid has catalysed educational outcomes in LMICs since the Millennium Declaration was signed. The study found that there have been improvements in educational access and attainment in LMICs, but in most cases, there was no credible evidence in the data to trace such improvements to education aid received in the countries since the Millennium Declaration was signed. This result is similar to some of the findings reviewed in the related literature.

More generally, the results are similar to the findings in the studies by Easterly (2002, 2006), Findley et al. (2010), and Ogbebor et al. (2018). The authors found that development aid to developing countries has not contributed to human development due to poor management and utilisation of such aid by aid agencies and domestic institutions and Moyo (2009) and Ramalingam (2013) who, for this reason, recommended the reduction and ultimate discontinuation of aid flows. However, the general findings are different from those of the studies by Birchler and Michaelowa (2016), Christensen et al. (2012), Michaelowa and Weber (2006, 2008),

and Sachs (2005) who found that aid is effective in improving welfare and educational outcomes in developing countries and that doubled ODA flows could end poverty in developing countries (Sachs, 2005).

Specifically, the results on the impact of education aid on educational development in LMICs since the Millennium Declaration was signed leaned towards the findings of Christensen et al. (2010) whose analysis of aid impact on enrolment in less-developed countries from 1975 to 2005 found that education aid has no impact on school enrolments in the countries. They attributed this to the wrong or non-usage of aid in the education sector by the receiving countries. In this research, Christensen et al. (2010) paper was taken further by analysing aid impact on educational outcomes in specifically LMICs within a period when development aid became increasingly focused on human development (2000 to 2019) following the signing of the Millennium Declaration. This research found similar results as Christensen et al. (2010); thus, inclined towards the strand of growing literature on aid ineffectiveness on educational development. The conclusion was drawn using various regression models including pooled OLS, fixed and random effects. However, the research did not recommend the discontinuation of aid flows as it has often been touted by scholars in this camp (Moyo, 2009; Ramalingam, 2013).

5.5 Implications for Policy Making

It is helpful to consider some of the implications of this study's findings for policy-making in LMICs. The risk that educational development will remain shallow and narrow if aid effectiveness is not strengthened in LMICs cannot be downplayed. It is, therefore, important for LMICs to channel education aid towards the improvement of educational access and attainment considering the vast benefit a skilled and literate population can have on economic growth and overall development. How can this be made possible?

The importance of robust accountability mechanisms in both domestic and donor institutions in achieving the utmost effectiveness of education aid in LMICs was established in this study. However, the results of the study revealed that there may be poor accountability mechanisms in aid processes and government spending on education in LMICs. It then follows that the enhancement of aid effectiveness on

educational outcomes in LMICs requires continued efforts towards strengthening accountability mechanisms in both domestic and donor institutions, and a massive injection of ODA thereafter as opposed to the discontinuation of aid flows. Such policy actions are necessary for education aid to reach end users in the respective LMICs.

Therefore, the research reverts to Hudson and GOVNET (2009), Organization for Economic Cooperation and Development (2007), and Winters (2010) by recommending the strengthening of accountability mechanisms in education aid processes through better technical assistance to ensure the effectiveness of education aid for its intended beneficiaries. The massive injection of education aid to LMICs should, thus, follow the improvement in accountability mechanisms. This way, donors, policymakers, and other stakeholders would be ensuring the utmost effectiveness of education aid in the countries. If these issues are not sufficiently addressed, it is likely that accountability will stay low in LMICs and as such, providing aid for education may remain tantamount to throwing money down a rat's hole. Peter Ustinov would argue that "the point of living, and of being an optimist, is to be foolish enough to believe that the best is yet to come" even when little or nothing is changed in the societies that require change (BBC News, 2004).

5.6 Conclusion

This chapter explored the implications of the research results presented in Chapter 4 of this study. The first section of the chapter highlighted the implication of the results for the research questions and research hypothesis outlined in Chapter 1. The chapter then examined why improvements in educational outcomes in LMICs could not be strongly traced to education aid received in the countries, which was mostly attributed to the existence of subpar accountability systems in aid processes. The implications of these findings for the divisive literature on the impact of aid on educational development were then discussed in the chapter. The chapter concluded with a brief discussion of some of the implications of the research findings for policymaking in LMICs.

Chapter 6

Conclusion

6.1 Conclusion

This research sought to ascertain whether, and under what conditions, education aid to LMICs contributes to three measures of educational development: the education index and its component measures which are the mean years of schooling (of adults) and the expected years of schooling (of children). The relationship was measured across 220 observations which represented average change data for 55 LMICs from 2000 to 2019. The study found that in most cases, improvements in educational outcomes could not be strongly linked with increased education aid to LMICs. It was concluded that low levels of accountability in recipient LMICs could have contributed to this uncertain relationship.

This research began by providing a background to the study in Chapter 1. The purpose and significance of the study were discussed in this chapter. The two research questions and the research hypothesis were equally reported in the chapter. The study's limitations were also covered in the first chapter, along with commentary on the relevant ethical issues.

Chapter 2 provided debates, and scholarship on the subject matter of education aid and its impact on educational outcomes, especially as it relates to LMICs. The ensuing debates exposed important dimensions linked to development aid and its effectiveness and ineffectiveness in developing countries. The chapter also presented the theoretical framework guiding this study – the capability theory. The role of mutual accountability in aid processes, as well as trends in education aid flows to LMICs were equally discussed in this chapter. The chapter noted that the existing body of

literature has primarily included the period of structural adjustment in their analysis, a time when aid was primarily aimed at promoting economic growth. The study, therefore, sought to fill this gap by focusing on the link between education aid and educational development in LMICs since the Millennium Declaration (2000 to 2019).

Chapter 3 provided a discussion of the research methodology. The chapter featured information on the pooled OLS, the fixed and random effects regression models that were used to explain the impact of education aid on educational outcomes in LMICs. The third chapter additionally provided details on the research sampling process, the data and data sources used for the research, the regression equation, and the investigation's sample. Chapter 3 also highlighted how the three indicators used in this study to measure educational development were calculated. These three indicators are: the Education Index (EI), the Mean Years of Schooling (MYS), and the Expected Years of Schooling (EYS). This chapter also provided a rationale for expressing the variables in terms of average change and explained how the time lag issues peculiar with panel data were addressed.

Chapter 4 featured a presentation of the research results. The results revealed that in most cases, there was no credible evidence in the data that improvements in educational outcomes in LMICs can be traced to increased education aid to the countries. Specifically, the study found that education aid was not positively and significantly linked with EI and its component MYS and EYS at the 90%, 95% and 99% confidence levels in both the main pooled OLSR models and the fixed and random effects models. GDP per capita on the other hand was found to be a stronger catalyst for educational development in LMICs than aid and government expenditure. The study also found that there was no credible evidence in the data that government spending on education reflects education aid in LMICs. In the robustness check models which measured educational outcomes through non-age-specific net enrolments (primary, secondary, tertiary, and total school enrolment rates), education aid was found to be linked with only primary school enrolment rate. The results suggest that the level of voice and accountability had a significant impact on this relationship. The regression diagnostics revealed that the research models were fit and relevant for prediction.

Chapter 5 discussed the implications of the findings for the research hypothesis, implications for the polarised body of scholarship on the research subject matter and the implications for policymaking in LMICs. Based on the research findings, the research null hypothesis could not be rejected. The research null hypothesis was not rejected mainly because contrary to expectations, there was no credible evidence in the data that education aid has had a positive impact on the specific measures of educational development included in the research's main models. It was also concluded in this chapter that the research findings were similar to the growing body of literature on aid ineffectiveness (Christensen et al., 2010; Easterly, 2002, 2006; Findley et al., 2010; Moyo, 2009; Ogbebor et al., 2018; Ramalingam, 2013). However, the research did not recommend the reduction and ultimate discontinuation of aid as often touted by authors in this camp (Moyo, 2009; Ramalingam, 2013) but emphasised the continued need to strengthen accountability mechanisms in educational aid processes in LMICs to ensure the effectiveness of education aid. It was noted that big push solutions, like the one advocated by Sachs (2005), will only result in further resource mismanagement if such accountability mechanisms remain brittle.

In sum, the research also laid much emphasis on the capability theory which endorses the importance of educational development towards achieving sustainable development. This is of particular importance for LMICs since educational development remains brittle in the countries despite increased education aid since the Millennium Declaration was signed. It is with this in mind that this research, in a broader sense, set out to determine whether the contemporary neoliberal aid regime works for countries in this group or the alternative worldview presented by dependency analyses which proposes the discontinuation of development aid. While the latter may find support in this study, the research did not recommend the discontinuation of educational aid flows to LMICs but rather emphasised the importance of robust accountability mechanisms in aid processes.

6.2 Suggestions for Future Studies

This report concludes with several suggestions for future research which seek to better understand whether, and under what conditions, education aid impacts educational outcomes in LMICs. At the basic level, future research can analyse the

impact of education aid on educational outcomes using other educational indicators, particularly ones that are not focused on educational access and attainment. This, as already noted, is considering that donors have often emphasised the multidimensionality of their educational objectives (Dreher et al., 2008). This would also help researchers get a broader understanding of how education aid impacts educational outcomes in LMICs when measured through other educational dimensions. Subject to data availability, such research could make use of indicators such as those measuring research output, improvements in educational infrastructure, literacy rates, teacher/staff training, staff compensation, educational equality, and technological skills acquisition.

This study found limited evidence of a positive relationship between education aid and educational outcomes in LMICs, likely due to the limited time series. To more accurately assess this relationship, future research should consider a longer time series. This study examined the relationship between education aid and educational outcomes considering the increased focus on human development since the signing of the Millennium Declaration in the year 2000. A future study might extend the time series prior to the Millennium Declaration and use the same educational aid, educational indicators, and control variables data sources used in this study to ascertain whether the findings differ from those obtained in this study. The unavailability of aggregated and disaggregated education aid data on the OECD's Creditor Reporting System before 2002 may account for some of the limitations of such a study. To get around this issue, the World Bank's WDI may be used to source aggregate ODA data that predates 2002.

For future research which utilises panel data similar to the one used in this study, it would also be helpful to ascertain whether the results which were obtained in this research on the relationship between education aid and educational outcomes since the Millennium Declaration holds in other income groups or other parts of the world. Particularly, it would be useful to discern whether the research finding that in most cases, there was no credible evidence in the data that education aid has catalysed educational outcomes in LMICs since the Millennium Declaration was signed would also be the case in other income groups by the World Bank such as the high-income, upper-middle-income, and low-income countries. The results from these various groups could be compared to, for example, discern which grouping

education aid is more likely to be effective and why. This research could assist with how future research would approach such an investigation since the data sources used are public and the methods used are replicable.

Appendix A

Additional Regression Models

This section presents the results of several models: a single cross-sectional model, fixed and random effects models for robustness checks, primary school enrolment rate with the variable "voice & accountability" excluded, and varying intercepts models by year. These models were included to compare their results with the main findings of the study.

A.1 Pooled OLS Regression of Single, Cross-Sectional Model

The pooled OLS regression results for the cross-sectional model in this subsection confirms the conclusions that increased education aid is not typically associated with improved educational outcomes in LMICs since the Millennium Declaration and that GDP per capita is more strongly linked with educational outcomes than education aid and government expenditure. This model also helps to rule out the possibility that the educational indicators in the previous models were too fine-grained to pick up slow-moving patterns of change.

TABLE A.1: Summary of Pooled OLS Regression of Single, Cross-Sectional Model[a]

	Dependent variable:		
	EI	MYS	EYS
	(1)	(2)	(3)
Education Aid Per Capita (log)	−0.025	−0.638	−0.138
	(0.035)	(0.664)	(0.609)
Voice & Accountability	0.034	0.191	1.036
	(0.039)	(0.736)	(0.675)
Government Expenditure (% of GDP)	0.009	0.155	0.134
	(0.014)	(0.259)	(0.238)
GDP per capita (log)	0.188***	3.117***	2.990***
	(0.049)	(0.924)	(0.848)
Trade (log)	−0.047	−1.132	−0.323
	(0.072)	(1.358)	(1.246)
Population (log)	−0.0004	−0.159	0.197
	(0.025)	(0.473)	(0.434)
Constant	−1.187*	−15.613	−24.124**
	(0.680)	(12.825)	(11.766)
Observations	50	50	50
R^2	0.283	0.226	0.287
Adjusted R^2	0.183	0.118	0.187
Residual Std. Error	0.167	3.153	2.892
F Statistic	2.831**	2.089*	2.883**

Note: *p<0.1; **p<0.05; ***p<0.01

[a] The model is cross-sectional, with the educational indicators in average change and education aid, along with other predictors, in average level. This was done since the study aims to determine whether receiving more aid leads to positive change in educational outcomes and to improve the model's linearity.

A.2 Fixed and Random Effects Results for Robustness Check Models

The models included in this subsection are the fixed and random effects results for the robustness check models. With these results, we can be even more confident that in most cases, there is no credible evidence in the data that increased education aid is associated with improved educational outcomes in LMICs since the Millennium Declaration. However, education aid was positively and significantly linked with primary school enrolment rate in the random effects model but not the fixed effects one.

TABLE A.2: Summary of Fixed Effects: Robustness Check[a]

	Dependent variable (measured in net enrolment rate):			
	Total	Primary	Secondary	Tertiary
	(1)	(2)	(3)	(4)
Education Aid (per capita)	−0.383	0.137	1.188	2.747
	(0.371)	(0.300)	(0.864)	(2.756)
Voice & Accountability	0.152	8.845	−5.697	22.977
	(6.212)	(6.129)	(14.708)	(45.564)
Government Expenditure (% of GDP)	−0.438	−1.688	−6.036*	−12.139
	(1.532)	(1.296)	(3.383)	(10.645)
GDP per capita	0.153	0.172	−0.614	1.034
	(0.204)	(0.164)	(0.385)	(1.100)
Trade (% of GDP)	0.028	0.026	−0.135	0.201
	(0.070)	(0.058)	(0.142)	(0.462)
Population	1.717	1.550	−1.514	4.787
	(1.098)	(1.092)	(2.559)	(7.901)
Observations	64	101	80	85
R^2	0.775	0.636	0.807	0.683
Adjusted R^2	0.399	0.265	0.517	0.309
Residual Std. Error	6.440	8.327	16.908	54.644
F Statistic	2.064**	1.713**	2.785***	1.825**

Note: *p<0.1; **p<0.05; ***p<0.01

[a] This model and its random effects version below include control variables for country and initial conditions in GDP per capita, government expenditure, and population, but these were omitted to highlight the more important variables. All variables in both models are in average change.

TABLE A.3: Summary of Random Effects: Robustness Check

	Dependent variable (measured in net enrolment rate):			
	Total	Primary	Secondary	Tertiary
	(1)	(2)	(3)	(4)
Education Aid (per capita)	−0.002	0.394**	0.526	−1.831
	(0.223)	(0.199)	(0.554)	(1.397)
Voice & Accountability	5.204	11.109***	6.604	−1.140
	(4.452)	(4.287)	(11.052)	(27.691)
Government Expenditure (% of GDP)	−0.387	−1.158	−2.319	−11.292
	(1.117)	(0.969)	(2.851)	(6.967)
GDP per capita	0.110	0.042	0.062	0.743
	(0.103)	(0.093)	(0.243)	(0.551)
Trade (% of GDP)	0.007	0.005	−0.025	0.074
	(0.056)	(0.039)	(0.098)	(0.252)
Population	0.927***	0.682***	1.623***	2.521*
	(0.263)	(0.225)	(0.611)	(1.401)
Constant	−10.710***	−10.873***	−6.343	−6.709
	(3.166)	(3.096)	(7.884)	(18.615)
Observations	64	101	80	85
Log Likelihood	−209.654	−351.799	−335.247	−426.557
Akaike Inf. Crit.	445.308	729.599	696.494	879.114
Bayesian Inf. Crit.	473.373	763.595	727.461	910.869

Note: *p<0.1; **p<0.05; ***p<0.01

A.3 Predicting Primary School Enrolment Rate without Voice & Accountability

The pooled OLS and random effects models for predicting primary school enrolment rate without the Voice & Accountability control variable were reported in this subsection. These were included to determine the impact of education aid on primary school enrolment rate when accountability is unaccounted for. Overall, the removal of the accountability control variable weakened the coefficient and predictive power of education aid on primary school enrolment rate, suggesting that the control of accountability significantly boosts aid impact on primary school enrolment rate.

TABLE A.4: Primary School Enrolment Rate: Pooled OLS and Random Effects Models with Voice & Accountability excluded[a]

	Dependent variable:	
	Net Primary School Enrolment Rate	
	(1)	(2)
Education Aid (per capita)	0.363*	0.337*
	(0.203)	(0.204)
Government Expenditure (% of GDP)	−0.861	−0.949
	(1.002)	(0.994)
GDP per capita	0.038	0.041
	(0.094)	(0.096)
Trade (% of GDP)	0.023	0.025
	(0.040)	(0.039)
Population	0.609***	0.622***
	(0.223)	(0.232)
Constant	−9.019***	−9.204***
	(3.038)	(3.140)
Observations	101	101
R^2	0.267	
Adjusted R^2	0.195	
Log Likelihood		−357.432
Akaike Inf. Crit.		738.864
Bayesian Inf. Crit.		770.245
Residual Std. Error	8.673	
F Statistic	3.692***	

Note: *p<0.1; **p<0.05; ***p<0.01

[a] The models include control variables for initial conditions in GDP per capita, government expenditure, and population, but these were excluded to emphasise the more crucial variables. All variables are in average change.

A.4 Varying Intercepts by Year Models

In this subsection, the intercepts were varied by year (instead of country) to see how the results differ from the main results. The results for this model were consistent with the main results that education aid is not positively and significantly associated with educational outcomes when measured through the age-specific educational indicators (EI, EYS, and MYS).

TABLE A.5: Summary of Random Effects: Varying Intercepts by Year[a]

	Dependent variable:		
	EI	EYS	MYS
	(1)	(2)	(3)
Education Aid (per capita)	−0.084	−0.063	−0.088
	(0.089)	(0.110)	(0.144)
Voice & Accountability	1.613	1.646	4.237
	(2.310)	(2.864)	(3.762)
Government Expenditure (% of GDP)	−0.362	−0.590	0.054
	(0.544)	(0.682)	(0.885)
GDP per capita	0.073	0.094	0.090
	(0.048)	(0.060)	(0.077)
Trade (% of GDP)	0.007	0.001	−0.004
	(0.021)	(0.027)	(0.035)
Population	0.256**	0.421***	−0.027
	(0.119)	(0.149)	(0.193)
Constant	3.728	1.041	7.693***
	(2.573)	(3.118)	(2.612)
Observations	117	119	117
Log Likelihood	−352.406	−383.161	−403.040
Akaike Inf. Crit.	730.812	792.321	832.081
Bayesian Inf. Crit.	766.720	828.450	867.989

Note: *p<0.1; **p<0.05; ***p<0.01

[a] The model and its fixed effects version below include control variables for year and initial conditions in GDP per capita, government expenditure, and population but these were excluded from the tables. All variables in both models are in average change.

TABLE A.6: Summary of Fixed Effects: Varying Intercepts by Year

	Dependent variable:		
	EI	EYS	MYS
	(1)	(2)	(3)
Education Aid (per capita)	−0.086	−0.067	−0.101
	(0.089)	(0.111)	(0.145)
Voice & Accountability	1.637	1.680	4.359
	(2.310)	(2.864)	(3.764)
Government Expenditure (% of GDP)	−0.356	−0.581	0.088
	(0.544)	(0.682)	(0.886)
GDP per capita	0.072	0.092	0.082
	(0.048)	(0.060)	(0.077)
Trade (% of GDP)	0.006	0.001	−0.006
	(0.021)	(0.027)	(0.035)
Population	0.254**	0.418***	−0.037
	(0.119)	(0.149)	(0.193)
Observations	117	119	117
R^2	0.785	0.709	0.648
Adjusted R^2	0.761	0.676	0.608
Residual Std. Error	4.832	6.063	7.874
F Statistic	31.996***	21.729***	16.097***
Note:			*p<0.1; **p<0.05; ***p<0.01

Appendix B

Additional Regression Diagnostics

In this part, the regression diagnostics for the pooled OLSR versions of MYS and EYS were presented. The plots look healthy as there were no severe deviations from equal variance in the regression residuals.

B.1 Regression Diagnostics: Mean Years of Schooling (MYS)

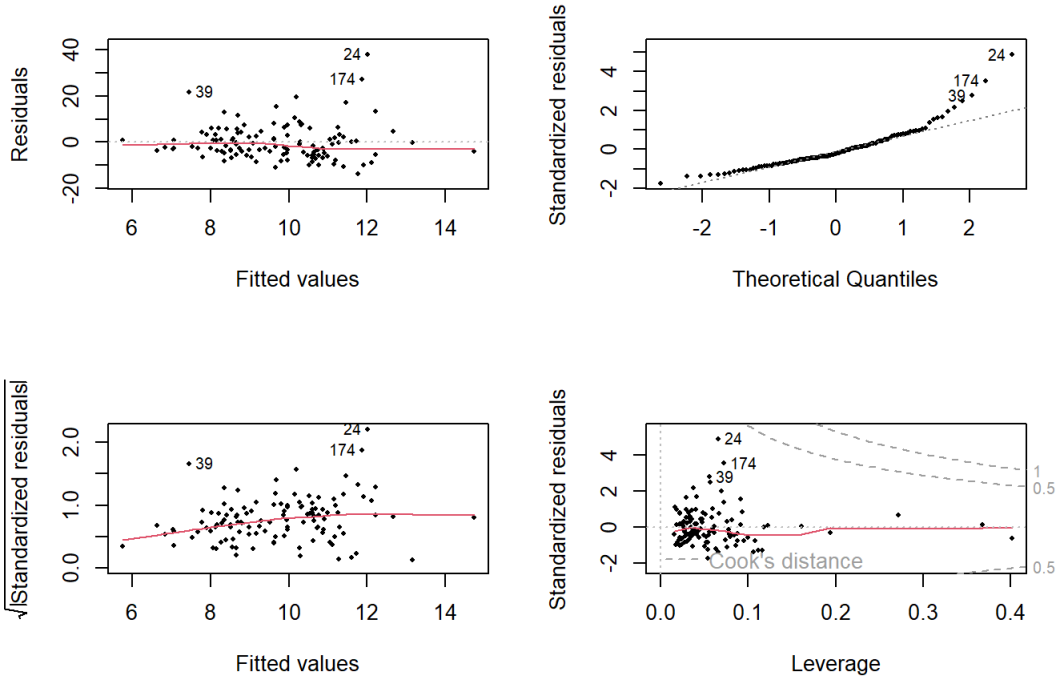


FIGURE B.1: Residual Plots: MYS

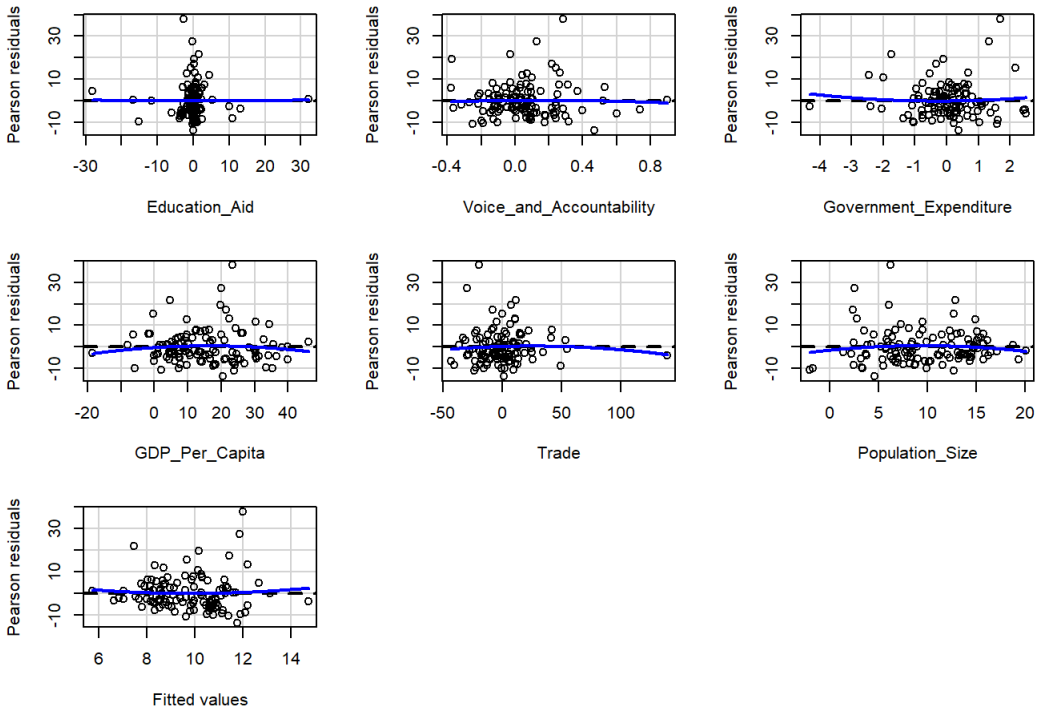


FIGURE B.2: Pearson Residual Plots: MYS

B.2 Regression Diagnostics: Expected Years of Schooling (EYS)

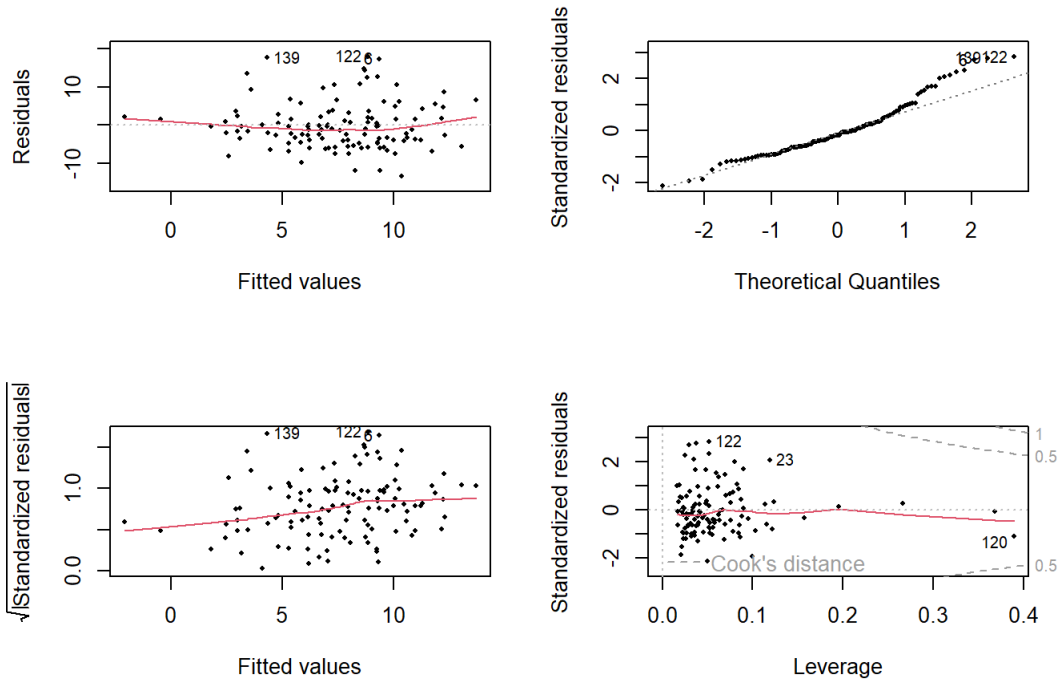


FIGURE B.3: Residual Plots: EYS

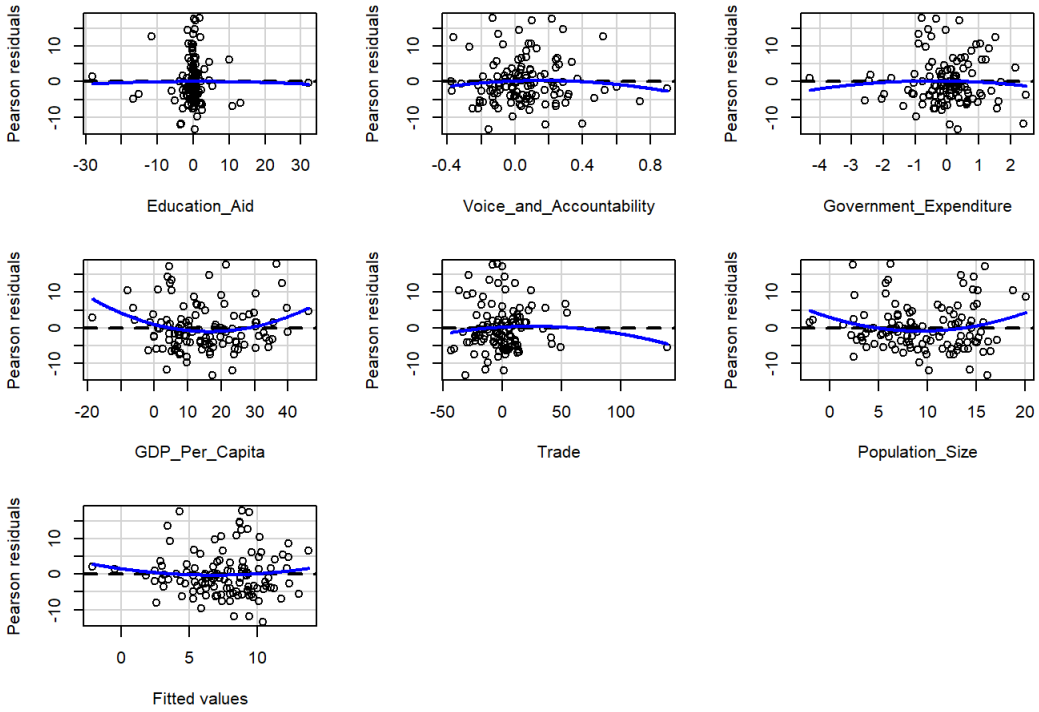


FIGURE B.4: Pearson Residual Plots: EYS

Appendix C

Trends in Educational Indicators for each Sample Country

In this part, the educational indicators were plotted over time for each country included in the sample. The plots reveal clear trends over time within countries.

C.1 Trends in Mean Years of Schooling

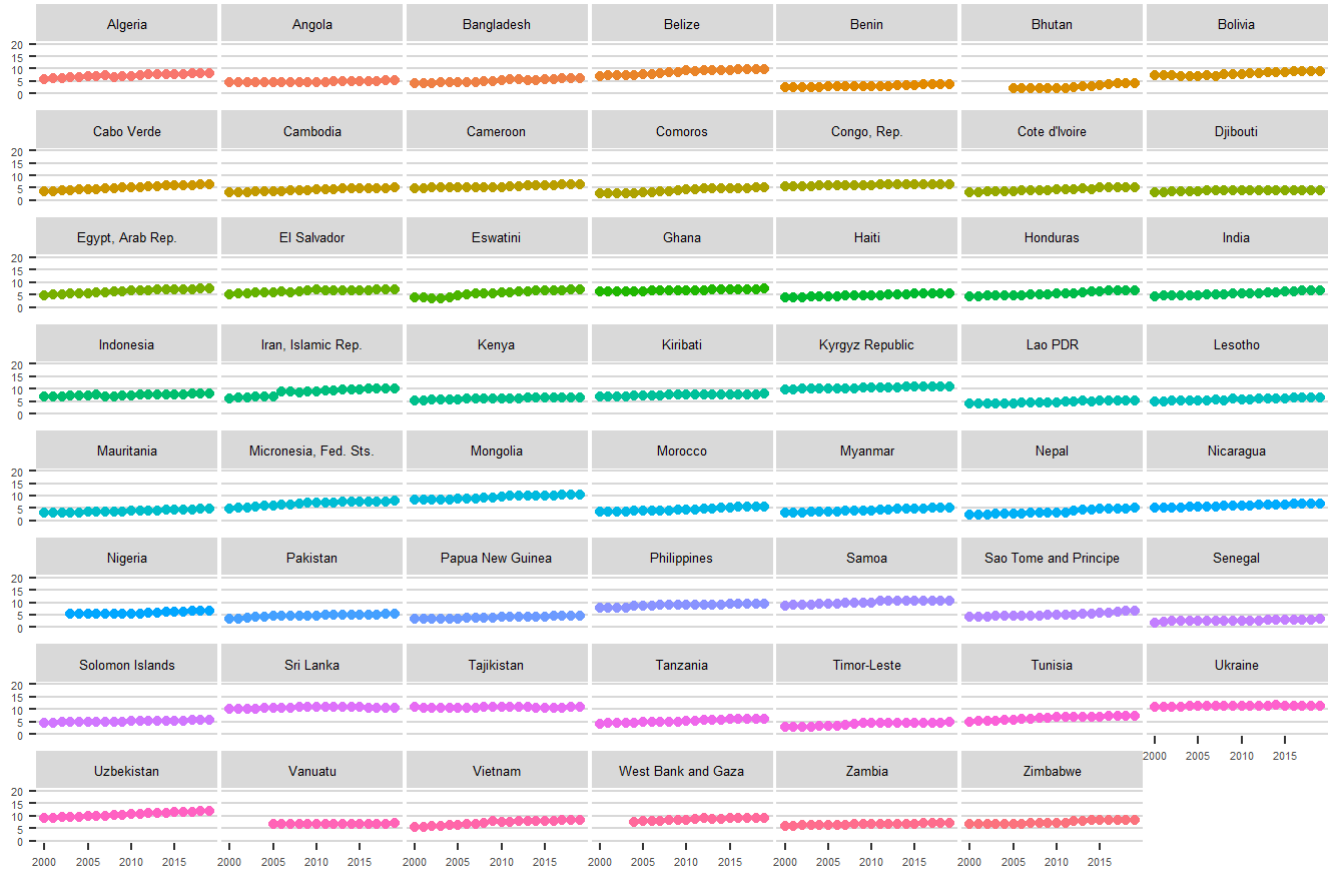


FIGURE C.1: Trend Plot: MYS

C.2 Trends in Expected Years of Schooling

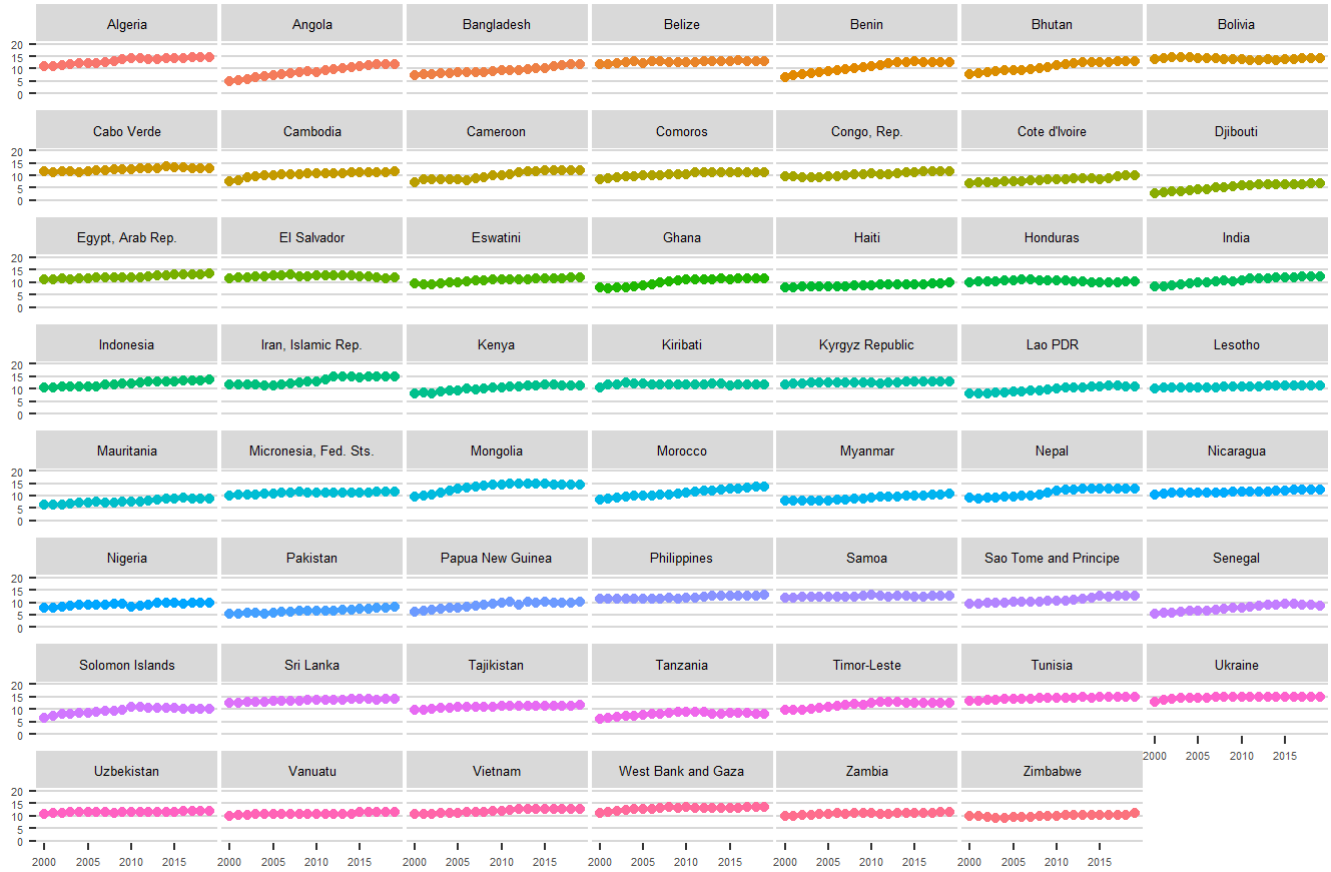


FIGURE C.2: Trend Plot: EYS

C.3 Trends in the Education Index

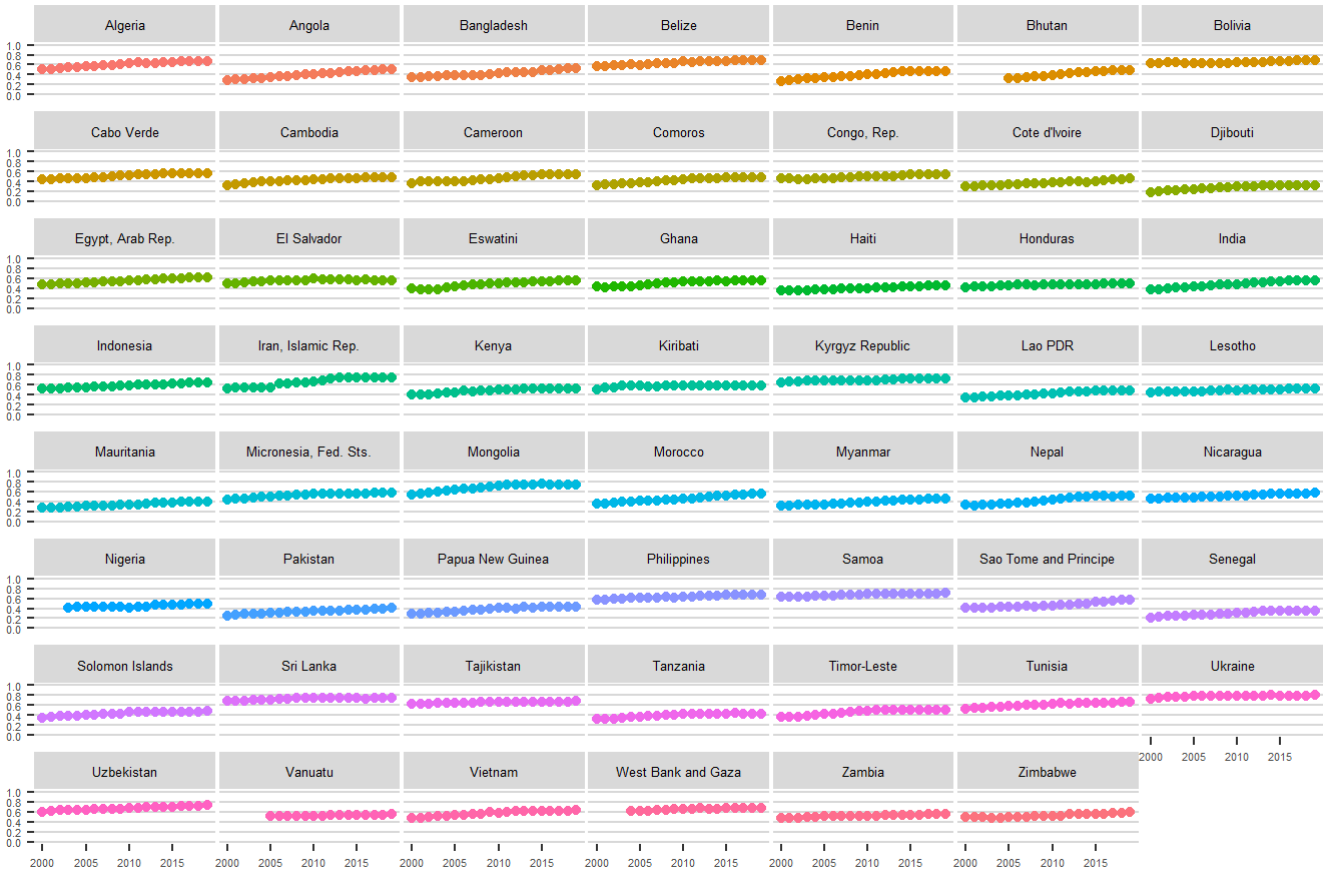


FIGURE C.3: Trend Plot: EI

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